

MILITARY SPECIFICATION  
MICROCIRCUITS, LINEAR, ADJUSTABLE, POSITIVE, VOLTAGE REGULATORS, MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

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| Reactivated for new design as of 10 February 2004. May be used for either new or existing design acquisition. |
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The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF-38535

## 1. SCOPE

1.1 Scope. This specification covers the detail requirements for three and four terminal monolithic silicon, adjustable, positive, voltage regulators. Two product assurance classes and a choice of case outlines and lead finish are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.4).

1.2 Part or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are as shown in the following:

| <u>Device type</u> | <u>Circuit</u>                                                                | <u>Case outline letter</u> |
|--------------------|-------------------------------------------------------------------------------|----------------------------|
| 01                 | 4-terminal voltage regulator,<br>5 volts $\leq V_O \leq$ 30 volts at 0.5 A    | X                          |
| 02                 | 4-terminal voltage regulator,<br>5 volts $\leq V_O \leq$ 30 volts at 1.5 A    | Y                          |
| 03                 | 3-terminal voltage regulator,<br>1.25 volts $\leq V_O \leq$ 37 volts at 0.5 A | X                          |
| 04                 | 3-terminal voltage regulator,<br>1.25 volts $\leq V_O \leq$ 37 volts at 1.5 A | Y                          |
| 05                 | 3-terminal voltage regulator,<br>1.25 volts $\leq V_O \leq$ 37 volts at 3.0 A | Y                          |
| 06                 | 3-terminal voltage regulator,<br>1.25 volts $\leq V_O \leq$ 37 volts at 5.0 A | Y                          |

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, 3990 East Broad St., Columbus, OH 43218-3990, or emailed to <a href="mailto:linear@dsc.dla.mil">linear@dsc.dla.mil</a> . Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <a href="http://assist.daps.dla.mil">http://assist.daps.dla.mil</a> . |
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1.2.3 Case outlines. The case outlines are as designated in MIL-STD-1835 and as follows:

| <u>Outline letter</u> | <u>Descriptive designator</u> | <u>Terminals</u> | <u>Device types</u> | <u>Package style</u> |
|-----------------------|-------------------------------|------------------|---------------------|----------------------|
| X                     | See figure 1                  | 4                | 01                  | Can                  |
| Y                     | See figure 2                  | 4                | 02                  | Flange mount         |
| X                     | See figure 3                  | 3                | 03                  | Can                  |
| Y                     | See figure 4                  | 2                | 04,05,06            | Flange mount         |

### 1.3 Absolute maximum ratings.

|                                                                     |                  |
|---------------------------------------------------------------------|------------------|
| Input voltage (device types 01 and 02) .....                        | 40 V             |
| Input-output differential voltage<br>(device types 03 and 04) ..... | 40 V             |
| (device types 05 and 06) .....                                      | 35 V             |
| Lead temperature (soldering, 60 seconds) .....                      | +300°C           |
| Junction temperature ( $T_J$ ) .....                                | +150°C <u>1/</u> |
| Storage temperature range .....                                     | -65°C to +150°C  |

### 1.4 Recommended operating conditions.

|                                                     |                         |
|-----------------------------------------------------|-------------------------|
| Input voltage range:                                |                         |
| Device types 01 and 02 .....                        | 8 V dc to 38 V dc       |
| Device types 03 and 04 .....                        | 4.25 V dc to 41.25 V dc |
| Device types 05 and 06 .....                        | 4.25 V dc to 36.25 V dc |
| Ambient operating temperature range ( $T_A$ ) ..... | -55°C to +125°C         |

### 1.5 Power and thermal characteristics.

| $T_A = T_S$     | Case | Max $\theta_{JA}$ | Maximum $P_D$ without<br>heat sink | Max $\theta_{JC}$ | Maximum $P_D$ with<br>heat sink | Max $\theta_{C-S}$ <u>2/</u> |
|-----------------|------|-------------------|------------------------------------|-------------------|---------------------------------|------------------------------|
| 125°C <u>3/</u> | X    | 140°C/W           | 0.18 W                             | 40°C/W            | 0.5 W                           | 10°C/W                       |
|                 | Y    | 35°C/W            | 0.71 W                             | 4°C/W <u>4/</u>   | 5.6 W <u>5/</u>                 | 0.5°C/W                      |
| 25°C <u>3/</u>  | X    | 140°C/W           | 0.89 W                             | 40°C/W            | 2.50 W                          | 10°C/W                       |
|                 | Y    | 35°C/W            | 3.60 W                             | 4°C/W <u>4/</u>   | 28.00 W <u>6/</u>               | 0.5°C/W                      |
| -55°C <u>3/</u> | X    | 140°C/W           | 1.50 W                             | 40°C/W            | 4.00 W                          | 10°C/W                       |
|                 | Y    | 35°C/W            | 5.80 W                             | 4°C/W <u>4/</u>   | 45.00 W <u>6/</u>               | 0.5°C/W                      |

1/ The device is protected by a thermal shutdown circuit which is designed to turn off the output transistor whenever the device junction temperature is in excess of 150°C.

2/ This value represents the maximum allowable thermal impedance of a heat sink to remain within the thermal ratings.

3/ Based on  $T_J = 150^\circ\text{C}$  and specified values of  $\theta_{JA}$  and  $\theta_{JC}$ .

4/ Maximum  $\theta_{JC}$  at all temperatures (for case Y only) = 1.5°C/W for device type 05 and 1.0°C/W for device type 06.

5/ Power dissipation ( $P_D$ ) at 125°C (for case Y only) = 12.5 W for device type 05 and 16.6 W for device type 06.

6/ Power dissipation ( $P_D$ ) at -55°C and +25°C (for case Y only) = 30 W for device type 05 and 50 W for device type 06.

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

#### DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.

MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.3).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Block diagram and terminal connections. The block diagrams and terminal connections shall be as specified on figures 5 through 8.

3.3.2 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity (DSCC-VA) upon request.

3.3.3 Case outlines. The case outlines shall be as specified in 1.2.3 and on figures 1, 2, 3, and 4.

3.4 Lead material and finish. Lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full operating ambient temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

3.5.1 Stability. If the device is located an appreciable distance from the power supply filter, a solid tantalum bypass capacitor should be connected as close to the device  $V_{CC}$  input as possible to suppress oscillation. A solid tantalum bypass capacitor is recommended on the device output. Since load currents of less than 5 milliamperes may result in a loss of voltage regulation, regulators should be preloaded with 5 milliamperes of load current in lightly loaded applications. In applications where fast rising high current pulses are present, additional output capacitance of 20  $\mu\text{F}$  or more shall be used.

3.5.2 Test limit. The test limits specified in tables I and III apply only for the stated test conditions (example, 2 percent duty cycle), which essentially keep the junction temperature constant. In most applications the junction temperature will greatly exceed the  $25^{\circ}\text{C}$  ambient or sink temperature; thus devices may not perform within the  $25^{\circ}\text{C}$  specified limits.

3.6 Electrical test requirements. Electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 52 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

| Test                                                   | Symbol                      | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                  | Device type | Limits |       | Unit |
|--------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------|--------|-------|------|
|                                                        |                             |                                                                                                                  |                                  |             | Min    | Max   |      |
|                                                        |                             | Input voltage                                                                                                    | Load current                     |             |        |       |      |
| Output voltage                                         | V <sub>OUT</sub>            | V <sub>IN</sub> = 8 V                                                                                            | I <sub>L</sub> = -5 mA, -500 mA  | 01          | 4.75   | 5.25  | V    |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                           | I <sub>L</sub> = -5 mA, -50 mA   |             | 4.75   | 5.25  |      |
|                                                        |                             | V <sub>IN</sub> = 38 V                                                                                           | I <sub>L</sub> = -500 mA         |             | 28.5   | 31.5  |      |
|                                                        |                             | V <sub>IN</sub> = 10 V,<br>T <sub>A</sub> = 150°C                                                                | I <sub>L</sub> = -5 mA           |             | 4.75   | 5.25  |      |
| Line regulation                                        | V <sub>RLINE</sub>          | 8 V ≤ V <sub>IN</sub> ≤ 30 V                                                                                     | I <sub>L</sub> = -50 mA          | 01          | -150   | 150   | mV   |
|                                                        |                             | 8 V ≤ V <sub>IN</sub> ≤ 25 V                                                                                     | I <sub>L</sub> = -350 mA         |             | -50    | 50    |      |
| Load regulation                                        | V <sub>RLOAD</sub>          | V <sub>IN</sub> = 10 V                                                                                           | -500 mA ≤ I <sub>L</sub> ≤ -5 mA | 01          | -100   | 100   | mV   |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                           | -50 mA ≤ I <sub>L</sub> ≤ -5 mA  |             | -150   | 150   |      |
| Thermal regulation                                     | V <sub>RTH</sub>            | V <sub>IN</sub> = 15 V,<br>T <sub>A</sub> = 25°C                                                                 | I <sub>L</sub> = -500 mA         | 01          | -50    | 50    | mV   |
| Standby current drain                                  | I <sub>SCD</sub>            | V <sub>IN</sub> = 10 V                                                                                           | I <sub>L</sub> = -5 mA           | 01          | -7.0   | -0.5  | mA   |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                           | I <sub>L</sub> = -5 mA           |             | -8.0   | -0.5  |      |
| Standby current drain<br>change versus line<br>voltage | ΔI <sub>SCD</sub><br>(LINE) | 8 V ≤ V <sub>IN</sub> ≤ 30 V                                                                                     | I <sub>L</sub> = -5 mA           | 01          | -1.0   | 1.0   | mA   |
| Standby current drain<br>change versus load<br>current | ΔI <sub>SCD</sub><br>(LOAD) | V <sub>IN</sub> = 10 V                                                                                           | -500 mA ≤ I <sub>L</sub> ≤ -5 mA | 01          | -0.5   | 0.5   | mA   |
| Control pin current                                    | I <sub>CTL</sub>            | V <sub>IN</sub> = 10 V,<br>T <sub>A</sub> = 25°C                                                                 | I <sub>L</sub> = -350 mA         | 01          | -5.0   | -0.01 | μA   |
|                                                        |                             | V <sub>IN</sub> = 10 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                        | I <sub>L</sub> = -350 mA         |             | -8.0   | -0.01 |      |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                       | Symbol                               | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                                                          | Device type | Limits |       | Unit  |
|------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------|--------|-------|-------|
|                                                            |                                      |                                                                                                                  |                                                                          |             | Min    | Max   |       |
|                                                            |                                      | Input voltage                                                                                                    | Load current                                                             |             |        |       |       |
| Output short circuit current                               | I <sub>OS1</sub>                     | V <sub>IN</sub> = 10 V                                                                                           |                                                                          | 01          | -2.0   | -0.50 | A     |
|                                                            | I <sub>OS2</sub>                     | V <sub>IN</sub> = 30 V                                                                                           |                                                                          |             | -1.0   | -0.01 |       |
| Output voltage recovery after output short circuit current | V <sub>OUT</sub> (RECOV)             | V <sub>IN</sub> = 10 V, <u>3/</u> after I <sub>OS1</sub>                                                         | R <sub>L</sub> = 10 Ω, C <sub>L</sub> = 20 μF                            | 01          | 4.75   | 5.25  | V     |
|                                                            |                                      | V <sub>IN</sub> = 30 V, <u>3/</u> after I <sub>OS2</sub>                                                         | R <sub>L</sub> = 1 kΩ                                                    |             | 4.75   | 5.25  |       |
| Voltage start-up                                           | V <sub>START</sub>                   | V <sub>IN</sub> = 8 V                                                                                            | R <sub>L</sub> = 10 Ω, C <sub>L</sub> = 20 μF                            | 01          | 4.75   | 5.25  | V     |
| Ripple rejection                                           | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | V <sub>IN</sub> = 10 V, <u>4/</u> e <sub>i</sub> = 1 Vrms, at f = 2400 Hz                                        | I <sub>L</sub> = -125 mA, T <sub>A</sub> = 25°C, see figure 11           | 01          | 45     |       | dB    |
| Output noise voltage                                       | V <sub>NO</sub>                      | V <sub>IN</sub> = 10 V, <u>4/</u> see figure 12                                                                  | I <sub>L</sub> = -50 mA, T <sub>A</sub> = 25°C                           | 01          |        | 125   | μVrms |
| Line transient response                                    | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | V <sub>IN</sub> = 10 V, <u>5/</u> ΔV <sub>IN</sub> = 3.0 V, see figure 13                                        | I <sub>L</sub> = -5 mA, T <sub>A</sub> = 25°C                            | 01          |        | 30    | mV/V  |
| Load transient response                                    | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | V <sub>IN</sub> = 10 V, <u>5/</u> see figure 14                                                                  | I <sub>L</sub> = -50 mA, ΔI <sub>L</sub> = -200 mA T <sub>A</sub> = 25°C | 01          |        | 2.5   | mV/mA |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                   | Symbol                      | Conditions <u>1/</u> <u>2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                  | Device type | Limits |       | Unit |
|--------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------|--------|-------|------|
|                                                        |                             |                                                                                                                         |                                  |             | Min    | Max   |      |
|                                                        |                             | Input voltage                                                                                                           | Load current                     |             |        |       |      |
| Output voltage                                         | V <sub>OUT</sub>            | V <sub>IN</sub> = 8 V                                                                                                   | I <sub>L</sub> = -5 mA, -1 A     | 02          | 4.75   | 5.25  | V    |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                                  | I <sub>L</sub> = -5 mA, -100 mA  |             | 4.75   | 5.25  |      |
|                                                        |                             | V <sub>IN</sub> = 38 V                                                                                                  | I <sub>L</sub> = -1 A            |             | 28.5   | 31.5  |      |
|                                                        |                             | V <sub>IN</sub> = 10 V,<br>T <sub>A</sub> = 150°C                                                                       | I <sub>L</sub> = -5 mA           |             | 4.75   | 5.25  |      |
| Line regulation                                        | V <sub>RLINE</sub>          | 8 V ≤ V <sub>IN</sub> ≤ 30 V                                                                                            | I <sub>L</sub> = -100 mA         | 02          | -150   | 150   | mV   |
|                                                        |                             | 8 V ≤ V <sub>IN</sub> ≤ 25 V                                                                                            | I <sub>L</sub> = -500 mA         |             | -50    | 50    |      |
| Load regulation                                        | V <sub>RLOAD</sub>          | V <sub>IN</sub> = 10 V                                                                                                  | -1 A ≤ I <sub>L</sub> ≤ -5 mA    | 02          | -100   | 100   | mV   |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                                  | -100 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -150   | 150   |      |
| Thermal regulation                                     | V <sub>RTH</sub>            | V <sub>IN</sub> = 15 V,<br>T <sub>A</sub> = 25°C                                                                        | I <sub>L</sub> = -1 A            | 02          | -50    | 50    | mV   |
| Standby current drain                                  | I <sub>SCD</sub>            | V <sub>IN</sub> = 10 V                                                                                                  | I <sub>L</sub> = -5 mA           | 02          | -7.0   | -0.5  | mA   |
|                                                        |                             | V <sub>IN</sub> = 30 V                                                                                                  | I <sub>L</sub> = -5 mA           |             | -8.0   | -0.5  |      |
| Standby current drain<br>change versus line<br>voltage | ΔI <sub>SCD</sub><br>(LINE) | 8 V ≤ V <sub>IN</sub> ≤ 30 V                                                                                            | I <sub>L</sub> = -5 mA           | 02          | -1.0   | 1.0   | mA   |
| Standby current drain<br>change versus load<br>current | ΔI <sub>SCD</sub><br>(LOAD) | V <sub>IN</sub> = 10 V                                                                                                  | -1 A ≤ I <sub>L</sub> ≤ -5 mA    | 02          | -0.5   | 0.5   | mA   |
| Control pin current                                    | I <sub>CTL</sub>            | V <sub>IN</sub> = 10 V,<br>T <sub>A</sub> = 25°C                                                                        | I <sub>L</sub> = -500 mA         | 02          | -5.0   | -0.01 | μA   |
|                                                        |                             | V <sub>IN</sub> = 10 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                               | I <sub>L</sub> = -500 mA         |             | -8.0   | -0.01 |      |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                       | Symbol                               | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                                                           | Device type | Limits |       | Unit  |
|------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------|--------|-------|-------|
|                                                            |                                      |                                                                                                                  |                                                                           |             | Min    | Max   |       |
|                                                            |                                      | Input voltage                                                                                                    | Load current                                                              |             |        |       |       |
| Output short circuit current                               | I <sub>OS1</sub>                     | V <sub>IN</sub> = 10 V                                                                                           |                                                                           | 02          | -4.0   | -1.00 | A     |
|                                                            | I <sub>OS2</sub>                     | V <sub>IN</sub> = 30 V                                                                                           |                                                                           |             | -2.0   | -0.02 |       |
| Output voltage recovery after output short circuit current | V <sub>OUT</sub> (RECOV)             | V <sub>IN</sub> = 10 V, <u>3/</u> after I <sub>OS1</sub>                                                         | R <sub>L</sub> = 5 Ω, C <sub>L</sub> = 20 μF                              | 02          | 4.75   | 5.25  | V     |
|                                                            |                                      | V <sub>IN</sub> = 30 V, <u>3/</u> after I <sub>OS2</sub>                                                         | R <sub>L</sub> = 5 kΩ                                                     |             | 4.75   | 5.25  |       |
| Voltage start-up                                           | V <sub>START</sub>                   | V <sub>IN</sub> = 8 V                                                                                            | R <sub>L</sub> = 5 Ω, C <sub>L</sub> = 20 μF                              | 02          | 4.75   | 5.25  | V     |
| Ripple rejection                                           | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | V <sub>IN</sub> = 10 V, <u>4/</u> e <sub>i</sub> = 1 Vrms, at f = 2400 Hz                                        | I <sub>L</sub> = -350 mA, T <sub>A</sub> = 25°C, see figure 11            | 02          | 45     |       | dB    |
| Output noise voltage                                       | V <sub>NO</sub>                      | V <sub>IN</sub> = 10 V, <u>4/</u> see figure 12                                                                  | I <sub>L</sub> = -100 mA, T <sub>A</sub> = 25°C                           | 02          |        | 250   | μVrms |
| Line transient response                                    | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | V <sub>IN</sub> = 10 V, <u>5/</u> ΔV <sub>IN</sub> = 3.0 V, see figure 13                                        | I <sub>L</sub> = -5 mA, T <sub>A</sub> = 25°C                             | 02          |        | 30    | mV/V  |
| Load transient response                                    | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | V <sub>IN</sub> = 10 V, <u>5/</u> see figure 14                                                                  | I <sub>L</sub> = -100 mA, ΔI <sub>L</sub> = -400 mA T <sub>A</sub> = 25°C | 02          |        | 2.5   | mV/mA |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                | Symbol                      | Conditions <u>1/</u> <u>2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                  | Device type | Limits |      | Unit |
|-----------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------|--------|------|------|
|                                                     |                             |                                                                                                                         |                                  |             | Min    | Max  |      |
|                                                     |                             | Input voltage                                                                                                           | Load current                     |             |        |      |      |
| Output voltage                                      | V <sub>OUT</sub>            | V <sub>IN</sub> = 4.25 V                                                                                                | I <sub>L</sub> = -5 mA, -500 mA  | 03          | 1.20   | 1.30 | V    |
|                                                     |                             | V <sub>IN</sub> = 41.25 V                                                                                               | I <sub>L</sub> = -5 mA, -50 mA   |             | 1.20   | 1.30 |      |
|                                                     |                             | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 150°C                                                                     | I <sub>L</sub> = -5 mA           |             | 1.20   | 1.30 |      |
| Line regulation                                     | V <sub>RLINE</sub>          | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V,<br>T <sub>A</sub> = 25°C                                                            | I <sub>L</sub> = -5 mA           | 03          | -9     | 9    | mV   |
|                                                     |                             | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                   | I <sub>L</sub> = -5 mA           |             | -23    | 23   |      |
| Load regulation                                     | V <sub>RLOAD</sub>          | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 25°C                                                                      | -500 mA ≤ I <sub>L</sub> ≤ -5 mA | 03          | -12    | 12   | mV   |
|                                                     |                             | V <sub>IN</sub> = 6.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                             | -500 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -12    | 12   |      |
|                                                     |                             | V <sub>IN</sub> = 41.25 V,<br>T <sub>A</sub> = 25°C                                                                     | -500 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -12    | 12   |      |
|                                                     |                             | V <sub>IN</sub> = 41.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                            | -500 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -12    | 12   |      |
| Thermal regulation                                  | V <sub>RTH</sub>            | V <sub>IN</sub> = 14.6 V,<br>T <sub>A</sub> = 25°C                                                                      | I <sub>L</sub> = -500 mA         | 03          | -12    | 12   | mV   |
| Adjust pin current                                  | I <sub>ADJ</sub>            | V <sub>IN</sub> = 4.25 V                                                                                                | I <sub>L</sub> = -5 mA           | 03          | -100   | -15  | μA   |
|                                                     |                             | V <sub>IN</sub> = 41.25 V                                                                                               | I <sub>L</sub> = -5 mA           |             | -100   | -15  |      |
| Adjust pin current<br>change versus<br>line voltage | ΔI <sub>ADJ</sub><br>(LINE) | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V                                                                                      | I <sub>L</sub> = -5 mA           | 03          | -5     | 5    | μA   |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                       | Symbol                               | Conditions <u>1/</u> <u>2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                                                          | Device type | Limits |       | Unit  |
|------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------|--------|-------|-------|
|                                                            |                                      |                                                                                                                         |                                                                          |             | Min    | Max   |       |
|                                                            |                                      | Input voltage                                                                                                           | Load current                                                             |             |        |       |       |
| Adjust pin current change versus load current              | ΔI <sub>ADJ</sub> (LOAD)             | V <sub>IN</sub> = 6.25 V                                                                                                | -500 mA ≤ I <sub>L</sub> ≤ -5 mA                                         | 03          | -5     | 5     | μA    |
| Minimum load current                                       | I <sub>Q</sub>                       | 4.25 V ≤ V <sub>IN</sub> ≤ 14.25 V, forced V <sub>OUT</sub> = 1.4 V                                                     |                                                                          | 03          | -3.00  | -0.05 | mA    |
|                                                            |                                      | V <sub>IN</sub> = 41.25 V forced V <sub>OUT</sub> = 1.4 V                                                               |                                                                          |             | -5.00  | -0.2  |       |
| Output short circuit current                               | I <sub>OS1</sub>                     | V <sub>IN</sub> = 4.25 V                                                                                                |                                                                          | 03          | -1.8   | -0.50 | A     |
|                                                            | I <sub>OS2</sub>                     | V <sub>IN</sub> = 40 V                                                                                                  |                                                                          |             | -0.50  | -0.05 |       |
| Output voltage recovery after output short circuit current | V <sub>OUT</sub> (RECOV)             | V <sub>IN</sub> = 4.25 V, <u>3/</u> after I <sub>OS1</sub>                                                              | R <sub>L</sub> = 2.5 Ω, C <sub>L</sub> = 20 μF                           | 03          | 1.20   | 1.30  | V     |
|                                                            |                                      | V <sub>IN</sub> = 40 V, <u>3/</u> after I <sub>OS2</sub>                                                                | R <sub>L</sub> = 250 Ω                                                   |             | 1.20   | 1.30  |       |
| Voltage start-up                                           | V <sub>START</sub>                   | V <sub>IN</sub> = 4.25 V                                                                                                | R <sub>L</sub> = 2.5 Ω, C <sub>L</sub> = 20 μF                           | 03          | 1.20   | 1.30  | V     |
| Ripple rejection                                           | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | V <sub>IN</sub> = 6.25 V, <u>4/</u> e <sub>i</sub> = 1 Vrms, at f = 2400 Hz                                             | I <sub>L</sub> = -125 mA, T <sub>A</sub> = 25°C, see figure 11           | 03          | 65     |       | dB    |
| Output noise voltage                                       | V <sub>NO</sub>                      | V <sub>IN</sub> = 6.25 V, <u>4/</u> see figure 12                                                                       | I <sub>L</sub> = -50 mA, T <sub>A</sub> = 25°C                           | 03          |        | 120   | μVrms |
| Line transient response                                    | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | V <sub>IN</sub> = 6.25 V, <u>5/</u> ΔV <sub>IN</sub> = 3.0 V, see figure 13                                             | I <sub>L</sub> = -10 mA, T <sub>A</sub> = 25°C                           | 03          |        | 6     | mV/V  |
| Load transient response                                    | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | V <sub>IN</sub> = 6.25 V, <u>5/</u> see figure 14                                                                       | I <sub>L</sub> = -50 mA, ΔI <sub>L</sub> = -200 mA T <sub>A</sub> = 25°C | 03          |        | 0.60  | mV/mA |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test            | Symbol             | Conditions <u>1/</u> <u>2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                  | Device type | Limits |      | Unit |
|-----------------|--------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------|--------|------|------|
|                 |                    |                                                                                                                         |                                  |             | Min    | Max  |      |
|                 |                    | Input voltage                                                                                                           | Load current                     |             |        |      |      |
| Output voltage  | V <sub>OUT</sub>   | V <sub>IN</sub> = 4.25 V                                                                                                | I <sub>L</sub> = -5 mA, -1.5 A   | 04          | 1.20   | 1.30 | V    |
|                 |                    | V <sub>IN</sub> = 41.25 V                                                                                               | I <sub>L</sub> = -5 mA, -200 mA  |             | 1.20   | 1.30 |      |
|                 |                    | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 150°C                                                                     | I <sub>L</sub> = -5 mA           |             | 1.20   | 1.30 |      |
| Line regulation | V <sub>RLINE</sub> | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V,<br>T <sub>A</sub> = 25°C                                                            | I <sub>L</sub> = -5 mA           | 04          | -9     | 9    | mV   |
|                 |                    | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                   | I <sub>L</sub> = -5 mA           |             | -23    | 23   |      |
| Load regulation | V <sub>RLOAD</sub> | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 25°C                                                                      | -1.5 A ≤ I <sub>L</sub> ≤ -5 mA  | 04          | -3.5   | 3.5  | mV   |
|                 |                    | V <sub>IN</sub> = 6.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                             | -1.5 A ≤ I <sub>L</sub> ≤ -5 mA  |             | -12    | 12   |      |
|                 |                    | V <sub>IN</sub> = 41.25 V,<br>T <sub>A</sub> = 25°C                                                                     | -200 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -3.5   | 3.5  |      |
|                 |                    | V <sub>IN</sub> = 41.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                            | -200 mA ≤ I <sub>L</sub> ≤ -5 mA |             | -12    | 12   |      |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                                | Symbol                                  | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                                                      | Device<br>type | Limits |       | Unit |
|---------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|--------|-------|------|
|                                                                     |                                         |                                                                                                                  |                                                                      |                | Min    | Max   |      |
|                                                                     |                                         | Input voltage                                                                                                    | Load current                                                         |                |        |       |      |
| Thermal regulation                                                  | V <sub>RTH</sub>                        | V <sub>IN</sub> = 14.6 V,<br>T <sub>A</sub> = 25°C                                                               | I <sub>L</sub> = -1.5 A                                              | 04             | -12    | 12    | mV   |
| Adjust pin current                                                  | I <sub>ADJ</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                         | I <sub>L</sub> = -5 mA                                               | 04             | -100   | -15   | μA   |
|                                                                     |                                         | V <sub>IN</sub> = 41.25 V                                                                                        | I <sub>L</sub> = -5 mA                                               |                | -100   | -15   |      |
| Adjust pin current<br>change versus line<br>voltage                 | ΔI <sub>ADJ</sub><br>(LINE)             | 4.25 V ≤ V <sub>IN</sub> ≤ 41.25 V                                                                               | I <sub>L</sub> = -5 mA                                               | 04             | -5     | 5     | μA   |
| Adjust pin current<br>change versus<br>load current                 | ΔI <sub>ADJ</sub><br>(LOAD)             | V <sub>IN</sub> = 6.25 V                                                                                         | -1.5 A ≤ I <sub>L</sub> ≤ -5 mA                                      | 04             | -5     | 5     | μA   |
| Minimum load current                                                | I <sub>Q</sub>                          | 4.25 V ≤ V <sub>IN</sub> ≤ 14.25 V,<br>forced V <sub>OUT</sub> = 1.4 V                                           |                                                                      | 04             | -3.00  | -0.05 | mA   |
|                                                                     |                                         | V <sub>IN</sub> = 41.25 V forced<br>V <sub>OUT</sub> = 1.4 V                                                     |                                                                      |                | -5.00  | -0.2  |      |
| Output short circuit<br>current                                     | I <sub>OS1</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                         |                                                                      | 04             | -3.50  | -1.50 | A    |
|                                                                     | I <sub>OS2</sub>                        | V <sub>IN</sub> = 40 V                                                                                           |                                                                      |                | -1.00  | -0.18 |      |
| Output voltage<br>recovery after output<br>short circuit<br>current | V <sub>OUT</sub><br>(RECOV)             | V <sub>IN</sub> = 4.25 V, <u>3/</u><br>after I <sub>OS1</sub>                                                    | R <sub>L</sub> = 0.833 Ω,<br>C <sub>L</sub> = 20 μF                  | 04             | 1.20   | 1.30  | V    |
|                                                                     |                                         | V <sub>IN</sub> = 40 V, <u>3/</u><br>after I <sub>OS2</sub>                                                      | R <sub>L</sub> = 250 Ω                                               |                | 1.20   | 1.30  |      |
| Voltage start-up                                                    | V <sub>START</sub>                      | V <sub>IN</sub> = 4.25 V                                                                                         | R <sub>L</sub> = 0.833 Ω,<br>C <sub>L</sub> = 20 μF                  | 04             | 1.20   | 1.30  | V    |
| Ripple rejection                                                    | ΔV <sub>IN</sub> /<br>ΔV <sub>OUT</sub> | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>e <sub>i</sub> = 1 V <sub>rms</sub> ,<br>at f = 2400 Hz                   | I <sub>L</sub> = -500 mA,<br>T <sub>A</sub> = 25°C,<br>see figure 11 | 04             | 65     |       | dB   |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                              | Symbol                                  | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 9 and 3.5<br>unless otherwise specified |                                                                                 | Device<br>type | Limits |      | Unit  |
|-----------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------|--------|------|-------|
|                                   |                                         |                                                                                                                  |                                                                                 |                | Min    | Max  |       |
|                                   |                                         | Input voltage                                                                                                    | Load current                                                                    |                |        |      |       |
| Output noise voltage              | V <sub>NO</sub>                         | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>see figure 12                                                             | I <sub>L</sub> = -100 mA,<br>T <sub>A</sub> = 25°C                              | 04             |        | 120  | μVrms |
| Line transient response           | ΔV <sub>OUT</sub> /<br>ΔV <sub>IN</sub> | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>ΔV <sub>IN</sub> = 3.0 V,<br>see figure 13                                | I <sub>L</sub> = -10 mA,<br>T <sub>A</sub> = 25°C                               | 04             |        | 6    | mV/V  |
| Load transient response           | ΔV <sub>OUT</sub> /<br>ΔI <sub>L</sub>  | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>see figure 14                                                             | I <sub>L</sub> = -100 mA,<br>ΔI <sub>L</sub> = -400 mA<br>T <sub>A</sub> = 25°C | 04             |        | 0.30 | mV/mA |
| For device type 05, see figure 10 |                                         |                                                                                                                  |                                                                                 |                |        |      |       |
| Output voltage                    | V <sub>OUT</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                         | I <sub>L</sub> = -5 mA, -3.0 A                                                  | 05             | 1.20   | 1.30 | V     |
|                                   |                                         | V <sub>IN</sub> = 36.25 V                                                                                        | I <sub>L</sub> = -5 mA, -150 mA                                                 |                | 1.20   | 1.30 |       |
|                                   |                                         | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 150°C                                                              | I <sub>L</sub> = -5 mA                                                          |                | 1.20   | 1.30 |       |
| Line regulation                   | V <sub>RLINE</sub>                      | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V,<br>T <sub>A</sub> = 25°C                                                     | I <sub>L</sub> = -5 mA                                                          | 05             | -4     | 4    | mV    |
|                                   |                                         | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                            | I <sub>L</sub> = -5 mA                                                          |                | -20    | 20   |       |
| Load regulation                   | V <sub>RLOAD</sub>                      | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 25°C                                                               | -3.0 A ≤ I <sub>L</sub> ≤ -5 mA                                                 | 05             | -3.5   | 3.5  | mV    |
|                                   |                                         | V <sub>IN</sub> = 6.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                      | -3.0 A ≤ I <sub>L</sub> ≤ -5 mA                                                 |                | -12    | 12   |       |
|                                   |                                         | V <sub>IN</sub> = 36.25 V,<br>T <sub>A</sub> = 25°C                                                              | -150 mA ≤ I <sub>L</sub> ≤ -5 mA                                                |                | -3.5   | 3.5  |       |
|                                   |                                         | V <sub>IN</sub> = 36.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                     | -150 mA ≤ I <sub>L</sub> ≤ -5 mA                                                |                | -12    | 12   |       |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                                | Symbol                                  | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 10 and 3.5<br>unless otherwise specified |                                                                      | Device<br>type | Limits |       | Unit |
|---------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|--------|-------|------|
|                                                                     |                                         |                                                                                                                   |                                                                      |                | Min    | Max   |      |
|                                                                     |                                         | Input voltage                                                                                                     | Load current                                                         |                |        |       |      |
| Thermal regulation                                                  | V <sub>RTH</sub>                        | V <sub>IN</sub> = 11.25 V,<br>T <sub>A</sub> = 25°C                                                               | I <sub>L</sub> = -1.0 A                                              | 05             | -5     | 5     | mV   |
| Adjust pin current                                                  | I <sub>ADJ</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                          | I <sub>L</sub> = -5 mA                                               | 05             | -100   | -15   | μA   |
|                                                                     |                                         | V <sub>IN</sub> = 36.25 V                                                                                         | I <sub>L</sub> = -5 mA                                               |                | -100   | -15   |      |
| Adjust pin current<br>change versus line<br>voltage                 | ΔI <sub>ADJ</sub><br>(LINE)             | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V                                                                                | I <sub>L</sub> = -5 mA                                               | 05             | -5     | 5     | μA   |
| Adjust pin current<br>change versus<br>load current                 | ΔI <sub>ADJ</sub><br>(LOAD)             | V <sub>IN</sub> = 6.25 V                                                                                          | -3.0 A ≤ I <sub>L</sub> ≤ -5 mA                                      | 05             | -5     | 5     | μA   |
| Minimum load current                                                | I <sub>Q</sub>                          | 4.25 V ≤ V <sub>IN</sub> ≤ 14.25 V,<br>forced V <sub>OUT</sub> = 1.4 V                                            |                                                                      | 05             | -3.00  | -0.05 | mA   |
|                                                                     |                                         | V <sub>IN</sub> = 36.25 V forced<br>V <sub>OUT</sub> = 1.4 V                                                      |                                                                      |                | -5.00  | -0.2  |      |
| Output short circuit<br>current                                     | I <sub>OS1</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                          |                                                                      | 05             | -5.2   | -3.0  | A    |
|                                                                     | I <sub>OS2</sub>                        | V <sub>IN</sub> = 35 V                                                                                            |                                                                      |                | -2.0   | -0.15 |      |
| Output voltage<br>recovery after output<br>short circuit<br>current | V <sub>OUT</sub><br>(RECOV)             | V <sub>IN</sub> = 4.25 V, <u>3/</u><br>after I <sub>OS1</sub>                                                     | R <sub>L</sub> = 0.416 Ω,<br>C <sub>L</sub> = 20 μF                  | 05             | 1.20   | 1.30  | V    |
|                                                                     |                                         | V <sub>IN</sub> = 35 V, <u>3/</u><br>after I <sub>OS2</sub>                                                       | R <sub>L</sub> = 250 Ω                                               |                | 1.20   | 1.30  |      |
| Voltage start-up                                                    | V <sub>START</sub>                      | V <sub>IN</sub> = 4.25 V                                                                                          | R <sub>L</sub> = 0.416 Ω,<br>C <sub>L</sub> = 20 μF                  | 05             | 1.20   | 1.30  | V    |
| Ripple rejection                                                    | ΔV <sub>IN</sub> /<br>ΔV <sub>OUT</sub> | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>e <sub>i</sub> = 1 Vrms,<br>at f = 2400 Hz                                 | I <sub>L</sub> = -500 mA,<br>T <sub>A</sub> = 25°C,<br>see figure 11 | 05             | 65     |       | dB   |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                    | Symbol                                  | Conditions <u>1/</u> <u>2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 10 and 3.5<br>unless otherwise specified |                                                                                 | Device<br>type | Limits |      | Unit              |
|-------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------|--------|------|-------------------|
|                         |                                         |                                                                                                                          |                                                                                 |                | Min    | Max  |                   |
|                         |                                         | Input voltage                                                                                                            | Load current                                                                    |                |        |      |                   |
| Output noise voltage    | V <sub>NO</sub>                         | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>see figure 12                                                                     | I <sub>L</sub> = -100 mA,<br>T <sub>A</sub> = 25°C                              | 05             |        | 120  | μV <sub>rms</sub> |
| Line transient response | ΔV <sub>OUT</sub> /<br>ΔV <sub>IN</sub> | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>ΔV <sub>IN</sub> = 3.0 V,<br>see figure 13                                        | I <sub>L</sub> = -10 mA,<br>T <sub>A</sub> = 25°C                               | 05             |        | 12   | mV/V              |
| Load transient response | ΔV <sub>OUT</sub> /<br>ΔI <sub>L</sub>  | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>see figure 14                                                                     | I <sub>L</sub> = -100 mA,<br>ΔI <sub>L</sub> = -400 mA<br>T <sub>A</sub> = 25°C | 05             |        | 0.30 | mV/mA             |
| Output voltage          | V <sub>OUT</sub>                        | V <sub>IN</sub> = 4.25 V                                                                                                 | I <sub>L</sub> = -5 mA, -5.0 A                                                  | 06             | 1.19   | 1.29 | V                 |
|                         |                                         | V <sub>IN</sub> = 36.25 V                                                                                                | I <sub>L</sub> = -5 mA, -150 mA                                                 |                | 1.19   | 1.29 |                   |
|                         |                                         | V <sub>IN</sub> = 6.25 V                                                                                                 | I <sub>L</sub> = -7.0 A                                                         |                | 1.19   | 1.29 |                   |
|                         |                                         | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 150°C                                                                      | I <sub>L</sub> = -5 mA                                                          |                | 1.19   | 1.29 |                   |
| Line regulation         | V <sub>RLINE</sub>                      | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V,<br>T <sub>A</sub> = 25°C                                                             | I <sub>L</sub> = -5 mA                                                          | 06             | -4     | 4    | mV                |
|                         |                                         | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                    | I <sub>L</sub> = -5 mA                                                          |                | -17    | 17   |                   |
| Load regulation         | V <sub>RLOAD</sub>                      | V <sub>IN</sub> = 6.25 V,<br>T <sub>A</sub> = 25°C                                                                       | -5.0 A ≤ I <sub>L</sub> ≤ -5 mA                                                 | 06             | -3.8   | 3.8  | mV                |
|                         |                                         | V <sub>IN</sub> = 6.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                              | -5.0 A ≤ I <sub>L</sub> ≤ -5 mA                                                 |                | -8     | 8    |                   |
|                         |                                         | V <sub>IN</sub> = 36.25 V,<br>T <sub>A</sub> = 25°C                                                                      | -150 mA ≤ I <sub>L</sub> ≤ -5 mA                                                |                | -3.8   | 3.8  |                   |
|                         |                                         | V <sub>IN</sub> = 36.25 V,<br>-55°C ≤ T <sub>A</sub> ≤ 125°C                                                             | -150 mA ≤ I <sub>L</sub> ≤ -5 mA                                                |                | -8     | 8    |                   |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                                                                | Symbol                      | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 10 and 3.5<br>unless otherwise specified |                                                    | Device<br>type | Limits |       | Unit |
|---------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------|--------|-------|------|
|                                                                     |                             |                                                                                                                   |                                                    |                | Min    | Max   |      |
|                                                                     |                             | Input voltage                                                                                                     | Load current                                       |                |        |       |      |
| Thermal regulation                                                  | V <sub>RTH</sub>            | V <sub>IN</sub> = 11.25 V,<br>T <sub>A</sub> = 25°C                                                               | I <sub>L</sub> = -1.0 A                            | 06             | -2     | 2     | mV   |
| Adjust pin current                                                  | I <sub>ADJ</sub>            | V <sub>IN</sub> = 4.25 V                                                                                          | I <sub>L</sub> = -5 mA                             | 06             | -100   | -15   | μA   |
|                                                                     |                             | V <sub>IN</sub> = 36.25 V                                                                                         | I <sub>L</sub> = -5 mA                             |                | -100   | -15   |      |
| Adjust pin current<br>change versus line<br>voltage                 | ΔI <sub>ADJ</sub><br>(LINE) | 4.25 V ≤ V <sub>IN</sub> ≤ 36.25 V                                                                                | I <sub>L</sub> = -5 mA                             | 06             | -5     | 5     | μA   |
| Adjust pin current<br>change versus<br>load current                 | ΔI <sub>ADJ</sub><br>(LOAD) | V <sub>IN</sub> = 6.25 V                                                                                          | -5.0 A ≤ I <sub>L</sub> ≤ -5 mA                    | 06             | -5     | 5     | μA   |
| Minimum load<br>current                                             | I <sub>Q</sub>              | 4.25 V ≤ V <sub>IN</sub> ≤ 14.25 V,<br>forced V <sub>OUT</sub> = 1.4 V                                            |                                                    | 06             | -3.00  | -0.05 | mA   |
|                                                                     |                             | V <sub>IN</sub> = 36.25 V forced<br>V <sub>OUT</sub> = 1.4 V                                                      |                                                    |                | -5.00  | -0.2  |      |
| Output short circuit<br>current                                     | I <sub>OS1</sub>            | V <sub>IN</sub> = 4.25 V, t = 0.1 ms                                                                              |                                                    | 06             | -16.0  | -7.0  | A    |
|                                                                     | I <sub>OS2</sub>            | V <sub>IN</sub> = 4.25 V, t = 0.5 ms                                                                              |                                                    |                | -16.0  | -7.0  |      |
|                                                                     | I <sub>OS3</sub>            | V <sub>IN</sub> = 4.25 V, t = 5.0 ms                                                                              |                                                    |                | -15.0  | -5.0  |      |
|                                                                     | I <sub>OS4</sub>            | V <sub>IN</sub> = 35 V, t = 10 ms                                                                                 |                                                    |                | -3.0   | -0.20 |      |
| Output voltage<br>recovery after<br>output short circuit<br>current | V <sub>OUT</sub><br>(RECOV) | V <sub>IN</sub> = 4.25 V, <u>3/</u><br>after I <sub>OS3</sub>                                                     | R <sub>L</sub> = 0.25 Ω,<br>C <sub>L</sub> = 20 μF | 06             | 1.19   | 1.29  | V    |
|                                                                     |                             | V <sub>IN</sub> = 35 V, <u>3/</u><br>after I <sub>OS4</sub>                                                       | R <sub>L</sub> = 250 Ω                             |                | 1.19   | 1.29  |      |
| Voltage start-up                                                    | V <sub>START</sub>          | V <sub>IN</sub> = 4.25 V                                                                                          | R <sub>L</sub> = 0.25 Ω,<br>C <sub>L</sub> = 20 μF | 06             | 1.19   | 1.29  | V    |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test                    | Symbol                           | Conditions <u>1/ 2/</u><br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>see figure 10 and 3.5<br>unless otherwise specified |                                                                                 | Device<br>type | Limits |      | Unit              |
|-------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------|--------|------|-------------------|
|                         |                                  |                                                                                                                   |                                                                                 |                | Min    | Max  |                   |
|                         |                                  | Input voltage                                                                                                     | Load current                                                                    |                |        |      |                   |
| Ripple rejection        | $\Delta V_{IN} / \Delta V_{OUT}$ | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>e <sub>i</sub> = 1 V <sub>rms</sub> ,<br>at f = 2400 Hz                    | I <sub>L</sub> = -500 mA,<br>T <sub>A</sub> = 25°C,<br>see figure 11            | 06             | 65     |      | dB                |
| Output noise voltage    | V <sub>NO</sub>                  | V <sub>IN</sub> = 6.25 V, <u>4/</u><br>see figure 12                                                              | I <sub>L</sub> = -100 mA,<br>T <sub>A</sub> = 25°C                              | 06             |        | 120  | μV <sub>rms</sub> |
| Line transient response | $\Delta V_{OUT} / \Delta V_{IN}$ | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>ΔV <sub>IN</sub> = 3.0 V,<br>see figure 13                                 | I <sub>L</sub> = -10 mA,<br>T <sub>A</sub> = 25°C                               | 06             |        | 12   | mV/V              |
| Load transient response | $\Delta V_{OUT} / \Delta I_L$    | V <sub>IN</sub> = 6.25 V, <u>5/</u><br>see figure 14                                                              | I <sub>L</sub> = -100 mA,<br>ΔI <sub>L</sub> = -400 mA<br>T <sub>A</sub> = 25°C | 06             |        | 0.30 | mV/mA             |

