

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

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

Reactivated after 24 February 2004 and may be used for either new or existing design acquisition.

The requirement 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 fixed output, monolithic silicon, 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 For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

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	Voltage regulator, +5 volts at 1.5 A (maximum)	X or Y (see table I)
02	Voltage regulator, +5 volts at 0.5 A	X
03	Voltage regulator, +12 volts at 0.5 A	X
04	Voltage regulator, +15 volts at 0.5 A	X
05	Voltage regulator, +24 volts at 0.5 A	X
06	Voltage regulator, +5 volts at 1.0 A	Y
07	Voltage regulator, +12 volts at 1.0 A	Y
08	Voltage regulator, +15 volts at 1.0 A	Y
09	Voltage regulator, +24 volts at 1.0 A	Y

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

1.2.3 Case outlines. The case outlines should be designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	See figure 1	3	Can
Y	See figure 2	2	Flange mount

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 43216-5000, or emailed to linear@dscclia.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

1.3 Absolute maximum ratings.

Input voltage:

Device types 01, 02, 03, 04, 06, 07, and 08	35 V dc
Device types 05 and 09	40 V dc
Lead temperature (soldering, 60 seconds)	+300°C
Storage temperature range	-65°C to +150°C
Junction temperature (T_J)	+150°C <u>1/</u>

1.4 Recommended operating conditions.

Input voltage range:

Device types 01	+7.0 V dc to +25 V dc
Device types 02 and 06	+8.0 V dc to +25 V dc
Device types 03 and 07	+15 V dc to +32 V dc
Device types 04 and 08	+18.5 V dc to +35 V dc
Device types 05 and 09	+28 V dc to +38 V dc

Ambient operating temperature range (T_A) -55°C to +125°C1.5 Power and thermal characteristics.

$T_A = T_S$	Case	Maximum θ_{JA}	Maximum P_D without heat sink	Maximum θ_{JC}	Maximum P_D with heat sink	Maximum θ_{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	5.6 W	0.5°C/W
25°C	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	28.00 W	0.5°C/W
-55°C	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	45.00 W	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 above thermal ratings.3/ Based on $T_J = 150^\circ\text{C}$ and specified values of θ_{JC} and θ_{JA} .

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 www.dodssp.daps.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 6.4).

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

3.3.2 Block diagram and terminal connections. The block diagrams and terminal connections shall be as specified on figures 3 and 4.

3.3.3 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.

3.4 Lead material and finish. Lead material and finish shall be in accordance with MIL-PRF-38535 or as follows:

Type X

Nickel	50-53 percent
Manganese	0.60 percent, maximum
Silicon	0.30 percent, maximum
Carbon	0.10 percent, maximum
Chromium	0.25 percent, maximum
Cobalt	0.50 percent, maximum
Phosphorous	0.025 percent, maximum
Sulfur	0.025 percent, maximum
Aluminum	0.10 percent maximum
Iron	Remainder

Type Y

Copper core	24.75 percent, maximum
Clad with Alloy 52	75.25 percent, maximum

3.4.1 Lead finish. The lead 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°C to $+125^{\circ}\text{C}$.

3.5.1 Stability. If the device is located an appreciable distance from the power supply filter, a large ($1.0\ \mu\text{F}$) bypass capacitor should be connected as close to the device V_{CC} input as possible to suppress oscillation. A $0.1\ \mu\text{F}$ bypass capacitor is recommended on the device output. Output current oscillations are likely to occur in the current limit operating mode with high input voltages ($V_{\text{IN}} > 18\ \text{V dc}$).

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°C ambient or sink temperature; thus devices may not perform within the 25°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 for device type 01.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 11 and 3.5, unless otherwise specified				Limits		Unit
		Input voltage	Load current		Other	Min	Max	
			I _L for case X	I _L for case Y				
Output voltage	V _{OUT}	V _{IN} = 7 V	-5 mA	-5 mA		4.70	5.40	V
		V _{IN} = 7 V, 8 V <u>1</u> /	-0.5 A	-1.5 A		4.70	5.40	
		V _{IN} = 9 V	-0.5 A			4.70	5.40	
		V _{IN} = 18 V		-1.5 A		4.70	5.40	
		V _{IN} = 25 V	-5 mA	-5 mA		4.70	5.40	
		V _{IN} = 25 V	-100 mA	-1.0 A		4.70	5.40	
Line regulation	V _{RLINE}	7 V ≤ V _{IN} ≤ 25 V	-5 mA		T _A = +25°C	-50	+50	mV
					-55°C ≤ T _A ≤ +125°C	-100	+100	
Load regulation	V _{RLOAD}	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-55°C ≤ T _A ≤ +125°C	-100	100	mV
			I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
Standby current drain	I _{SCD}	7 V ≤ V _{IN} ≤ 25 V	-5 mA			-10.0	+0.5	mA
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	7 V ≤ V _{IN} ≤ 25 V	-5 mA			-0.5	+0.5	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA			-0.8	+0.8	mA
			I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
Output short circuit current <u>2</u> /	I _{OS}	V _{IN} = 35 V			Case X	-2.0	0.01	A
					Case Y	-2.8	0.01	