1/ All tests performed at T<sub>A</sub> = 125°C may at the manufacturer's option, be performed at T<sub>A</sub> = 150°C. Specifications for T<sub>A</sub> = 125°C shall then apply at T<sub>A</sub> = 150°C.

2/ Static tests with load currents greater than 5 mA are performed under pulsed conditions defined on figures 9 or 10 as applicable.

3/ Output voltage recovery test shall be performed, with the designated load conditions, immediately after removal of each I<sub>OS</sub> test forced output voltage condition.

4/ The meter for e<sub>i</sub> and e<sub>o</sub> shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.

5/ The oscilloscope shall have a bandwidth between 5 and 15 MHz.

#### 4. VERIFICATION.

4.1 Sampling and inspection. Sampling and inspection procedures should be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

- a. For class S and B devices, an additional burn-in screen shall be performed to test the operation of the thermal shutdown circuit. This screen shall be performed after serialization (3.1.8 of method 5004 of MIL-STD-883) and before interim electrical parameters (pre burn-in, 3.1.9 of method 5004 of MIL-STD-883). The requirements of 3.2.3 of method 1015 of MIL-STD-883 shall apply to this screen except the devices need not be tested in an oven.
- b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.
- c. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.
- d. Reverse bias burn-in shall not be performed.
- e. Additional screening for space level product shall be as specified in MIL-PRF-38535.
- f. Constant acceleration (method 2001 of MIL-STD-883); test condition B shall be used for case Y.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5, 6, 8, 9, 10, and 11 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535 and as follows:

- a. When using the method 5005 option, end point electrical parameters shall be as specified in table II herein.
- b. When using the method 5005 option, constant acceleration for class S (method 2001 of MIL-STD-883); test condition B shall be used for case Y.

TABLE II. Electrical test requirements.

| MIL-PRF-38535<br>test requirements                                             | Subgroups (see table III)              |                                   |
|--------------------------------------------------------------------------------|----------------------------------------|-----------------------------------|
|                                                                                | Class S<br>devices                     | Class B<br>devices                |
| Interim electrical parameters                                                  | 1                                      | 1                                 |
| Final electrical test parameters <u>1/</u>                                     | 1,2,3,4                                | 1,2,3,4                           |
| Group A test requirements                                                      | 1,2,3,4,7                              | 1,2,3,4,7                         |
| Group B electrical test parameters<br>when using the method 5005 QCI<br>option | 1,2,3, and<br>table IV delta<br>limits | N/A                               |
| Group C electrical parameters                                                  | 1,2,3, and<br>table IV delta<br>limits | 1 and<br>table IV delta<br>limits |
| Group D end point electrical<br>parameters                                     | 1,2,3                                  | 1                                 |

1/ PDA applies to subgroup 1.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

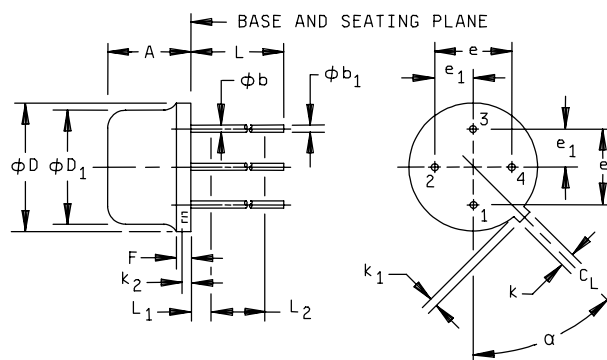
- a. End point electrical parameters shall be as specified in table II herein. Delta limits shall apply to group C inspection for classes B and S devices.
- b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535 and as follows:

- a. End point electrical parameters shall be as specified in table II herein.
- b. Constant acceleration (method 2001 of MIL-STD-883); test condition B shall be used for case Y.

4.5 Methods of inspection. Methods of inspection shall be as specified and as follows.

4.5.1 Voltage and current. All voltage values given are referenced to the designated return sense line. Currents given are conventional current and positive when flowing into the referenced terminal.

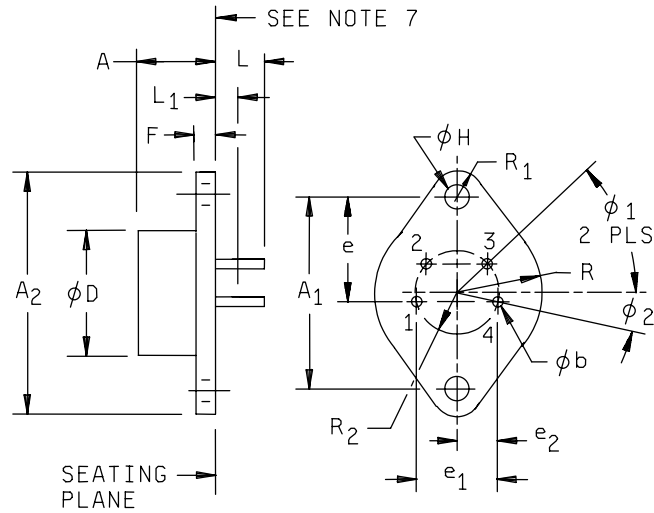


| Dimensions |        |      |             |      |       |
|------------|--------|------|-------------|------|-------|
| Symbol     | Inches |      | Millimeters |      | Notes |
|            | Min    | Max  | Min         | Max  |       |
| A          | .240   | .260 | 6.10        | 6.60 |       |
| $\phi b$   | .016   | .019 | .41         | .48  | 3     |
| $\phi b_1$ | .016   | .021 | .41         | .53  | 3     |
| $\phi D$   | .335   | .370 | 8.51        | 9.40 |       |
| $\phi D_1$ | .305   | .335 | 7.79        | 8.51 |       |
| e          | .200   | T.P. | 5.08        | T.P. | 5     |
| $e_1$      | .100   | T.P. | 2.54        | T.P. | 5     |
| F          | ---    | .050 | ---         | 1.27 |       |
| k          | .028   | .034 | .71         | .86  |       |
| $k_1$      | .029   | .045 | .74         | 1.14 | 4     |
| $k_2$      | .009   | .041 | .23         | 1.04 |       |
| L          | .500   | ---  | 12.70       | ---  |       |
| $L_1$      | ---    | .050 | ---         | 1.27 |       |
| $L_2$      | .250   | ---  | 6.35        | ---  |       |
| $\alpha$   | 45°    | T.P. | 45°         | T.P. | 5     |

## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
3. (Four leads)  $\phi b$  applies between  $L_1$  and  $L_2$ .  $\phi b_1$  applies between  $L_2$  and .500 (12.70 mm) from the reference plane.  
Diameter is uncontrolled in  $L_1$  and beyond .500 (12.70 mm) from the reference plane.
4. Four leads.
5. Measured from the maximum diameter of the product.
6. Leads having a maximum diameter .019 (.48 mm) measured in gaging plane .054 (1.37 mm) + .001 (.03 mm) - .000 (.00 mm) below the base plane of the product shall be within .007 (.18 mm) of their true position relative to a maximum width tab.
7. The product may be measured by direct methods or by gage.

FIGURE 1. Case outline X (device type 01).



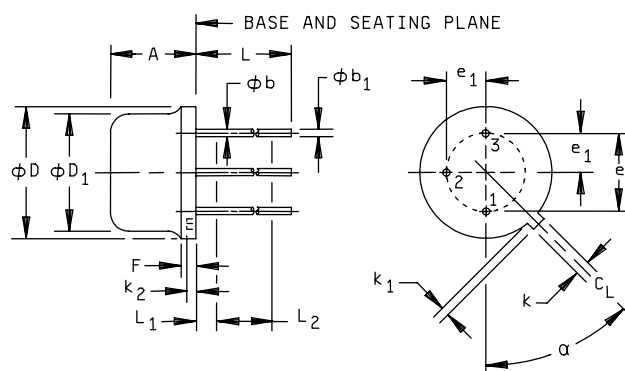
| Dimensions     |        |       |             |       |       |
|----------------|--------|-------|-------------|-------|-------|
| Symbol         | Inches |       | Millimeters |       | Notes |
|                | Min    | Max   | Min         | Max   |       |
| A              | .250   | .450  | 6.35        | 11.43 |       |
| A <sub>1</sub> | 1.177  | 1.197 | 29.90       | 30.40 |       |
| A <sub>2</sub> | 1.480  | 1.500 | 37.59       | 38.10 |       |
| ϕb             | .038   | .043  | .97         | 1.09  | 3,7   |
| ϕD             | ---    | .875  | ---         | 22.22 |       |
| e              | .655   | .675  | 16.64       | 17.14 |       |
| e <sub>1</sub> | .420   | .440  | 10.67       | 11.18 |       |
| e <sub>2</sub> | .205   | .225  | 5.21        | 5.72  |       |
| F              | .060   | .135  | 1.52        | 3.43  |       |
| ϕH             | .151   | .161  | 3.84        | 4.09  | 5,6   |
| L              | .312   | .500  | 7.92        | 12.70 | 4     |
| L <sub>1</sub> | ---    | .050  | ---         | 1.27  | 3,5   |
| R              | .495   | .525  | 12.57       | 13.34 |       |
| R <sub>1</sub> | .131   | .188  | 3.33        | 4.78  |       |
| R <sub>2</sub> | .470   | T.P.  | 11.94       | T.P.  |       |
| θ <sub>1</sub> | 54°    | T.P.  | 54°         | T.P.  |       |
| θ <sub>2</sub> | 18°    | T.P.  | 18°         | T.P.  |       |

FIGURE 2. Case outline Y (device type 02).

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
3. (Four leads)  $\phi b$  applies between  $L_1$  and .500 (12.70 mm) from the seating plane.  
Diameter is uncontrolled in  $L_1$  and beyond .500 (12.70 mm) from the seating plane.
4. Four leads.
5. Two holes.
6. Two holes located at true position within diameter .010 (.25 mm).
7. Leads having a maximum diameter .043 (1.09 mm) measured in gaging plane .054 (1.37 mm) + .001 (.03 mm) - .000 (.00 mm) below the seating plane shall be located at true position within diameter .014 (.36 mm).
8. The mounting surface of the header shall be flat to convex within .003 (.08 mm) inside a .930 (23.62 mm) diameter circle on the center of the header and flat to convex within .006 (.15 mm) overall.

FIGURE 2. Case outline Y (device type 02) – Continued.



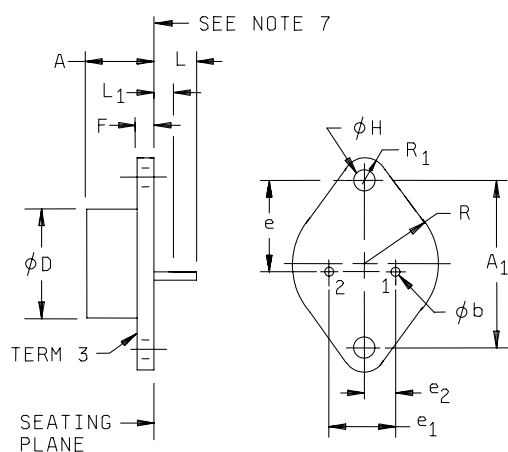
| Dimensions |        |      |             |      |       |
|------------|--------|------|-------------|------|-------|
| Symbol     | Inches |      | Millimeters |      | Notes |
|            | Min    | Max  | Min         | Max  |       |
| A          | .165   | .185 | 4.19        | 4.70 |       |
| $\phi b$   | .016   | .019 | .41         | .48  | 3     |
| $\phi b_1$ | .016   | .021 | .41         | .53  | 3     |
| $\phi D$   | .335   | .370 | 8.51        | 9.40 |       |
| $\phi D_1$ | .305   | .335 | 7.75        | 8.51 |       |
| e          | .200   | T.P. | 5.08        | T.P. | 5     |
| $e_1$      | .100   | T.P. | 2.54        | T.P. | 5     |
| F          | ---    | .050 | ---         | 1.27 |       |
| k          | .028   | .034 | .71         | .86  |       |
| $k_1$      | .029   | .045 | .74         | 1.14 | 4     |
| $k_2$      | .009   | .041 | .23         | 1.04 |       |
| L          | .500   | ---  | 12.70       | ---  |       |
| $L_1$      | ---    | .050 | ---         | 1.27 |       |
| $L_2$      | .250   | ---  | 6.35        | ---  |       |
| $\alpha$   | 45°    | T.P. | 45°         | T.P. | 5     |

## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
3. (Three leads)  $\phi b$  applies between  $L_1$  and  $L_2$ .  $\phi b_1$  applies between  $L_2$  and .500 (12.70 mm) from the reference plane.  
Diameter is uncontrolled in  $L_1$  and beyond .500 (12.70 mm) from the reference plane.
4. Three leads.
5. Measured from the maximum diameter of the product.
6. Leads having a maximum diameter .019 (.48 mm) measured in gaging plane .054 (1.37 mm) + .001 (.03 mm) - .000 (.00 mm) below the base plane of the product shall be within .007 (.18 mm) of their true position relative to a maximum width tab.
7. The product may be measured by direct methods or by gage.

FIGURE 3. Case outline X (device type 03).

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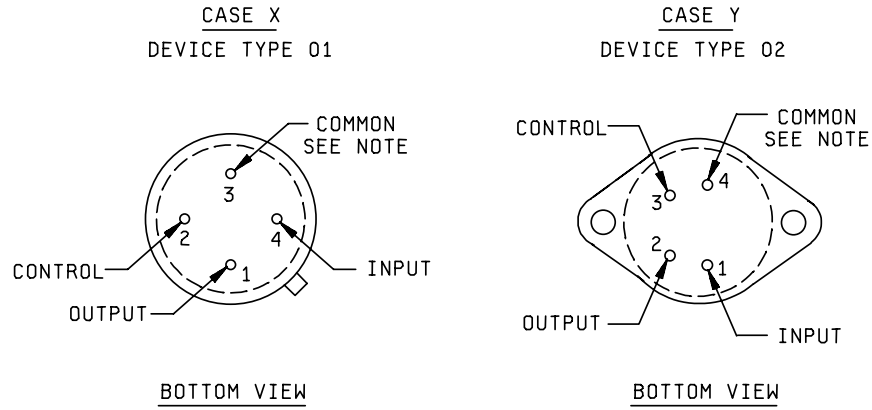


| Dimensions     |        |       |             |       |       |
|----------------|--------|-------|-------------|-------|-------|
| Symbol         | Inches |       | Millimeters |       | Notes |
|                | Min    | Max   | Min         | Max   |       |
| A              | .250   | .450  | 6.35        | 11.43 |       |
| A <sub>1</sub> | 1.177  | 1.197 | 29.90       | 30.40 |       |
| φb             | .038   | .043  | .97         | 1.09  | 3,7   |
| φD             | ---    | .875  | ---         | 22.22 |       |
| e              | .655   | .675  | 16.64       | 17.14 |       |
| e <sub>1</sub> | .420   | .440  | 10.67       | 11.18 |       |
| e <sub>2</sub> | .205   | .225  | 5.21        | 5.72  |       |
| F              | .060   | .135  | 1.52        | 3.43  |       |
| φH             | .151   | .161  | 3.84        | 4.09  | 5,6   |
| L              | .312   | .500  | 7.92        | 12.70 | 4     |
| L <sub>1</sub> | ---    | .050  | ---         | 1.27  | 3,5   |
| R              | .495   | .525  | 12.57       | 13.34 |       |
| R <sub>1</sub> | .131   | .188  | 3.33        | 4.78  |       |

NOTES:

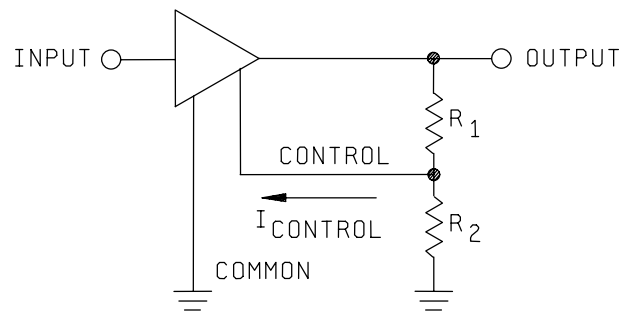
1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
3. (Two leads) φb applies between L<sub>1</sub> and .500 (12.70 mm) from the seating plane.  
Diameter is uncontrolled in L<sub>1</sub> and beyond .500 (12.70 mm) from the seating plane.
4. Two leads.
5. Two holes.
6. Two holes located at true position within diameter .010 (.25 mm).
7. Leads having a maximum diameter .043 (1.09 mm) measured in gaging plane .054 (1.37 mm) + .001 (.03 mm) - .000 (.00 mm) below the seating plane shall be located at true position within diameter .014 (.36 mm).
8. The mounting surface of the header shall be flat to convex within .003 (.08 mm) inside a .930 (23.62 mm) diameter circle on the center of the header and flat to convex within .006 (.15 mm) overall.

FIGURE 4. Case outline Y (device types 04, 05, and 06).



Note: Case is connected to common.

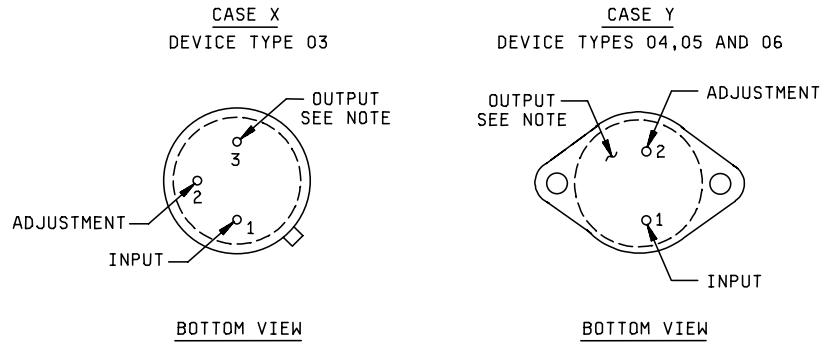
FIGURE 5. Terminal connections for device types 01 and 02.



NOTES:

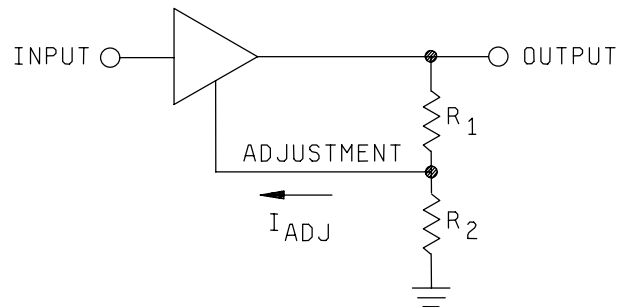
1.  $V_{\text{OUT}} = [(R_1 + R_2) / R_2] \times (V_{\text{CONTROL}}) + |I_{\text{CONTROL}}| \times R_1$  volts.
2.  $V_{\text{CONTROL}} = 5.00 \text{ V}$  (nominal).
3.  $R_2 = 1.0 \text{ k}\Omega$  provides a minimum of  $|5 \text{ mA}|$  load to the regulator at any  $V_{\text{OUT}}$ .

FIGURE 6. Block diagram for device types 01 and 02.



NOTE: Case is connected to output.

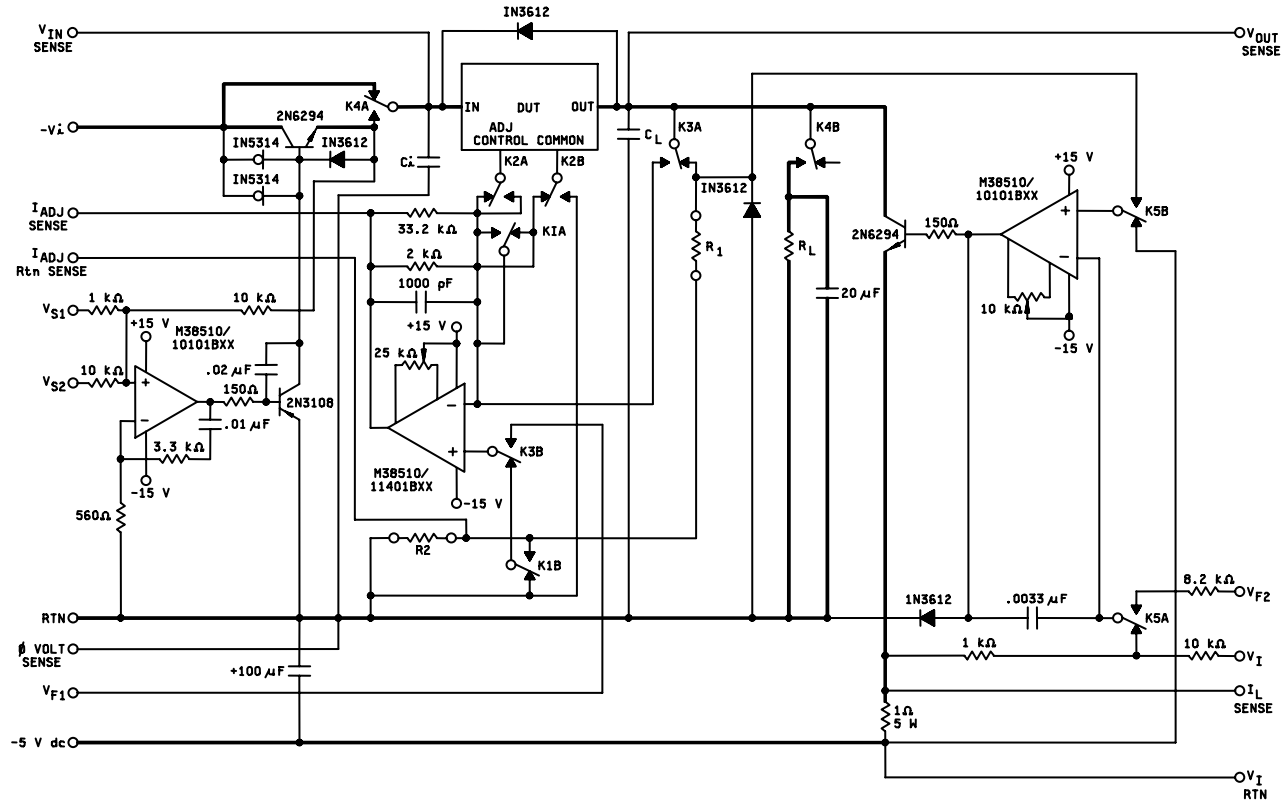
FIGURE 7. Terminal connections for 03, 04, 05, and 06.



NOTES:

1.  $V_{OUT} = [(R_1 + R_2) / R_1] \times (1.25) + |I_{ADJ}| \times R_2$  volts.
2.  $R_1 = 250 \, \Omega$  provides a minimum of  $|5 \, \text{mA}|$  load to the regulator at any  $V_{OUT}$ .

FIGURE 8. Block diagram for device types 03, 04, 05, and 06.



| Device table |              |              |              |                |
|--------------|--------------|--------------|--------------|----------------|
| Device type  | 01           | 02           | 03           | 04             |
| $R_1$        | 0 $\Omega$   | 0 $\Omega$   | 249 $\Omega$ | 249 $\Omega$   |
| $R_2$        | 1 k $\Omega$ | 1 k $\Omega$ | 0 $\Omega$   | 0 $\Omega$     |
| $R_L$        | 10 $\Omega$  | 5 $\Omega$   | 2.5 $\Omega$ | 0.833 $\Omega$ |
| $C_i$        | 0.33 $\mu$ F | 0.33 $\mu$ F | 1.0 $\mu$ F  | 1.0 $\mu$ F    |
| $C_L$        | 0.1 $\mu$ F  | 0.1 $\mu$ F  | 1.0 $\mu$ F  | 1.0 $\mu$ F    |

FIGURE 9. Test circuit for static tests for device types 01, 02, 03, and 04.

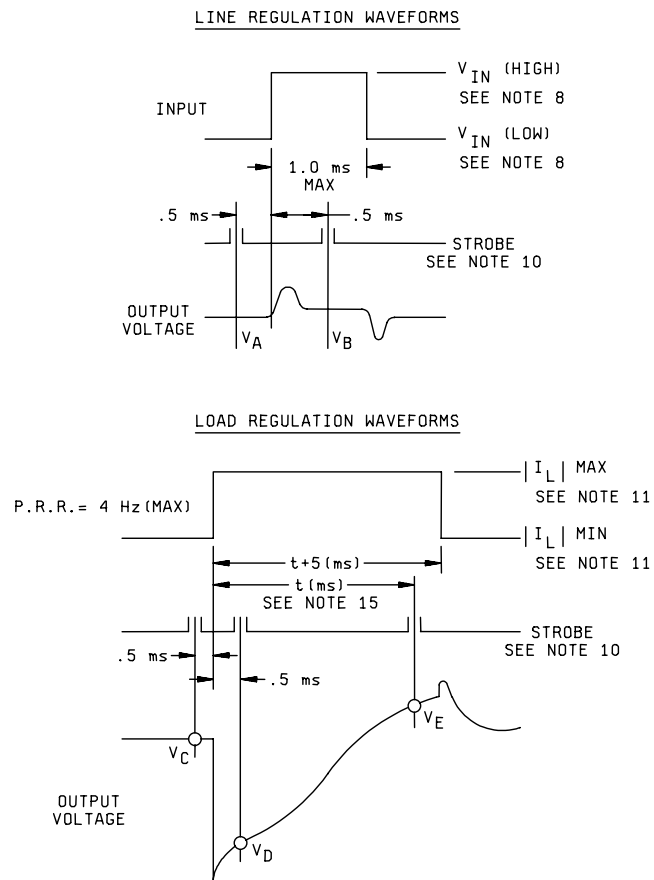


FIGURE 9. Test circuit for static tests for device types 01, 02, 03, and 04 – Continued.

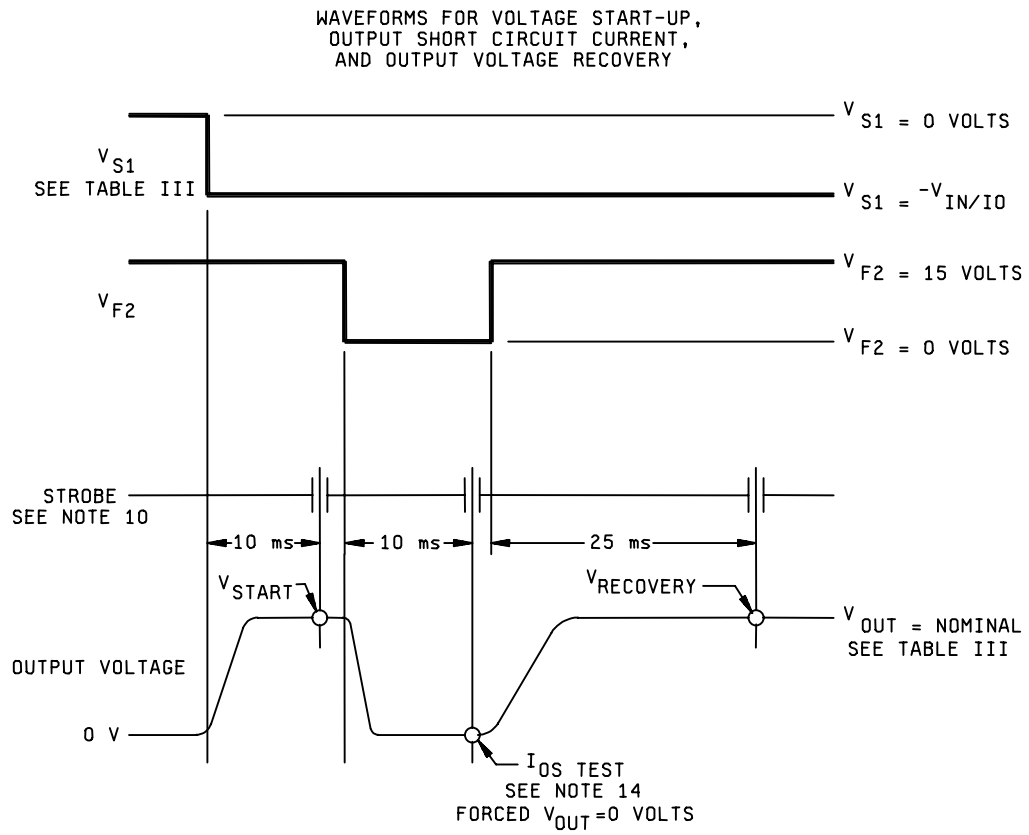
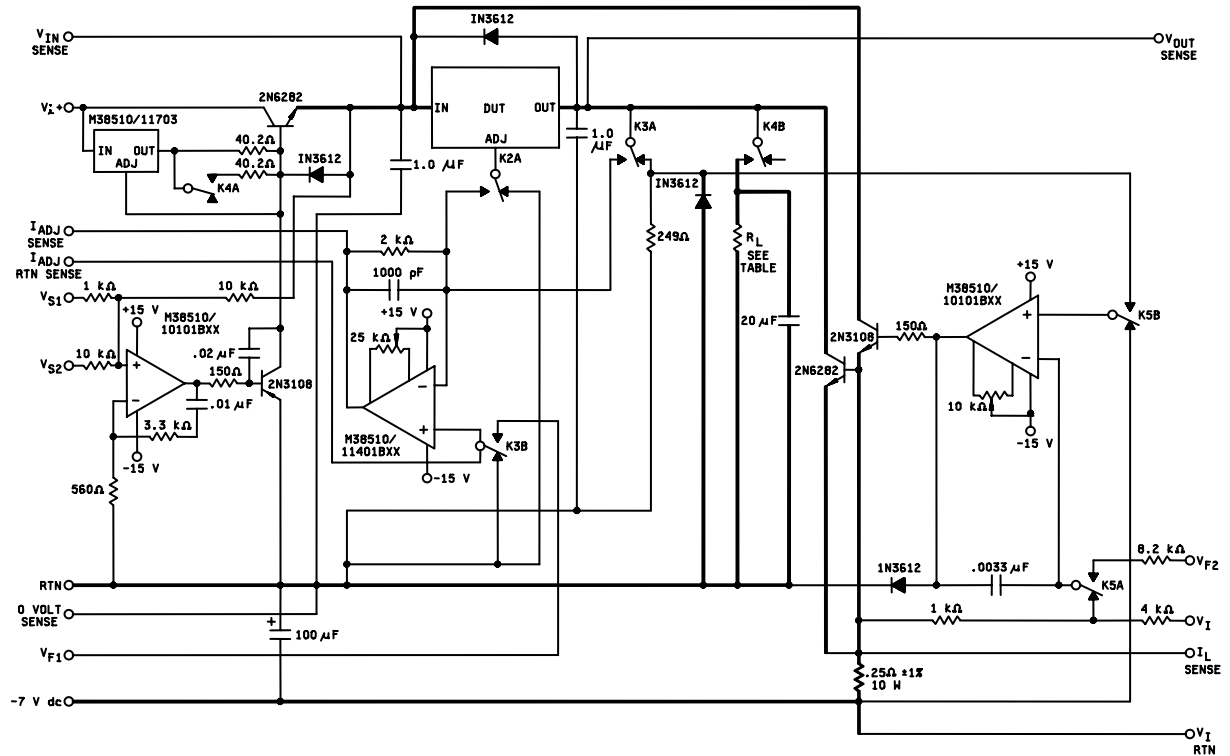


FIGURE 9. Test circuit for static tests for device types 01, 02, 03, and 04 – Continued.

## NOTES:

1. Heavy current paths ( $I \geq 0.05$  A) are indicated by bold lines.
2. Kelvin connections must be used for all output current and voltage measurements.  
For device types 03 and 04, output voltage measurements should be made at the case.  
For device type 03 only. If output voltage measurements are not made at the case but instead at the output lead, an error will result in the measurement due to internal lead resistance.  
The amount of error depends on the magnitude of the load current and the distance from the case to where the output voltage measurement is taken on the output pin.
3. The output offset voltage shall be adjusted to zero with the device under test (DUT) removed.  
The operational amplifier stabilization networks may vary with test adapter construction.  
Alternate drive circuits for the 2N6294 may be used to develop the proper load current and input voltage pulses.
4. Relay switch positions are defined in table III.
5. Load currents of 5 mA may be established via the load resistors  $R_1$  and  $R_2$ . All other load currents shall be established via the pulse load circuits. Resistors  $R_1$  and  $R_2$  shall have a tolerance  $\leq 0.1$  % for device types 01 and 02.
6. The pulse generator for the pulse load circuit shall have the following characteristics:
  - a. Pulse amplitude =  $-10 ( |I_L| - V_O / ( R_1 + R_2 ) )$  volts (referenced to  $-5$  volts).
  - b. Pulse width = 1.0 ms (unless otherwise stated).
  - c. Duty cycle = 2% (maximum).
7. Load currents shall be determined by the voltage measured across the  $1 \Omega$  resistor.  
Measurements shall be made 0.5 ms after the start of the pulse.
8.  $V_{IN}$  (LOW) and  $V_{IN}$  (HIGH) per table III herein.
9.  $V_{RLINE} = V_B - V_A$ .
10. The output voltage is sampled at specified intervals. Strobe pulse width is 100  $\mu$ s maximum.
11.  $|I_L|$  (minimum) and  $|I_L|$  (maximum) per table III herein.
12.  $V_{RLOAD} = V_D - V_C$ .
13.  $V_{RTH} = V_D - V_E$ .
14.  $I_{OS} = (I_L)$  amps.
15. For device types 01 and 02,  $t = 10.5$  ms. For device types 03 and 04,  $t = 20.5$  ms.
16. For static test  $V_{RLOAD} 1$ ,  $I_L = 500$  mA, device type 03 only the following may apply. If output voltage measurements are taken from the output lead and not the case, the maximum limit shall be allowed to increase by 5 mV to account for the error due to internal lead resistance.

FIGURE 9. Test circuit for static tests for device types 01, 02, 03, and 04 – Continued.



| Device table |                |               |
|--------------|----------------|---------------|
| Device type  | 05             | 06            |
| $R_L$        | $0.416 \Omega$ | $0.25 \Omega$ |

FIGURE 10. Test circuit for static tests for device types 05 and 06 .

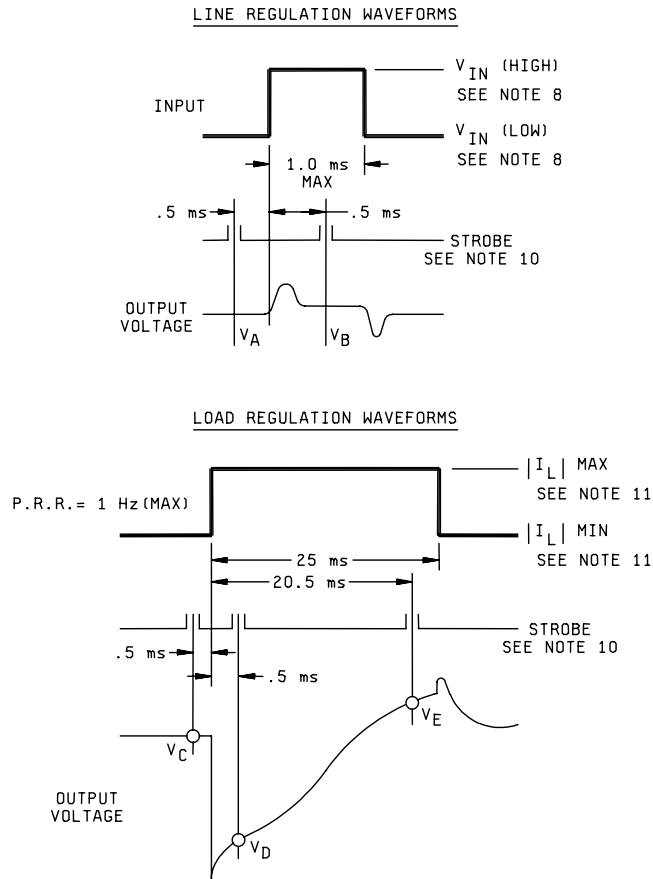


FIGURE 10. Test circuit for static tests for device types 05 and 06 - Continued.

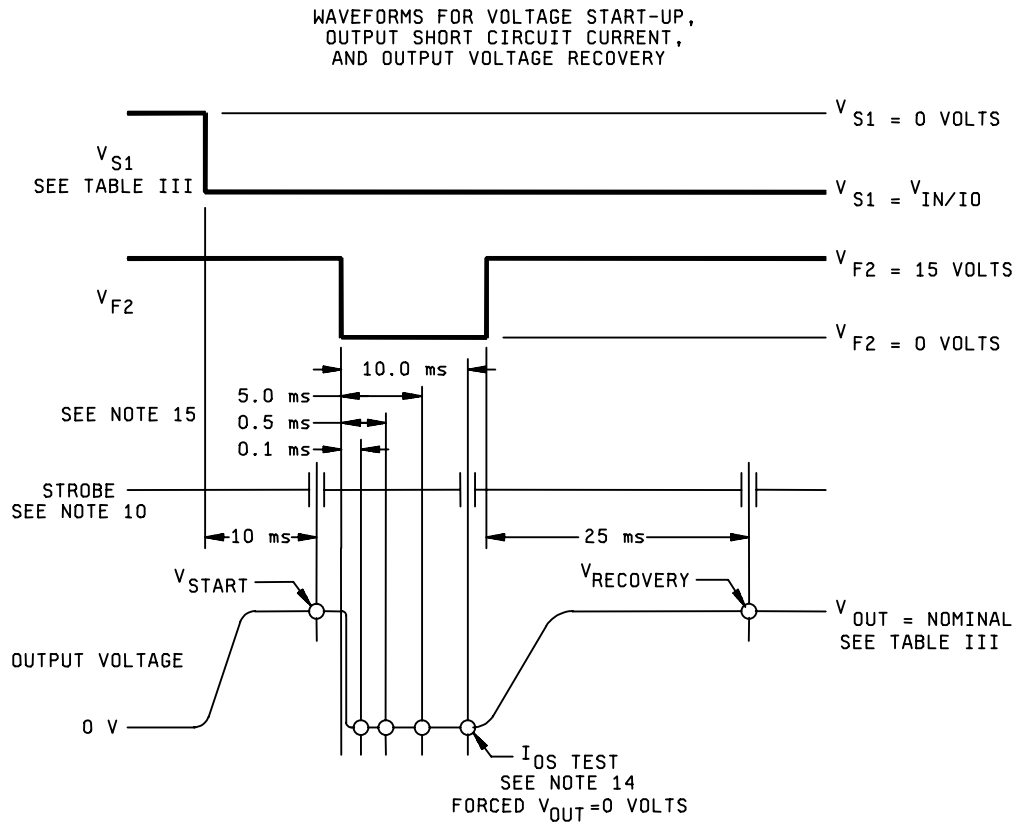
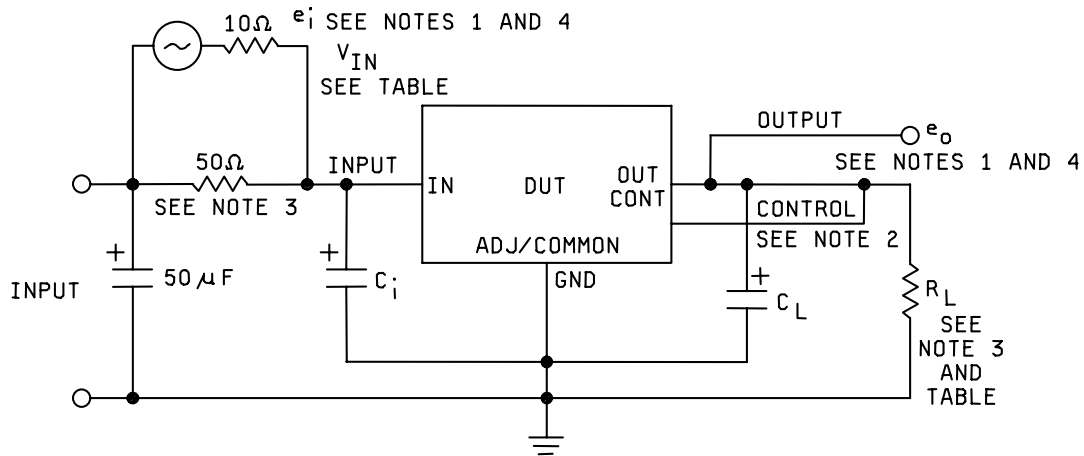


FIGURE 10. Test circuit for static tests for device types 05 and 06 - Continued.

## NOTES:

1. Heavy current paths ( $I \geq 0.1$  A) are indicated by bold lines.
2. Kelvin connections must be used for all output current and voltage measurements.  
For device types 05 and 06, output voltage measurements shall be made at the case.
3. The output offset voltage shall be adjusted to zero with the device under test (DUT) removed.  
The operational amplifier stabilization networks may vary with test adapter construction.  
Alternate drive circuits for the 2N6282 may be used to develop the proper load current and input voltage pulses. These circuits shall require the approval of the qualifying activity.
4. Relay switch positions are defined in table III.
5. Load currents of 5 mA may be established via the  $249\ \Omega$  load resistor. All other load currents shall be established via the pulse load circuit.
6. The pulse generator for the pulse load circuit shall have the following characteristics:
  - a. Pulse amplitude =  $-(|I_L| - .005)$  volts. (referenced to  $-7$  volts)
  - b. Pulse width = 1.0 ms (unless otherwise stated).
  - c. Duty cycle = 2% (maximum).
  - d. Rise time =  $30\ \mu\text{s}$  (minimum).
7. Load currents shall be determined by the voltage measured across the  $0.25\ \Omega$  resistor.  
Measurements shall be made 0.5 ms after the start of the pulse.
8.  $V_{IN}$  (LOW) and  $V_{IN}$  (HIGH) per table III herein.
9.  $V_{RLINE} = V_B - V_A$ .
10. The output voltage is sampled at specified intervals. Strobe pulse width is  $100\ \mu\text{s}$  maximum.
11.  $|I_L|$  (minimum) and  $|I_L|$  (maximum) per table III herein.
12.  $V_{RLOAD} = V_D - V_C$ .
13.  $V_{RTH} = V_D - V_E$ .
14.  $I_{OS} = (I_L)$  amps.
15. Output short circuit current measurements at  $t = 0.1$ ,  $t = 0.5$ , and  $t = 5.0$ , are to be made on device type 06 only.

FIGURE 10. Test circuit for static tests for device types 05 and 06 – Continued.

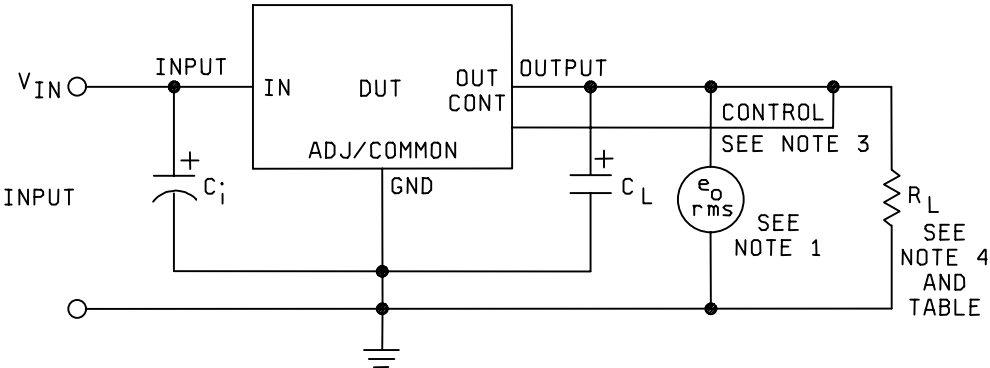


| Device table |         |         |        |        |        |        |
|--------------|---------|---------|--------|--------|--------|--------|
| Device types | 01      | 02      | 03     | 04     | 05     | 06     |
| $V_{IN}$     | 10 V    | 10 V    | 6.25 V | 6.25 V | 6.25 V | 6.25 V |
| $R_L$        | 40.2 Ω  | 14.3 Ω  | 10 Ω   | 2.5 Ω  | 2.5 Ω  | 2.5 Ω  |
| $C_i$        | 0.33 μF | 0.33 μF | 1.0 μF | 1.0 μF | 1.0 μF | 1.0 μF |
| $C_L$        | 0.1 μF  | 0.1 μF  | 1.0 μF | 1.0 μF | 1.0 μF | 1.0 μF |

## NOTES:

- $e_i = 1 \text{ V}_{rms}$  at  $f = 2400 \text{ Hz}$  (measured at the input terminals of the DUT).  
Ripple rejection =  $20 \log (e_{irms} / e_{orms})$ .
- The control pin connection is required for device types 01 and 02 only.
- The input 50 Ω resistor and  $R_L$  shall be type RER 70 or equivalent.
- The meter for  $e_i$  and  $e_o$  shall have a minimum bandwidth from 10 Hz to 10 kHz for devices 01 – 05 and 300 Hz to 10 kHz for device type 06 shall measure true rms voltages.

FIGURE 11. Ripple rejection test circuit.

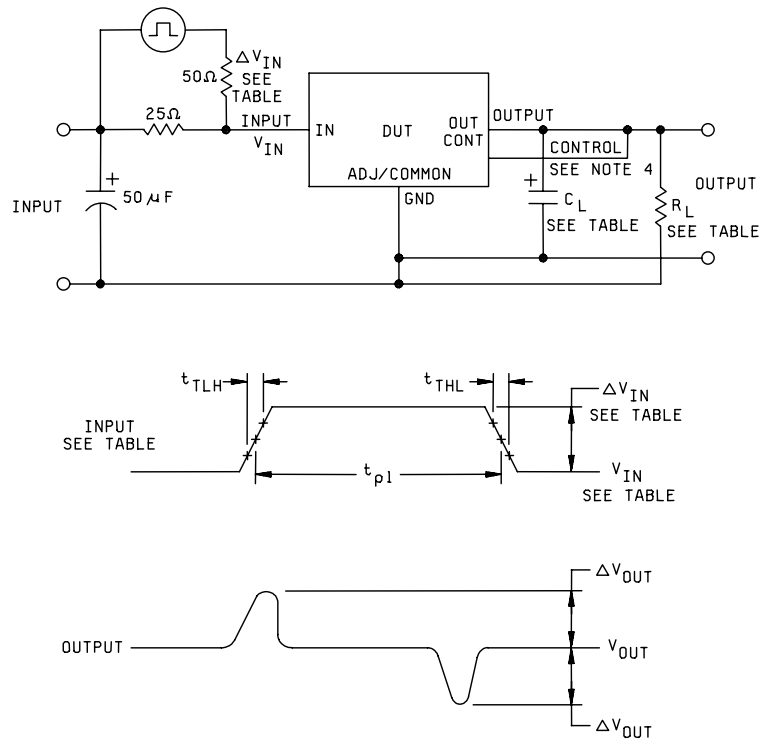


| Device table |              |              |             |               |               |               |
|--------------|--------------|--------------|-------------|---------------|---------------|---------------|
| Device type  | 01           | 02           | 03          | 04            | 05            | 06            |
| $V_{IN}$     | 10 V         | 10 V         | 6.25 V      | 6.25 V        | 6.25 V        | 6.25 V        |
| $R_L$        | 100 $\Omega$ | 50 $\Omega$  | 25 $\Omega$ | 12.5 $\Omega$ | 12.5 $\Omega$ | 12.5 $\Omega$ |
| $C_i$        | 0.33 $\mu F$ | 0.33 $\mu F$ | 1.0 $\mu F$ | 1.0 $\mu F$   | 1.0 $\mu F$   | 1.0 $\mu F$   |
| $C_L$        | 0.1 $\mu F$  | 0.1 $\mu F$  | 1.0 $\mu F$ | 1.0 $\mu F$   | 1.0 $\mu F$   | 1.0 $\mu F$   |

NOTES:

1. The meter for measuring  $e_{rms}$  shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.
2.  $V_{NO} = e_{rms}$
3. The control pin connection is required for device types 01 and 02 only.
4.  $R_L$  shall be type RER 70 or equivalent.