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 01 – Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 11 and 3.5, unless otherwise specified				Limits		Unit
		Input voltage	Load current		Other	Min	Max	
			I _L for case X	I _L for case Y				
Minimum start-up input voltage	V _{START}		Case X	R _L = 25 Ω ±5%	See figure 12		9.0	V
			Case Y	R _L = 5 Ω ±5%				
Ripple rejection <u>3/</u>	ΔV _{IN} / ΔV _{OUT}	V _{IN} = 10 V, e _i = 1 V _{rms} , at f = 2,400 Hz	-125 mA	-350 mA	T _A = +25°C, see figure 7	60		dB
Output noise voltage <u>3/</u>	N _O	V _{IN} = 10 V	-50 mA	-100 mA	T _A = +25°C, see figure 8		125	μV _{rms}
Line transient response	ΔV _{OUT} / ΔV _{IN}	V _{IN} = 10 V, V _{PULSE} = 3.0 V	-5 mA		T _A = +25°C, see figure 9		15	mV/V
Load transient response	ΔV _{OUT} / ΔI _L	V _{IN} = 10 V	-50 mA, ΔI _L = -200 mA	-100 mA, ΔI _L = -400 mA	T _A = +25°C, see figure 10		2.0	mV/mA
Average temperature coefficient of output voltage	ΔV _{OUT} / ΔT	V _{IN} = 7 V	-5 mA		T _A = +125°C, and -55°C	-2.0	+2.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 02. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 8 V	I _L = -5 mA, -0.5 A		4.75	5.25	V
		V _{IN} = 20 V	I _L = -5 mA, -0.5 A		4.75	5.25	
		V _{IN} = 35 V	I _L = -5 mA, -50 mA		4.75	5.25	
		V _{IN} = 10 V	I _L = -5 mA	T _A = 150°C	4.70	5.30	
Line regulation	V _{RLINE}	8 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA		-150	150	mV
		8 V ≤ V _{IN} ≤ 25 V	I _L = -350 mA		-50	50	
Load regulation	V _{RLOAD}	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA		-100	100	mV
		V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA		-150	150	
Standby current drain	I _{SCD}	V _{IN} = 10 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short circuit current 2/ 5/	I _{OS}	V _{IN} = 10 V			-2.00	-0.01	A
		V _{IN} = 25 V			-1.50	-0.01	
		V _{IN} = 35 V			-1.00	-0.01	
Overload current 6/	I _{OL}	V _{IN} = 8 V, forced ΔV _{OUT} = -0.48 V		See figure 6	-2.0	-0.5	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 02 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 10 V, e _i = 1 V rms at f = 2,400 Hz	I _L = -125 mA	See figure 7, T _A = +25°C	60		dB
Output noise voltage <u>3/</u>	N _O	V _{IN} = 10 V	I _L = -50 mA	See figure 8, T _A = +25°C		125	μV rms
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 10 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = +25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 10 V	I _L = -50 mA, ΔI _L = -200 mA	See figure 10, T _A = +25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 10 V	I _L = -5 mA	T _A = +125°C and -55°C	-2.0	+2.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 03. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 15 V	I _L = -5 mA, -0.5 A		11.40	12.60	V
		V _{IN} = 27 V	I _L = -5 mA, -0.5 A		11.40	12.60	
		V _{IN} = 35 V	I _L = -5 mA, -50 mA		11.40	12.60	
		V _{IN} = 17 V	I _L = -5 mA	T _A = 150°C	11.28	12.72	
Line regulation	V _{RLINE}	15 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA		-360	360	mV
		15 V ≤ V _{IN} ≤ 32 V	I _L = -350 mA		-120	120	
Load regulation	V _{RLOAD}	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA		-240	240	mV
		V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA		-360	360	
Standby current drain	I _{SCD}	V _{IN} = 17 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short <u>2/ 5/</u> circuit current	I _{OS}	V _{IN} = 17 V			-1.75	-0.01	A
		V _{IN} = 32 V			-1.25	-0.01	
		V _{IN} = 35 V			-1.00	-0.01	
Overload current <u>6/</u>	I _{OL}	V _{IN} = 15 V, forced ΔV _{OUT} = -1.13 V		See figure 6	-2.0	-0.5	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 03 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 17 V, e _i = 1 V _{rms} , at f = 2,400 Hz	I _L = -125 mA	See figure 7, T _A = +25°C	55		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 17 V	I _L = -50 mA	See figure 8, T _A = +25°C		250	μV _{rms}
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 17 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = +25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 17 V	I _L = -50 mA, ΔI _L = -200 mA	See figure 10, T _A = +25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 17 V	I _L = -5 mA	T _A = +125°C and -55°C	-3.0	+3.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 04. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 18.5 V	I _L = -5 mA, -0.5 A		14.25	15.75	V
		V _{IN} = 30 V	I _L = -5 mA, -0.5 A		14.25	15.75	
		V _{IN} = 35 V	I _L = -5 mA, -50 mA		14.25	15.75	
		V _{IN} = 20 V	I _L = -5 mA	T _A = 150°C	14.10	15.90	
Line regulation	V _{RLINE}	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -350 mA		-150	150	mV
Load regulation	V _{RLOAD}	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA		-300	300	mV
		V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA		-450	450	
Standby current drain	I _{SCD}	V _{IN} = 20 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short <u>2/ 5/</u> circuit current	I _{OS}	V _{IN} = 20 V			-1.75	-0.01	A
		V _{IN} = 35 V			-1.00	-0.01	
Overload current <u>6/</u>	I _{OL}	V _{IN} = 18.5 V, forced ΔV _{OUT} = -1.43 V		See figure 6	-2.0	-0.5	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device 04 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 20 V, e _i = 1 Vrms, at f = 2,400 Hz	I _L = -125 mA	See figure 7, T _A = 25°C	53		dB
Output noise <u>3/</u> voltage	V _{NO}	V _{IN} = 20 V	I _L = -50 mA	See figure 8, T _A = 25°C		300	μVrms
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 20 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 20 V	I _L = -50 mA, ΔI _L = -200 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 20 V	I _L = -5 mA	T _A = +125°C and -55°C	-3.75	+3.75	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device 05. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 28 V	I _L = -5 mA, -0.5 A		22.80	25.20	V
		V _{IN} = 38 V	I _L = -5 mA, -0.5 A		22.80	25.20	
		V _{IN} = 40 V	I _L = -5 mA, -50 mA		22.80	25.20	
		V _{IN} = 30 V	I _L = -5 mA	T _A = 150°C	22.56	25.44	
Line regulation	V _{RLINE}	28 V ≤ V _{IN} ≤ 40 V	I _L = -50 mA		-720	720	mV
		28 V ≤ V _{IN} ≤ 38 V	I _L = -350 mA		-240	240	
Load regulation	V _{RLOAD}	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA		-480	480	mV
		V _{IN} = 40 V	-50 mA ≤ I _L ≤ -5 mA		-720	720	
Standby current drain	I _{SCD}	V _{IN} = 30 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 40 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	28 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short <u>2/ 5/</u> circuit current	I _{OS}	V _{IN} = 30 V			-1.25	-0.01	A
		V _{IN} = 38 V			-1.00	-0.01	
		V _{IN} = 40 V			-1.00	-0.01	
Overload current <u>6/</u>	I _{OL}	V _{IN} = 28 V, forced ΔV _{OUT} = -2.28 V		See figure 6	-2.0	-0.5	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 05 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 30 V, e _i = 1 V _{rms} , at f = 2,400 Hz	I _L = -125 mA	See figure 7, T _A = 25°C	50		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 30 V	I _L = -50 mA	See figure 8, T _A = 25°C		500	μV _{rms}
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 30 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 30 V	I _L = -50 mA, ΔI _L = -200 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 30 V	I _L = -5 mA	T _A = +125°C and -55°C	-6.0	+6.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 06. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 8 V	I _L = -5 mA, -1.0 A		4.75	5.25	V
		V _{IN} = 20 V	I _L = -5 mA, -1.0 A		4.75	5.25	
		V _{IN} = 35 V	I _L = -5 mA, -0.1 A		4.75	5.25	
		V _{IN} = 10 V	I _L = -5 mA	T _A = 150°C	4.70	5.30	
Line regulation	V _{RLINE}	8 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A		-150	150	mV
		8 V ≤ V _{IN} ≤ 25 V	I _L = -0.5 A		-50	50	
Load regulation	V _{RLOAD}	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA		-100	100	mV
		V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA		-150	150	
Standby current drain	I _{SCD}	V _{IN} = 10 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short <u>2/ 5/</u> circuit current	I _{OS}	V _{IN} = 10 V			-4.00	-0.02	A
		V _{IN} = 25 V			-3.00	-0.02	
		V _{IN} = 35 V			-2.00	-0.02	
Overload current <u>6/</u>	I _{OL}	V _{IN} = 8 V, forced ΔV _{OUT} = -0.48 V		See figure 6	-4.0	-1.0	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 06 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 10 V, e _i = 1 Vrms, at f = 2,400 Hz	I _L = -350 mA	See figure 7, T _A = 25°C	60		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 10 V	I _L = -0.1 A	See figure 8, T _A = 25°C		125	μVrms
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 10 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 10 V	I _L = -100 mA, ΔI _L = -400 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 10 V	I _L = -5 mA	T _A = +125°C and -55°C	-2.0	+2.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 07. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 15 V	I _L = -5 mA, -1.0 A		11.40	12.60	V
		V _{IN} = 27 V	I _L = -5 mA, -1.0 A		11.40	12.60	
		V _{IN} = 35 V	I _L = -5 mA, -0.1 A		11.40	12.60	
		V _{IN} = 17 V	I _L = -5 mA	T _A = 150°C	11.28	12.72	
Line regulation	V _{RLINE}	15 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A		-360	360	mV
		15 V ≤ V _{IN} ≤ 32 V	I _L = -0.5 A		-120	120	
Load regulation	V _{RLOAD}	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA		-240	240	mV
		V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA		-360	360	
Standby current drain	I _{SCD}	V _{IN} = 17 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short 2/ 5/ circuit current	I _{OS}	V _{IN} = 17 V			-3.50	-0.02	A
		V _{IN} = 32 V			-2.50	-0.02	
		V _{IN} = 35 V			-2.00	-0.02	
Overload current 6/	I _{OL}	V _{IN} = 15 V, forced ΔV _{OUT} = -1.13 V		See figure 6	-4.0	-1.0	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 07 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 17 V, e _i = 1 V _{rms} , at f = 2,400 Hz	I _L = -350 mA	See figure 7, T _A = 25°C	55		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 17 V	I _L = -0.1 A	See figure 8, T _A = 25°C		250	μV _{rms}
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 17 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 17 V	I _L = -100 mA, ΔI _L = -400 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 17 V	I _L = -5 mA	T _A = +125°C and -55°C	-3.0	+3.0	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 08. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 18.5 V	I _L = -5 mA, -1.0 A		14.25	15.75	V
		V _{IN} = 30 V	I _L = -5 mA, -1.0 A		14.25	15.75	
		V _{IN} = 35 V	I _L = -5 mA, -0.1 A		14.25	15.75	
		V _{IN} = 20 V	I _L = -5 mA	T _A = 150°C	14.10	15.90	
Line regulation	V _{RLINE}	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -0.5 A		-150	150	mV
Load regulation	V _{RLOAD}	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA		-300	300	mV
		V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA		-450	450	
Standby current drain	I _{SCD}	V _{IN} = 20 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 35 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short <u>2/ 5/</u> circuit current	I _{OS}	V _{IN} = 20 V			-3.50	-0.02	A
		V _{IN} = 35 V			-2.00	-0.02	
Overload current <u>6/</u>	I _{OL}	V _{IN} = 18.5 V, forced ΔV _{OUT} = -1.43 V		See figure 6	-4.0	-1.0	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 08 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 20 V, e _i = 1 V _{rms} , at f = 2,400 Hz	I _L = -350 mA	See figure 7, T _A = 25°C	53		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 20 V	I _L = -0.1 A	See figure 8, T _A = 25°C		300	μV _{rms}
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 20 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 20 V	I _L = -100 mA, ΔI _L = -400 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 20 V	I _L = -5 mA	T _A = +125°C and -55°C	-3.75	+3.75	mV/°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 09. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Output voltage	V _{OUT}	V _{IN} = 28 V	I _L = -5 mA, -1.0 A		22.80	25.20	V
		V _{IN} = 38 V	I _L = -5 mA, -1.0 A		22.80	25.20	
		V _{IN} = 40 V	I _L = -5 mA, -0.1 A		22.80	25.20	
		V _{IN} = 30 V	I _L = -5 mA	T _A = 150°C	22.56	25.44	
Line regulation	V _{RLINE}	28 V ≤ V _{IN} ≤ 40 V	I _L = -0.1 A		-720	720	mV
		28 V ≤ V _{IN} ≤ 38 V	I _L = -0.5 A		-240	240	
Load regulation	V _{RLOAD}	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA		-480	480	mV
		V _{IN} = 40 V	-0.1 A ≤ I _L ≤ -5 mA		-720	720	
Standby current drain	I _{SCD}	V _{IN} = 30 V	I _L = -5 mA		-7.0	-0.5	mA
		V _{IN} = 40 V	I _L = -5 mA		-8.0	-0.5	
Standby current drain change (versus line voltage)	ΔI _{SCD} (line)	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA		-1.0	1.0	mA
Standby current drain change (versus load current)	ΔI _{SCD} (load)	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA		-0.5	0.5	mA
Output short 2/ 5/ circuit current	I _{OS}	V _{IN} = 30 V			-2.50	-0.02	A
		V _{IN} = 35 V			-2.00	-0.005	
Overload current 6/	I _{OL}	V _{IN} = 28 V, forced ΔV _{OUT} = -2.28 V		See figure 6	-4.0	-1.0	A

See footnotes at end of table.

TABLE I. Electrical performance characteristics for device type 09 – Continued. 4/

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C, see figure 5 and 3.5, unless otherwise specified			Limits		Unit
		Input voltage	Load current	Other	Min	Max	
Ripple rejection <u>3/</u>	$\Delta V_{IN} / \Delta V_{OUT}$	V _{IN} = 30 V, e _i = 1 V _{rms} , at f = 2,400 Hz	I _L = -350 mA	See figure 7, T _A = 25°C	50		dB
Output noise <u>3/</u> voltage	N _O	V _{IN} = 30 V	I _L = -0.1 A	See figure 8, T _A = 25°C		500	μV _{rms}
Line transient response	$\Delta V_{OUT} / \Delta V_{IN}$	V _{IN} = 30 V, V _{PULSE} = 3.0 V	I _L = -5 mA	See figure 9, T _A = 25°C		30	mV/V
Load transient response	$\Delta V_{OUT} / \Delta I_L$	V _{IN} = 30 V	I _L = -100 mA, ΔI _L = -400 mA	See figure 10, T _A = 25°C		2.5	mV/mA
Average temperature coefficient of output voltage	$\Delta V_{OUT} / \Delta T$	V _{IN} = 30 V	I _L = -5 mA	T _A = +125°C and -55°C	-6.0	+6.0	mV/°C

1/ V_{OUT} test at V_{IN} = 8 V is conducted at T_A = -55°C only.

2/ One second maximum test duration.

3/ The meter for e_i and e_o shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.

4/ For device types 02 through 09, all tests performed at T_A = +125°C may, at the manufacturer's option, be performed at T_A = +150°C. Specifications for T_A = +125°C shall then apply at T_A = +150°C.

5/ A 1 μF capacitor may be added to dampen oscillations during the I_{OS} test for device types 02 through 09.

6/ The overload current test checks the device current limiting, and it is not a measure of the output peak current.

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 technology 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. 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.
- c. 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.
- d. Additional screening for space level product shall be as specified in MIL-PRF-38535.
- e. 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, 9, 10, and 11 shall be omitted in table II herein.

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

- a. 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.

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.
- 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.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B 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	1,2,3,4,7,8	1,2,3,4,7,8
Group B electrical test parameters when using the method 5005 QCI option	1,2,3, and table IV delta limits	N/A
Group C electrical parameters	1,2,3, and table IV delta limits	1 and table IV delta limits
Group D end point electrical parameters	1,2,3	1

1/ PDA applies to subgroup 1.