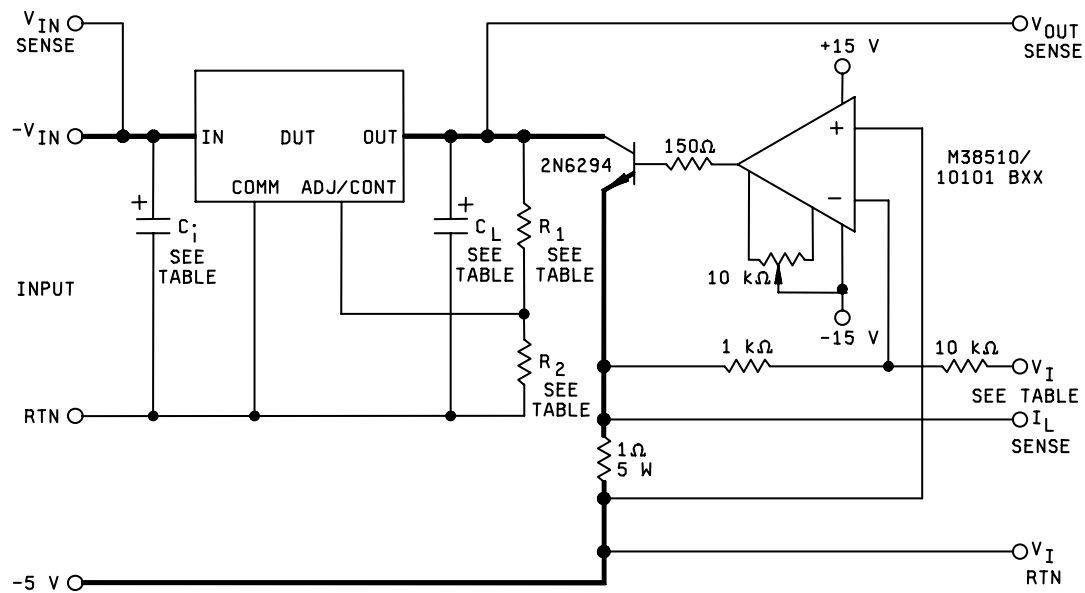
FIGURE 12. Noise test circuit.



| Device table                        |         |         |        |        |        |        |       |
|-------------------------------------|---------|---------|--------|--------|--------|--------|-------|
| Device type                         | 01      | 02      | 03     | 04     | 05     | 06     | Notes |
| V <sub>IN</sub>                     | 10 V    | 10 V    | 6.25 V | 6.25 V | 6.25 V | 6.25 V | 1     |
| ΔV <sub>IN</sub>                    | 3.0 V   | 3.0 V   | 3.0 V  | 3.0 V  | 3.0 V  | 3.0 V  | 1     |
| R <sub>L</sub>                      | 1.25 kΩ | 1.25 kΩ | 120 Ω  | 120 Ω  | 120 Ω  | 120 Ω  |       |
| t <sub>THL</sub> = t <sub>TLH</sub> | 5.0 μs  | 5.0 μs  | 5.0 μs | 5.0 μs | 5.0 μs | 5.0 μs | 1     |
| C <sub>L</sub>                      | 0.1 μF  | 0.1 μF  | 1.0 μF | 1.0 μF | 1.0 μF | 1.0 μF |       |

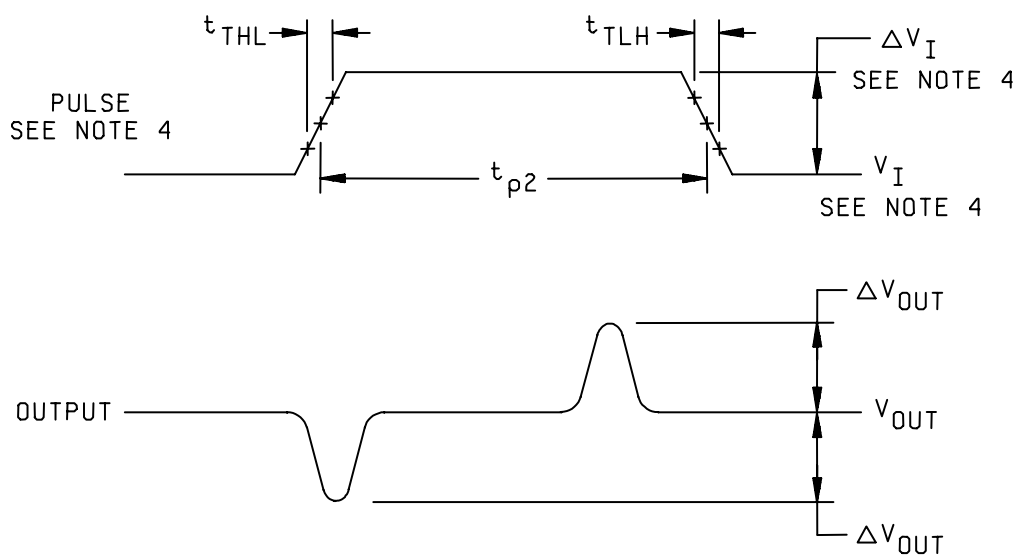
- NOTES:
1. Measured at device input.
  2. Pulse width t<sub>p1</sub> = 25 μs; duty cycle = 3% (maximum).
  3. Oscilloscope bandwidth = 5 MHz to 15 MHz.
  4. The control pin connection is required for device types 01 and 02 only.
  5. The input 25 Ω resistor and R<sub>L</sub> shall be type RER 70 or equivalent.

FIGURE 13. Line transient response test circuit.



| Device table    |         |         |         |         |         |         |
|-----------------|---------|---------|---------|---------|---------|---------|
| Device type     | 01      | 02      | 03      | 04      | 05      | 06      |
| R <sub>1</sub>  | 0       | 0       | 249 Ω   | 249 Ω   | 249 Ω   | 249 Ω   |
| R <sub>2</sub>  | 1.0 kΩ  | 1.0 kΩ  | 0       | 0       | 0       | 0       |
| I <sub>L</sub>  | -50 mA  | -100 mA | -50 mA  | -100 mA | -100 mA | -100 mA |
| ΔI <sub>L</sub> | -200 mA | -400 mA | -200 mA | -400 mA | -400 mA | -400 mA |
| V <sub>I</sub>  | -0.45 V | -0.95 V | -0.45 V | -0.95 V | -0.95 V | -0.95 V |
| ΔV <sub>I</sub> | -2.0 V  | -4.0 V  | -2.0 V  | -4.0 V  | -4.0 V  | -4.0 V  |
| C <sub>i</sub>  | 0.33 μF | 0.33 μF | 1.0 μF  | 1.0 μF  | 1.0 μF  | 1.0 μF  |
| C <sub>L</sub>  | 0.1 μF  | 0.1 μF  | 1.0 μF  | 1.0 μF  | 1.0 μF  | 1.0 μF  |

FIGURE 14. Load transient response test circuit.



## NOTES:

1. Heavy current paths ( $I \geq 1.0$  A) are indicated by bold lines.
2. Kelvin connections must be used for all output current and voltage measurements.
3. The operational amplifier stabilization networks may vary with test adapter construction. Alternate drive circuits for the 2N6294 may be used to develop the proper load current and input voltage pulses.
4. The pulse generator for the pulse load circuit shall have the following characteristics. (See device table III.)
  - a. Voltage level ( $V_I$ ) =  $-10[|I_L| - (V_{OUT} / (R_1 + R_2))]$  volts. (Referenced to  $-5$  volts).
  - b. Pulse width ( $t_{p2}$ ) =  $25 \mu s$ .
  - c. Duty cycle = 3% (maximum).
  - d.  $t_{THL} = t_{TLH} = 1.0 \mu s$  for device types 01 and 02.
  - e.  $t_{THL} = t_{TLH} = 5.0 \mu s$  for device types 03, 04, 05, and 06.
  - f. Difference voltage level ( $\Delta V_I$ ) =  $10(I_L)$  volts.
5.
  - a.  $\Delta V_{OUT} = 500$  mV maximum for device type 01.
  - b.  $\Delta V_{OUT} = 1,000$  mV maximum for device type 02.
  - c.  $\Delta V_{OUT} = 120$  mV maximum for device types 03, 04, 05, and 06. (These values guarantee the specified limits for load transient response.)
6. The oscilloscope shall have a bandwidth between 5 and 15 MHz.
7. Resistors  $R_1$  and  $R_2$  shall be type RER 70 or equivalent.

FIGURE 14. Load transient response test circuit – Continued.

TABLE III. Group A inspection for all device type 01.

| Subgroup                         | Symbol                    | Test no. | See figure 9            |                     |                                                       |       |      |      |     | Relays energized | Measurement sense lines |                 |       | Equation                                                            | Notes                              | Limits |       | Unit |
|----------------------------------|---------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|-------|------|------|-----|------------------|-------------------------|-----------------|-------|---------------------------------------------------------------------|------------------------------------|--------|-------|------|
|                                  |                           |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |       |      |      |     |                  | Pins                    | Value           | Units |                                                                     |                                    | Min    | Max   |      |
|                                  |                           |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11 | 7-2  | 8-2 |                  |                         |                 |       |                                                                     |                                    |        |       |      |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>         | 1        | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | None             | 9-11                    | E <sub>1</sub>  | V     | V <sub>OUT1</sub> = E <sub>1</sub>                                  |                                    | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT2</sub>         | 2        | 8                       | -500                | 8                                                     | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>2</sub>  | "     | V <sub>OUT2</sub> = E <sub>2</sub>                                  |                                    | "      | "     | "    |
|                                  | V <sub>OUT3</sub>         | 3        | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>3</sub>  | "     | V <sub>OUT3</sub> = E <sub>3</sub>                                  |                                    | "      | "     | "    |
|                                  | V <sub>OUT4</sub>         | 4        | 30                      | -50                 | 30                                                    | -0.45 | ---  | ---  | --- | "                | "                       | E <sub>4</sub>  | "     | V <sub>OUT4</sub> = E <sub>4</sub>                                  |                                    | "      | "     | "    |
|                                  | V <sub>RLINE1</sub>       | 5        | 8                       | -50                 | 8                                                     | -0.45 | ---  | ---  | --- | "                | "                       | E <sub>5</sub>  | "     | V <sub>RLINE1</sub> = E <sub>5</sub> – E <sub>4</sub>               | See figure 9 waveforms             | -150   | 150   | mV   |
|                                  | V <sub>RLINE2</sub>       | 6        | 8                       | -350                | 8                                                     | -3.45 | ---  | ---  | --- | "                | "                       | E <sub>6</sub>  | "     | ---                                                                 |                                    | ---    | "     | "    |
|                                  | V <sub>RLINE2</sub>       | 7        | 25                      | -350                | 25                                                    | -3.45 | ---  | ---  | --- | "                | "                       | E <sub>7</sub>  | "     | V <sub>RLINE2</sub> = E <sub>6</sub> – E <sub>7</sub>               |                                    | -50    | 50    | "    |
|                                  | VR <sub>LOAD1</sub>       | 8        | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>8</sub>  | "     | ---                                                                 | See figure 9 waveforms             | ---    | ---   | "    |
|                                  | VR <sub>LOAD1</sub>       | 9        | 10                      | -500                | 10                                                    | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>9</sub>  | "     | V <sub>RLOAD1</sub> = E <sub>8</sub> – E <sub>9</sub>               |                                    | -100   | 100   | "    |
|                                  | VR <sub>LOAD2</sub>       | 10       | ---                     | ---                 | ---                                                   | ---   | ---  | ---  | --- | "                | ---                     | ---             | "     | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>               |                                    | -150   | 150   | "    |
|                                  | VR <sub>TH</sub>          | 11       | 15                      | -500                | 15                                                    | -4.95 | ---  | ---  | --- | "                | 9-11                    | E <sub>10</sub> | "     | V <sub>RTH</sub> = E <sub>10</sub>                                  | See figure 9 waveforms t = 10.5 ms | -50    | 50    | "    |
|                                  | I <sub>SCD1</sub>         | 12       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>11</sub> | "     | I <sub>SCD1</sub> = E <sub>11</sub> / 2000                          |                                    | -7.0   | -0.5  | mA   |
|                                  | I <sub>SCD2</sub>         | 13       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>12</sub> | "     | I <sub>SCD2</sub> = E <sub>12</sub> / 2000                          |                                    | -0.5   | -0.5  | "    |
|                                  | ΔI <sub>SCD</sub> (LINE)  | 14       | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | "                | "                       | E <sub>13</sub> | "     | ΔI <sub>SCD</sub> = E <sub>13</sub> – E <sub>12</sub> / 2000 (LINE) |                                    |        | 1.0   | "    |
|                                  | ΔI <sub>SCD</sub> (LOAD)  | 15       | 10                      | -500                | 10                                                    | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>14</sub> | "     | ΔI <sub>SCD</sub> = E <sub>11</sub> – E <sub>14</sub> / 2000 (LOAD) | -8.0<br>-1.0                       |        | 0.5   | "    |
|                                  | I <sub>OS1</sub>          | 16       | 10                      | ---                 | 15                                                    | ---   | ---  | -1.0 | 0   | K4,K5            | 10-5                    | E <sub>15</sub> | "     | I <sub>OS1</sub> = E <sub>15</sub>                                  | See figure 9 waveforms             | -2.00  | -0.50 | A    |
|                                  | V <sub>OUT5</sub> (RECOV) | 17       | 10                      | ---                 | 15                                                    | ---   | ---  | -1.0 | 15  | K4,K5            | 9-11                    | E <sub>16</sub> | "     | V <sub>OUT5</sub> = E <sub>16</sub>                                 |                                    | 4.75   | 5.25  | V    |
|                                  | I <sub>OS2</sub>          | 18       | 30                      | ---                 | 30                                                    | ---   | ---  | ---  | 0   | K5               | 10-5                    | E <sub>17</sub> | "     | I <sub>OS2</sub> = E <sub>17</sub>                                  |                                    |        | -0.01 | A    |
|                                  | V <sub>OUT6</sub> (RECOV) | 19       | 30                      | ---                 | 30                                                    | ---   | ---  | ---  | 15  | K5               | 9-11                    | E <sub>18</sub> | "     | V <sub>OUT6</sub> = E <sub>18</sub>                                 |                                    | 5.25   | V     |      |
|                                  | I <sub>CTL</sub>          | 20       | 10                      | -350                | 10                                                    | -3.45 | ---  | ---  | --- | K1,K2            | 12-13                   | E <sub>19</sub> | "     | I <sub>CTL</sub> = E <sub>19</sub> / 33200                          | -1.00                              |        | -0.01 | μA   |
|                                  | V <sub>START</sub>        | 21       | 8                       | -500                | 15                                                    | ---   | ---  | -0.8 | --- | K4               | 9-11                    | E <sub>20</sub> | "     | V <sub>OUT</sub> = E <sub>20</sub>                                  | See figure 9 waveforms             | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT7</sub>         | 22       | 38                      | -500                | 38                                                    | -4.95 | ---  | ---  | --- | None             | "                       | E <sub>21</sub> | "     | V <sub>OUT7</sub> = E <sub>21</sub>                                 | R1 = 4.50K2 ±0.1%                  | 28.5   | 31.5  | V    |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>         | 23       | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | None             | 9-11                    | E <sub>22</sub> | V     | V <sub>OUT1</sub> = E <sub>22</sub>                                 |                                    | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT2</sub>         | 24       | 8                       | -500                | 8                                                     | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>23</sub> | "     | V <sub>OUT2</sub> = E <sub>23</sub>                                 |                                    | "      | "     | "    |
|                                  | V <sub>OUT3</sub>         | 25       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>24</sub> | "     | V <sub>OUT3</sub> = E <sub>24</sub>                                 |                                    | "      | "     | "    |
|                                  | V <sub>OUT4</sub>         | 26       | 30                      | -50                 | 30                                                    | -0.45 | ---  | ---  | --- | "                | "                       | E <sub>25</sub> | "     | V <sub>OUT4</sub> = E <sub>25</sub>                                 |                                    | "      | "     | "    |
|                                  | V <sub>RLINE1</sub>       | 27       | 8                       | -50                 | 8                                                     | -0.45 | ---  | ---  | --- | "                | "                       | E <sub>26</sub> | "     | V <sub>RLINE1</sub> = E <sub>26</sub> – E <sub>25</sub>             | See figure 9 waveforms             | -150   | 150   | mV   |
|                                  | V <sub>RLINE2</sub>       | 28       | 8                       | -350                | 8                                                     | -3.45 | ---  | ---  | --- | "                | "                       | E <sub>27</sub> | "     | ---                                                                 |                                    | ---    | "     | "    |
|                                  | V <sub>RLINE2</sub>       | 29       | 25                      | -350                | 25                                                    | -3.45 | ---  | ---  | --- | "                | "                       | E <sub>28</sub> | "     | V <sub>RLINE2</sub> = E <sub>27</sub> – E <sub>28</sub>             |                                    | -50    | 50    | "    |
|                                  | VR <sub>LOAD1</sub>       | 30       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>29</sub> | "     | ---                                                                 | See figure 9 waveforms             | ---    | ---   | "    |
|                                  | VR <sub>LOAD1</sub>       | 31       | 10                      | -500                | 10                                                    | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>30</sub> | "     | V <sub>RLOAD1</sub> = E <sub>29</sub> – E <sub>30</sub>             |                                    | -100   | 100   | "    |
|                                  | VR <sub>LOAD2</sub>       | 32       | ---                     | ---                 | ---                                                   | ---   | ---  | ---  | --- | "                | ---                     | ---             | "     | V <sub>RLOAD2</sub> = E <sub>24</sub> – E <sub>25</sub>             |                                    | -150   | 150   | "    |
|                                  | I <sub>SCD1</sub>         | 33       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>31</sub> | "     | I <sub>SCD1</sub> = E <sub>31</sub> / 2000                          |                                    | -7.0   | -0.5  | mA   |
|                                  | I <sub>SCD2</sub>         | 34       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>32</sub> | "     | I <sub>SCD2</sub> = E <sub>32</sub> / 2000                          |                                    | -0.5   | -0.5  | "    |

TABLE III. Group A inspection for all device type 01 – Continued.

| Subgroup                | Symbol                                 | Test no.                                                          | See figure 9            |                     |                                                       |       |       |      |      | Relays energized | Measurement sense lines |                 |                 | Equation                                                                  | Notes                                                                     | Limits                                     |                        | Unit          |         |
|-------------------------|----------------------------------------|-------------------------------------------------------------------|-------------------------|---------------------|-------------------------------------------------------|-------|-------|------|------|------------------|-------------------------|-----------------|-----------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------|------------------------|---------------|---------|
|                         |                                        |                                                                   | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |       |       |      |      |                  | Pins                    | Value           | Units           |                                                                           |                                                                           | Min                                        | Max                    |               |         |
|                         |                                        |                                                                   | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11  | 7-2  | 8-2  |                  |                         |                 |                 |                                                                           |                                                                           |                                            |                        |               |         |
| 2                       | ΔI <sub>SCD</sub> (LINE)               | 35                                                                | 8                       | -5                  | 8                                                     | ---   | ---   | ---  | ---  | None             | 12-13                   | E <sub>33</sub> | V               | ΔI <sub>SCD</sub> = E <sub>33</sub> – E <sub>32</sub> / 2000 (LINE)       |                                                                           |                                            | 1.0                    | mA            |         |
|                         | ΔI <sub>SCD</sub> (LOAD)               | 36                                                                | 10                      | -500                | 10                                                    | -4.95 | ---   | ---  | ---  | "                | 12-13                   | E <sub>34</sub> | "               | ΔI <sub>SCD</sub> = E <sub>31</sub> – E <sub>34</sub> / 2000 (LOAD)       | -1.0                                                                      |                                            | 0.5                    | "             |         |
|                         | I <sub>OS1</sub><br>V <sub>OUT5</sub>  | 37                                                                | 10                      | ---                 | 15                                                    | ---   | ---   | -1.0 | 0    | K4,K5            | 10-5                    | E <sub>35</sub> | "               | I <sub>OS1</sub> = E <sub>35</sub><br>V <sub>OUT5</sub> = E <sub>36</sub> | See figure 9 waveforms                                                    | -2.00<br>4.75                              | -0.50<br>5.25          | A<br>V        |         |
|                         |                                        | 38                                                                | 10                      | ---                 | 15                                                    | ---   | ---   | -1.0 | 15   | K4,K5            | 9-11                    | E <sub>36</sub> | "               |                                                                           |                                                                           |                                            |                        |               |         |
|                         | I <sub>OS2</sub><br>V <sub>OUT6</sub>  | 39                                                                | 30                      | ---                 | 30                                                    | ---   | ---   |      | 0    | K5               | 10-5                    | E <sub>37</sub> | "               | I <sub>OS2</sub> = E <sub>37</sub><br>V <sub>OUT6</sub> = E <sub>38</sub> |                                                                           |                                            | -0.01<br>5.25          | A<br>V        |         |
|                         |                                        | 40                                                                | 30                      | ---                 | 30                                                    | ---   | ---   |      |      | K5               | 9-11                    | E <sub>38</sub> | "               |                                                                           |                                                                           |                                            |                        |               |         |
|                         | (RECOV)                                | I <sub>CTL</sub>                                                  | 41                      | 10                  | -350                                                  | 10    | -3.45 | ---  | -15  | ---              | K1,K2                   | 12-13           | E <sub>39</sub> | "                                                                         | I <sub>CTL</sub> = E <sub>39</sub> / 33200                                | -1.00                                      |                        | -0.01         | μA      |
|                         |                                        | V <sub>START</sub>                                                | 42                      | 8                   | -500                                                  | 15    | ---   | ---  | -0.8 | ---              | K4                      | 9-11            | E <sub>40</sub> | "                                                                         | V <sub>OUT</sub> = E <sub>40</sub>                                        | See figure 9 waveforms                     | 4.75                   | 5.25          | V       |
| (RECOV)                 | V <sub>OUT7</sub>                      | 43                                                                | 38                      | -500                | 38                                                    | -4.95 | ---   | ---  | ---  | None             | "                       | E <sub>41</sub> | "               | V <sub>OUT7</sub> = E <sub>41</sub>                                       | R1 = 4.99k <sub>Ω</sub> ±0.1%                                             | 28.5                                       | 31.5                   | V             |         |
| T <sub>A</sub> = +150°C | V <sub>OUT8</sub>                      | 44                                                                | 10                      | -5                  | 10                                                    | ---   | ---   | ---  | ---  | "                | "                       | E <sub>42</sub> | "               | V <sub>OUT8</sub> = E <sub>42</sub>                                       |                                                                           | 4.70                                       | 5.30                   | "             |         |
| 3                       | T <sub>A</sub> = -55°C                 | V <sub>OUT1</sub>                                                 | 45                      | 8                   | -5                                                    | 8     | ---   | ---  | ---  | ---              | None                    | 9-11            | E <sub>43</sub> | V                                                                         | V <sub>OUT1</sub> = E <sub>43</sub>                                       |                                            | 4.75                   | 5.25          | V       |
|                         |                                        | V <sub>OUT2</sub>                                                 | 46                      | 8                   | -500                                                  | 8     | -4.95 | ---  | ---  | ---              | "                       | "               | E <sub>44</sub> | "                                                                         | V <sub>OUT2</sub> = E <sub>44</sub>                                       |                                            |                        | "             | "       |
|                         |                                        | V <sub>OUT3</sub>                                                 | 47                      | 30                  | -5                                                    | 30    | ---   | ---  | ---  | ---              | "                       | "               | E <sub>45</sub> | "                                                                         | V <sub>OUT3</sub> = E <sub>45</sub>                                       |                                            |                        | "             | "       |
|                         |                                        | V <sub>OUT4</sub>                                                 | 48                      | 30                  | -50                                                   | 30    | -0.45 | ---  | ---  | ---              | "                       | "               | E <sub>46</sub> | "                                                                         | V <sub>OUT4</sub> = E <sub>46</sub>                                       |                                            |                        | "             | "       |
|                         |                                        | V <sub>RLINE1</sub>                                               | 49                      | 8                   | -50                                                   | 8     | -0.45 | ---  | ---  | ---              | "                       | "               | E <sub>47</sub> | "                                                                         | V <sub>RLINE1</sub> = E <sub>47</sub> – E <sub>46</sub>                   | See figure 9 waveforms                     | -150<br>---            | 150<br>---    | mV<br>" |
|                         |                                        | V <sub>RLINE2</sub>                                               | 50                      | 8                   | -350                                                  | 8     | -3.45 | ---  | ---  | ---              | "                       | "               | E <sub>48</sub> | "                                                                         | ---                                                                       |                                            |                        |               |         |
|                         |                                        | V <sub>RLINE2</sub>                                               | 51                      | 25                  | -350                                                  | 25    | -3.45 | ---  | ---  | ---              | "                       | "               | E <sub>49</sub> | "                                                                         | V <sub>RLINE2</sub> = E <sub>48</sub> – E <sub>49</sub>                   |                                            | -50                    | 50            | "       |
|                         |                                        | V <sub>RLOAD1</sub><br>V <sub>RLOAD1</sub><br>V <sub>RLOAD2</sub> | 52                      | 10                  | -5                                                    | 10    | ---   | ---  | ---  | ---              | ---                     | "               | "               | E <sub>50</sub>                                                           | "                                                                         | ---                                        | See figure 9 waveforms | ---           | ---     |
|                         | 53                                     |                                                                   | 10                      | -500                | 10                                                    | -4.95 | ---   | ---  | ---  | ---              | "                       | "               | E <sub>51</sub> | "                                                                         | V <sub>RLOAD1</sub> = E <sub>50</sub> – E <sub>51</sub>                   |                                            |                        |               |         |
|                         | 54                                     |                                                                   | ---                     | ---                 | ---                                                   | ---   | ---   | ---  | ---  | ---              | "                       | ---             | ---             | "                                                                         | V <sub>RLOAD2</sub> = E <sub>45</sub> – E <sub>46</sub>                   |                                            | -100<br>-150           | 100<br>150    | "<br>"  |
|                         | I <sub>SCD1</sub><br>I <sub>SCD2</sub> |                                                                   | 55                      | 10                  | -5                                                    | 10    | ---   | ---  | ---  | ---              | ---                     | "               | 12-13           | E <sub>52</sub>                                                           | "                                                                         | I <sub>SCD1</sub> = E <sub>52</sub> / 2000 |                        | -7.0          | -0.5    |
|                         |                                        | 56                                                                | 30                      | -5                  | 30                                                    | ---   | ---   | ---  | ---  | ---              | "                       | "               | E <sub>53</sub> | "                                                                         | I <sub>SCD2</sub> = E <sub>53</sub> / 2000                                |                                            |                        |               |         |
|                         | ΔI <sub>SCD</sub> (LINE)               | 57                                                                | 8                       | -5                  | 8                                                     | ---   | ---   | ---  | ---  | ---              | None                    | 12-13           | E <sub>54</sub> | V                                                                         | ΔI <sub>SCD</sub> = E <sub>54</sub> – E <sub>53</sub> / 2000 (LINE)       |                                            |                        | 1.0           | mA      |
|                         |                                        | ΔI <sub>SCD</sub> (LOAD)                                          | 58                      | 10                  | -500                                                  | 10    | -4.95 | ---  | ---  | ---              | "                       | "               | E <sub>55</sub> | "                                                                         | ΔI <sub>SCD</sub> = E <sub>52</sub> – E <sub>55</sub> / 2000 (LOAD)       | -8.0                                       |                        | 0.5           | "       |
|                         | (RECOV)                                | I <sub>OS1</sub><br>V <sub>OUT5</sub>                             | 59                      | 10                  | ---                                                   | 15    | ---   | ---  | -1.0 | 0                | K4,K5                   | 10-5            | E <sub>56</sub> | "                                                                         | I <sub>OS1</sub> = E <sub>56</sub><br>V <sub>OUT5</sub> = E <sub>57</sub> | See figure 9 waveforms                     | -2.00<br>4.75          | -0.50<br>5.25 | A<br>V  |
|                         |                                        |                                                                   | 60                      | 10                  | ---                                                   | 15    | ---   | ---  | -1.0 | 15               | K4,K5                   | 9-11            | E <sub>57</sub> | "                                                                         |                                                                           |                                            |                        |               |         |
|                         |                                        | I <sub>OS2</sub><br>V <sub>OUT6</sub>                             | 61                      | 30                  | ---                                                   | 30    | ---   | ---  |      | 0                | K5                      | 10-5            | E <sub>58</sub> | "                                                                         | I <sub>OS2</sub> = E <sub>58</sub><br>V <sub>OUT6</sub> = E <sub>59</sub> |                                            |                        | -0.01<br>5.25 | A<br>V  |
|                         |                                        |                                                                   | 62                      | 30                  | ---                                                   | 30    | ---   | ---  |      |                  | K5                      | 9-11            | E <sub>59</sub> | "                                                                         |                                                                           |                                            |                        |               |         |
|                         | (RECOV)                                | I <sub>CTL</sub>                                                  | 63                      | 10                  | -350                                                  | 10    | -3.45 | ---  | -15  | ---              | K1,K2                   | 12-13           | E <sub>60</sub> | "                                                                         | I <sub>CTL</sub> = E <sub>60</sub> / 33200                                | -1.00                                      |                        | -0.01         | μA      |
|                         |                                        | V <sub>START</sub>                                                | 64                      | 8                   | -500                                                  | 15    | ---   | ---  | -0.8 | ---              | K4                      | 9-11            | E <sub>61</sub> | "                                                                         | V <sub>OUT</sub> = E <sub>61</sub>                                        | See figure 9 waveforms                     | 4.75                   | 5.25          | V       |
|                         |                                        | V <sub>OUT7</sub>                                                 | 65                      | 38                  | -500                                                  | 38    | -4.95 | ---  | ---  | ---              | None                    | "               | E <sub>62</sub> | "                                                                         | V <sub>OUT7</sub> = E <sub>62</sub>                                       | R1 = 4.99k <sub>Ω</sub> ±0.1%              | 28.5                   | 31.5          | V       |

TABLE III. Group A inspection for all device type 01 – Continued.

| Subgroup                             | Symbol                           | Test no. | Test conditions                                                     |                                                            | Measurement sense lines    |       |       | Equation                                           | Notes         | Limits |     | Unit             |
|--------------------------------------|----------------------------------|----------|---------------------------------------------------------------------|------------------------------------------------------------|----------------------------|-------|-------|----------------------------------------------------|---------------|--------|-----|------------------|
|                                      |                                  |          | Input voltage                                                       | Load current                                               | Symbol                     | Value | Units |                                                    |               | Min    | Max |                  |
| 4<br><br>$T_A = +25^{\circ}\text{C}$ | $\Delta V_{IN} / \Delta V_{OUT}$ | 66       | $V_{IN} = 10\text{ V}$<br><br>$e_i = 1.0\text{ Vrms}$<br>at 2400 Hz | $I_L = -125\text{ mA}$                                     | $e_{\text{orms}}$<br><br>E | 63    | Vrms  | $\Delta V_{IN} / \Delta V_{OUT} = -20 \log E_{63}$ | See figure 11 | 45     | --- | dB               |
| 7<br><br>$T_A = +25^{\circ}\text{C}$ | $V_{NO}$                         | 67       | $V_{IN} = 10\text{ V}$                                              | $I_L = -50\text{ mA}$                                      | $e_{\text{orms}}$          | 64    | Vrms  | $V_{NO} = E_{64}$                                  | See figure 12 | ---    | 125 | $\mu\text{Vrms}$ |
|                                      | $\Delta V_{OUT} / \Delta V_{IN}$ | 68       | $V_{IN} = 10\text{ V}$<br><br>$\Delta V_{IN} = 3.0\text{ V}$        | $I_L = -5\text{ mA}$                                       | $V_{OUT}$<br>E<br>E        | 65    | V     | $\Delta V_{OUT} / \Delta V_{IN} = E_{65} / 3$      | See figure 13 | ---    | 30  | mV/V             |
|                                      | $\Delta V_{OUT} / \Delta I_L$    | 69       | $V_{IN} = 10\text{ V}$                                              | $I_L = -50\text{ mA}$<br><br>$\Delta I_L = -200\text{ mA}$ | $V_{OUT}$<br><br>E         | 66    | V     | $\Delta V_{OUT} / \Delta I_L = E_{66} / 200$       | See figure 14 | ---    | 2.5 | mV/mA            |

TABLE III. Group A inspection for all device type 02.

| Subgroup                         | Symbol                    | Test no. | See figure 9            |                     |                                                       |       |      |      |     | Relays energized | Measurement sense lines |                 |       | Equation                                                            | Notes                  | Limits |       | Unit |
|----------------------------------|---------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|-------|------|------|-----|------------------|-------------------------|-----------------|-------|---------------------------------------------------------------------|------------------------|--------|-------|------|
|                                  |                           |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |       |      |      |     |                  | Pins                    | Value           | Units |                                                                     |                        | Min    | Max   |      |
|                                  |                           |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11 | 7-2  | 8-2 |                  |                         |                 |       |                                                                     |                        |        |       |      |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>         | 1        | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | None             | 9-11                    | E <sub>1</sub>  | V     | V <sub>OUT1</sub> = E <sub>1</sub>                                  |                        | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT2</sub>         | 2        | 8                       | -1000               | 8                                                     | -9.95 | ---  | ---  | --- | "                | "                       | E <sub>2</sub>  | "     | V <sub>OUT2</sub> = E <sub>2</sub>                                  |                        | "      | "     | "    |
|                                  | V <sub>OUT3</sub>         | 3        | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>3</sub>  | "     | V <sub>OUT3</sub> = E <sub>3</sub>                                  |                        | "      | "     | "    |
|                                  | V <sub>OUT4</sub>         | 4        | 30                      | -100                | 30                                                    | -0.95 | ---  | ---  | --- | "                | "                       | E <sub>4</sub>  | "     | V <sub>OUT4</sub> = E <sub>4</sub>                                  |                        | "      | "     | "    |
|                                  | V <sub>RLINE1</sub>       | 5        | 8                       | -100                | 8                                                     | -0.95 | ---  | ---  | --- | "                | "                       | E <sub>5</sub>  | "     | V <sub>RLINE1</sub> = E <sub>5</sub> – E <sub>4</sub>               | See figure 9 waveforms | -150   | 150   | mV   |
|                                  | V <sub>RLINE2</sub>       | 6        | 8                       | -500                | 8                                                     | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>6</sub>  | "     | ---                                                                 |                        | ---    | "     |      |
|                                  | V <sub>RLINE2</sub>       | 7        | 25                      | -500                | 25                                                    | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>7</sub>  | "     | V <sub>RLINE2</sub> = E <sub>6</sub> – E <sub>7</sub>               |                        | -50    | 50    | "    |
|                                  | V <sub>RLOAD1</sub>       | 8        | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>8</sub>  | "     | ---                                                                 | See figure 9 waveforms | ---    | ---   | "    |
|                                  | V <sub>RLOAD1</sub>       | 9        | 10                      | -1000               | 10                                                    | -9.95 | ---  | ---  | --- | "                | "                       | E <sub>9</sub>  | "     | V <sub>RLOAD1</sub> = E <sub>8</sub> – E <sub>9</sub>               |                        | -100   | 100   | "    |
|                                  | V <sub>RLOAD2</sub>       | 10       | ---                     | ---                 | ---                                                   | ---   | ---  | ---  | --- | "                | ---                     | ---             | "     | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>               |                        | -150   | 150   | "    |
|                                  | V <sub>RTH</sub>          | 11       | 15                      | -1000               | 15                                                    | -9.95 | ---  | ---  | --- | "                | 9-11                    | E <sub>10</sub> | "     | V <sub>RTH</sub> = E <sub>10</sub>                                  | See figure 9 waveforms | -50    | 50    | "    |
|                                  | I <sub>SCD1</sub>         | 12       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>11</sub> | "     | I <sub>SCD1</sub> = E <sub>11</sub> / 2000                          |                        | -7.0   | -0.5  | mA   |
|                                  | I <sub>SCD2</sub>         | 13       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>12</sub> | "     | I <sub>SCD2</sub> = E <sub>12</sub> / 2000                          |                        | -0.5   | -0.5  | "    |
|                                  | ΔI <sub>SCD</sub> (LINE)  | 14       | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | "                | "                       | E <sub>13</sub> | "     | ΔI <sub>SCD</sub> = E <sub>13</sub> – E <sub>12</sub> / 2000 (LINE) |                        |        | 1.0   | "    |
|                                  | ΔI <sub>SCD</sub> (LOAD)  | 15       | 10                      | -1000               | 10                                                    | -9.95 | ---  | ---  | --- | "                | "                       | E <sub>14</sub> | "     | ΔI <sub>SCD</sub> = E <sub>11</sub> – E <sub>14</sub> / 2000 (LOAD) | -8.0<br>-1.0           |        | 0.5   | "    |
|                                  | I <sub>OS1</sub>          | 16       | 10                      | ---                 | 15                                                    | ---   | ---  | -1.0 | 0   | K4,K5            | 10-5                    | E <sub>15</sub> | "     | I <sub>OS1</sub> = E <sub>15</sub>                                  | See figure 9 waveforms | -4.00  | -1.00 | A    |
|                                  | V <sub>OUT5</sub> (RECOV) | 17       | 10                      | ---                 | 15                                                    | ---   | ---  | -1.0 | 15  | K4,K5            | 9-11                    | E <sub>16</sub> | "     | V <sub>OUT5</sub> = E <sub>16</sub>                                 |                        | 4.75   | 5.25  | V    |
|                                  | I <sub>OS2</sub>          | 18       | 30                      | ---                 | 30                                                    | ---   | ---  | -0   | 0   | K5               | 10-5                    | E <sub>17</sub> | "     | I <sub>OS2</sub> = E <sub>17</sub>                                  |                        |        | -0.02 | A    |
|                                  | V <sub>OUT6</sub> (RECOV) | 19       | 30                      | ---                 | 30                                                    | ---   | ---  | -0   | 15  | K5               | 9-11                    | E <sub>18</sub> | "     | V <sub>OUT6</sub> = E <sub>18</sub>                                 |                        |        | 5.25  | V    |
|                                  | I <sub>CTL</sub>          | 20       | 10                      | -500                | 10                                                    | -4.95 | ---  | ---  | --- | K1,K2            | 12-13                   | E <sub>19</sub> | "     | I <sub>CTL</sub> = E <sub>19</sub> / 33200                          | -2.00                  |        | -0.01 | μA   |
|                                  | V <sub>START</sub>        | 21       | 8                       | -1000               | 15                                                    | ---   | ---  | -0.8 | --- | K4               | 9-11                    | E <sub>20</sub> | "     | V <sub>OUT</sub> = E <sub>20</sub>                                  | See figure 9 waveforms | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT7</sub>         | 22       | 38                      | -1000               | 38                                                    | ---   | ---  | ---  | --- | None             | "                       | E <sub>21</sub> | "     | V <sub>OUT7</sub> = E <sub>21</sub>                                 | R1 = 4.50k ±0.1%       | 28.5   | 31.5  | V    |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>         | 23       | 8                       | -5                  | 8                                                     | ---   | ---  | ---  | --- | None             | 9-11                    | E <sub>22</sub> | V     | V <sub>OUT1</sub> = E <sub>22</sub>                                 |                        | 4.75   | 5.25  | V    |
|                                  | V <sub>OUT2</sub>         | 24       | 8                       | -1000               | 8                                                     | -9.95 | ---  | ---  | --- | "                | "                       | E <sub>23</sub> | "     | V <sub>OUT2</sub> = E <sub>23</sub>                                 |                        | "      | "     | "    |
|                                  | V <sub>OUT3</sub>         | 25       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>24</sub> | "     | V <sub>OUT3</sub> = E <sub>24</sub>                                 |                        | "      | "     | "    |
|                                  | V <sub>OUT4</sub>         | 26       | 30                      | -100                | 30                                                    | -0.95 | ---  | ---  | --- | "                | "                       | E <sub>25</sub> | "     | V <sub>OUT4</sub> = E <sub>25</sub>                                 |                        | "      | "     | "    |
|                                  | V <sub>RLINE1</sub>       | 27       | 8                       | -100                | 8                                                     | -0.95 | ---  | ---  | --- | "                | "                       | E <sub>26</sub> | "     | V <sub>RLINE1</sub> = E <sub>26</sub> – E <sub>25</sub>             | See figure 9 waveforms | -150   | 150   | mV   |
|                                  | V <sub>RLINE2</sub>       | 28       | 8                       | -500                | 8                                                     | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>27</sub> | "     | ---                                                                 |                        | ---    | "     |      |
|                                  | V <sub>RLINE2</sub>       | 29       | 25                      | -500                | 25                                                    | -4.95 | ---  | ---  | --- | "                | "                       | E <sub>28</sub> | "     | V <sub>RLINE2</sub> = E <sub>27</sub> – E <sub>28</sub>             |                        | -50    | 50    | "    |
|                                  | V <sub>RLOAD1</sub>       | 30       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | "                       | E <sub>29</sub> | "     | ---                                                                 | See figure 9 waveforms | ---    | ---   | "    |
|                                  | V <sub>RLOAD1</sub>       | 31       | 10                      | -1000               | 10                                                    | -9.95 | ---  | ---  | --- | "                | "                       | E <sub>30</sub> | "     | V <sub>RLOAD1</sub> = E <sub>29</sub> – E <sub>30</sub>             |                        | -100   | 100   | "    |
|                                  | V <sub>RLOAD2</sub>       | 32       | ---                     | ---                 | ---                                                   | ---   | ---  | ---  | --- | "                | ---                     | ---             | "     | V <sub>RLOAD2</sub> = E <sub>24</sub> – E <sub>25</sub>             |                        | -150   | 150   | "    |
|                                  | I <sub>SCD1</sub>         | 33       | 10                      | -5                  | 10                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>31</sub> | "     | I <sub>SCD1</sub> = E <sub>31</sub> / 2000                          |                        | -7.0   | -0.5  | mA   |
|                                  | I <sub>SCD2</sub>         | 34       | 30                      | -5                  | 30                                                    | ---   | ---  | ---  | --- | "                | 12-13                   | E <sub>32</sub> | "     | I <sub>SCD2</sub> = E <sub>32</sub> / 2000                          |                        | -0.5   | -0.5  | "    |

TABLE III. Group A inspection for all device type 02 – Continued.

| Subgroup                         | Symbol                                | Test no.                              | See figure 9            |                     |                                                       |       |       |      |      | Relays energized | Measurement sense lines |                 |                 | Equation                                                                  | Notes                                                                     | Limits                 |               | Unit          |        |
|----------------------------------|---------------------------------------|---------------------------------------|-------------------------|---------------------|-------------------------------------------------------|-------|-------|------|------|------------------|-------------------------|-----------------|-----------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------|---------------|---------------|--------|
|                                  |                                       |                                       | Test conditions         |                     | Applied test voltages (volts) (Hi - Lo pin potential) |       |       |      |      |                  | Pins                    | Value           | Units           |                                                                           |                                                                           | Min                    | Max           |               |        |
|                                  |                                       |                                       | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11  | 7-2  | 8-2  |                  |                         |                 |                 |                                                                           |                                                                           |                        |               |               |        |
| 2<br><br>T <sub>A</sub> = +125°C | ΔI <sub>SCD</sub> (LINE)              | 35                                    | 8                       | -5                  | 8                                                     | ---   | ---   | ---  | ---  | None             | 12-13                   | E <sub>33</sub> | V               | ΔI <sub>SCD</sub> = E <sub>33</sub> – E <sub>32</sub> / 2000 (LINE)       |                                                                           |                        | 1.0           | mA            |        |
|                                  | ΔI <sub>SCD</sub> (LOAD)              | 36                                    | 10                      | -1000               | 10                                                    | -9.95 | ---   | ---  | ---  | "                | "                       | E <sub>34</sub> | "               | ΔI <sub>SCD</sub> = E <sub>31</sub> – E <sub>34</sub> / 2000 (LOAD)       | -1.0                                                                      |                        | 0.5           | "             |        |
|                                  | I <sub>OS1</sub><br>V <sub>OUT5</sub> | 37                                    | 10                      | ---                 | 15                                                    | ---   | ---   | 1.0  | 0    | K4,K5            | 10-5                    | E <sub>35</sub> | "               | I <sub>OS1</sub> = E <sub>35</sub><br>V <sub>OUT5</sub> = E <sub>36</sub> | See figure 9 waveforms                                                    | -4.00<br>4.75          | -1.00<br>5.25 | A             |        |
|                                  |                                       | 38                                    | 10                      | ---                 | 15                                                    | ---   | ---   | 1.0  | 15   | K4,K5            | 9-11                    | E <sub>36</sub> | "               |                                                                           |                                                                           |                        |               | V             |        |
|                                  | (RECOV)                               | I <sub>OS2</sub><br>V <sub>OUT6</sub> | 39                      | 30                  | ---                                                   | 30    | ---   | ---  | -0   | 0                | K5                      | 10-5            | E <sub>37</sub> | "                                                                         | I <sub>OS2</sub> = E <sub>37</sub><br>V <sub>OUT6</sub> = E <sub>38</sub> |                        |               | -0.02<br>5.25 | A<br>V |
|                                  |                                       | 40                                    | 30                      | ---                 | 30                                                    | ---   | ---   | -0   | 15   | K5               | 9-11                    | E <sub>38</sub> | "               | V                                                                         |                                                                           |                        |               |               |        |
|                                  | (RECOV)                               | I <sub>CTL</sub>                      | 41                      | 10                  | -500                                                  | 10    | -4.95 | ---  | ---  | ---              | K1,K2                   | 12-13           | E <sub>39</sub> | "                                                                         | I <sub>CTL</sub> = E <sub>39</sub> / 33200                                | -2.00                  |               | -0.01         | μA     |
| V <sub>START</sub>               |                                       | 42                                    | 8                       | -1000               | 15                                                    | ---   | ---   | -0.8 | ---  | K4               | 9-11                    | E <sub>40</sub> | "               | V <sub>OUT</sub> = E <sub>40</sub>                                        | See figure 9 waveforms                                                    | 4.75                   | 5.25          | V             |        |
|                                  | V <sub>OUT7</sub>                     | 43                                    | 38                      | -1000               | 38                                                    | ---   | ---   | ---  | ---  | None             | "                       | E <sub>41</sub> | "               | V <sub>OUT7</sub> = E <sub>41</sub>                                       | R1 = 4.89k ±0.1%                                                          | 28.5                   | 31.5          | V             |        |
| T <sub>A</sub> = +150°C          | V <sub>OUT8</sub>                     | 44                                    | 10                      | -5                  | 10                                                    | ---   | ---   | ---  | ---  | "                | "                       | E <sub>42</sub> | "               | V <sub>OUT8</sub> = E <sub>42</sub>                                       |                                                                           | 4.70                   | 5.30          | "             |        |
| 3<br><br>T <sub>A</sub> = -55°C  | V <sub>OUT1</sub>                     | 45                                    | 8                       | -5                  | 8                                                     | ---   | ---   | ---  | ---  | None             | 9-11                    | E <sub>43</sub> | V               | V <sub>OUT1</sub> = E <sub>43</sub>                                       |                                                                           | 4.75                   | 5.25          | V             |        |
|                                  | V <sub>OUT2</sub>                     | 46                                    | 8                       | -1000               | 8                                                     | -9.95 | ---   | ---  | ---  | "                | "                       | E <sub>44</sub> | "               | V <sub>OUT2</sub> = E <sub>44</sub>                                       |                                                                           |                        | "             | "             |        |
|                                  | V <sub>OUT3</sub>                     | 47                                    | 30                      | -5                  | 30                                                    | ---   | ---   | ---  | ---  | "                | "                       | E <sub>45</sub> | "               | V <sub>OUT3</sub> = E <sub>45</sub>                                       |                                                                           |                        | "             | "             |        |
|                                  | V <sub>OUT4</sub>                     | 48                                    | 30                      | -100                | 30                                                    | -0.95 | ---   | ---  | ---  | "                | "                       | E <sub>46</sub> | "               | V <sub>OUT4</sub> = E <sub>46</sub>                                       |                                                                           |                        | "             | "             |        |
|                                  | V <sub>RLINE1</sub>                   | 49                                    | 8                       | -100                | 8                                                     | -0.95 | ---   | ---  | ---  | "                | "                       | E <sub>47</sub> | "               | V <sub>RLINE1</sub> = E <sub>47</sub> – E <sub>46</sub>                   | See figure 9 waveforms                                                    | -150<br>---            | 150<br>---    | mV            |        |
|                                  | V <sub>RLINE2</sub>                   | 50                                    | 8                       | -500                | 8                                                     | -4.95 | ---   | ---  | ---  | "                | "                       | E <sub>48</sub> | "               | ---                                                                       |                                                                           |                        |               | "             |        |
|                                  | V <sub>RLINE2</sub>                   | 51                                    | 25                      | -500                | 25                                                    | -4.95 | ---   | ---  | ---  | "                | "                       | E <sub>49</sub> | "               | V <sub>RLINE2</sub> = E <sub>48</sub> – E <sub>49</sub>                   |                                                                           | -50                    | 50            | "             |        |
|                                  | V <sub>RLOAD1</sub>                   | 52                                    | 10                      | -5                  | 10                                                    | ---   | ---   | ---  | ---  | "                | "                       | E <sub>50</sub> | "               | ---                                                                       | See figure 9 waveforms                                                    | ---                    | ---           | "             |        |
|                                  | V <sub>RLOAD1</sub>                   | 53                                    | 10                      | -1000               | 10                                                    | -9.95 | ---   | ---  | ---  | "                | "                       | E <sub>51</sub> | "               | V <sub>RLOAD1</sub> = E <sub>50</sub> – E <sub>51</sub>                   |                                                                           |                        |               | -100          | 100    |
|                                  | V <sub>RLOAD2</sub>                   | 54                                    | ---                     | ---                 | ---                                                   | ---   | ---   | ---  | ---  | "                | ---                     | ---             | "               | V <sub>RLOAD2</sub> = E <sub>45</sub> – E <sub>46</sub>                   |                                                                           | -150                   | 150           | "             |        |
|                                  | I <sub>SCD1</sub>                     | 55                                    | 10                      | -5                  | 10                                                    | ---   | ---   | ---  | ---  | "                | 12-13                   | E <sub>52</sub> | "               | I <sub>SCD1</sub> = E <sub>52</sub> / 2000                                |                                                                           | -7.0                   | -0.5          | mA            |        |
|                                  | I <sub>SCD2</sub>                     | 56                                    | 30                      | -5                  | 30                                                    | ---   | ---   | ---  | ---  | "                | "                       | E <sub>53</sub> | "               | I <sub>SCD2</sub> = E <sub>53</sub> / 2000                                |                                                                           |                        | -0.5          | "             |        |
|                                  | ΔI <sub>SCD</sub> (LINE)              | 57                                    | 8                       | -5                  | 8                                                     | ---   | ---   | ---  | ---  | None             | 12-13                   | E <sub>54</sub> | V               | ΔI <sub>SCD</sub> = E <sub>54</sub> – E <sub>53</sub> / 2000 (LINE)       |                                                                           |                        | 1.0           | mA            |        |
|                                  | ΔI <sub>SCD</sub> (LOAD)              | 58                                    | 10                      | -1000               | 10                                                    | -9.95 | ---   | ---  | ---  | "                | "                       | E <sub>55</sub> | "               | ΔI <sub>SCD</sub> = E <sub>52</sub> – E <sub>55</sub> / 2000 (LOAD)       | -8.0<br>-1.0                                                              |                        | 0.5           | "             |        |
|                                  | I <sub>OS1</sub><br>V <sub>OUT5</sub> | 59                                    | 10                      | ---                 | 15                                                    | ---   | ---   | -1.0 | 0    | K4,K5            | 10-5                    | E <sub>56</sub> | "               | I <sub>OS1</sub> = E <sub>56</sub><br>V <sub>OUT5</sub> = E <sub>57</sub> | See figure 9 waveforms                                                    | -4.00<br>4.75          | -1.00<br>5.25 | A             |        |
|                                  |                                       | 60                                    | 10                      | ---                 | 15                                                    | ---   | ---   | -1.0 | 15   | K4,K5            | 9-11                    | E <sub>57</sub> | "               |                                                                           |                                                                           |                        |               | V             |        |
|                                  | (RECOV)                               | I <sub>OS2</sub><br>V <sub>OUT6</sub> | 61                      | 30                  | ---                                                   | 30    | ---   | ---  | ---  | 0                | K5                      | 10-5            | E <sub>58</sub> | "                                                                         | I <sub>OS2</sub> = E <sub>58</sub><br>V <sub>OUT6</sub> = E <sub>59</sub> |                        |               | -0.02<br>5.25 | A<br>V |
|                                  |                                       | 62                                    | 30                      | ---                 | 30                                                    | ---   | ---   | ---  | 15   | K5               | 9-11                    | E <sub>59</sub> | "               | V                                                                         |                                                                           |                        |               |               |        |
|                                  | (RECOV)                               | I <sub>CTL</sub>                      | 63                      | 10                  | -500                                                  | 10    | -4.95 | ---  | ---  | ---              | K1,K2                   | 12-13           | E <sub>60</sub> | "                                                                         | I <sub>CTL</sub> = E <sub>60</sub> / 33200                                | -2.00                  |               | -0.01         | μA     |
|                                  |                                       | V <sub>START</sub>                    | 64                      | 8                   | -1000                                                 | 15    | ---   | ---  | -0.8 | ---              | K4                      | 9-11            | E <sub>61</sub> | "                                                                         | V <sub>OUT</sub> = E <sub>61</sub>                                        | See figure 9 waveforms | 4.75          | 5.25          | V      |
|                                  |                                       | V <sub>OUT7</sub>                     | 65                      | 38                  | -1000                                                 | 38    | ---   | ---  | ---  | ---              | None                    | "               | E <sub>62</sub> | "                                                                         | V <sub>OUT7</sub> = E <sub>62</sub>                                       | R1 = 4.89k ±0.1%       | 28.5          | 31.5          | V      |

TABLE III. Group A inspection for all device type 02 – Continued.

| Subgroup                        | Symbol                           | Test no. | Test conditions                                                    |                                                                | Measurement sense lines    |       |       | Equation                                           | Notes         | Limits |     | Unit  |
|---------------------------------|----------------------------------|----------|--------------------------------------------------------------------|----------------------------------------------------------------|----------------------------|-------|-------|----------------------------------------------------|---------------|--------|-----|-------|
|                                 |                                  |          | Input voltage                                                      | Load current                                                   | Symbol                     | Value | Units |                                                    |               | Min    | Max |       |
| 4<br><br>T <sub>A</sub> = +25°C | $\Delta V_{IN} / \Delta V_{OUT}$ | 66       | V <sub>IN</sub> = 10 V<br><br>e <sub>i</sub> = 1.0 Vrms at 2400 Hz | I <sub>L</sub> = -350 mA                                       | e <sub>orms</sub><br>E     | 63    | Vrms  | $\Delta V_{IN} / \Delta V_{OUT} = -20 \log E_{63}$ | See figure 11 | 45     | --- | dB    |
| 7<br><br>T <sub>A</sub> = +25°C | V <sub>NO</sub>                  | 67       | V <sub>IN</sub> = 10 V                                             | I <sub>L</sub> = -100 mA                                       | e <sub>orms</sub>          | 64    | Vrms  | V <sub>NO</sub> = E <sub>64</sub>                  | See figure 12 | ---    | 250 | μVrms |
|                                 | $\Delta V_{OUT} / \Delta V_{IN}$ | 68       | V <sub>IN</sub> = 10 V<br><br>$\Delta V_{IN} = 3.0 \text{ V}$      | I <sub>L</sub> = -5 mA                                         | V <sub>OUT</sub><br>E<br>E | 65    | V     | $\Delta V_{OUT} / \Delta V_{IN} = E_{65} / 3$      | See figure 13 | ---    | 30  | mV/V  |
|                                 | $\Delta V_{OUT} / \Delta I_L$    | 69       | V <sub>IN</sub> = 10 V                                             | I <sub>L</sub> = -100 mA<br><br>$\Delta I_L = -400 \text{ mA}$ | V <sub>OUT</sub><br>E      | 66    | V     | $\Delta V_{OUT} / \Delta I_L = E_{66} / 400$       | See figure 14 | ---    | 2.5 | mV/mA |

TABLE III. Group A inspection for all device type 03.

| Subgroup                         | Symbol                   | Test no.           | See figure 9            |                     |                                                       |       |      |     |        | Relays energized | Measurement sense lines |                 |                 | Equation                                                               | Notes                                       | Limits                 |      | Unit  |    |
|----------------------------------|--------------------------|--------------------|-------------------------|---------------------|-------------------------------------------------------|-------|------|-----|--------|------------------|-------------------------|-----------------|-----------------|------------------------------------------------------------------------|---------------------------------------------|------------------------|------|-------|----|
|                                  |                          |                    | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |       |      |     |        |                  | Pins                    | Value           | Units           |                                                                        |                                             | Min                    | Max  |       |    |
|                                  |                          |                    | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11 | 7-2 | 8-2    |                  |                         |                 |                 |                                                                        |                                             |                        |      |       |    |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>        | 1                  | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | --- | ---    | None             | 9-11                    | E <sub>1</sub>  | V               | V <sub>OUT1</sub> = E <sub>1</sub>                                     |                                             | 1.20                   | 1.30 | V     |    |
|                                  | V <sub>OUT2</sub>        | 2                  | 4.25                    | -500                | 4.25                                                  | -4.95 | ---  | --- | ---    | "                | "                       | E <sub>2</sub>  | "               | V <sub>OUT2</sub> = E <sub>2</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT3</sub>        | 3                  | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | --- | ---    | "                | "                       | E <sub>3</sub>  | "               | V <sub>OUT3</sub> = E <sub>3</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT4</sub>        | 4                  | 41.25                   | -50                 | 41.25                                                 | -0.45 | ---  | --- | ---    | "                | "                       | E <sub>4</sub>  | "               | V <sub>OUT4</sub> = E <sub>4</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>RLINE</sub>       | 5                  | ---                     | ---                 | ---                                                   | ---   | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>1</sub> – E <sub>3</sub>                   | See figure 9 waveforms                      | -9                     | 9    | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 6                  | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | --- | ---    | "                | "                       | E <sub>5</sub>  | "               | ---                                                                    | See figure 9 waveforms                      | -12                    | -12  | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 7                  | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | --- | ---    | "                | "                       | E <sub>6</sub>  | "               | V <sub>RLOAD1</sub> = E <sub>5</sub> – E <sub>6</sub>                  |                                             | -12                    | 12   | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 8                  | ---                     | ---                 | ---                                                   | ---   | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>                  | See figure 9 waveforms t = 20.5 ms          | -12                    | 12   | "     |    |
|                                  | V <sub>RTH</sub>         | 9                  | 14.6                    | -500                | 14.6                                                  | -7.45 | ---  | --- | ---    | "                | "                       | E <sub>7</sub>  | "               | V <sub>RTH</sub> = E <sub>7</sub>                                      |                                             |                        |      | "     |    |
|                                  | I <sub>ADJ</sub>         | 10                 | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | --- | ---    | K2               | 12-13                   | E <sub>8</sub>  | mV              | I <sub>ADJ</sub> = E <sub>8</sub> / 2000                               |                                             |                        | -15  | μA    |    |
|                                  | I <sub>ADJ</sub>         | 11                 | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | --- | ---    | "                | "                       | E <sub>9</sub>  | "               | I <sub>ADJ</sub> = E <sub>9</sub> / 2000                               |                                             |                        | -15  | "     |    |
|                                  | ΔI <sub>ADJ</sub> (LINE) | 12                 | ---                     | ---                 | ---                                                   | ---   | ---  | --- | ---    | "                | "                       | ---             | "               | ΔI <sub>ADJ</sub> = (E <sub>8</sub> – E <sub>9</sub> ) / 2000 (LINE)   | -100                                        |                        | 5    | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 13                 | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | --- | ---    | "                | "                       | E <sub>10</sub> | "               | ΔI <sub>ADJ</sub> = (E <sub>10</sub> – E <sub>11</sub> ) / 2000        | -100                                        |                        | 5    | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 14                 | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | --- | ---    | "                | "                       | E <sub>11</sub> | "               | ΔI <sub>ADJ</sub> = (E <sub>10</sub> – E <sub>11</sub> ) / 2000 (LOAD) | -5                                          |                        |      | "     |    |
|                                  | (LOAD)                   | I <sub>OS1</sub>   | 15                      | 4.25                | ---                                                   | 10    | ---  | --- | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>12</sub> | V                                                                      | I <sub>OS1</sub> = E <sub>12</sub>          | See figure 9 waveforms | -1.8 | -0.5  | A  |
|                                  | (LOAD)                   | V <sub>OUT5</sub>  | 16                      | 4.25                | ---                                                   | 10    | ---  | --- | -0.425 | 15               | K4,K5                   | 9-11            | E <sub>13</sub> | "                                                                      | V <sub>OUT5</sub> = E <sub>13</sub> (RECOV) |                        | 1.20 | 1.30  | V  |
|                                  | (RECOV)                  | I <sub>OS2</sub>   | 17                      | 40                  | ---                                                   | 40    | ---  | --- | ---    | 0                | K5                      | 10-5            | E <sub>14</sub> | "                                                                      | I <sub>OS2</sub> = E <sub>14</sub>          |                        |      | -0.05 | A  |
|                                  | (RECOV)                  | V <sub>OUT6</sub>  | 18                      | 40                  | ---                                                   | 40    | ---  | --- | ---    | 15               | K5                      | 9-11            | E <sub>15</sub> | "                                                                      | V <sub>OUT6</sub> = E <sub>15</sub> (RECOV) |                        |      | 1.30  | V  |
|                                  | (RECOV)                  | I <sub>Q1</sub>    | 19                      | 4.25                | ---                                                   | 4.25  | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>16</sub> | "                                                                      | I <sub>Q1</sub> = E <sub>16</sub> / 2000    | -0.5                   |      | -0.05 | mA |
|                                  |                          | I <sub>Q2</sub>    | 20                      | 14.25               | ---                                                   | 14.25 | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>17</sub> | "                                                                      | I <sub>Q2</sub> = E <sub>17</sub> / 2000    | 1.20                   |      | -0.05 | "  |
|                                  |                          | I <sub>Q3</sub>    | 21                      | 41.25               | ---                                                   | 41.25 | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>18</sub> | "                                                                      | I <sub>Q3</sub> = E <sub>18</sub> / 2000    |                        |      | -0.2  | "  |
|                                  |                          | V <sub>START</sub> | 22                      | 4.25                | -500                                                  | 10    | 0    | --- | -0.425 | ---              | K4                      | 9-11            | E <sub>19</sub> | "                                                                      | V <sub>START</sub> = E <sub>19</sub>        | See figure 9 waveforms | 1.20 | 1.30  | V  |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>        | 23                 | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | --- | ---    | None             | 9-11                    | E <sub>20</sub> | V               | V <sub>OUT1</sub> = E <sub>20</sub>                                    | -5.0                                        | 1.20                   | 1.30 | V     |    |
|                                  | V <sub>OUT2</sub>        | 24                 | 4.25                    | -500                | 4.25                                                  | -4.95 | ---  | --- | ---    | "                | "                       | E <sub>21</sub> | "               | V <sub>OUT2</sub> = E <sub>21</sub>                                    |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT3</sub>        | 25                 | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | --- | ---    | "                | "                       | E <sub>22</sub> | "               | V <sub>OUT3</sub> = E <sub>22</sub>                                    |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT4</sub>        | 26                 | 41.25                   | -50                 | 41.25                                                 | -0.45 | ---  | --- | ---    | "                | "                       | E <sub>23</sub> | "               | V <sub>OUT4</sub> = E <sub>23</sub>                                    |                                             | "                      | "    | "     |    |
|                                  | V <sub>RLINE1</sub>      | 27                 | ---                     | ---                 | ---                                                   | ---   | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>20</sub> – E <sub>22</sub>                 | See figure 9 waveforms                      | -23                    | 23   | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 28                 | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | --- | ---    | "                | "                       | E <sub>24</sub> | "               | ---                                                                    | See figure 9                                | ---                    | ---  | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 29                 | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | --- | ---    | "                | "                       | E <sub>25</sub> | "               | V <sub>RLOAD1</sub> = E <sub>24</sub> – E <sub>25</sub>                |                                             | -12                    | 12   | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 30                 | ---                     | ---                 | ---                                                   | ---   | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>22</sub> – E <sub>23</sub>                |                                             | 12                     | 12   | "     |    |