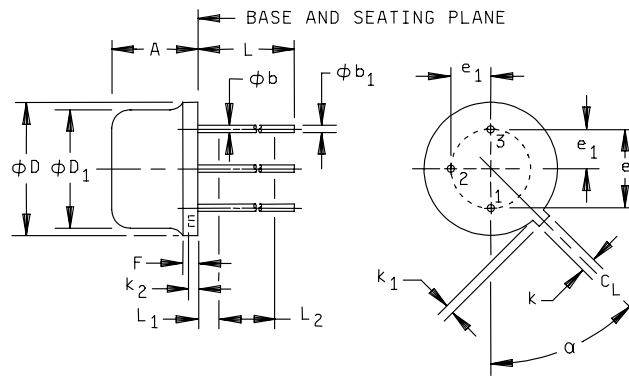
4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535 and as follows:

- 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, except the input offset voltage (or differential voltage) are referenced to the external zero reference level of the supply voltage. Currents values given are for conventional current and are positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cool down procedures. When devices are measured at +25°C following application of the steady-state life or burn-in test condition, they shall be cooled to within +10°C of their power stable condition prior to removal of the bias.

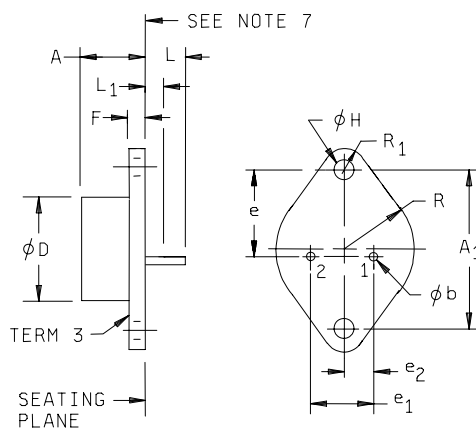


Dimensions					
Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.165	.185	4.19	4.70	
ϕb	.016	.019	0.41	0.48	3
ϕb_1	.016	.021	0.41	0.53	3
ϕD	.335	.370	8.51	9.40	
ϕD_1	.305	.335	7.75	8.51	
e	.200	T.P.	5.08	T.P.	5
e_1	.100	T.P.	2.54	T.P.	5
F	---	.050	---	1.27	
k	.028	.034	0.71	0.86	
k_1	.029	.045	0.74	1.14	4
k_2	.009	.041	0.23	1.04	
L	.500	---	12.70	---	
L_1	---	.050	---	1.27	
L_2	.250	---	6.35	---	
α	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. (All leads) ϕb applies between L_1 and L_2 . ϕb_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. Measured from the maximum diameter of the product.
5. Leads having a maximum diameter .019 (0.48 mm) measured in gauging plane .054 (1.37 mm) + .001 (0.03 mm) - .000 (0.00 mm) below the base plane of the product shall be within .007 (0.18 mm) of their true position relative to a maximum width tab.
6. The product may be measured by direct methods or by gauge.

FIGURE 1. Case outline X.



Dimensions					
Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.250	.450	6.35	11.43	
A ₁	1.177	1.197	29.90	30.40	
φb	.038	.043	0.97	1.09	3,7
φD	---	.875	---	22.22	
e	.655	.675	16.64	17.14	
e ₁	.420	.440	10.67	11.18	
e ₂	.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 ₁	---	.050	---	1.27	3,4
R	.495	.525	12.57	13.34	
R ₁	.131	.188	3.33	4.78	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. (Two leads) phi b applies between L₁ and .500 (12.70 mm) from the seating plane.
Diameter is uncontrolled in L₁ 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 (0.25 mm).
7. Leads having a maximum diameter .043 (1.09 mm) measured in gauging plane .054 (1.37 mm) + .001 (0.03 mm) - .000 (0.00 mm) below the seating plane shall be located at true position within diameter .014 (0.36 mm).
8. The mounting surface of the header shall be flat to convex within .003 (0.08 mm) inside a .930 (23.62 mm) diameter circle on the center of the header and flat to convex within .006 (0.15 mm) overall.

FIGURE 2. Case outline Y.

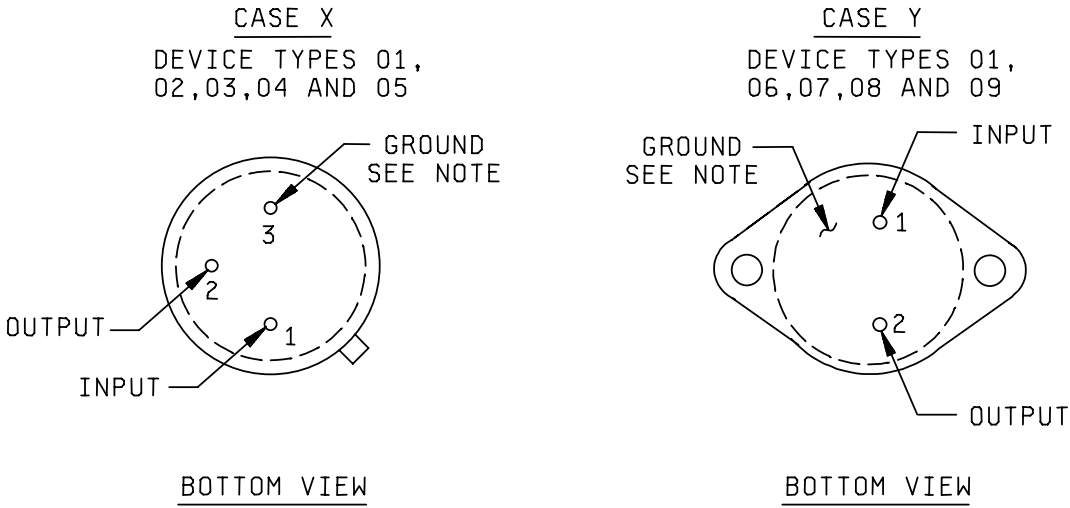
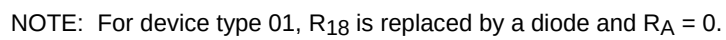


FIGURE 3. Terminal connections.



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MIL-M-38510/107D

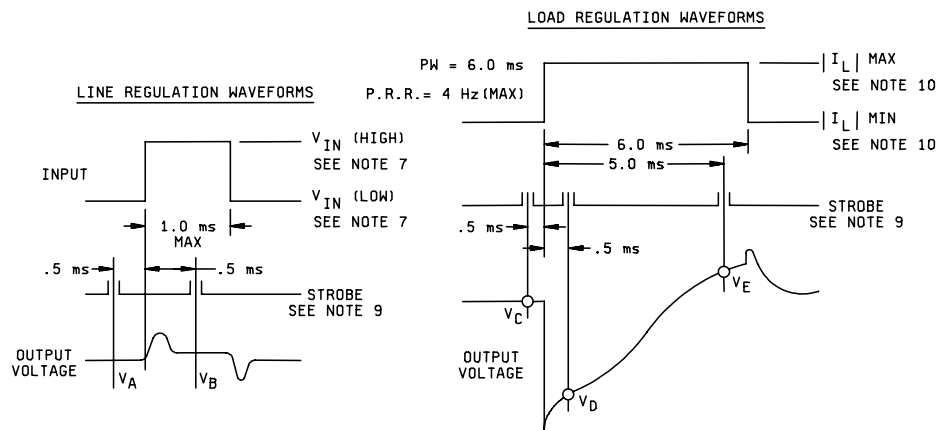
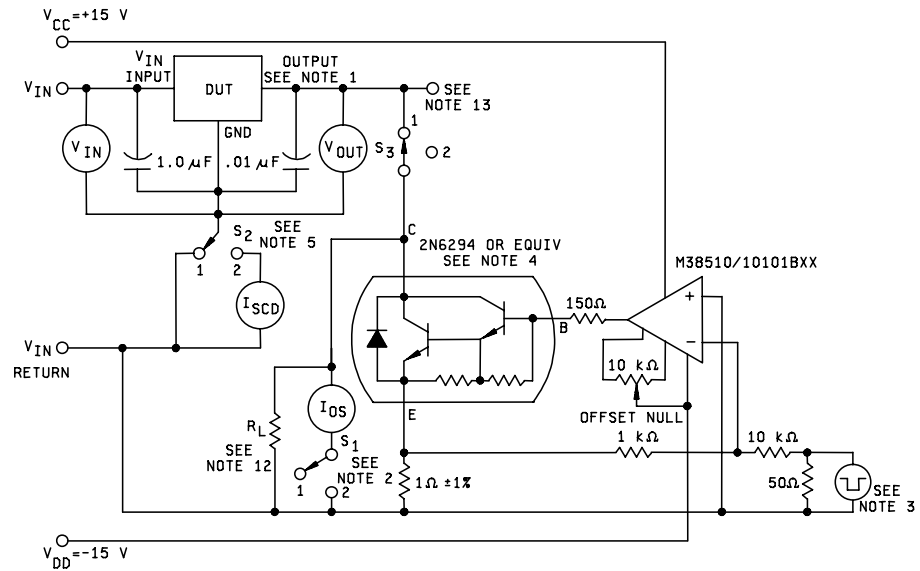


FIGURE 5. Test circuit for static tests for device types 02, 03, 04, 05, 06, 07, 08, and 09.

NOTES:

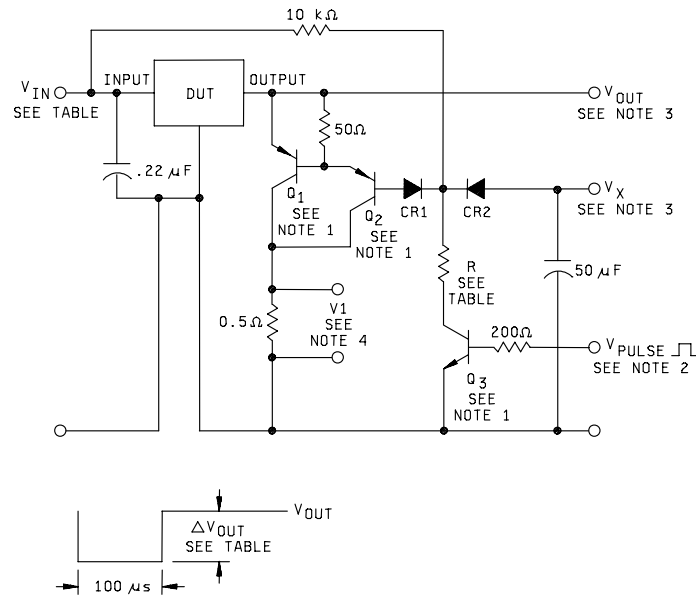
1. Output terminal must utilize a Kelvin connection.
2. I_{OS} test duration: 1 second maximum.
 S_1 : Position 2 for I_{OS} test. Position 1 for all other tests.
3. The pulse generator has the following characteristics:
 - a. Pulse amplitude = $-10 I_L$ volts.
 - b. Pulse width = 1.0 ms
 - c. Duty cycle = 2 percent (maximum).