TABLE III. Group A inspection for all device type 03 – Continued.

| Subgroup                | Symbol                   | Test no. | See figure 9            |                     |                                                       |       |      |        |     | Relays energized | Measurement sense lines |                 |       | Equation                                                               | Notes                  | Limits |       | Unit |
|-------------------------|--------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|-------|------|--------|-----|------------------|-------------------------|-----------------|-------|------------------------------------------------------------------------|------------------------|--------|-------|------|
|                         |                          |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |       |      |        |     |                  | Pins                    | Value           | Units |                                                                        |                        | Min    | Max   |      |
|                         |                          |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5   | 6-11 | 7-2    | 8-2 |                  |                         |                 |       |                                                                        |                        |        |       |      |
| 2                       | I <sub>ADJ</sub>         | 31       | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | ---    | --- | K2               | 12-13                   | E <sub>26</sub> | mV    | I <sub>ADJ</sub> = E <sub>26</sub> / 2000                              |                        |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 32       | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | ---    | --- | "                | "                       | E <sub>27</sub> | "     | I <sub>ADJ</sub> = E <sub>27</sub> / 2000                              |                        |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 33       | ---                     | ---                 | ---                                                   | ---   | ---  | ---    | --- | "                | "                       | ---             | "     | I <sub>ADJ</sub> = (E <sub>26</sub> – E <sub>27</sub> ) / 2000 (LINE)  | -100                   |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 34       | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | ---    | --- | "                | "                       | E <sub>28</sub> | "     |                                                                        | -100                   |        |       |      |
|                         | ΔI <sub>ADJ</sub>        | 35       | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | ---    | --- | "                | "                       | E <sub>29</sub> | "     | I <sub>ADJ</sub> = (E <sub>28</sub> – E <sub>29</sub> ) / 2000 (LOAD)  | -5                     |        | 5     | "    |
|                         | I <sub>OS1</sub>         | 36       | 4.25                    | ---                 | 10                                                    | ---   | ---  | 0.425  | 0   | K4,K5            | 10-5                    | E <sub>30</sub> | V     | I <sub>OS1</sub> = E <sub>30</sub>                                     | See figure 9 waveforms | -1.8   | -0.5  | A    |
|                         | (LOAD)V <sub>OUT5</sub>  | 37       | 4.25                    | ---                 | 10                                                    | ---   | ---  | 0.425  | 15  | K4,K5            | 9-11                    | E <sub>31</sub> | "     | V <sub>OUT5</sub> = E <sub>31</sub> (RECOV)                            |                        | 1.20   | 1.30  | V    |
|                         | I <sub>OS2</sub>         | 38       | 40                      | ---                 | 40                                                    | ---   | ---  | ---    | 0   | K5               | 10-5                    | E <sub>32</sub> | "     | I <sub>OS2</sub> = E <sub>32</sub>                                     |                        |        | -0.05 | A    |
|                         | (RECOV)V <sub>OUT6</sub> | 39       | 40                      | ---                 | 40                                                    | ---   | ---  | ---    | 15  | K5               | 9-11                    | E <sub>33</sub> | "     | V <sub>OUT6</sub> = E <sub>33</sub> (RECOV)                            |                        |        | 1.30  | V    |
|                         | I <sub>Q1</sub>          | 40       | 4.25                    | ---                 | 4.25                                                  | 0     | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>34</sub> | "     | I <sub>Q1</sub> = E <sub>34</sub> / 2000                               | -0.5                   |        | -0.05 | mA   |
|                         | (RECOV)I <sub>Q2</sub>   | 41       | 14.25                   | ---                 | 14.25                                                 | 0     | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>35</sub> | "     | I <sub>Q2</sub> = E <sub>35</sub> / 2000                               | 1.20                   |        | -0.05 | "    |
|                         | I <sub>Q3</sub>          | 42       | 41.25                   | ---                 | 41.25                                                 | 0     | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>36</sub> | "     | I <sub>Q3</sub> = E <sub>36</sub> / 2000                               |                        |        | -0.2  | "    |
|                         | V <sub>START</sub>       | 43       | 4.25                    | -500                | 10                                                    | 0     | ---  | -0.425 | --- | K4               | 9-11                    | E <sub>37</sub> | "     | V <sub>START</sub> = E <sub>37</sub>                                   | See figure 9 waveforms | 1.20   | 1.30  | V    |
| T <sub>A</sub> = +150°C | V <sub>OUT7</sub>        | 44       | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | ---    | --- | None             | "                       | E <sub>38</sub> | "     | V <sub>OUT7</sub> = E <sub>38</sub>                                    | -5.0                   | 1.20   | 1.30  | V    |
| 3                       | V <sub>OUT1</sub>        | 45       | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | ---    | --- | None             | 9-11                    | E <sub>39</sub> | V     | V <sub>OUT1</sub> = E <sub>39</sub>                                    |                        | 1.20   | 1.30  | V    |
|                         | V <sub>OUT2</sub>        | 46       | 4.25                    | -500                | 4.25                                                  | -4.95 | ---  | ---    | --- | "                | "                       | E <sub>40</sub> | "     | V <sub>OUT2</sub> = E <sub>40</sub>                                    |                        |        | "     | "    |
|                         | V <sub>OUT3</sub>        | 47       | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | ---    | --- | "                | "                       | E <sub>41</sub> | "     | V <sub>OUT3</sub> = E <sub>41</sub>                                    |                        |        | "     | "    |
|                         | V <sub>OUT4</sub>        | 48       | 41.25                   | -50                 | 41.25                                                 | -0.45 | ---  | ---    | --- | "                | "                       | E <sub>42</sub> | "     | V <sub>OUT4</sub> = E <sub>42</sub>                                    |                        |        | "     | "    |
|                         | V <sub>RLINE1</sub>      | 49       | ---                     | ---                 | ---                                                   | ---   | ---  | ---    | --- | "                | "                       | ---             | "     | V <sub>RLINE</sub> = E <sub>39</sub> – E <sub>41</sub>                 | See figure 9 waveforms | -23    | 23    | mV   |
|                         | V <sub>RLOAD1</sub>      | 50       | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | ---    | --- | "                | "                       | E <sub>43</sub> | "     | ---                                                                    | See figure 9           | ---    | ---   | "    |
|                         | V <sub>RLOAD1</sub>      | 51       | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | ---    | --- | "                | "                       | E <sub>44</sub> | "     | V <sub>RLOAD1</sub> = E <sub>43</sub> – E <sub>44</sub>                |                        | -12    | 12    | "    |
|                         | V <sub>RLOAD2</sub>      | 52       | ---                     | ---                 | ---                                                   | ---   | ---  | ---    | --- | "                | "                       | ---             | "     | V <sub>RLOAD2</sub> = E <sub>41</sub> – E <sub>42</sub>                |                        |        | 12    | "    |
|                         | I <sub>ADJ</sub>         | 53       | 4.25                    | -5                  | 4.25                                                  | 0     | ---  | ---    | --- | K2               | 12-13                   | E <sub>45</sub> | mV    | I <sub>ADJ</sub> = E <sub>45</sub> / 2000                              |                        |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 54       | 41.25                   | -5                  | 41.25                                                 | 0     | ---  | ---    | --- | "                | "                       | E <sub>46</sub> | "     | I <sub>ADJ</sub> = E <sub>46</sub> / 2000                              |                        |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 55       | ---                     | ---                 | ---                                                   | ---   | ---  | ---    | --- | "                | "                       | ---             | "     | ΔI <sub>ADJ</sub> = (E <sub>45</sub> – E <sub>46</sub> ) / 2000 (LINE) | -12<br>-100            |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 56       | 6.25                    | -5                  | 6.25                                                  | 0     | ---  | ---    | --- | "                | "                       | E <sub>47</sub> | "     |                                                                        | -100                   |        |       |      |
|                         | ΔI <sub>ADJ</sub>        | 57       | 6.25                    | -500                | 6.25                                                  | -4.95 | ---  | ---    | --- | "                | "                       | E <sub>48</sub> | "     | ΔI <sub>ADJ</sub> = (E <sub>47</sub> – E <sub>48</sub> ) / 2000 (LINE) | -5                     |        | 5     | "    |

TABLE III. Group A inspection for all device type 03 – Continued.

| Subgroup                                       | Symbol                               | Test no. | See figure 9                                                         |                     |                                                       |     |                                                          |        |     | Relays energized        | Measurement sense lines |                  |                                                                | Equation                                    | Notes                  | Limits |       | Unit |
|------------------------------------------------|--------------------------------------|----------|----------------------------------------------------------------------|---------------------|-------------------------------------------------------|-----|----------------------------------------------------------|--------|-----|-------------------------|-------------------------|------------------|----------------------------------------------------------------|---------------------------------------------|------------------------|--------|-------|------|
|                                                |                                      |          | Test conditions                                                      |                     | Applied test voltages (volts) (Hi – Lo pin potential) |     |                                                          |        |     |                         | Pins                    | Value            | Units                                                          |                                             |                        | Min    | Max   |      |
|                                                |                                      |          | V <sub>IN</sub> (volts)                                              | I <sub>L</sub> (mA) | 1-2                                                   | 4-5 | 6-11                                                     | 7-2    | 8-2 |                         |                         |                  |                                                                |                                             |                        |        |       |      |
| 3<br><br>T <sub>A</sub> = -55°C<br><br>(RECOV) | I <sub>OS1</sub>                     | 58       | 4.25                                                                 | ---                 | 10                                                    | --- | ---                                                      | -0.425 | 0   | K4,K5                   | 10-5                    | E <sub>49</sub>  | V                                                              | I <sub>OS1</sub> = E <sub>49</sub>          | See figure 9 waveforms | -1.8   | -0.5  | A    |
|                                                | V <sub>OUT5</sub> (RECOV)            | 59       | 4.25                                                                 | ---                 | 10                                                    | --- | ---                                                      | -0.425 | 15  | K4,K5                   | 9-11                    | E <sub>50</sub>  | "                                                              | V <sub>OUT5</sub> = E <sub>50</sub> (RECOV) |                        | 1.20   | 1.30  | V    |
|                                                | I <sub>OS2</sub>                     | 60       | 40                                                                   | ---                 | 40                                                    | --- | ---                                                      | ---    | 0   | K5                      | 10-5                    | E <sub>51</sub>  | "                                                              | I <sub>OS2</sub> = E <sub>51</sub>          |                        |        | -0.05 | A    |
|                                                | V <sub>OUT6</sub>                    | 61       | 40                                                                   | ---                 | 40                                                    | --- | ---                                                      | ---    | 15  | K5                      | 9-11                    | E <sub>52</sub>  | "                                                              | V <sub>OUT6</sub> = E <sub>52</sub> (RECOV) |                        |        | 1.30  | V    |
|                                                | I <sub>Q1</sub>                      | 62       | 4.25                                                                 | ---                 | 4.25                                                  | 0   | 1.4                                                      | ---    | --- | K3                      | 12-13                   | E <sub>53</sub>  | "                                                              | I <sub>Q1</sub> = E <sub>53</sub> / 2000    | -0.5                   |        | -0.05 | mA   |
|                                                | I <sub>Q2</sub>                      | 63       | 14.25                                                                | ---                 | 14.25                                                 | 0   | 1.4                                                      | ---    | --- | K3                      | 12-13                   | E <sub>54</sub>  | "                                                              | I <sub>Q2</sub> = E <sub>54</sub> / 2000    | 1.20                   |        | -0.05 | "    |
|                                                | I <sub>Q3</sub>                      | 64       | 41.25                                                                | ---                 | 41.25                                                 | 0   | 1.4                                                      | ---    | --- | K3                      | 12-13                   | E <sub>55</sub>  | "                                                              | I <sub>Q3</sub> = E <sub>55</sub> / 2000    | 3.0                    |        | -0.2  | "    |
|                                                | V <sub>START</sub>                   | 65       | 4.25                                                                 | -500                | 10                                                    | 0   | ---                                                      | -0.425 | --- | K4                      | 9-11                    | E <sub>56</sub>  | "                                                              | V <sub>START</sub> = E <sub>56</sub>        | See figure 9 waveforms | 1.20   | 1.30  | V    |
|                                                |                                      |          |                                                                      |                     |                                                       |     |                                                          |        |     |                         |                         |                  |                                                                |                                             |                        |        |       |      |
| Subgroup                                       | Symbol                               | Test no. | Test conditions                                                      |                     |                                                       |     |                                                          |        |     | Measurement sense lines |                         |                  | Equation                                                       | Notes                                       | Limits                 |        | Unit  |      |
|                                                |                                      |          | Input voltage                                                        |                     |                                                       |     | Load current                                             |        |     | Symbol                  | Value                   | Units            |                                                                |                                             | Min                    | Max    |       |      |
| 4<br><br>T <sub>A</sub> = +25°C                | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | 66       | V <sub>IN</sub> = 6.25 V<br><br>e <sub>i</sub> = 1.0 Vrms at 2400 Hz |                     |                                                       |     | I <sub>L</sub> = -125 mA                                 |        |     | e <sub>orms</sub>       | 57                      | V <sub>rms</sub> | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> = -20 log E <sub>57</sub> | See figure 11                               | 65                     | ---    | dB    |      |
| 7<br><br>T <sub>A</sub> = +25°C                | V <sub>NO</sub>                      | 67       | V <sub>IN</sub> = 6.25 V                                             |                     |                                                       |     | I <sub>L</sub> = -50 mA                                  |        |     | e <sub>orms</sub>       | 58                      | V <sub>rms</sub> | V <sub>NO</sub> = E <sub>58</sub>                              | See figure 12                               | ---                    | 120    | μVrms |      |
|                                                | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | 68       | V <sub>IN</sub> = 6.25 V<br><br>ΔV <sub>IN</sub> = 3.0 V             |                     |                                                       |     | I <sub>L</sub> = -10 mA                                  |        |     | V <sub>OUT</sub>        | 59                      | V                | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> = E <sub>59</sub> / 3     | See figure 13                               | ---                    | 6      | mV/V  |      |
|                                                | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | 69       | V <sub>IN</sub> = 6.25 V                                             |                     |                                                       |     | I <sub>L</sub> = -50 mA<br><br>ΔI <sub>L</sub> = -200 mA |        |     | V <sub>OUT</sub>        | 60                      | V                | ΔV <sub>OUT</sub> / ΔI <sub>L</sub> = E <sub>60</sub> / 200    | See figure 14                               | ---                    | 0.60   | mV/mA |      |

TABLE III. Group A inspection for all device type 04.

| Subgroup                         | Symbol                   | Test no.           | See figure 9            |                     |                                                       |        |      |     |        | Relays energized | Measurement sense lines |                 |                 | Equation                                                               | Notes                                       | Limits                 |      | Unit  |    |
|----------------------------------|--------------------------|--------------------|-------------------------|---------------------|-------------------------------------------------------|--------|------|-----|--------|------------------|-------------------------|-----------------|-----------------|------------------------------------------------------------------------|---------------------------------------------|------------------------|------|-------|----|
|                                  |                          |                    | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |      |     |        |                  | Pins                    | Value           | Units           |                                                                        |                                             | Min                    | Max  |       |    |
|                                  |                          |                    | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11 | 7-2 | 8-2    |                  |                         |                 |                 |                                                                        |                                             |                        |      |       |    |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>        | 1                  | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | --- | ---    | None             | 9-11                    | E <sub>1</sub>  | V               | V <sub>OUT1</sub> = E <sub>1</sub>                                     |                                             | 1.20                   | 1.30 | V     |    |
|                                  | V <sub>OUT2</sub>        | 2                  | 4.25                    | -1500               | 4.25                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>2</sub>  | "               | V <sub>OUT2</sub> = E <sub>2</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT3</sub>        | 3                  | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | --- | ---    | "                | "                       | E <sub>3</sub>  | "               | V <sub>OUT3</sub> = E <sub>3</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>OUT4</sub>        | 4                  | 41.25                   | -200                | 41.25                                                 | -1.95  | ---  | --- | ---    | "                | "                       | E <sub>4</sub>  | "               | V <sub>OUT4</sub> = E <sub>4</sub>                                     |                                             | "                      | "    | "     |    |
|                                  | V <sub>RLINE</sub>       | 5                  | ---                     | ---                 | ---                                                   | ---    | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>1</sub> – E <sub>3</sub>                   | See figure 9 waveforms                      | -9                     | 9    | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 6                  | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | --- | ---    | "                | "                       | E <sub>5</sub>  | "               | ---                                                                    | See figure 9 waveforms                      | ---                    | ---  | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 7                  | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>6</sub>  | "               | V <sub>RLOAD1</sub> = E <sub>5</sub> – E <sub>6</sub>                  |                                             | -3.5                   | 3.5  | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 8                  | ---                     | ---                 | ---                                                   | ---    | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>                  |                                             | -3.5                   | 3.5  | "     |    |
|                                  | V <sub>RTH</sub>         | 9                  | 14.6                    | -1500               | 14.6                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>7</sub>  | "               | V <sub>RTH</sub> = E <sub>7</sub>                                      | See figure 9 waveforms, t = 20.5 ms         | -12                    | 12   | "     |    |
|                                  | I <sub>ADJ</sub>         | 10                 | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | --- | ---    | K2               | 12-13                   | E <sub>8</sub>  | mV              | I <sub>ADJ</sub> = E <sub>8</sub> / 2000                               |                                             |                        | -15  | μA    |    |
|                                  | I <sub>ADJ</sub>         | 11                 | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | --- | ---    | "                | "                       | E <sub>9</sub>  | "               | I <sub>ADJ</sub> = E <sub>9</sub> / 2000                               |                                             |                        | -15  | "     |    |
|                                  | ΔI <sub>ADJ</sub> (LINE) | 12                 | ---                     | ---                 | ---                                                   | ---    | ---  | --- | ---    | "                | "                       | ---             | "               | ΔI <sub>ADJ</sub> = (E <sub>8</sub> – E <sub>9</sub> ) / 2000 (LINE)   | -100                                        |                        | 5    | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 13                 | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | --- | ---    | "                | "                       | E <sub>10</sub> | "               | ΔI <sub>ADJ</sub> = (E <sub>10</sub> – E <sub>11</sub> ) / 2000 (LOAD) | -100                                        |                        | 5    | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 14                 | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>11</sub> | "               |                                                                        | -5                                          |                        |      | "     |    |
|                                  | (LOAD)                   | I <sub>OS1</sub>   | 15                      | 4.25                | ---                                                   | 10     | ---  | --- | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>12</sub> | V                                                                      | I <sub>OS1</sub> = E <sub>12</sub>          | See figure 9 waveforms | -3.5 | -1.5  | A  |
|                                  | (LOAD)                   | V <sub>OUT5</sub>  | 16                      | 4.25                | ---                                                   | 10     | ---  | --- | -0.425 | 15               | K4,K5                   | 9-11            | E <sub>13</sub> | "                                                                      | V <sub>OUT5</sub> = E <sub>13</sub> (RECOV) |                        | 1.20 | 1.30  | V  |
|                                  | (RECOV)                  | I <sub>OS2</sub>   | 17                      | 40                  | ---                                                   | 40     | ---  | --- | ---    | 0                | K5                      | 10-5            | E <sub>14</sub> | "                                                                      | I <sub>OS2</sub> = E <sub>14</sub>          |                        |      | -0.18 | A  |
|                                  | (RECOV)                  | V <sub>OUT6</sub>  | 18                      | 40                  | ---                                                   | 40     | ---  | --- | ---    | 15               | K5                      | 9-11            | E <sub>15</sub> | "                                                                      | V <sub>OUT6</sub> = E <sub>15</sub> (RECOV) |                        |      | 1.30  | V  |
|                                  | (RECOV)                  | I <sub>Q1</sub>    | 19                      | 4.25                | ---                                                   | 4.25   | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>16</sub> | "                                                                      | I <sub>Q1</sub> = E <sub>16</sub> / 2000    | -1.00                  |      | -0.05 | mA |
|                                  | (RECOV)                  | I <sub>Q2</sub>    | 20                      | 14.25               | ---                                                   | 14.25  | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>17</sub> | "                                                                      | I <sub>Q2</sub> = E <sub>17</sub> / 2000    | 1.20                   |      | -0.05 | "  |
|                                  | (RECOV)                  | I <sub>Q3</sub>    | 21                      | 41.25               | ---                                                   | 41.25  | 0    | 1.4 | ---    | ---              | K3                      | 12-13           | E <sub>18</sub> | "                                                                      | I <sub>Q3</sub> = E <sub>18</sub> / 2000    |                        |      | -0.2  | "  |
|                                  |                          | V <sub>START</sub> | 22                      | 4.25                | -1500                                                 | 10     | 0    | --- | -0.425 | ---              | K4                      | 9-11            | E <sub>19</sub> | "                                                                      | V <sub>START</sub> = E <sub>19</sub>        | See figure 9 waveforms | 1.20 | 1.30  | V  |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>        | 23                 | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | --- | ---    | None             | 9-11                    | E <sub>20</sub> | V               | V <sub>OUT1</sub> = E <sub>20</sub>                                    |                                             | -5.0                   | 1.20 | 1.30  | V  |
|                                  | V <sub>OUT2</sub>        | 24                 | 4.25                    | -1500               | 4.25                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>21</sub> | "               | V <sub>OUT2</sub> = E <sub>21</sub>                                    |                                             |                        | "    | "     | "  |
|                                  | V <sub>OUT3</sub>        | 25                 | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | --- | ---    | "                | "                       | E <sub>22</sub> | "               | V <sub>OUT3</sub> = E <sub>22</sub>                                    |                                             |                        | "    | "     | "  |
|                                  | V <sub>OUT4</sub>        | 26                 | 41.25                   | -200                | 41.25                                                 | -1.95  | ---  | --- | ---    | "                | "                       | E <sub>23</sub> | "               | V <sub>OUT4</sub> = E <sub>23</sub>                                    |                                             |                        | "    | "     | "  |
|                                  | V <sub>RLINE1</sub>      | 27                 | ---                     | ---                 | ---                                                   | ---    | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>20</sub> – E <sub>22</sub>                 | See figure 9 waveforms                      | -23                    | 23   | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 28                 | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | --- | ---    | "                | "                       | E <sub>24</sub> | "               | ---                                                                    | See figure 9 waveforms                      | ---                    | ---  | ---   | "  |
|                                  | V <sub>RLOAD1</sub>      | 29                 | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | --- | ---    | "                | "                       | E <sub>25</sub> | "               | V <sub>RLOAD1</sub> = E <sub>24</sub> – E <sub>25</sub>                |                                             | -12                    | 12   | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 30                 | ---                     | ---                 | ---                                                   | ---    | ---  | --- | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>22</sub> – E <sub>23</sub>                |                                             | -12                    | 12   | "     |    |

TABLE III. Group A inspection for all device type 04 – Continued.

| Subgroup                | Symbol                   | Test no. | See figure 9            |                     |                                                       |        |      |        |     | Relays energized | Measurement sense lines |                 |       | Equation                                                               | Notes                  | Limits |       | Unit |
|-------------------------|--------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|--------|------|--------|-----|------------------|-------------------------|-----------------|-------|------------------------------------------------------------------------|------------------------|--------|-------|------|
|                         |                          |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |      |        |     |                  | Pins                    | Value           | Units |                                                                        |                        | Min    | Max   |      |
|                         |                          |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11 | 7-2    | 8-2 |                  |                         |                 |       |                                                                        |                        |        |       |      |
| 2                       | I <sub>ADJ</sub>         | 31       | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | ---    | --- | K2               | 12-13                   | E <sub>26</sub> | mV    | I <sub>ADJ</sub> = E <sub>26</sub> / 2000                              |                        |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 32       | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | ---    | --- | "                | "                       | E <sub>27</sub> | "     | I <sub>ADJ</sub> = E <sub>27</sub> / 2000                              |                        |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 33       | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | --- | "                | "                       | ---             | "     | ΔI <sub>ADJ</sub> = (E <sub>26</sub> – E <sub>27</sub> ) / 2000 (LINE) | -100                   |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 34       | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | ---    | --- | "                | "                       | E <sub>28</sub> | "     |                                                                        | -100                   |        |       |      |
|                         | ΔI <sub>ADJ</sub>        | 35       | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | ---    | --- | "                | "                       | E <sub>29</sub> | "     | ΔI <sub>ADJ</sub> = (E <sub>28</sub> – E <sub>29</sub> ) / 2000 (LOAD) | -5                     |        | 5     | "    |
|                         | I <sub>OS1</sub>         | 36       | 4.25                    | ---                 | 10                                                    | ---    | ---  | -0.425 | 0   | K4,K5            | 10-5                    | E <sub>30</sub> | V     | I <sub>OS1</sub> = E <sub>30</sub>                                     | See figure 9 waveforms | -3.5   | -1.5  | A    |
|                         | (LOAD)V <sub>OUT5</sub>  | 37       | 4.25                    | ---                 | 10                                                    | ---    | ---  | -0.425 | 15  | K4,K5            | 9-11                    | E <sub>31</sub> | "     | V <sub>OUT5</sub> = E <sub>31</sub> (RECOV)                            |                        | 1.20   | 1.30  | V    |
|                         | I <sub>OS2</sub>         | 38       | 40                      | ---                 | 40                                                    | ---    | ---  | ---    | 0   | K5               | 10-5                    | E <sub>32</sub> | "     | I <sub>OS2</sub> = E <sub>32</sub>                                     |                        |        | -0.18 | A    |
|                         | (RECOV)V <sub>OUT6</sub> | 39       | 40                      | ---                 | 40                                                    | ---    | ---  | ---    | 15  | K5               | 9-11                    | E <sub>33</sub> | "     | V <sub>OUT6</sub> = E <sub>33</sub> (RECOV)                            |                        |        | 1.30  | V    |
|                         | I <sub>Q1</sub>          | 40       | 4.25                    | ---                 | 4.25                                                  | 0      | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>34</sub> | "     | I <sub>Q1</sub> = E <sub>34</sub> / 2000                               | -1.00                  |        | -0.05 | mA   |
|                         | (RECOV)I <sub>Q2</sub>   | 41       | 14.25                   | ---                 | 14.25                                                 | 0      | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>35</sub> | "     | I <sub>Q2</sub> = E <sub>35</sub> / 2000                               | 1.20                   |        | -0.05 | "    |
|                         | I <sub>Q3</sub>          | 42       | 41.25                   | ---                 | 41.25                                                 | 0      | 1.4  | ---    | --- | K3               | 12-13                   | E <sub>36</sub> | "     | I <sub>Q3</sub> = E <sub>36</sub> / 2000                               |                        |        | -0.2  | "    |
|                         | V <sub>START</sub>       | 43       | 4.25                    | -1500               | 10                                                    | 0      | ---  | -0.425 | --- | K4               | 9-11                    | E <sub>37</sub> | "     | V <sub>START</sub> = E <sub>37</sub>                                   | See figure 9 waveforms | 1.20   | 1.30  | V    |
| T <sub>A</sub> = +150°C | V <sub>OUT7</sub>        | 44       | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | ---    | --- | None             | "                       | E <sub>38</sub> | "     | V <sub>OUT7</sub> = E <sub>38</sub>                                    | -5.0                   | 1.20   | 1.30  | V    |
| 3                       | V <sub>OUT1</sub>        | 45       | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | ---    | --- | None             | 9-11                    | E <sub>39</sub> | V     | V <sub>OUT1</sub> = E <sub>39</sub>                                    |                        | 1.20   | 1.30  | V    |
|                         | V <sub>OUT2</sub>        | 46       | 4.25                    | -1500               | 4.25                                                  | -14.95 | ---  | ---    | --- | "                | "                       | E <sub>40</sub> | "     | V <sub>OUT2</sub> = E <sub>40</sub>                                    |                        |        | "     | "    |
|                         | V <sub>OUT3</sub>        | 47       | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | ---    | --- | "                | "                       | E <sub>41</sub> | "     | V <sub>OUT3</sub> = E <sub>41</sub>                                    |                        |        | "     | "    |
|                         | V <sub>OUT4</sub>        | 48       | 41.25                   | -200                | 41.25                                                 | -1.95  | ---  | ---    | --- | "                | "                       | E <sub>42</sub> | "     | V <sub>OUT4</sub> = E <sub>42</sub>                                    |                        |        | "     | "    |
|                         | V <sub>RLINE1</sub>      | 49       | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | --- | "                | "                       | ---             | "     | V <sub>RLINE</sub> = E <sub>39</sub> – E <sub>41</sub>                 | See figure 9 waveforms | -23    | 23    | mV   |
|                         | V <sub>RLOAD1</sub>      | 50       | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | ---    | --- | "                | "                       | E <sub>43</sub> | "     | ---                                                                    | See figure 9 waveforms | ---    | ---   | "    |
|                         | V <sub>RLOAD1</sub>      | 51       | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | ---    | --- | "                | "                       | E <sub>44</sub> | "     | V <sub>RLOAD1</sub> = E <sub>43</sub> – E <sub>44</sub>                |                        | -12    | 12    | "    |
|                         | V <sub>RLOAD2</sub>      | 52       | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | --- | "                | "                       | ---             | "     | V <sub>RLOAD2</sub> = E <sub>41</sub> – E <sub>42</sub>                |                        | -12    | 12    | "    |
|                         | I <sub>ADJ</sub>         | 53       | 4.25                    | -5                  | 4.25                                                  | 0      | ---  | ---    | --- | K2               | 12-13                   | E <sub>45</sub> | mV    | I <sub>ADJ</sub> = E <sub>45</sub> / 2000                              |                        |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 54       | 41.25                   | -5                  | 41.25                                                 | 0      | ---  | ---    | --- | "                | "                       | E <sub>46</sub> | "     | I <sub>ADJ</sub> = E <sub>46</sub> / 2000                              |                        |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 55       | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | --- | "                | "                       | ---             | "     | ΔI <sub>ADJ</sub> = (E <sub>45</sub> – E <sub>46</sub> ) / 2000 (LINE) | -100                   |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 56       | 6.25                    | -5                  | 6.25                                                  | 0      | ---  | ---    | --- | "                | "                       | E <sub>47</sub> | "     |                                                                        | -100                   |        |       |      |
|                         | ΔI <sub>ADJ</sub>        | 57       | 6.25                    | -1500               | 6.25                                                  | -14.95 | ---  | ---    | --- | "                | "                       | E <sub>48</sub> | "     | ΔI <sub>ADJ</sub> = (E <sub>47</sub> – E <sub>48</sub> ) / 2000 (LOAD) | -5                     |        | 5     | "    |

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TABLE III. Group A inspection for all device type 04 – Continued.

| Subgroup                        | Symbol                               | Test no. | See figure 9                                                     |                     |                                                       |     |                                                       |        |     | Relays energized        | Measurement sense limits |                 |                                                                | Equation                                                                                                                                                                   | Notes                  | Limits       |                        | Unit |
|---------------------------------|--------------------------------------|----------|------------------------------------------------------------------|---------------------|-------------------------------------------------------|-----|-------------------------------------------------------|--------|-----|-------------------------|--------------------------|-----------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------|------------------------|------|
|                                 |                                      |          | Test conditions                                                  |                     | Applied test voltages (volts) (Hi – Lo pin potential) |     |                                                       |        |     |                         | Pins                     | Value           | Units                                                          |                                                                                                                                                                            |                        | Min          | Max                    |      |
|                                 |                                      |          | V <sub>IN</sub> (volts)                                          | I <sub>L</sub> (mA) | 1-2                                                   | 4-5 | 6-11                                                  | 7-2    | 8-2 |                         |                          |                 |                                                                |                                                                                                                                                                            |                        |              |                        |      |
| 3<br><br>T <sub>A</sub> = -55°C | I <sub>OS1</sub>                     | 58       | 4.25                                                             | ---                 | 10                                                    | --- | ---                                                   | -0.425 | 0   | K4,K5                   | 10-5                     | E <sub>49</sub> | V                                                              | I <sub>OS1</sub> = E <sub>49</sub><br>V <sub>OUT5</sub> = E <sub>50</sub> (RECOV)<br><br>I <sub>OS2</sub> = E <sub>51</sub><br>V <sub>OUT6</sub> = E <sub>52</sub> (RECOV) | See figure 9 waveforms | -3.5<br>1.20 | -1.5<br>1.30           | A    |
|                                 | V <sub>OUT5</sub> (RECOV)            | 59       | 4.25                                                             | ---                 | 10                                                    | --- | ---                                                   | -0.425 | 15  | K4,K5                   | 9-11                     | E <sub>50</sub> | "                                                              |                                                                                                                                                                            |                        |              |                        | V    |
|                                 | I <sub>OS2</sub>                     | 60       | 40                                                               | ---                 | 40                                                    | --- | ---                                                   | ---    | 0   | K5                      | 10-5                     | E <sub>51</sub> | "                                                              |                                                                                                                                                                            |                        |              |                        | A    |
|                                 | V <sub>OUT6</sub> (RECOV)            | 61       | 40                                                               | ---                 | 40                                                    | --- | ---                                                   | ---    | 15  | K5                      | 9-11                     | E <sub>52</sub> | "                                                              |                                                                                                                                                                            |                        |              |                        | V    |
|                                 | I <sub>Q1</sub>                      | 62       | 4.25                                                             | ---                 | 4.25                                                  | 0   | 1.4                                                   | ---    | --- | K3                      | 12-13                    | E <sub>53</sub> | "                                                              | I <sub>Q1</sub> = E <sub>53</sub> / 2000                                                                                                                                   | -1.00<br>1.20          |              | -0.05<br>-0.05<br>-0.2 | mA   |
|                                 | I <sub>Q2</sub>                      | 63       | 14.25                                                            | ---                 | 14.25                                                 | 0   | 1.4                                                   | ---    | --- | K3                      | 12-13                    | E <sub>54</sub> | "                                                              | I <sub>Q2</sub> = E <sub>54</sub> / 2000                                                                                                                                   |                        |              |                        | "    |
|                                 | I <sub>Q3</sub>                      | 64       | 41.25                                                            | ---                 | 41.25                                                 | 0   | 1.4                                                   | ---    | --- | K3                      | 12-13                    | E <sub>55</sub> | "                                                              | I <sub>Q3</sub> = E <sub>55</sub> / 2000                                                                                                                                   |                        |              |                        | "    |
| V <sub>START</sub>              | 65                                   | 4.25     | -1500                                                            | 10                  | 0                                                     | --- | -0.425                                                | ---    | K4  | 9-11                    | E <sub>56</sub>          | "               | V <sub>START</sub> = E <sub>56</sub>                           | See figure 9 waveforms                                                                                                                                                     | 1.20                   | 1.30         | V                      |      |
| -5.0                            |                                      |          |                                                                  |                     |                                                       |     |                                                       |        |     |                         |                          |                 |                                                                |                                                                                                                                                                            |                        |              |                        |      |
| Subgroup                        | Symbol                               | Test no. | Test conditions                                                  |                     |                                                       |     |                                                       |        |     | Measurement sense lines |                          |                 | Equation                                                       | Notes                                                                                                                                                                      | Limits                 |              | Unit                   |      |
|                                 |                                      |          | Input voltage                                                    |                     |                                                       |     | Load current                                          |        |     | Symbol                  | Value                    | Units           |                                                                |                                                                                                                                                                            | Min                    | Max          |                        |      |
| 4<br><br>T <sub>A</sub> = +25°C | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | 66       | V <sub>IN</sub> = 6.25 V<br>e <sub>i</sub> = 1.0 Vrms at 2400 Hz |                     |                                                       |     | I <sub>L</sub> = -500 mA                              |        |     | e <sub>orms</sub>       | 57                       | Vrms            | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> = -20 log E <sub>57</sub> | See figure 11                                                                                                                                                              | 65                     | ---          | dB                     |      |
| 7<br><br>T <sub>A</sub> = +25°C | V <sub>NO</sub>                      | 67       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       |     | I <sub>L</sub> = -100 mA                              |        |     | e <sub>orms</sub>       | 58                       | Vrms            | V <sub>NO</sub> = E <sub>58</sub>                              | See figure 12                                                                                                                                                              | ---                    | 120          | μVrms                  |      |
|                                 | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | 68       | V <sub>IN</sub> = 6.25 V<br>ΔV <sub>IN</sub> = 3.0 V             |                     |                                                       |     | I <sub>L</sub> = -10 mA                               |        |     | V <sub>OUT</sub>        | 59                       | V               | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> = E <sub>59</sub> / 3     | See figure 13                                                                                                                                                              | ---                    | 6            | mV/V                   |      |
|                                 | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | 69       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       |     | I <sub>L</sub> = -100 mA<br>ΔI <sub>L</sub> = -400 mA |        |     | V <sub>OUT</sub>        | 60                       | V               | ΔV <sub>OUT</sub> / ΔI <sub>L</sub> = E <sub>60</sub> / 200    | See figure 14                                                                                                                                                              | ---                    | 0.30         | mV/mA                  |      |

TABLE III. Group A inspection for all device type 05.

| Subgroup                         | Symbol                   | Test no.           | See figure 10           |                     |                                                       |        |      |        |        | Relays energized | Measurement sense lines |                 |                 | Equation                                                               | Notes                                       | Limits                  |       | Unit  |    |
|----------------------------------|--------------------------|--------------------|-------------------------|---------------------|-------------------------------------------------------|--------|------|--------|--------|------------------|-------------------------|-----------------|-----------------|------------------------------------------------------------------------|---------------------------------------------|-------------------------|-------|-------|----|
|                                  |                          |                    | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |      |        |        |                  | Pins                    | Value           | Units           |                                                                        |                                             | Min                     | Max   |       |    |
|                                  |                          |                    | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11 | 7-2    | 8-2    |                  |                         |                 |                 |                                                                        |                                             |                         |       |       |    |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>        | 1                  | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | None             | 9-11                    | E <sub>1</sub>  | V               | V <sub>OUT1</sub> = E <sub>1</sub>                                     |                                             | 1.20                    | 1.30  | V     |    |
|                                  | V <sub>OUT2</sub>        | 2                  | 4.25                    | -3000               | 15                                                    | -2.995 | ---  | -0.425 | ---    | "                | "                       | E <sub>2</sub>  | "               | V <sub>OUT2</sub> = E <sub>2</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT3</sub>        | 3                  | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>3</sub>  | "               | V <sub>OUT3</sub> = E <sub>3</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT4</sub>        | 4                  | 36.25                   | -150                | 42.5                                                  | -0.145 | ---  | -3.625 | ---    | "                | "                       | E <sub>4</sub>  | "               | V <sub>OUT4</sub> = E <sub>4</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>RLINE</sub>       | 5                  | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>1</sub> – E <sub>3</sub>                   | See figure 10 waveforms                     | -4                      | 4     | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 6                  | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>5</sub>  | "               | ---                                                                    | See figure 10 waveforms                     | -3.5                    | 3.5   | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 7                  | 6.25                    | -3000               | 15                                                    | -2.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>6</sub>  | "               | V <sub>RLOAD1</sub> = E <sub>5</sub> – E <sub>6</sub>                  |                                             | -3.5                    | 3.5   | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 8                  | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>                  |                                             | -3.5                    | 3.5   | "     |    |
|                                  | V <sub>RTH</sub>         | 9                  | 11.25                   | -1000               | 25                                                    | -0.995 | ---  | -1.125 | ---    | "                | "                       | E <sub>7</sub>  | "               | V <sub>RTH</sub> = E <sub>7</sub>                                      | See figure 10 waveforms, t = 20.5 ms        | -5                      | 5     | "     |    |
|                                  | I <sub>ADJ</sub>         | 10                 | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | K2               | 12-13                   | E <sub>8</sub>  | mV              | I <sub>ADJ</sub> = E <sub>8</sub> / 2000                               |                                             | -15                     |       | μA    |    |
|                                  | I <sub>ADJ</sub>         | 11                 | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>9</sub>  | "               | I <sub>ADJ</sub> = E <sub>9</sub> / 2000                               |                                             | -15                     |       | "     |    |
|                                  | ΔI <sub>ADJ</sub> (LINE) | 12                 | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "               | ΔI <sub>ADJ</sub> = (E <sub>8</sub> – E <sub>9</sub> ) / 2000 (LINE)   | -100                                        |                         | 5     | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 13                 | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>10</sub> | "               | ΔI <sub>ADJ</sub> = (E <sub>10</sub> – E <sub>11</sub> ) / 2000 (LOAD) | -100                                        |                         | 5     | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 14                 | 6.25                    | -3000               | 15                                                    | -2.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>11</sub> | "               |                                                                        | -5                                          |                         |       | "     |    |
|                                  | (LOAD)                   | I <sub>OS1</sub>   | 15                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>12</sub> | V                                                                      | I <sub>OS1</sub> = 4E <sub>12</sub>         | See figure 10 waveforms | -5.2  | -3.0  | A  |
|                                  | (LOAD)                   | V <sub>OUT5</sub>  | 16                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 15               | K4,K5                   | 9-11            | E <sub>13</sub> | "                                                                      | V <sub>OUT5</sub> = E <sub>13</sub> (RECOV) |                         | 1.20  | 1.30  | V  |
|                                  | (RECOV)                  | I <sub>OS2</sub>   | 17                      | 35                  | ---                                                   | 42.5   | ---  | ---    | -3.5   | 0                | K5                      | 10-5            | E <sub>14</sub> | "                                                                      | I <sub>OS2</sub> = 4E <sub>14</sub>         |                         | -0.15 |       | A  |
|                                  | (RECOV)                  | V <sub>OUT6</sub>  | 18                      | 35                  | ---                                                   | 42.5   | ---  | ---    | -3.5   | 15               | K5                      | 9-11            | E <sub>15</sub> | "                                                                      | V <sub>OUT6</sub> = E <sub>15</sub> (RECOV) |                         | 1.30  |       | V  |
|                                  | (RECOV)                  | I <sub>Q1</sub>    | 19                      | 4.25                | ---                                                   | 15     | 0    | 1.4    | -0.425 | ---              | K3                      | 12-13           | E <sub>16</sub> | "                                                                      | I <sub>Q1</sub> = E <sub>16</sub> / 2000    | -2.00                   |       | -0.05 | mA |
|                                  |                          | I <sub>Q2</sub>    | 20                      | 14.25               | ---                                                   | 25     | 0    | 1.4    | -1.425 | ---              | K3                      | 12-13           | E <sub>17</sub> | "                                                                      | I <sub>Q2</sub> = E <sub>17</sub> / 2000    | 1.20                    |       | -0.05 | "  |
|                                  |                          | I <sub>Q3</sub>    | 21                      | 36.25               | ---                                                   | 42.5   | 0    | 1.4    | -3.625 | ---              | K3                      | 12-13           | E <sub>18</sub> | "                                                                      | I <sub>Q3</sub> = E <sub>18</sub> / 2000    |                         |       | -0.2  | "  |
|                                  |                          | V <sub>START</sub> | 22                      | 4.25                | -3000                                                 | 15     | 0    | ---    | -0.425 | ---              | K4                      | 9-11            | E <sub>19</sub> | "                                                                      | V <sub>START</sub> = E <sub>19</sub>        | See figure 10 waveforms | 1.20  | 1.30  | V  |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>        | 23                 | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | None             | 9-11                    | E <sub>20</sub> | V               | V <sub>OUT1</sub> = E <sub>20</sub>                                    |                                             | 1.20                    | 1.30  | V     |    |
|                                  | V <sub>OUT2</sub>        | 24                 | 4.25                    | -3000               | 15                                                    | -2.995 | ---  | -0.425 | ---    | "                | "                       | E <sub>21</sub> | "               | V <sub>OUT2</sub> = E <sub>21</sub>                                    | -5.0                                        | "                       | "     | "     |    |
|                                  | V <sub>OUT3</sub>        | 25                 | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>22</sub> | "               | V <sub>OUT3</sub> = E <sub>22</sub>                                    |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT4</sub>        | 26                 | 36.25                   | -150                | 42.5                                                  | -0.145 | ---  | -3.625 | ---    | "                | "                       | E <sub>23</sub> | "               | V <sub>OUT4</sub> = E <sub>23</sub>                                    |                                             | "                       | "     | "     |    |
|                                  | V <sub>RLINE1</sub>      | 27                 | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "               | V <sub>RLINE</sub> = E <sub>20</sub> – E <sub>22</sub>                 | See figure 10 waveforms                     | -20                     | 20    | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 28                 | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>24</sub> | "               | ---                                                                    | See figure 10 waveforms                     | ---                     | ---   | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 29                 | 6.25                    | -3000               | 15                                                    | -2.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>25</sub> | "               | V <sub>RLOAD1</sub> = E <sub>24</sub> – E <sub>25</sub>                |                                             | -12                     | 12    | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 30                 | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "               | V <sub>RLOAD2</sub> = E <sub>22</sub> – E <sub>23</sub>                |                                             | -12                     | 12    | "     |    |

TABLE III. Group A inspection for all device type 05 – Continued.

| Subgroup                | Symbol                   | Test no. | See figure 10           |                     |                                                       |        |        |        |     | Relays energized | Measurement sense lines |                 |                                                                        | Equation                                                               | Notes                   | Limits |       | Unit |
|-------------------------|--------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|--------|--------|--------|-----|------------------|-------------------------|-----------------|------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------|--------|-------|------|
|                         |                          |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |        |        |     |                  | Pins                    | Value           | Units                                                                  |                                                                        |                         | Min    | Max   |      |
|                         |                          |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11   | 7-2    | 8-2 |                  |                         |                 |                                                                        |                                                                        |                         |        |       |      |
| 2                       | I <sub>ADJ</sub>         | 31       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | K2               | 12-13                   | E <sub>26</sub> | mV                                                                     | I <sub>ADJ</sub> = E <sub>26</sub> / 2000                              |                         |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 32       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>27</sub> | "                                                                      | I <sub>ADJ</sub> = E <sub>27</sub> / 2000                              |                         |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 33       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                                                      | ΔI <sub>ADJ</sub> = (E <sub>26</sub> – E <sub>27</sub> ) / 2000 (LINE) | -100                    |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 34       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>28</sub> | "                                                                      |                                                                        | -100                    |        |       |      |
|                         | ΔI <sub>ADJ</sub>        | 35       | 6.25                    | -3000               | 15                                                    | -2.995 | ---    | -0.625 | --- | "                | "                       | E <sub>29</sub> | "                                                                      | ΔI <sub>ADJ</sub> = (E <sub>28</sub> – E <sub>29</sub> ) / 2000 (LOAD) | -5                      |        | 5     | "    |
|                         | I <sub>OS1</sub>         | 36       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 0   | K4,K5            | 10-5                    | E <sub>30</sub> | V                                                                      | I <sub>OS1</sub> = 4E <sub>30</sub>                                    | See figure 10 waveforms | -5.2   | -3.0  | A    |
|                         | (LOAD)V <sub>OUT5</sub>  | 37       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 15  | K4,K5            | 9-11                    | E <sub>31</sub> | "                                                                      | V <sub>OUT5</sub> = E <sub>31</sub> (RECOV)                            |                         | 1.20   | 1.30  | V    |
|                         | I <sub>OS2</sub>         | 38       | 35                      | ---                 | 42.5                                                  | ---    | ---    | -3.5   | 0   | K5               | 10-5                    | E <sub>32</sub> | "                                                                      | I <sub>OS2</sub> = 4E <sub>32</sub>                                    |                         |        | -0.15 | A    |
|                         | (RECOV)V <sub>OUT6</sub> | 39       | 35                      | ---                 | 42.5                                                  | ---    | ---    | -3.5   | 15  | K5               | 9-11                    | E <sub>33</sub> | "                                                                      | V <sub>OUT6</sub> = E <sub>33</sub> (RECOV)                            |                         |        | 1.30  | V    |
|                         | I <sub>Q1</sub>          | 40       | 4.25                    | ---                 | 15                                                    | 0      | 1.4    | -0.425 | --- | K3               | 12-13                   | E <sub>34</sub> | "                                                                      | I <sub>Q1</sub> = E <sub>34</sub> / 2000                               | -2.0                    |        | -0.05 | mA   |
|                         | (RECOV)I <sub>Q2</sub>   | 41       | 14.25                   | ---                 | 25                                                    | 0      | 1.4    | -1.425 | --- | K3               | 12-13                   | E <sub>35</sub> | "                                                                      | I <sub>Q2</sub> = E <sub>35</sub> / 2000                               | 1.20                    |        | -0.05 | "    |
|                         | I <sub>Q3</sub>          | 42       | 36.25                   | ---                 | 42.5                                                  | 0      | 1.4    | -3.625 | --- | K3               | 12-13                   | E <sub>36</sub> | "                                                                      | I <sub>Q3</sub> = E <sub>36</sub> / 2000                               |                         |        | -0.2  | "    |
| V <sub>START</sub>      | 43                       | 4.25     | -3000                   | 15                  | 0                                                     | ---    | -0.425 | ---    | K4  | 9-11             | E <sub>37</sub>         | "               | V <sub>START</sub> = E <sub>37</sub>                                   | See figure 10 waveforms                                                | 1.20                    | 1.30   | V     |      |
| T <sub>A</sub> = +150°C | V <sub>OUT7</sub>        | 44       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | None             | "                       | E <sub>38</sub> | "                                                                      | V <sub>OUT7</sub> = E <sub>38</sub>                                    | -5.0                    | 1.20   | 1.30  | V    |
| 3                       | V <sub>OUT1</sub>        | 45       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | None             | 9-11                    | E <sub>39</sub> | V                                                                      | V <sub>OUT1</sub> = E <sub>39</sub>                                    |                         | 1.20   | 1.30  | V    |
|                         | V <sub>OUT2</sub>        | 46       | 4.25                    | -3000               | 15                                                    | -2.995 | ---    | -0.425 | --- | "                | "                       | E <sub>40</sub> | "                                                                      | V <sub>OUT2</sub> = E <sub>40</sub>                                    |                         |        | "     | "    |
|                         | V <sub>OUT3</sub>        | 47       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>41</sub> | "                                                                      | V <sub>OUT3</sub> = E <sub>41</sub>                                    |                         |        | "     | "    |
|                         | V <sub>OUT4</sub>        | 48       | 36.25                   | -150                | 42.5                                                  | -0.145 | ---    | -3.625 | --- | "                | "                       | E <sub>42</sub> | "                                                                      | V <sub>OUT4</sub> = E <sub>42</sub>                                    |                         |        | "     | "    |
|                         | V <sub>RLINE1</sub>      | 49       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                                                      | V <sub>RLINE</sub> = E <sub>39</sub> – E <sub>41</sub>                 | See figure 10 waveforms | -20    | 20    | mV   |
|                         | V <sub>RLOAD1</sub>      | 50       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>43</sub> | "                                                                      | ---                                                                    | See figure 10 waveforms | ---    | ---   | "    |
|                         | V <sub>RLOAD1</sub>      | 51       | 6.25                    | -3000               | 15                                                    | -2.995 | ---    | -0.625 | --- | "                | "                       | E <sub>44</sub> | "                                                                      | V <sub>RLOAD1</sub> = E <sub>43</sub> – E <sub>44</sub>                |                         | -12    | 12    | "    |
|                         | V <sub>RLOAD2</sub>      | 52       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                                                      | V <sub>RLOAD2</sub> = E <sub>41</sub> – E <sub>42</sub>                |                         | -12    | 12    | "    |
|                         | I <sub>ADJ</sub>         | 53       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | K2               | 12-13                   | E <sub>45</sub> | mV                                                                     | I <sub>ADJ</sub> = E <sub>45</sub> / 2000                              |                         |        | -15   | μA   |
|                         | I <sub>ADJ</sub>         | 54       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>46</sub> | "                                                                      | I <sub>ADJ</sub> = E <sub>46</sub> / 2000                              |                         |        | -15   | "    |
|                         | ΔI <sub>ADJ</sub> (LINE) | 55       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                                                      | ΔI <sub>ADJ</sub> = (E <sub>45</sub> – E <sub>46</sub> ) / 2000 (LINE) | -100                    |        | 5     | "    |
|                         | ΔI <sub>ADJ</sub>        | 56       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>47</sub> | "                                                                      |                                                                        | -100                    |        |       |      |
| ΔI <sub>ADJ</sub>       | 57                       | 6.25     | -3000                   | 15                  | -2.995                                                | ---    | -0.625 | ---    | "   | "                | E <sub>48</sub>         | "               | ΔI <sub>ADJ</sub> = (E <sub>47</sub> – E <sub>48</sub> ) / 2000 (LOAD) | -5                                                                     |                         | 5      | "     |      |

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TABLE III. Group A inspection for all device type 05 – Continued.

| Subgroup                        | Symbol                               | Test no. | See figure 10                                                    |                     |                                                       |     |                                                       |        |     | Relays energized        | Measurement sense limits |                 |                                                                | Equation                                                                                                                                                                     | Notes                   | Limits       |                        | Unit |
|---------------------------------|--------------------------------------|----------|------------------------------------------------------------------|---------------------|-------------------------------------------------------|-----|-------------------------------------------------------|--------|-----|-------------------------|--------------------------|-----------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------|------------------------|------|
|                                 |                                      |          | Test conditions                                                  |                     | Applied test voltages (volts) (Hi – Lo pin potential) |     |                                                       |        |     |                         | Pins                     | Value           | Units                                                          |                                                                                                                                                                              |                         | Min          | Max                    |      |
|                                 |                                      |          | V <sub>IN</sub> (volts)                                          | I <sub>L</sub> (mA) | 1-2                                                   | 4-5 | 6-11                                                  | 7-2    | 8-2 |                         |                          |                 |                                                                |                                                                                                                                                                              |                         |              |                        |      |
| 3<br><br>T <sub>A</sub> = -55°C | I <sub>OS1</sub>                     | 58       | 4.25                                                             | ---                 | 15                                                    | --- | ---                                                   | -0.425 | 0   | K4,K5                   | 10-5                     | E <sub>49</sub> | V                                                              | I <sub>OS1</sub> = 4E <sub>49</sub><br>V <sub>OUT5</sub> = E <sub>50</sub> (RECOV)<br><br>I <sub>OS2</sub> = 4E <sub>51</sub><br>V <sub>OUT6</sub> = E <sub>52</sub> (RECOV) | See figure 10 waveforms | -5.2<br>1.20 | -3.0<br>1.30           | A    |
|                                 | V <sub>OUT5</sub> (RECOV)            | 59       | 4.25                                                             | ---                 | 15                                                    | --- | ---                                                   | -0.425 | 15  | K4,K5                   | 9-11                     | E <sub>50</sub> | "                                                              |                                                                                                                                                                              |                         |              |                        | V    |
|                                 | I <sub>OS2</sub>                     | 60       | 35                                                               | ---                 | 42.5                                                  | --- | ---                                                   | -3.5   | 0   | K5                      | 10-5                     | E <sub>51</sub> | "                                                              |                                                                                                                                                                              |                         |              |                        | A    |
|                                 | V <sub>OUT6</sub> (RECOV)            | 61       | 35                                                               | ---                 | 42.5                                                  | --- | ---                                                   | -3.5   | 15  | K5                      | 9-11                     | E <sub>52</sub> | "                                                              |                                                                                                                                                                              |                         |              |                        | V    |
|                                 | I <sub>Q1</sub>                      | 62       | 4.25                                                             | ---                 | 15                                                    | 0   | 1.4                                                   | -0.425 | --- | K3                      | 12-13                    | E <sub>53</sub> | "                                                              | I <sub>Q1</sub> = E <sub>53</sub> / 2000<br>I <sub>Q2</sub> = E <sub>54</sub> / 2000<br>I <sub>Q3</sub> = E <sub>55</sub> / 2000                                             | -2.0<br>1.20            |              | -0.05<br>-0.05<br>-0.2 | mA   |
|                                 | I <sub>Q2</sub>                      | 63       | 14.25                                                            | ---                 | 25                                                    | 0   | 1.4                                                   | -1.425 | --- | K3                      | 12-13                    | E <sub>54</sub> | "                                                              |                                                                                                                                                                              |                         |              |                        | "    |
|                                 | I <sub>Q3</sub>                      | 64       | 36.25                                                            | ---                 | 42.5                                                  | 0   | 1.4                                                   | -3.625 | --- | K3                      | 12-13                    | E <sub>55</sub> | "                                                              |                                                                                                                                                                              |                         |              |                        | "    |
| V <sub>START</sub>              | 65                                   | 4.25     | -3000                                                            |                     | 0                                                     | --- | -0.425                                                | ---    | K4  | 9-11                    | E <sub>56</sub>          | "               | V <sub>START</sub> = E <sub>56</sub>                           | See figure 10 waveforms                                                                                                                                                      | 1.20                    | 1.30         | V                      |      |
| -5.0                            |                                      |          |                                                                  |                     |                                                       |     |                                                       |        |     |                         |                          |                 |                                                                |                                                                                                                                                                              |                         |              |                        |      |
| Subgroup                        | Symbol                               | Test no. | Test conditions                                                  |                     |                                                       |     |                                                       |        |     | Measurement sense lines |                          |                 | Equation                                                       | Notes                                                                                                                                                                        | Limits                  |              | Unit                   |      |
|                                 |                                      |          | Input voltage                                                    |                     |                                                       |     | Load current                                          |        |     | Symbol                  | Value                    | Units           |                                                                |                                                                                                                                                                              | Min                     | Max          |                        |      |
| 4<br><br>T <sub>A</sub> = +25°C | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | 66       | V <sub>IN</sub> = 6.25 V<br>e <sub>i</sub> = 1.0 Vrms at 2400 Hz |                     |                                                       |     | I <sub>L</sub> = -500 mA                              |        |     | e <sub>orms</sub>       | 57                       | Vrms            | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> = -20 log E <sub>57</sub> | See figure 11                                                                                                                                                                | 65                      | ---          | dB                     |      |
| 7<br><br>T <sub>A</sub> = +25°C | V <sub>NO</sub>                      | 67       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       |     | I <sub>L</sub> = -100 mA                              |        |     | e <sub>orms</sub>       | 58                       | Vrms            | V <sub>NO</sub> = E <sub>58</sub>                              | See figure 12                                                                                                                                                                | ---                     | 120          | μVrms                  |      |
|                                 | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | 68       | V <sub>IN</sub> = 6.25 V<br>ΔV <sub>IN</sub> = 3.0 V             |                     |                                                       |     | I <sub>L</sub> = -10 mA                               |        |     | V <sub>OUT</sub>        | 59                       | V               | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> = E <sub>59</sub> / 3     | See figure 13                                                                                                                                                                | ---                     | 12           | mV/V                   |      |
|                                 | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | 69       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       |     | I <sub>L</sub> = -100 mA<br>ΔI <sub>L</sub> = -400 mA |        |     | V <sub>OUT</sub>        | 60                       | V               | ΔV <sub>OUT</sub> / ΔI <sub>L</sub> = E <sub>60</sub> / 200    | See figure 14                                                                                                                                                                | ---                     | 0.30         | mV/mA                  |      |

TABLE III. Group A inspection for all device type 06 .