Load current is determined by the voltage across the 1Ω resistor. Measurements shall be made 0.5 ms after the start of the pulse.
4. An alternate drive circuit for 2N6294 transistor may be used to develop the proper load current through the 1Ω resistor.
5. Use position 2 of S_2 for I_{SCD} , ΔI_{SCD} tests only.
6. Thermal shutdown output voltage test is conducted without a heat sink at an ambient temperature of $T_A = +150^\circ\text{C}$.
7. $V_{IN(LOW)}$ and $V_{IN(HIGH)}$ per table III.
8. $V_{RLINE} = V_B - V_A$.
9. The output voltage is sampled at the specified intervals. Strobe pulse width is 100 μs maximum.
10. $|I_L|$ minimum and $|I_L|$ maximum in accordance with table III
11. $V_{RLOAD} = V_D - V_C$ and $V_{RLOAD} = V_E - V_C$.
- 12.

Device types	02	03	04	05	06	07	08	09
R_L	1 k Ω	2.4 k Ω	3 k Ω	4.8 k Ω	1 k Ω	2.4 k Ω	3 k Ω	4.8 k Ω

13. Alternate point for applying load circuit directly with automatic test equipment (place S_3 in position 2).
14. A 1 μF capacitor may be added to dampen oscillations during the I_{OS} test for device types 02 through 09.

FIGURE 5. Test circuit for static tests for device types 02, 03, 04, 05, 06, 07, 08, 09 – Continued.

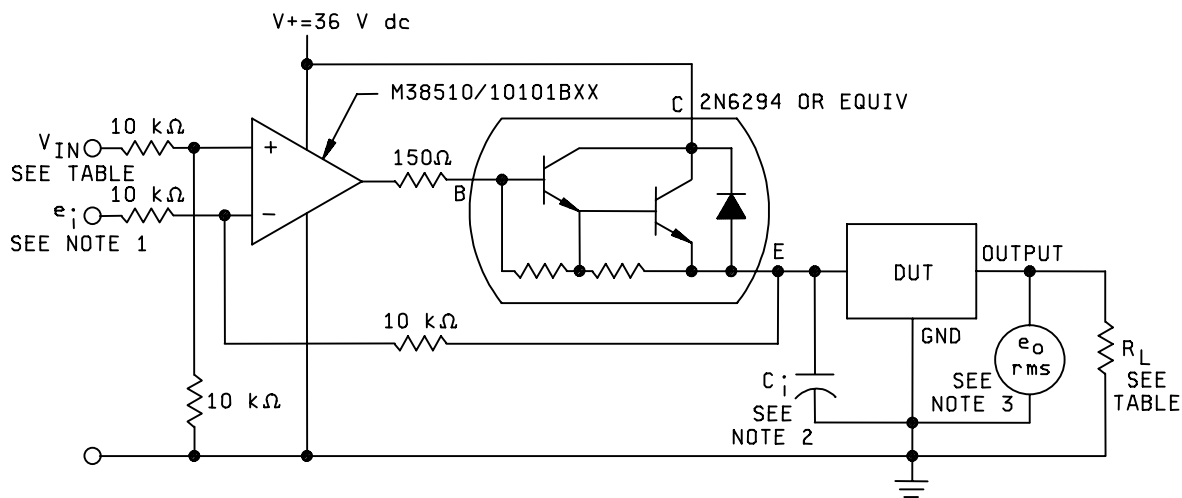


Device types	02	03	04	05	06	07	08	09
V_{IN}	8 V	15 V	18.5 V	28 V	8 V	15 V	18.5 V	28 V
ΔV_{OUT}	-0.48 V	-1.13 V	-1.43 V	-2.28 V	-0.48 V	-1.13 V	-1.43 V	-2.28 V
R	110 Ω	300 Ω	390 Ω	680 Ω	110 Ω	300 Ω	390 Ω	680 Ω

NOTE:

1. Q1 = 2N6187 or equivalent.
Q2 = 2N4033 or equivalent.
Q3 = 2N3108 or equivalent.
CR1 = 1N3873 or equivalent.
CR2 = 1N3873 or equivalent.
2. The pulse, V_{PULSE} , has the following characteristics:
Pulse width = 100 μs
Pulse repetition rate = 200 Hz.
Pulse amplitude = 5 V.
3. Adjust V_X for a forced output voltage condition during application of V_{PULSE} .
4. Kelvin connections shall be made directly to the 0.5 Ω resistor. The overload current is $I_{OL} = 2 (V_1)$ amperes.
5. The overload current test checks the device limiting, and is not a measure of the output peak current.

FIGURE 6. Overload current test circuit for device types 02, 03, 04, 05, 06, 07, 08, 09



Device table									
Device types	01	02	03	04	05	06	07	08	09
V_{IN}	10 V	10 V	17 V	20 V	30 V	10 V	17 V	20 V	30 V
R_L	40.2 Ω *	40.2 Ω	95.3 Ω	121 Ω	191 Ω	14.3 Ω	34 Ω	43.2 Ω	68.1 Ω

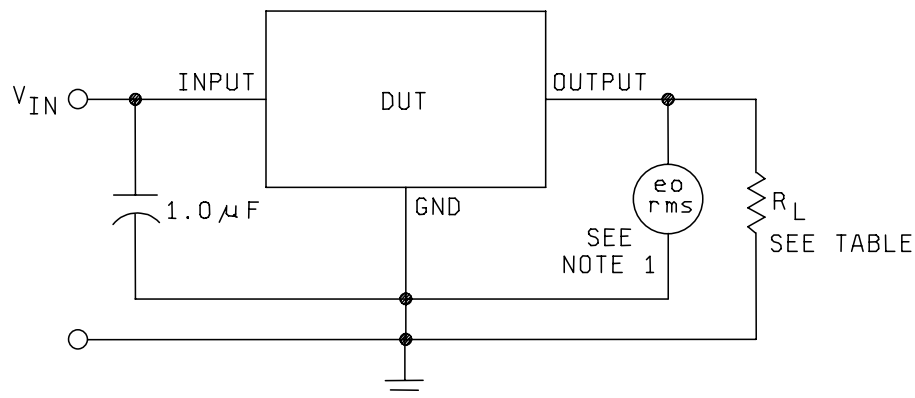
R_L shall be type RER 70 or equivalent.

* This value shall be used for case X. For case Y use $R_L = 14.3 \Omega$.

NOTES:

- $e_i = 1 \text{ Vrms}$ at $f = 2400 \text{ Hz}$ (measured at the input terminals of device under test (DUT)).
Ripple rejection (dB) = $20 \log (e_{irms} / e_{orms})$.
- c_i shall be minimum value to prevent oscillations of the device under test.
The maximum value of c_i shall be $0.4 \mu\text{F}$.
- The meter for e_i and e_o shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.

FIGURE 7. Ripple rejection test circuit for all device types.



Device table

Device types	01	02	03	04	05	06	07	08	09
V_{IN}	10 V	10 V	17 V	20 V	30 V	10 V	17 V	20 V	30 V
R_L	100 Ω *	100 Ω	237 Ω	301 Ω	475 Ω	49.9 Ω	121 Ω	150 Ω	237 Ω

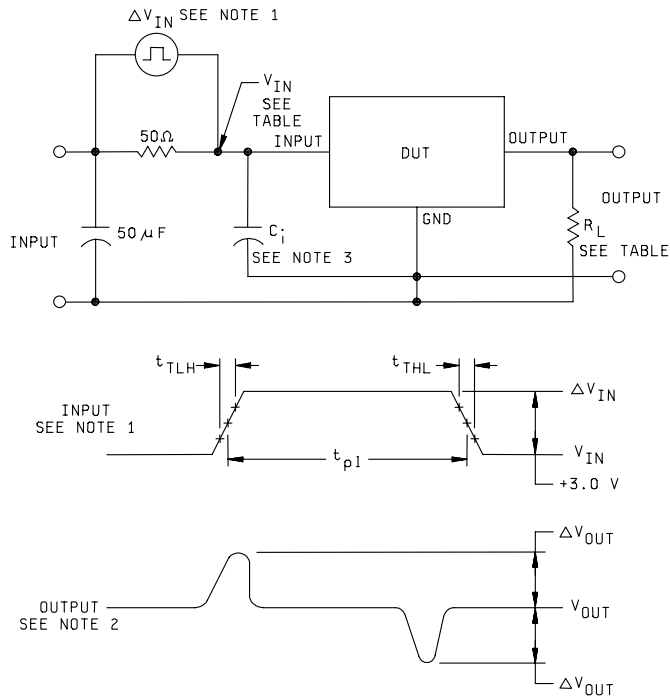
R_L shall be type RER 70 or equivalent.

* This value shall be used for case X. For case Y use $R_L = 49.9 \Omega$.

NOTES:

1. The meter for measuring $e_{o\ rms}$ shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.
2. $N_0 = e_{o\ rms}$.

FIGURE 8. Noise test circuit for all devices.



Device types	01, 02, 06	03, 07	04, 08	05, 09
V_{IN}	10 V	17 V	20 V	30 V
* R_L	1.0 k Ω	2.4 k Ω	3.0 k Ω	4.8 k Ω

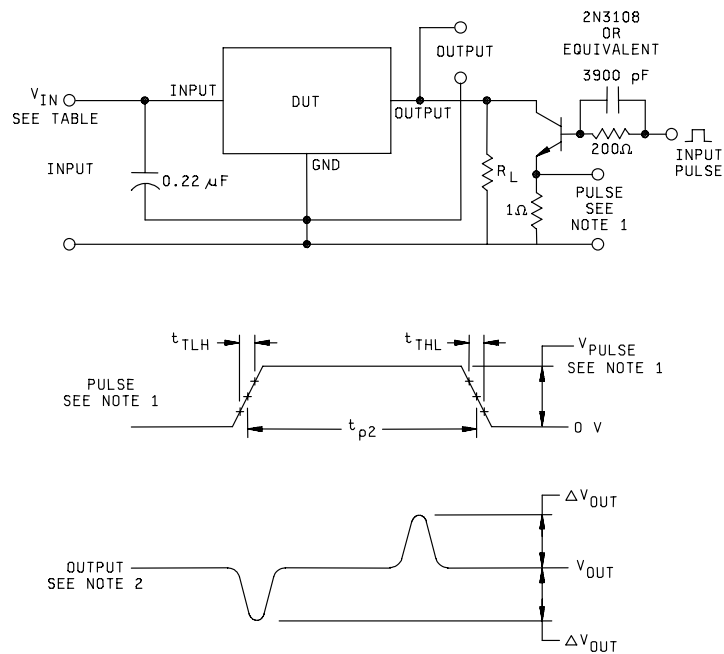
* R_L shall be type RER 70 or equivalent.

NOTES:

1. The pulse characteristics shall be established under load while the DUT is operating.
 $t_{TLH} = t_{THL} = 5.0 \mu s$
 $\Delta V_{IN} = V_{IN} + 3.0 V$
 $t_{PI} = 25 \mu s$ at 3 percent duty cycle.
2. $\Delta V_{OUT} = 90 mV$ maximum (this guarantees the specification limit of 30 mV/V).
3. c_i shall be minimum value to prevent device oscillations.

FIGURE 9. Line transient response test circuit for all device types.