| Subgroup                         | Symbol                   | Test no.           | See figure 10           |                     |                                                       |        |      |        |        | Relays energized | Measurement sense lines |                 |                                                         | Equation                                                               | Notes                                       | Limits                  |       | Unit  |    |
|----------------------------------|--------------------------|--------------------|-------------------------|---------------------|-------------------------------------------------------|--------|------|--------|--------|------------------|-------------------------|-----------------|---------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------|-------------------------|-------|-------|----|
|                                  |                          |                    | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |      |        |        |                  | Pins                    | Value           | Units                                                   |                                                                        |                                             | Min                     | Max   |       |    |
|                                  |                          |                    | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11 | 7-2    | 8-2    |                  |                         |                 |                                                         |                                                                        |                                             |                         |       |       |    |
| 1<br><br>T <sub>A</sub> = +25°C  | V <sub>OUT1</sub>        | 1                  | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | None             | 9-11                    | E <sub>1</sub>  | V                                                       | V <sub>OUT1</sub> = E <sub>1</sub>                                     |                                             | 1.19                    | 1.29  | V     |    |
|                                  | V <sub>OUT2</sub>        | 2                  | 4.25                    | -5000               | 15                                                    | -4.995 | ---  | -0.425 | ---    | "                | "                       | E <sub>2</sub>  | "                                                       | V <sub>OUT2</sub> = E <sub>2</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT3</sub>        | 3                  | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>3</sub>  | "                                                       | V <sub>OUT3</sub> = E <sub>3</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT4</sub>        | 4                  | 36.25                   | -0.150              | 42.5                                                  | -0.145 | ---  | -3.625 | ---    | "                | "                       | E <sub>4</sub>  | "                                                       | V <sub>OUT4</sub> = E <sub>4</sub>                                     |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT5</sub>        | 5                  | 6.25                    | -7000               | 15                                                    | -6.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>5</sub>  | "                                                       | V <sub>OUT5</sub> = E <sub>5</sub>                                     | "                                           | "                       | "     | "     |    |
|                                  | V <sub>RLINE</sub>       | 6                  | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "                                                       | V <sub>RLINE</sub> = E <sub>1</sub> – E <sub>3</sub>                   | See figure 10 waveforms                     | -4                      | 4     | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 7                  | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>6</sub>  | "                                                       | ---                                                                    | See figure 10 waveforms                     | ---                     | ---   | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 8                  | 6.25                    | -5000               | 15                                                    | -4.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>7</sub>  | "                                                       | V <sub>RLOAD1</sub> = E <sub>6</sub> – E <sub>7</sub>                  |                                             | -3.8                    | 3.8   | "     |    |
|                                  | V <sub>RLOAD2</sub>      | 9                  | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "                                                       | V <sub>RLOAD2</sub> = E <sub>3</sub> – E <sub>4</sub>                  |                                             | -3.8                    | 3.8   | "     |    |
|                                  | V <sub>RTH</sub>         | 10                 | 11.25                   | -1000               | 25                                                    | -0.995 | ---  | -1.125 | ---    | "                | "                       | E <sub>8</sub>  | "                                                       | V <sub>RTH</sub> = E <sub>8</sub>                                      | See figure 10 waveforms t = 20.5 ms         | -2                      | 2     | "     |    |
|                                  | I <sub>ADJ</sub>         | 11                 | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | K2               | 12-13                   | E <sub>9</sub>  | mV                                                      | I <sub>ADJ</sub> = E <sub>9</sub> / 2000                               |                                             |                         | -15   | μA    |    |
|                                  | I <sub>ADJ</sub>         | 12                 | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>10</sub> | "                                                       | I <sub>ADJ</sub> = E <sub>10</sub> / 2000                              |                                             |                         | -15   | "     |    |
|                                  | ΔI <sub>ADJ</sub> (LINE) | 13                 | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | ---             | "                                                       | ΔI <sub>ADJ</sub> = (E <sub>9</sub> – E <sub>10</sub> ) / 2000 (LINE)  | -100                                        |                         | 5     | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 14                 | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>11</sub> | "                                                       | ΔI <sub>ADJ</sub> = (E <sub>11</sub> – E <sub>12</sub> ) / 2000 (LOAD) | -100                                        |                         |       | "     |    |
|                                  | ΔI <sub>ADJ</sub>        | 15                 | 6.25                    | -5000               | 15                                                    | -4.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>12</sub> | "                                                       |                                                                        | -5                                          |                         | 5     | "     |    |
|                                  | (LOAD)                   | I <sub>OS1</sub>   | 16                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>13</sub>                                         | V                                                                      | I <sub>OS1</sub> = 4E <sub>13</sub>         | t = 0.1 ms              | -16.0 | -7.0  | A  |
|                                  | (LOAD)                   | I <sub>OS2</sub>   | 17                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>14</sub>                                         | "                                                                      | I <sub>OS2</sub> = 4E <sub>14</sub>         | t = 0.5 ms              | -16.0 | -7.0  | A  |
|                                  | (LOAD)                   | I <sub>OS3</sub>   | 18                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 0                | K4,K5                   | 10-5            | E <sub>15</sub>                                         | "                                                                      | I <sub>OS3</sub> = 4E <sub>15</sub>         | t = 5.0 ms              | -15.0 | -5.0  | A  |
|                                  | (LOAD)                   | V <sub>OUT6</sub>  | 19                      | 4.25                | ---                                                   | 15     | ---  | ---    | -0.425 | 15               | K4,K5                   | 9-11            | E <sub>16</sub>                                         | "                                                                      | V <sub>OUT6</sub> = E <sub>16</sub> (RECOV) |                         |       | 1.29  | V  |
|                                  | (RECOV)                  | I <sub>OS4</sub>   | 20                      | 35                  | ---                                                   | 42.5   | ---  | ---    | -3.5   | 0                | K5                      | 10-5            | E <sub>17</sub>                                         | "                                                                      | I <sub>OS4</sub> = 4E <sub>17</sub>         | See figure 10 waveforms | -3.00 | -0.20 | A  |
|                                  | (RECOV)                  | V <sub>OUT7</sub>  | 21                      | 35                  | ---                                                   | 42.5   | ---  | ---    | -3.5   | 15               | K5                      | 9-11            | E <sub>18</sub>                                         | "                                                                      | V <sub>OUT7</sub> = E <sub>18</sub> (RECOV) |                         | 1.19  | 1.29  | V  |
|                                  | (RECOV)                  | I <sub>Q1</sub>    | 22                      | 4.25                | ---                                                   | 15     | 0    | 1.4    | -0.425 | ---              | K3                      | 12-13           | E <sub>19</sub>                                         | "                                                                      | I <sub>Q1</sub> = E <sub>19</sub> / 2000    |                         |       | -0.05 | mA |
|                                  | (RECOV)                  | I <sub>Q2</sub>    | 23                      | 14.25               | ---                                                   | 25     | 0    | 1.4    | -1.425 | ---              | K3                      | 12-13           | E <sub>20</sub>                                         | "                                                                      | I <sub>Q2</sub> = E <sub>20</sub> / 2000    |                         |       | -0.05 | "  |
|                                  | (RECOV)                  | I <sub>Q3</sub>    | 24                      | 36.25               | ---                                                   | 42.5   | 0    | 1.4    | -3.625 | ---              | K3                      | 12-13           | E <sub>21</sub>                                         | "                                                                      | I <sub>Q3</sub> = E <sub>21</sub> / 2000    |                         |       | -0.2  | "  |
|                                  | (RECOV)                  | V <sub>START</sub> | 25                      | 4.25                | -5000                                                 | 15     | 0    | ---    | -0.425 | ---              | K4                      | 9-11            | E <sub>22</sub>                                         | "                                                                      | V <sub>START</sub> = E <sub>22</sub>        | See figure 10 waveforms | 1.19  | 1.29  | V  |
| 2<br><br>T <sub>A</sub> = +125°C | V <sub>OUT1</sub>        | 26                 | 4.25                    | -5                  | 15                                                    | 0      | ---  | -0.425 | ---    | None             | 9-11                    | E <sub>23</sub> | V                                                       | V <sub>OUT1</sub> = E <sub>23</sub>                                    | -5.0                                        | 1.19                    | 1.29  | V     |    |
|                                  | V <sub>OUT2</sub>        | 27                 | 4.25                    | -5000               | 15                                                    | -4.995 | ---  | -0.425 | ---    | "                | "                       | E <sub>24</sub> | "                                                       | V <sub>OUT2</sub> = E <sub>24</sub>                                    |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT3</sub>        | 28                 | 36.25                   | -5                  | 42.5                                                  | 0      | ---  | -3.625 | ---    | "                | "                       | E <sub>25</sub> | "                                                       | V <sub>OUT3</sub> = E <sub>25</sub>                                    |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT4</sub>        | 29                 | 36.25                   | -0.150              | 42.5                                                  | -0.145 | ---  | -3.625 | ---    | "                | "                       | E <sub>26</sub> | "                                                       | V <sub>OUT4</sub> = E <sub>26</sub>                                    |                                             | "                       | "     | "     |    |
|                                  | V <sub>OUT5</sub>        | 30                 | 6.25                    | -7000               | 15                                                    | -6.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>27</sub> | "                                                       | V <sub>OUT5</sub> = E <sub>27</sub>                                    | "                                           | "                       | "     | "     |    |
|                                  | V <sub>RLINE1</sub>      | 31                 | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | ---    | "                | "                       | E <sub>28</sub> | "                                                       | V <sub>RLINE</sub> = E <sub>23</sub> – E <sub>25</sub>                 | See figure 10 waveforms                     | -20                     | 20    | mV    |    |
|                                  | V <sub>RLOAD1</sub>      | 32                 | 6.25                    | -5                  | 15                                                    | 0      | ---  | -0.625 | ---    | "                | "                       | E <sub>29</sub> | "                                                       | ---                                                                    | See figure 10 waveforms                     | ---                     | ---   | "     |    |
|                                  | V <sub>RLOAD1</sub>      | 33                 | 6.25                    | -5000               | 15                                                    | -4.995 | ---  | -0.625 | ---    | "                | "                       | E <sub>30</sub> | "                                                       | V <sub>RLOAD1</sub> = E <sub>29</sub> – E <sub>30</sub>                |                                             | -8                      | 8     | "     |    |
| V <sub>RLOAD2</sub>              | 34                       | ---                | ---                     | ---                 | ---                                                   | ---    | ---  | ---    | "      | "                | ---                     | "               | V <sub>RLOAD2</sub> = E <sub>25</sub> – E <sub>26</sub> |                                                                        | -8                                          | 8                       | "     |       |    |

TABLE III. Group A inspection for all device type 06 – Continued.

| Subgroup                | Symbol                   | Test no. | See figure 10           |                     |                                                       |        |        |        |     | Relays energized | Measurement sense lines |                 |                                          | Equation                                                               | Notes                   | Limits |       | Unit |  |
|-------------------------|--------------------------|----------|-------------------------|---------------------|-------------------------------------------------------|--------|--------|--------|-----|------------------|-------------------------|-----------------|------------------------------------------|------------------------------------------------------------------------|-------------------------|--------|-------|------|--|
|                         |                          |          | Test conditions         |                     | Applied test voltages (volts) (Hi – Lo pin potential) |        |        |        |     |                  | Pins                    | Value           | Units                                    |                                                                        |                         | Min    | Max   |      |  |
|                         |                          |          | V <sub>IN</sub> (volts) | I <sub>L</sub> (mA) | 1-2                                                   | 4-5    | 6-11   | 7-2    | 8-2 |                  |                         |                 |                                          |                                                                        |                         |        |       |      |  |
| 2                       | I <sub>ADJ</sub>         | 35       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | K2               | 12-13                   | E <sub>31</sub> | mV                                       | I <sub>ADJ</sub> = E <sub>31</sub> / 2000                              |                         |        | -15   | μA   |  |
|                         | I <sub>ADJ</sub>         | 36       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>32</sub> | "                                        | I <sub>ADJ</sub> = E <sub>32</sub> / 2000                              |                         |        | -15   | "    |  |
|                         | ΔI <sub>ADJ</sub> (LINE) | 37       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                        | ΔI <sub>ADJ</sub> = (E <sub>31</sub> – E <sub>32</sub> ) / 2000 (LINE) | -100                    |        | 5     | "    |  |
|                         | ΔI <sub>ADJ</sub>        | 38       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>33</sub> | "                                        |                                                                        | -100                    |        |       | "    |  |
|                         | ΔI <sub>ADJ</sub>        | 39       | 6.25                    | -5000               | 15                                                    | -4.995 | ---    | -0.625 | --- | "                | "                       | E <sub>34</sub> | "                                        | ΔI <sub>ADJ</sub> = (E <sub>33</sub> – E <sub>34</sub> ) / 2000 (LOAD) | -5                      |        | 5     | "    |  |
|                         | (LOAD)                   |          |                         |                     |                                                       |        |        |        |     |                  |                         |                 |                                          |                                                                        |                         |        |       |      |  |
|                         | I <sub>OS1</sub>         | 40       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 0   | K4,K5            | 10-5                    | E <sub>35</sub> | V                                        | I <sub>OS1</sub> = 4E <sub>35</sub>                                    | t = 0.1 ms              | -16.0  | -7.0  | A    |  |
|                         | I <sub>OS2</sub>         | 41       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 0   | K4,K5            | 10-5                    | E <sub>36</sub> | V                                        | I <sub>OS2</sub> = 4E <sub>36</sub>                                    | t = 0.5 ms              | -16.0  | -7.0  | A    |  |
|                         | I <sub>OS3</sub>         | 42       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 0   | K4,K5            | 10-5                    | E <sub>37</sub> | V                                        | I <sub>OS3</sub> = 4E <sub>37</sub>                                    | t = 5.0 ms              | -15.0  | -5.0  | A    |  |
|                         | V <sub>OUT6</sub>        | 43       | 4.25                    | ---                 | 15                                                    | ---    | ---    | -0.425 | 15  | K4,K5            | 9-11                    | E <sub>38</sub> | "                                        | V <sub>OUT6</sub> = E <sub>38</sub> (RECOV)                            |                         |        | 1.29  | V    |  |
|                         | I <sub>OS4</sub>         | 44       | 35                      | ---                 | 42.5                                                  | ---    | ---    | -3.5   | 0   | K5               | 10-5                    | E <sub>39</sub> | "                                        | I <sub>OS4</sub> = 4E <sub>39</sub>                                    | t = 10.0 ms             | -3.0   | -0.20 | A    |  |
|                         | V <sub>OUT7</sub>        | 45       | 35                      | ---                 | 42.5                                                  | ---    | ---    | -3.5   | 15  | K5               | 9-11                    | E <sub>40</sub> | "                                        | V <sub>OUT7</sub> = E <sub>40</sub> (RECOV)                            | See figure 10 waveforms | 1.19   | 1.29  | V    |  |
|                         | (RECOV)                  |          |                         |                     |                                                       |        |        |        |     |                  |                         |                 |                                          |                                                                        |                         |        |       |      |  |
|                         | I <sub>Q1</sub>          | 46       | 4.25                    | ---                 | 15                                                    | 0      | 1.4    | -0.425 | --- | K3               | 12-13                   | E <sub>41</sub> | "                                        | I <sub>Q1</sub> = E <sub>41</sub> / 2000                               |                         |        | -0.05 | mA   |  |
| I <sub>Q2</sub>         | 47                       | 14.25    | ---                     | 25                  | 0                                                     | 1.4    | -1.425 | ---    | K3  | 12-13            | E <sub>42</sub>         | "               | I <sub>Q2</sub> = E <sub>42</sub> / 2000 |                                                                        |                         | -0.05  | "     |      |  |
| I <sub>Q3</sub>         | 48                       | 36.25    | ---                     | 42.5                | 0                                                     | 1.4    | -3.625 | ---    | K3  | 12-13            | E <sub>43</sub>         | "               | I <sub>Q3</sub> = E <sub>43</sub> / 2000 |                                                                        |                         | -0.2   | "     |      |  |
|                         | V <sub>START</sub>       | 49       | 4.25                    | -5000               | 15                                                    | 0      | ---    | -0.425 | --- | K4               | 9-11                    | E <sub>44</sub> | "                                        | V <sub>START</sub> = E <sub>44</sub>                                   | See figure 10 waveforms | 1.19   | 1.29  | V    |  |
| T <sub>A</sub> = +150°C | V <sub>OUT7</sub>        | 50       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | None             | "                       | E <sub>45</sub> | "                                        | V <sub>OUT7</sub> = E <sub>45</sub>                                    | -5.0                    | 1.19   | 1.29  | V    |  |
| 3                       | V <sub>OUT1</sub>        | 51       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | None             | 9-11                    | E <sub>46</sub> | V                                        | V <sub>OUT1</sub> = E <sub>46</sub>                                    |                         | 1.19   | 1.29  | V    |  |
|                         | V <sub>OUT2</sub>        | 52       | 4.25                    | -5000               | 15                                                    | -4.995 | ---    | -0.425 | --- | "                | "                       | E <sub>47</sub> | "                                        | V <sub>OUT2</sub> = E <sub>47</sub>                                    |                         |        | "     | "    |  |
|                         | V <sub>OUT3</sub>        | 53       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>48</sub> | "                                        | V <sub>OUT3</sub> = E <sub>48</sub>                                    |                         |        | "     | "    |  |
|                         | V <sub>OUT4</sub>        | 54       | 36.25                   | -0.150              | 42.5                                                  | -0.145 | ---    | -3.625 | --- | "                | "                       | E <sub>49</sub> | "                                        | V <sub>OUT4</sub> = E <sub>49</sub>                                    |                         |        | "     | "    |  |
|                         | V <sub>OUT5</sub>        | 55       | 6.25                    | -7000               | 15                                                    | -6.995 | ---    | -0.625 | --- | "                | "                       | E <sub>50</sub> | "                                        | V <sub>OUT5</sub> = E <sub>50</sub>                                    |                         |        | "     | "    |  |
|                         | V <sub>RLINE1</sub>      | 56       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                        | V <sub>RLINE</sub> = E <sub>46</sub> – E <sub>48</sub>                 | See figure 10 waveforms | -17    | 17    | mV   |  |
|                         | V <sub>RLOAD1</sub>      | 57       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>51</sub> | "                                        | ---                                                                    | See figure 10 waveforms | ---    | ---   | "    |  |
|                         | V <sub>RLOAD1</sub>      | 58       | 6.25                    | -5000               | 15                                                    | -4.995 | ---    | -0.625 | --- | "                | "                       | E <sub>52</sub> | "                                        | V <sub>RLOAD1</sub> = E <sub>51</sub> – E <sub>52</sub>                |                         | -8     | 8     | "    |  |
|                         | V <sub>RLOAD2</sub>      | 59       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                        | V <sub>RLOAD2</sub> = E <sub>48</sub> – E <sub>49</sub>                |                         | -8     | 8     | "    |  |
|                         | I <sub>ADJ</sub>         | 60       | 4.25                    | -5                  | 15                                                    | 0      | ---    | -0.425 | --- | K2               | 12-13                   | E <sub>53</sub> | mV                                       | I <sub>ADJ</sub> = E <sub>53</sub> / 2000                              |                         |        | -15   | μA   |  |
|                         | I <sub>ADJ</sub>         | 61       | 36.25                   | -5                  | 42.5                                                  | 0      | ---    | -3.625 | --- | "                | "                       | E <sub>54</sub> | "                                        | I <sub>ADJ</sub> = E <sub>54</sub> / 2000                              |                         |        | -15   | "    |  |
|                         | ΔI <sub>ADJ</sub> (LINE) | 62       | ---                     | ---                 | ---                                                   | ---    | ---    | ---    | --- | "                | "                       | ---             | "                                        | ΔI <sub>ADJ</sub> = (E <sub>53</sub> – E <sub>54</sub> ) / 2000 (LINE) | -100                    |        | 5     | "    |  |
|                         | ΔI <sub>ADJ</sub>        | 63       | 6.25                    | -5                  | 15                                                    | 0      | ---    | -0.625 | --- | "                | "                       | E <sub>55</sub> | "                                        |                                                                        | -100                    |        |       | "    |  |
|                         | ΔI <sub>ADJ</sub>        | 64       | 6.25                    | -5000               | 15                                                    | -4.995 | ---    | -0.625 | --- | "                | "                       | E <sub>56</sub> | "                                        | ΔI <sub>ADJ</sub> = (E <sub>55</sub> – E <sub>56</sub> ) / 2000 (LOAD) | -5                      |        | 5     | "    |  |
| (LOAD)                  |                          |          |                         |                     |                                                       |        |        |        |     |                  |                         |                 |                                          |                                                                        |                         |        |       |      |  |

TABLE III. Group A inspection for all device type 06 – Continued.

| Subgroup                        | Symbol                               | Test no. | See figure 10                                                    |                     |                                                       |                                                       |      |        |     | Relays energized                 | Measurement sense limts |                 |                                                                | Equation                                    | Notes                   | Limits |       | Unit |
|---------------------------------|--------------------------------------|----------|------------------------------------------------------------------|---------------------|-------------------------------------------------------|-------------------------------------------------------|------|--------|-----|----------------------------------|-------------------------|-----------------|----------------------------------------------------------------|---------------------------------------------|-------------------------|--------|-------|------|
|                                 |                                      |          | Test conditions                                                  |                     | Applied test voltages (volts) (Hi – Lo pin potential) |                                                       |      |        |     |                                  | Pins                    | Value           | Units                                                          |                                             |                         | Min    | Max   |      |
|                                 |                                      |          | V <sub>IN</sub> (volts)                                          | I <sub>L</sub> (mA) | 1-2                                                   | 4-5                                                   | 6-11 | 7-2    | 8-2 |                                  |                         |                 |                                                                |                                             |                         |        |       |      |
| 3<br><br>T <sub>A</sub> = -55°C | I <sub>OS1</sub>                     | 65       | 4.25                                                             | ---                 | 15                                                    | ---                                                   | ---  | -0.425 | 0   | K4,K5                            | 10-5                    | E <sub>57</sub> | V                                                              | I <sub>OS1</sub> = 4E <sub>57</sub>         | t = 0.1 ms              | -16.0  | -7.0  | A    |
|                                 | I <sub>OS2</sub>                     | 66       | 4.25                                                             | ---                 | 15                                                    | ---                                                   | ---  | -0.425 | 0   | K4,K5                            |                         | E <sub>58</sub> | "                                                              | I <sub>OS2</sub> = 4E <sub>58</sub>         | t = 0.5 ms              | -16.0  | -7.0  | A    |
|                                 | I <sub>OS3</sub>                     | 67       | 4.25                                                             | ---                 | 15                                                    | ---                                                   | ---  | -0.425 | 0   | K4,K5                            |                         | E <sub>59</sub> | "                                                              | I <sub>OS3</sub> = 4E <sub>59</sub>         | t = 5.0 ms              | -15.0  | -5.0  | A    |
|                                 | V <sub>OUT6</sub> (RECOV)            | 68       | 4.25                                                             | ---                 | 15                                                    | ---                                                   | ---  | -0.425 | 15  | K4,K5                            | 9-11                    | E <sub>60</sub> | "                                                              | V <sub>OUT6</sub> = E <sub>60</sub> (RECOV) |                         |        | 1.29  | V    |
|                                 | I <sub>OS4</sub>                     | 69       | 35                                                               | ---                 | 42.5                                                  | ---                                                   | ---  | -3.5   | 0   | K5                               | 10-5                    | E <sub>61</sub> | "                                                              | I <sub>OS4</sub> = 4E <sub>61</sub>         | t = 10.0 ms             | -3.0   | -0.20 | A    |
|                                 | V <sub>OUT7</sub> (RECOV)            | 70       | 35                                                               | ---                 | 42.5                                                  | ---                                                   | ---  | -3.5   | 15  | K5                               | 9-11                    | E <sub>62</sub> | "                                                              | V <sub>OUT7</sub> = E <sub>62</sub> (RECOV) | See figure 10 waveforms | 1.19   | 1.29  | V    |
|                                 | I <sub>Q1</sub>                      | 71       | 4.25                                                             | ---                 | 15                                                    | 0                                                     | 1.4  | -0.425 | --- | K3                               | 12-13                   | E <sub>63</sub> | "                                                              | I <sub>Q1</sub> = E <sub>63</sub> / 2000    |                         |        | -0.05 | mA   |
|                                 | I <sub>Q2</sub>                      | 72       | 14.25                                                            | ---                 | 25                                                    | 0                                                     | 1.4  | -1.425 | --- | K3                               | 12-13                   | E <sub>64</sub> | "                                                              | I <sub>Q2</sub> = E <sub>64</sub> / 2000    |                         |        | -0.05 | "    |
|                                 | I <sub>Q3</sub>                      | 73       | 36.25                                                            | ---                 | 42.5                                                  | 0                                                     | 1.4  | -3.625 | --- | K3                               | 12-13                   | E <sub>65</sub> | "                                                              | I <sub>Q3</sub> = E <sub>65</sub> / 2000    |                         |        | -0.2  | "    |
|                                 | V <sub>START</sub>                   | 74       | 4.25                                                             | -5000               | 15                                                    | 0                                                     | ---  | -0.425 | --- | K4                               | 9-11                    | E <sub>66</sub> | "                                                              | V <sub>START</sub> = E <sub>66</sub>        | See figure 10 waveforms | 1.19   | 1.29  | V    |
| -5.0                            |                                      |          |                                                                  |                     |                                                       |                                                       |      |        |     |                                  |                         |                 |                                                                |                                             |                         |        |       |      |
| Subgroup                        | Symbol                               | Test no. | Test conditions                                                  |                     |                                                       |                                                       |      |        |     | Measurement sense lines          |                         |                 | Equation                                                       | Notes                                       | Limits                  |        | Unit  |      |
|                                 |                                      |          | Input voltage                                                    |                     |                                                       | Load current                                          |      |        |     | Symbol                           | Value                   | Units           |                                                                |                                             | Min                     | Max    |       |      |
| 4<br><br>T <sub>A</sub> = +25°C | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> | 75       | V <sub>IN</sub> = 6.25 V<br>e <sub>i</sub> = 1.0 Vrms at 2400 Hz |                     |                                                       | I <sub>L</sub> = -500 mA                              |      |        |     | e <sub>orms</sub>                | 67                      | Vrms            | ΔV <sub>IN</sub> / ΔV <sub>OUT</sub> = -20 log E <sub>67</sub> | See figure 11                               | 65                      | ---    | dB    |      |
| 7<br><br>T <sub>A</sub> = +25°C | V <sub>NO</sub>                      | 76       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       | I <sub>L</sub> = -100 mA                              |      |        |     | e <sub>orms</sub>                | 68                      | Vrms            | V <sub>NO</sub> = E <sub>68</sub>                              | See figure 12                               | ---                     | 120    | μVrms |      |
|                                 | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> | 77       | V <sub>IN</sub> = 6.25 V<br>ΔV <sub>IN</sub> = 3.0 V             |                     |                                                       | I <sub>L</sub> = -10 mA                               |      |        |     | V <sub>OUT</sub> E <sub>69</sub> | 69                      | V               | ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> = E <sub>69</sub> / 3     | See figure 13                               | ---                     | 12     | mV/V  |      |
|                                 | ΔV <sub>OUT</sub> / ΔI <sub>L</sub>  | 78       | V <sub>IN</sub> = 6.25 V                                         |                     |                                                       | I <sub>L</sub> = -100 mA<br>ΔI <sub>L</sub> = -400 mA |      |        |     | V <sub>OUT</sub> E <sub>70</sub> | 70                      | V               | ΔV <sub>OUT</sub> / ΔI <sub>L</sub> = E <sub>70</sub> / 200    | See figure 14                               | ---                     | 0.30   | mV/mA |      |

TABLE IV. Group C end point electrical parameters. ( $T_A = +25^\circ\text{C}$ )

| Device type    | Characteristic        | Symbol              | Delta limits <u>1/</u> | Limits |      | Units         |
|----------------|-----------------------|---------------------|------------------------|--------|------|---------------|
|                |                       |                     |                        | Min    | Max  |               |
| 01, 02         | Output voltage        | $V_{OUT}$ <u>2/</u> | $\pm 50$ mV            | 4.75   | 5.25 | V             |
|                | Standby current drain | $I_{SCD}$           | $\pm 20$ %             | -8.0   | -0.5 | mA            |
| 03, 04, 05     | Output voltage        | $V_{OUT}$ <u>2/</u> | $\pm 10$ mV            | 1.20   | 1.30 | V             |
| 06             | Output voltage        | $V_{OUT}$ <u>2/</u> | $\pm 10$ mV            | 1.19   | 1.29 | V             |
| 03, 04, 05, 06 | Adjust pin current    | $I_{ADJ}$ <u>3/</u> | $\pm 10$ $\mu\text{A}$ | -100   | -15  | $\mu\text{A}$ |
| 03, 04         | Line regulation       | $V_{RLINE}$         | $\pm 4$ mV             | -9     | 9    | mV            |
| 05, 06         | Line regulation       | $V_{RLINE}$         | $\pm 2$ mV             | -4     | 4    | mV            |

1/ Delta limits apply to the measured value (see delta limit definition in MIL-PRF-38535).

2/ Delta limits apply to test number 3 for all device types.

3/ Delta limits apply to test number 11 for all device types 03, 04, 05 and test number 12 for device type 06.

## 5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Pin and compliance identifier, if applicable (see 1.2).
- c. Requirements for delivery of one copy of the conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- d. Requirements for certificate of compliance, if applicable.
- e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.
- f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.
- g. Requirements for product assurance options.
- h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.
- i. Requirements for "JAN" marking.
- j. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43218-3990.

6.4 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-STD-1331, and as follows:

6.5.1 Line regulation. The change in output voltage for a specified change in input voltage ( $V_{RLINE}$ ).

6.5.2 Load regulation. The change in output voltage for a specified change in load current ( $V_{RLOAD}$ ).

6.5.3 Ripple rejection. The ratio of the peak to peak input ripple voltage to the peak to peak output ripple voltage ( $\Delta V_{OUT} / \Delta V_{IN}$ ).

6.5.4 Output noise voltage. The rms output noise voltage with constant load and no input ripple ( $V_{NO}$ ).

6.5.5 Standby current drain. The supply current drawn by the regulator with no output load or with a 1 k ohm output load.

6.5.6 Minimum load current. The minimum load current is that current required to maintain regulation.

6.5.7 Input voltage range. The range of supply voltage over which the regulator will operate.

6.5.8 Output voltage range. The range of output voltage over which the regulator will operate.

6.5.9 Transient response. The closed-loop step function response of the regulator under small-signal conditions.

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

| <u>Military device type</u> | <u>Generic-industry type</u> |
|-----------------------------|------------------------------|
| 01                          | 78MG                         |
| 02                          | 78G                          |
| 03                          | LM117H                       |
| 04                          | LM117K                       |
| 05                          | LM150K                       |
| 06                          | LM138K                       |

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - CR  
Navy - EC  
Air Force - 11  
DLA - CC

Preparing activity:

DLA - CC

Project 5962-2005-027

Review activities:

Army – MI, SM  
Navy – AS, CG, MC, SH, TD  
Air Force – 03, 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.