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Device types	01	02	03	04	05	06	07	08	09
V_{IN}	10 V	10 V	17 V	20 V	30 V	10 V	17 V	20 V	30 V
$*R_L$	100 Ω **	100 Ω	243 Ω	301 Ω	487 Ω	49.9 Ω	121 Ω	150 Ω	243 Ω

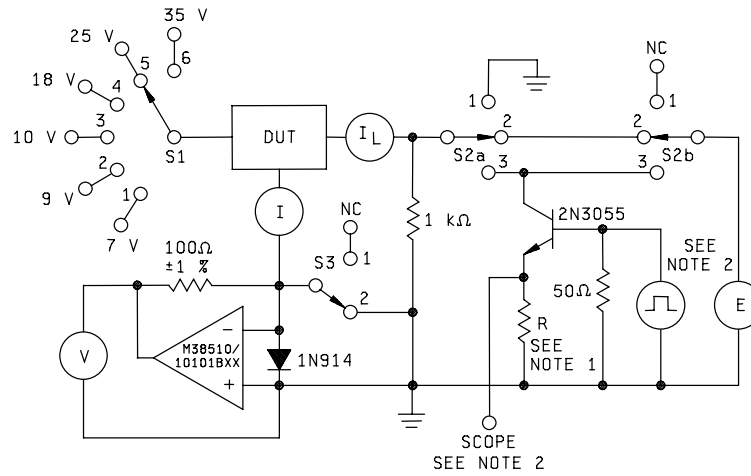
* Load resistor R_L shall be type RER 70 or equivalent.
** This value shall be used for case X. For case Y use $R_L = 49.9 \Omega$.

NOTES:

- The pulse characteristics shall be established under load while the DUT is operating.
 $t_{THL} = t_{TLH} = 1.0 \mu s$.
 $t_{p2} = 25 \mu s$ at 3% duty cycle.
 $V_{PULSE} = 0.2 V$ for device types 01 (case X), 02, 03, 04, and 05.
 $V_{PULSE} = 0.4 V$ for device types 01 (case Y), 06, 07, 08, and 09.
- $\Delta V_{OUT} = 400 mV$ maximum for device type 01 (case X).
 $\Delta V_{OUT} = 800 mV$ maximum for device type 01 (case Y).
 $\Delta V_{OUT} = 500 mV$ maximum for device types 02 - 05.
 $\Delta V_{OUT} = 1000 mV$ maximum for device types 06 - 09.
(These values guarantee the specified limits for load transient response).
- Oscilloscope minimum bandwidth shall be 5 MHz.

FIGURE 10. Load transient response test circuit for all devices.

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Parameters	Test	I _L (mA)	Switch positions			Measure		Measured parameters equation	Units
			S1	S2	S3	Value	Units		
V _{OUT}	1,14,27	-5	1	3	2	E ₁	V	V _{OUT} = E ₁	V
	2,15,28	See notes 3 and 7	1	3	2	E ₂	V	V _{OUT} = E ₂	V
	3,16,29	See note 3	2	3	2	E ₃	V	V _{OUT} = E ₃	V
	4,17,30	See note 7	4	3	2	E ₄	V	V _{OUT} = E ₄	V
	5,18,31	-5	5	3	2	E ₅	V	V _{OUT} = E ₅	V
	6,19,32	See note 8	5	3	2	E ₆	V	V _{OUT} = E ₆	V
V _{RLINE}	7,20,33	-5	1	2	2	E ₇	V	V _{RLINE} = E ₈ - E ₇ 1,000	mV
		-5	5	2	2	E ₈	V		
V _{RLOAD}	8,21,34	-5	3	3	2	E ₉	V	V _{RLOAD} = E ₁₀ - E ₉ 1,000	mV
		See notes 3 and 7	3	3	2	E ₁₀	V		

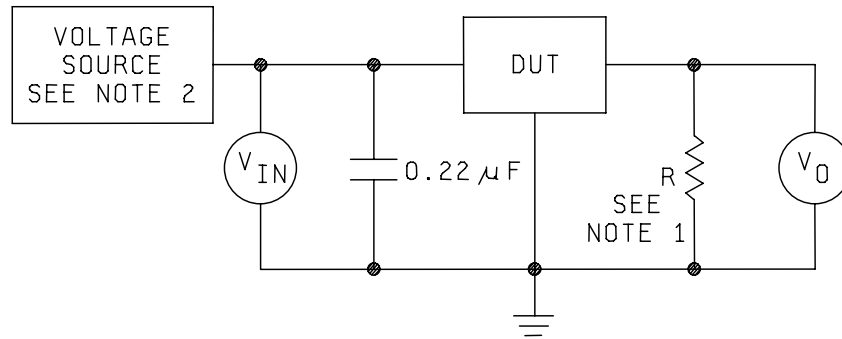
FIGURE 11 Test circuit for static and dynamic test for device type 01.

Parameter	Test	I_L (mA)	Switch positions			Measure		Measured parameters equation	Units
			S1	S2	S3	Value	Units		
I_{SCD}	9, 22, 35	-5	1	2	2	I_1	mA	$I_{SCD} = I_1$	mA
		-5	5	2	2	I_2	mA	$I_{SCD} = I_2$	
ΔI_{SCD} (line)	10, 23, 36	-5	1	2	1	V_1	V	$\Delta I_{SCD} = IO(V_2 - V_1)$ (line)	mA
		-5	5	2	1	V_2	V		
ΔI_{SCD} (load)	11, 24, 37	-5	3	3	1	V_3	V	$\Delta I_{SCD} = IO(V_4 - V_3)$ (load)	mA
		See notes 3 and 7	3	3	1	V_4	V		
I_{OS}	12, 25, 38	See note 6	6	1	2	I_L	A	$I_{OS} = I_L$	A

NOTES:

1. $R = 2 \Omega \pm 1$ percent for case X; $R = 1 \Omega \pm 1$ percent for case Y.
2. The pulse generator has the following characteristics:
Variable amplitude, pulse width = 50 μ s and PRR = 200 Hz.
Pulse amplitude is adjusted to set the load current by monitoring the voltage drop across R.
3. $I_L = -0.5$ A for case X.
4. $+25^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$; $\Delta V_{OUT} / \Delta T = (V_{OUT} \text{ at } +25^\circ\text{C}) - (V_{OUT} \text{ at } +125^\circ\text{C}) \times 10$.
5. $-55^\circ\text{C} \leq T_A \leq +25^\circ\text{C}$; $\Delta V_{OUT} / \Delta T = (V_{OUT} \text{ at } -55^\circ\text{C}) - (V_{OUT} \text{ at } +25^\circ\text{C}) \times 12.5$.
6. One second maximum test duration.
7. $I_L = 1.5$ A for case Y.
8. $I_L = -100$ mA for case X; $I_L = -1.0$ A for case Y.

FIGURE 11. Test circuit for static and dynamic test for device type 01 – Continued.



NOTES:

1. $R = 25 \Omega \pm 5$ percent for case X and $5 \Omega \pm 5$ percent for case Y.
2. Voltage source shall be a variable power supply capable of producing the following input waveform. Device shall turn on at $V_{IN} \leq 9$ V and shall remain on when the input is returned to 7 V.

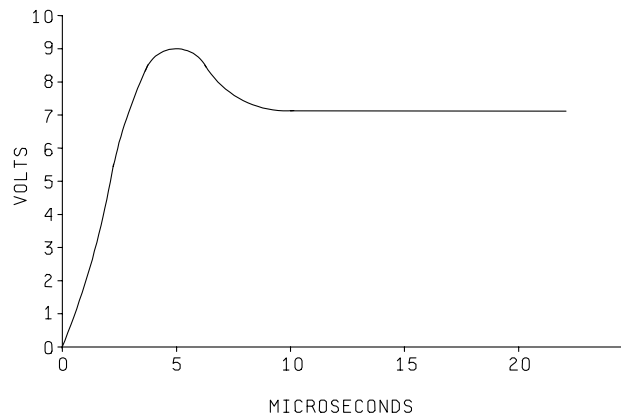
FIGURE 12. Start-up input voltage test circuit for device type 01 .

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

Subgroup	Symbol	Test no.	Conditions figure 11, unless otherwise specified			Limits		Unit	Notes
			Input voltage	Load current		Min	Max		
				I _L for case X	I _L for case Y				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 7 V	-5 mA	-5 mA	4.70	5.40	V	
		2	V _{IN} = 7 V	-0.5 A	-1.5 A	“	“	“	
		3	V _{IN} = 9 V	-0.5 A		“	“	“	
		4	V _{IN} = 18 V		-1.5 A	“	“	“	
		5	V _{IN} = 25 V	-5 mA	-5 mA	“	“	“	
		6	V _{IN} = 25 V	-100 mA	-1.0 A	“	“	“	
	V _{RLINE}	7	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-50	50	mV	
	V _{RLOAD}	8	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-100	100	mV	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
	I _{SCD}	9	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-10.0	+0.5	mA	
	ΔI _{SCD} (line)	10	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-0.5	+0.5	mA	
	ΔI _{SCD} (load)	11	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-0.8	0.8	mA	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
I _{OS}	12	V _{IN} = 35 V			-2.0	0.01	A	Case X <u>1/</u>	
					-2.8	0.01	“	Case Y <u>1/</u>	
V _{START}	13		Case X (R _L = 25 Ω ±5%)			9.0	V	See figure 12	
			Case Y (R _L = 5 Ω ±5%)						

See footnotes at end of table.

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

Subgroup	Symbol	Test no.	Conditions figure 11, unless otherwise specified			Limits		Unit	Notes
			Input voltage	Load current		Min	Max		
				I _L for case X	I _L for case Y				
2 T _A = +125°C	V _{OUT}	14	V _{IN} = 7 V	-5 mA	-5 mA	4.70	5.40	V	
		15	V _{IN} = 7 V	-0.5 A	-1.5 A	“	“	“	
		16	V _{IN} = 9 V	-0.5 A		“	“	“	
		17	V _{IN} = 18 V		-1.5 A	“	“	“	
		18	V _{IN} = 25 V	-5 mA	-5 mA	“	“	“	
		19	V _{IN} = 25 V	-100 mA	-1.0 A	“	“	“	
	V _{RLINE}	20	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-100	100	mV	
	V _{RLOAD}	21	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-100	100	mV	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
	I _{SCD}	22	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-10.0	0.5	mA	
	ΔI _{SCD} (line)	23	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-0.5	0.5	mA	
	ΔI _{SCD} (load)	24	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-0.8	0.8	mA	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
	I _{OS}	25	V _{IN} = 35 V			-2.0	0.01	A	Case X <u>1</u> /
						-2.8	0.01	“	Case Y <u>1</u> /
	V _{START}	26		Case X (R _L = 25 Ω ±5%)			9.0	V	See figure 12
				Case Y (R _L = 5 Ω ±5%)					

See footnotes at end of table.

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

Subgroup	Symbol	Test no.	Conditions figure 11, unless otherwise specified			Limits		Unit	Notes
			Input voltage	Load current		Min	Max		
				I _L for case X	I _L for case Y				
3 T _A = -55°C	V _{OUT}	27	V _{IN} = 7 V	-5 mA	-5 mA	4.70	5.40	V	
		28	V _{IN} = 7 V	-0.5 A	-1.5 A	“	“	“	
		29	V _{IN} = 9 V	-0.5 A		“	“	“	
		30	V _{IN} = 18 V		-1.5 A	“	“	“	
		31	V _{IN} = 25 V	-5 mA	-5 mA	“	“	“	
		32	V _{IN} = 25 V	-100 mA	-1.0 A	“	“	“	
	V _{RLINE}	33	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-100	100	mV	
	V _{RLOAD}	34	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-100	100	mV	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
	I _{SCD}	35	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-10.0	0.5	mA	
	ΔI _{SCD} (line)	36	7 V ≤ V _{IN} ≤ 25 V	-5 mA		-0.5	0.5	mA	
	ΔI _{SCD} (load)	37	V _{IN} = 10 V	I _{MAX} ≤ I _L ≤ -5 mA		-0.8	0.8	mA	
				I _{MAX} = -0.5 A	I _{MAX} = -1.5 A				
	I _{OS}	38	V _{IN} = 35 V			-2.0	0.01	A	Case X <u>1</u> /
						-2.8	0.01	“	Case Y <u>1</u> /
	V _{START}	39		Case X (R _L = 25 Ω ±5%)			9.0	V	See figure 12
				Case Y (R _L = 5 Ω ±5%)					

See footnotes at end of table.

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

Subgroup	Symbol	Test no.	Conditions figure 11, unless otherwise specified			Limits		Unit	Notes
			Input voltage	Load current		Min	Max		
				I _L for case X	I _L for case Y				
4 T _A = +25°C	ΔV _{IN} / ΔV _{OUT}	40	V _{IN} = 10 V, e _i = 1 V rms at f = 2,400 Hz	-125 mA	-350 mA	60		dB	See <u>2</u> / figure 10
7 T _A = +25°C	N ₀	41	V _{IN} = 10 V	-50 mA	-100 mA		125	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	42	V _{IN} = 10 V, V _{pulse} = 3.0 V	-5 mA			15	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	43	V _{IN} = 10 V	-50 mA	-100 mA		2.0	mV/mA	See figure 10
				ΔI _L = -200 mA	ΔI _L = -400 mA				
8 T _A = +125°C	ΔV _{OUT} / ΔT	44	V _{IN} = 7 V	-5 mA		-2.0	+2.0	mV/°C	ΔV _{OUT} /ΔT = (V ₁ – V ₁₄) x 10
8 T _A = -55°C	ΔV _{OUT} / ΔT	45	V _{IN} = 7 V	-5 mA		-2.0	+2.0	mV/°C	ΔV _{OUT} /ΔT = (V ₁ – V ₂₇) x 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 02. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		2		I _L = -500 mA	“	“	“	
		3	V _{IN} = 20 V	I _L = -5 mA	“	“	“	
		4		I _L = -500 mA	“	“	“	
		5	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		6		I _L = -50 mA	“	“	“	
	V _{RLINE}	7	8 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-150	150	mV	See figure 5 waveforms
		8	8 V ≤ V _{IN} ≤ 25 V	I _L = -350 mA	-50	50	“	
	V _{RLOAD}	9	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		10	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-150	150	“	
	I _{SCD}	11	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		12	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	13	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃
	ΔI _{SCD} (load)	14	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄
	I _{OS}	15	V _{IN} = 10 V		-2.00	-0.01	A	<u>1/ 4/</u>
		16	V _{IN} = 25 V		-1.50	-0.01	“	
		17	V _{IN} = 35 V		-1.00	-0.01	“	
	I _{OL}	18	V _{IN} = 8 V; forced ΔV _{OUT} = -0.48 V		-2.0	-0.5	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 02 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	19	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		20		I _L = -500 mA	“	“	“	
		21	V _{IN} = 20 V	I _L = -5 mA	“	“	“	
		22		I _L = -500 mA	“	“	“	
		23	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		24		I _L = -50 mA	“	“	“	
	V _{RLINE}	25	8 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-150	150	mV	See figure 5 waveforms
		26	8 V ≤ V _{IN} ≤ 25 V	I _L = -350 mA	-50	50	“	
	V _{RLOAD}	27	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		28	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-150	150	“	
	I _{SCD}	29	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		30	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	31	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁
	ΔI _{SCD} (load)	32	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂
	I _{OS}	33	V _{IN} = 10 V		-2.00	-0.01	A	<u>1/ 4/</u>
		34	V _{IN} = 25 V		-1.50	-0.01	“	
		35	V _{IN} = 35 V		-1.00	-0.01	“	
	I _{OL}	36	V _{IN} = 8 V; forced ΔV _{OUT} = -0.48 V		-2.0	-0.5	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	37	V _{IN} = 10 V	I _L = -5 mA	4.70	5.30	V	

TABLE III. Group A inspection for all device type 02 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	38	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		39		I _L = -500 mA	“	“	“	
		40	V _{IN} = 20 V	I _L = -5 mA	“	“	“	
		41		I _L = -500 mA	“	“	“	
		42	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		43		I _L = -50 mA	“	“	“	
	V _{RLINE}	44	8 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-150	150	mV	See figure 5 waveforms
		45	8 V ≤ V _{IN} ≤ 25 V	I _L = -350 mA	-50	50		
	V _{RLOAD}	46	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		47	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-150	150		
	I _{SCD}	48	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		49	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5		
	ΔI _{SCD} (line)	50	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} (load)	51	V _{IN} = 10 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	52	V _{IN} = 10 V		-2.00	-0.01	A	<u>1/ 4/</u>
		53	V _{IN} = 25 V		-1.50	-0.01		
		54	V _{IN} = 35 V		-1.00	-0.01		
	I _{OL}	55	V _{IN} = 8 V; forced ΔV _{OUT} = -0.48 V		-2.0	-0.5	A	See <u>5/</u> figure 6

TABLE III. Group A inspection for all device type 02 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 T _A = 25°C	ΔV _{IN} / ΔV _{OUT}	56	V _{IN} = 10 V, e _i = 1 V rms at f = 2400 Hz	I _L = -125 mA	60		dB	See <u>2</u> / figure 7
7 T _A = 25°C	N _O	57	V _{IN} = 10 V	I _L = -50 mA		125	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	58	V _{IN} = 10 V, V _{PULSE} = 3.0 V	I _L = -5 mA		30	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	59	V _{IN} = 10 V	I _L = -50 mA ΔI _L = -200 mA		2.5	mV/mA	See figure 10
	V _{OUT}	60	V _{IN} = 10 V	I _L = -5 mA	4.75	5.25	V	See figure 5
8 T _A = +125°C	V _{OUT}	61	V _{IN} = 10 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	62	V _{IN} = 10 V	I _L = -5 mA	-2.0	+2.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₁) x 10
8 T _A = -55°C	V _{OUT}	63	V _{IN} = 10 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	64	V _{IN} = 10 V	I _L = -5 mA	-2.0	2.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₃) x 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 03. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 15 V	I _L = -5 mA	11.40	12.60	V	
		2		I _L = -0.5 A	"	"	"	
		3	V _{IN} = 27 V	I _L = -5 mA	"	"	"	
		4		I _L = -0.5 A	"	"	"	
		5	V _{IN} = 35 V	I _L = -5 mA	"	"	"	
		6		I _L = -50 mA	"	"	"	
	V _{RLINE}	7	15 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-360	360	mV	See figure 5 waveforms
		8	15 V ≤ V _{IN} ≤ 32 V	I _L = -350 mA	-120	120	"	
	V _{RLOAD}	9	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms
		10	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-360	360	"	
	I _{SCD}	11	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA	
		12	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	"	
	I _{SCD} (line)	13	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃
	I _{SCD} (load)	14	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄
	I _{OS}	15	V _{IN} = 17 V		-1.75	-0.01	A	<u>1/ 4/</u>
		16	V _{IN} = 32 V		-1.25	-0.01	"	
		17	V _{IN} = 35 V		-1.00	-0.01	"	
	I _{OL}	18	V _{IN} = 15 V; forced ΔV _{OUT} = -1.13 V		-2.0	-0.5	A	See <u>5/</u> figure 6

TABLE III. Group A inspection for all device type 03 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	19	V _{IN} = 15 V	I _L = - 5 mA	11.40	12.60	V	
		20		I _L = -0.5 A	“	“	“	
		21	V _{IN} = 27 V	I _L = -5 mA	“	“	“	
		22		I _L = -0.5 A	“	“	“	
		23	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		24		I _L = -50 mA	“	“	“	
	V _{RLINE}	25	15 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-360	360	mV	See figure 5 waveforms
		26	15 V ≤ V _{IN} ≤ 32 V	I _L = -350 mA	-120	120	“	
	V _{RLOAD}	27	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms
		28	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-360	360	“	
	I _{SCD}	29	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA	
		30	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	31	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁
	ΔI _{SCD} (load)	32	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂
	I _{OS}	33	V _{IN} = 17 V		-1.75	-0.01	A	<u>1/ 4/</u>
		34	V _{IN} = 32 V		-1.25	-0.01	“	
		35	V _{IN} = 35 V		-1.00	-0.01	“	
	I _{OL}	36	V _{IN} = 15 V; forced ΔV _{OUT} = -1.13 V		-2.0	-0.5	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	37	V _{IN} = 17 V	I _L = -5 mA	11.28	12.72	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 03 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	38	V _{IN} = 15 V	I _L = -5 mA	11.40	12.60	V	
		39		I _L = -0.5 A	“	“	“	
		40	V _{IN} = 27 V	I _L = -5 mA	“	“	“	
		41		I _L = -0.5 A	“	“	“	
		42	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		43		I _L = -50 mA	“	“	“	
	V _{RLINE}	44	15 V ≤ V _{IN} ≤ 35 V	I _L = -50 mA	-360	360	mV	See figure 5 waveforms
		45	15 V ≤ V _{IN} ≤ 32 V	I _L = -350 mA	-120	120	“	
	V _{RLOAD}	46	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms
		47	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-360	360	“	
	I _{SCD}	48	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA	
		49	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	50	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} (load)	51	V _{IN} = 17 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	52	V _{IN} = 17 V		-1.75	-0.01	A	<u>1/ 4/</u>
		53	V _{IN} = 32 V		-1.25	-0.01	“	
		54	V _{IN} = 35 V		-1.00	-0.01	“	
	I _{OL}	55	V _{IN} = 15 V; forced ΔV _{OUT} = -1.13 V		-2.0	-0.5	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 03 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 T _A = 25°C	ΔV _{IN} / ΔV _{OUT}	56	V _{IN} = 17 V, e _i = 1 V rms at f = 2,400 Hz	I _L = -125 mA	55		dB	See <u>2</u> / figure 7
7 T _A = 25°C	N _O	57	V _{IN} = 17 V	I _L = -50 mA		250	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	58	V _{IN} = 17 V, V _{PULSE} = 3.0 V	I _L = -5 mA		30	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	59	V _{IN} = 17 V	I _L = -50 mA ΔI _L = -200 mA		2.5	mV/mA	See figure 10
	V _{OUT}	60	V _{IN} = 17 V	I _L = -5 mA	11.40	12.60	V	See figure 5
8 T _A = +125°C	V _{OUT}	61	V _{IN} = 17 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	62	V _{IN} = 17 V	I _L = -5 mA	-3.0	+3.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₁) x 10
8 T _A = -55°C	V _{OUT}	63	V _{IN} = 17 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	64	V _{IN} = 17 V	I _L = -5 mA	-3.0	3.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₃) x 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 04. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes	
			see figure 5, unless otherwise specified		Min	Max			
			Input voltage	Load current					
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 18.5 V	I _L = -5 mA	14.25	15.75	V		
		2		I _L = -500 mA					“
		3	V _{IN} = 30 V	I _L = -5 mA	“	“	“		“
		4		I _L = -500 mA					
		5	V _{IN} = 35 V	I _L = -5 mA	“	“	“		“
		6		I _L = -50 mA					
	V _{RLINE}	7	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -350 mA	-150	150	mV	See figure 5 waveforms	
	V _{RLOAD}	8	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-300	300	mV	See figure 5 waveforms	
		9	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-450	450	“		
	I _{SCD}	10	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA		
		11	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“		
	ΔI _{SCD} (line)	12	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₁ – I ₁₂	
	ΔI _{SCD} (load)	13	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₀ – I ₁₃	
	I _{OS}	14	V _{IN} = 20 V		-1.75	-0.01	A	<u>1/ 4/</u>	
		15	V _{IN} = 35 V		-1.00	-0.01	“		
	I _{OL}	16	V _{IN} = 18.5 V; forced ΔV _{OUT} = -1.43 V		-2.0	-0.5	A	See <u>5/</u> figure 6	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 04 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5 unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	17	V _{IN} = 18.5 V	I _L = - 5 mA	14.25	15.75	V	
		18		I _L = -500 mA	"	"	"	
		19	V _{IN} = 30	I _L = -5 mA	"	"	"	
		20		I _L = -500 mA	"	"	"	
		21	V _{IN} = 35 V	I _L = -5 mA	"	"	"	
		22		I _L = -50 mA	"	"	"	
	V _{RLINE}	23	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -350 mA	-150	150	mV	See figure 5 waveforms
	V _{RLOAD}	24	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-300	300	mV	See figure 5 waveforms
		25	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-450	450	"	
	I _{SCD}	26	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA	
		27	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	"	
	ΔI _{SCD} (line)	28	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₂₇ – I ₂₈
	ΔI _{SCD} (load)	29	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₆ – I ₂₉
	I _{OS}	30	V _{IN} = 20 V		-1.75	-0.01	A	<u>1/ 4/</u>
		31	V _{IN} = 35 V		-1.00	-0.01	"	
	I _{OL}	32	V _{IN} = 18.5 V; forced ΔV _{OUT} = -1.43 V		-2.0	-0.5	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	33	V _{IN} = 20 V	I _L = -5 mA	14.10	15.90	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 04 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	34	V _{IN} = 18.5 V	I _L = -5 mA	14.25	15.75	V	
		35		I _L = -500 mA	“	“	“	
		36	V _{IN} = 30 V	I _L = -5 mA	“	“	“	
		37		I _L = -500 mA	“	“	“	
		38	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		39		I _L = -50 mA	“	“	“	
	V _{RLINE}	40	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -350 mA	-150	150	mV	See figure 5 waveforms
	V _{RLOAD}	41	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-300	300	mV	See figure 5 waveforms
		42	V _{IN} = 35 V	-50 mA ≤ I _L ≤ -5 mA	-450	450	“	
	I _{SCD}	43	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA	
		44	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	45	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₄ – I ₄₅
	ΔI _{SCD} (load)	46	V _{IN} = 20 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₃ – I ₄₆
	I _{OS}	47	V _{IN} = 20 V		-1.75	-0.01	A	<u>1/ 4/</u>
		48	V _{IN} = 35 V		-1.00	-0.01	“	
	I _{OL}	49	V _{IN} = 18.5 V; forced ΔV _{OUT} = -1.43 V		-2.0	-0.5	A	See <u>5/</u> figure 6

TABLE III. Group A inspection for all device type 04 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions see figure 5, unless otherwise specified		Limits		Unit	Notes
					Min	Max		
			Input voltage	Load current				
4 $T_A = 25^\circ\text{C}$	$\Delta V_{IN} / \Delta V_{OUT}$	50	$V_{IN} = 20\text{ V}$, $e_i = 1\text{ V rms at}$ $f = 2,400\text{ Hz}$	$I_L = -125\text{ mA}$	53		dB	See <u>2/</u> figure 7
7 $T_A = 25^\circ\text{C}$	N_O	51	$V_{IN} = 20\text{ V}$	$I_L = -50\text{ mA}$		300	$\mu\text{V rms}$	See <u>2/</u> figure 8
	$\Delta V_{OUT} / \Delta V_{IN}$	52	$V_{IN} = 20\text{ V}$, $V_{PULSE} = 3.0\text{ V}$	$I_L = -5\text{ mA}$		30	mV/V	See figure 9
	$\Delta V_{OUT} / \Delta I_L$	53	$V_{IN} = 20\text{ V}$	$I_L = -50\text{ mA}$ $\Delta I_L = -200\text{ mA}$		2.5	mV/mA	See figure 10
	V_{OUT}	54	$V_{IN} = 20\text{ V}$	$I_L = -5\text{ mA}$	14.25	15.75	V	See figure 5
8 $T_A = +125^\circ\text{C}$	V_{OUT}	55	$V_{IN} = 20\text{ V}$	$I_L = -5\text{ mA}$			V	See figure 5
	$\Delta V_{OUT} / \Delta T$	56	$V_{IN} = 20\text{ V}$	$I_L = -5\text{ mA}$	-3.75	+3.75	mV/ $^\circ\text{C}$	See figure 5, $\Delta V_{OUT} / \Delta T =$ $(V_{54} - V_{55}) \times$ 10
8 $T_A = -55^\circ\text{C}$	V_{OUT}	57	$V_{IN} = 20\text{ V}$	$I_L = -5\text{ mA}$			V	See figure 5
	$\Delta V_{OUT} / \Delta T$	58	$V_{IN} = 20\text{ V}$	$I_L = -5\text{ mA}$	-3.75	+3.75	mV/ $^\circ\text{C}$	See figure 5, $\Delta V_{OUT} / \Delta T =$ $(V_{54} - V_{57}) \times$ 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 05. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V	
		2		I _L = -500 mA	“	“	“	
		3	V _{IN} = 38 V	I _L = -5 mA	“	“	“	
		4		I _L = -500 mA	“	“	“	
		5	V _{IN} = 40 V	I _L = -5 mA	“	“	“	
		6		I _L = -50 mA	“	“	“	
	V _{RLINE}	7	28 V ≤ V _{IN} ≤ 40 V	I _L = -50 mA	-720	720	mV	See figure 5 waveforms
		8	28 V ≤ V _{IN} ≤ 38 V	I _L = -350 mA	-240	240	“	
	V _{RLOAD}	9	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms
		10	V _{IN} = 40 V	-50 mA ≤ I _L ≤ -5 mA	-720	720	“	
	I _{SCD}	11	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA	
		12	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	13	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃
	ΔI _{SCD} (load)	14	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄
	I _{OS}	15	V _{IN} = 30 V		-1.25	-0.01	A	<u>1/ 4/</u>
		16	V _{IN} = 38 V		-1.00	-0.01	“	
		17	V _{IN} = 40 V		-1.00	-0.01	“	
	I _{OL}	18	V _{IN} = 28 V; forced ΔV _{OUT} = -2.28 V		-2.0	-0.5	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 05 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	19	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V	
		20		I _L = -500 mA	“	“	“	
		21	V _{IN} = 38 V	I _L = -5 mA	“	“	“	
		22		I _L = -500 mA	“	“	“	
		23	V _{IN} = 40 V	I _L = -5 mA	“	“	“	
		24		I _L = -50 mA	“	“	“	
	V _{RLINE}	25	28 V ≤ V _{IN} ≤ 40 V	I _L = -50 mA	-720	720	mV	See figure 5 waveforms
		26	28 V ≤ V _{IN} ≤ 38 V	I _L = -350 mA	-240	240	“	
	V _{RLOAD}	27	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms
		28	V _{IN} = 40 V	-50 mA ≤ I _L ≤ -5 mA	-720	720	“	
	I _{SCD}	29	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA	
		30	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	31	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁
	ΔI _{SCD} (load)	32	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂
	I _{OS}	33	V _{IN} = 30 V		-1.25	-0.01	A	<u>1/ 4/</u>
		34	V _{IN} = 38 V		-1.00	-0.01	“	
		35	V _{IN} = 40 V		-1.00	-0.01	“	
	I _{OL}	36	V _{IN} = 28 V; forced ΔV _{OUT} = -2.28 V		-2.0	-0.5	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	37	V _{IN} = 30 V	I _L = -5 mA	22.56	25.44	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 05 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	38	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V	
		39		I _L = -500 mA	“	“	“	
		40	V _{IN} = 38 V	I _L = -5 mA	“	“	“	
		41		I _L = -500 mA	“	“	“	
		42	V _{IN} = 40 V	I _L = -5 mA	“	“	“	
		43		I _L = -50 mA	“	“	“	
	V _{RLINE}	44	28 V ≤ V _{IN} ≤ 40 V	I _L = -50 mA	-720	720	mV	See figure 5 waveforms
		45	28 V ≤ V _{IN} ≤ 38 V	I _L = -350 mA	-240	240	“	
	V _{RLOAD}	46	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms
		47	V _{IN} = 40 V	-50 mA ≤ I _L ≤ -5 mA	-720	720	“	
	I _{SCD}	48	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA	
		49	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	50	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} (load)	51	V _{IN} = 30 V	-500 mA ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	52	V _{IN} = 30 V		-1.25	-0.01	A	<u>1/ 4/</u>
		53	V _{IN} = 38 V		-1.00	-0.01	“	
		54	V _{IN} = 40 V		-1.00	-0.01	“	
	I _{OL}	55	V _{IN} = 28 V; forced ΔV _{OUT} = -2.28 V		-2.0	-0.5	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 05 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 T _A = 25°C	ΔV _{IN} / ΔV _{OUT}	56	V _{IN} = 30 V, e _i = 1 V rms at f = 2,400 Hz	I _L = -125 mA	50		dB	See <u>2</u> / figure 7
7 T _A = 25°C	N _O	57	V _{IN} = 30 V	I _L = -50 mA		500	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	58	V _{IN} = 30 V, V _{PULSE} = 3.0 V	I _L = -5 mA		30	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	59	V _{IN} = 30 V	I _L = -50 mA ΔI _L = -200 mA		2.5	mV/mA	See figure 10
	V _{OUT}	60	V _{IN} = 30 V	I _L = -5 mA	22.80	25.20	V	See figure 5
8 T _A = +125°C	V _{OUT}	61	V _{IN} = 30 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	62	V _{IN} = 30 V	I _L = -5 mA	-6.0	+6.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₁) x 10
8 T _A = -55°C	V _{OUT}	63	V _{IN} = 30 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	64	V _{IN} = 30 V	I _L = -5 mA	-6.0	+6.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₃) x 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 06. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		2		I _L = -1.0 A				
		3	V _{IN} = 20 V	I _L = -5 mA	“	“	“	
		4		I _L = -1.0 A				
		5	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		6		I _L = -0.1 A				
	V _{RLINE}	7	8 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-150	150	mV	See figure 5 waveforms
		8	8 V ≤ V _{IN} ≤ 25 V	I _L = -0.5 A	-50	50	“	
	V _{RLOAD}	9	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		10	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-150	150	“	
	I _{SCD}	11	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		12	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	13	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃
	ΔI _{SCD} (load)	14	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄
	I _{OS}	15	V _{IN} = 15 V		-4.00	-0.02	A	<u>1/ 4/</u>
		16	V _{IN} = 25 V		-3.00	-0.02	“	
		17	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	18	V _{IN} = 8 V; forced ΔV _{OUT} = -0.48 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 06 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	19	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		20		I _L = -1.0 A	“	“	“	
		21	V _{IN} = 20	I _L = -5 mA	“	“	“	
		22		I _L = -1.0 A	“	“	“	
		23	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		24		I _L = -0.1 A	“	“	“	
	V _{RLINE}	25	8 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-150	150	mV	See figure 5 waveforms
		26	8 V ≤ V _{IN} ≤ 25 V	I _L = -0.5 A	-50	50	“	
	V _{RLOAD}	27	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		28	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-150	150	“	
	I _{SCD}	29	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		30	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	31	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁
	ΔI _{SCD} (load)	32	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂
	I _{OS}	33	V _{IN} = 10 V		-4.00	-0.02	A	<u>1/ 4/</u>
		34	V _{IN} = 25 V		-3.00	-0.02	“	
		35	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	36	V _{IN} = 8 V; forced ΔV _{OUT} = -0.48 V		-4.0	-1.0	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	37	V _{IN} = 10 V	I _L = -5 mA	4.70	5.30	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 06 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	38	V _{IN} = 8 V	I _L = -5 mA	4.75	5.25	V	
		39		I _L = -1.0 A	“	“	“	
		40	V _{IN} = 20 V	I _L = -5 mA	“	“	“	
		41		I _L = -1.0 A	“	“	“	
		42	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		43		I _L = -0.1 A	“	“	“	
	V _{RLINE}	44	8 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-150	150	mV	See figure 5 waveforms
		45	8 V ≤ V _{IN} ≤ 25 V	I _L = -0.5 A	-50	50	“	
	V _{RLOAD}	46	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-100	100	mV	See figure 5 waveforms
		47	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-150	150	“	
	I _{SCD}	48	V _{IN} = 10 V	I _L = -5 mA	-7.0	-0.5	mA	
		49	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	50	8 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} (load)	51	V _{IN} = 10 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	52	V _{IN} = 10 V		-4.00	-0.02	A	<u>1/ 4/</u>
		53	V _{IN} = 25 V		-3.00	-0.02	“	
		54	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	55	V _{IN} = 8 V, forced ΔV _{OUT} = -0.48 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table

TABLE III. Group A inspection for all device type 06 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 T _A = 25°C	ΔV _{IN} / ΔV _{OUT}	56	V _{IN} = 10 V, e _i = 1 V rms at f = 2,400 Hz	I _L = -350 mA	60		dB	See <u>2</u> / figure 7
7 T _A = 25°C	N _O	57	V _{IN} = 10 V	I _L = -0.1 A		125	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	58	V _{IN} = 10 V, V _{PULSE} = 3.0 V	I _L = -5 mA		30	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	59	V _{IN} = 10 V	I _L = -100 mA ΔI _L = -400 mA		2.5	mV/mA	See figure 10
	V _{OUT}	60	V _{IN} = 10 V	I _L = -5 mA	4.75	5.25	V	See figure 5
8 T _A = +125°C	V _{OUT}	61	V _{IN} = 10 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	62	V _{IN} = 10 V	I _L = -5 mA	-2.0	+2.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₁) x 10
8 T _A = -55°C	V _{OUT}	63	V _{IN} = 10 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	64	V _{IN} = 10 V	I _L = -5 mA	-2.0	+2.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₆₀ - V ₆₃) x 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 07. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes	
			see figure 5, unless otherwise specified		Min	Max			
			Input voltage	Load current					
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 15 V	I _L = -5 mA	11.40	12.60	V		
		2		I _L = -1.0 A					“
		3	V _{IN} = 27 V	I _L = -5 mA	“	“	“		“
		4		I _L = -1.0 A					
		5	V _{IN} = 35 V	I _L = -5 mA	“	“	“		“
		6		I _L = -0.1 A					
	V _{RLINE}	7	15 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-360	360	mV	See figure 5 waveforms	
		8	15 V ≤ V _{IN} ≤ 32 V	I _L = -0.5 A	-120	120	“		
	V _{RLOAD}	9	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms	
		10	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-360	360	“		
	I _{SCD}	11	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA		
		12	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“		
	ΔI _{SCD} (line)	13	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃	
	ΔI _{SCD} (load)	14	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄	
	I _{OS}	15	V _{IN} = 17 V		-3.50	-0.02	A	<u>1/ 4/</u>	
		16	V _{IN} = 32 V		-2.50	-0.02	“		
		17	V _{IN} = 35 V		-2.00	-0.02	“		
	I _{OL}	18	V _{IN} = 15 V, forced ΔV _{OUT} = -1.13 V		-4.0	-1.0	A	See <u>5/</u> figure 6	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 07 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes	
			see figure 5, unless otherwise specified		Min	Max			
			Input voltage	Load current					
2 T _A = +125°C	V _{OUT}	19	V _{IN} = 15 V	I _L = -5 mA	11.40	12.60	V		
		20		I _L = -1.0 A					“
		21	V _{IN} = 27 V	I _L = -5 mA	“	“	“		“
		22		I _L = -1.0 A					
		23	V _{IN} = 35 V	I _L = -5 mA	“	“	“		“
		24		I _L = -0.1 A					
	V _{RLINE}	26	15 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-360	360	mV	See figure 5 waveforms	
		27	15 V ≤ V _{IN} ≤ 25 V	I _L = -0.5 A	-120	120	“		
	V _{RLOAD}	27	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms	
		28	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-360	360	“		
	I _{SCD}	29	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA		
		30	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“		
	ΔI _{SCD} (line)	31	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁	
	ΔI _{SCD} (load)	32	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂	
	I _{OS}	33	V _{IN} = 17 V		-3.50	-0.02	A	<u>1/ 4/</u>	
		34	V _{IN} = 32 V		-2.50	-0.02	“		
		35	V _{IN} = 35 V		-2.00	-0.02	“		
	I _{OL}	36	V _{IN} = 15 V, forced ΔV _{OUT} = -1.13 V		-4.0	-1.0	A	See <u>5/</u> figure 6	
2 T _A = +150°C	V _{OUT}	37	V _{IN} = 17 V	I _L = -5 mA	11.28	12.72	V		

See footnotes at end of table.

TABLE III. Group A inspection for all device type 07 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	38	V _{IN} = 15 V	I _L = -5 mA	11.40	12.60	V	
		39		I _L = -1.0 A	“	“	“	
		40	V _{IN} = 27 V	I _L = -5 mA	“	“	“	
		41		I _L = -1.0 A	“	“	“	
		42	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		43		I _L = -0.1 A	“	“	“	
	V _{RLINE}	44	15 V ≤ V _{IN} ≤ 35 V	I _L = -0.1 A	-360	360	mV	See figure 5 waveforms
		45	15 V ≤ V _{IN} ≤ 32 V	I _L = -0.5 A	-120	120	“	
	V _{RLOAD}	46	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-240	240	mV	See figure 5 waveforms
		47	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-360	360	“	
	I _{SCD}	48	V _{IN} = 17 V	I _L = -5 mA	-7.0	-0.5	mA	
		49	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} line	50	15 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} load	51	V _{IN} = 17 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	52	V _{IN} = 17 V		-3.50	-0.02	A	<u>1/ 4/</u>
		53	V _{IN} = 32 V		-2.50	-0.02	“	
		54	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	55	V _{IN} = 15 V, forced ΔV _{OUT} = -1.13 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 07 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 $T_A = 25^{\circ}\text{C}$	$\Delta V_{\text{IN}} / \Delta V_{\text{OUT}}$	56	$V_{\text{IN}} = 17\text{ V}$, $e_{\text{i}} = 1\text{ V rms at}$ $f = 2,400\text{ Hz}$	$I_{\text{L}} = -350\text{ mA}$	55		dB	See <u>2/</u> figure 7
7 $T_A = 25^{\circ}\text{C}$	N_{O}	57	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -0.1\text{ A}$		250	$\mu\text{V rms}$	See <u>2/</u> figure 8
	$\Delta V_{\text{OUT}} / \Delta V_{\text{IN}}$	58	$V_{\text{IN}} = 17\text{ V}$, $V_{\text{PULSE}} = 3.0\text{ V}$	$I_{\text{L}} = -5\text{ mA}$		30	mV/V	See figure 9
	$\Delta V_{\text{OUT}} / \Delta I_{\text{L}}$	59	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -100\text{ mA}$ $\Delta I_{\text{L}} = -400\text{ mA}$		2.5	mV/mA	See figure 10
	V_{OUT}	60	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	11.40	12.60	V	See figure 5
8 $T_A = +125^{\circ}\text{C}$	V_{OUT}	61	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -5\text{ mA}$			V	See figure 5
	$\Delta V_{\text{OUT}} / \Delta T$	62	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	-3.0	+3.0	mV/ $^{\circ}\text{C}$	See figure 5, $\Delta V_{\text{OUT}} / \Delta T =$ $(V_{60} - V_{61}) \times$ 10
8 $T_A = -55^{\circ}\text{C}$	V_{OUT}	63	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -5\text{ mA}$			V	See figure 5
	$\Delta V_{\text{OUT}} / \Delta T$	64	$V_{\text{IN}} = 17\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	-3.0	+3.0	mV/ $^{\circ}\text{C}$	See figure 5, $\Delta V_{\text{OUT}} / \Delta T =$ $(V_{60} - V_{63}) \times$ 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 08. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 18.5 V	I _L = -5 mA	14.25	15.75	V	
		2		I _L = -1.0 A	“	“	“	
		3	V _{IN} = 30 V	I _L = -5 mA	“	“	“	
		4		I _L = -1.0 A	“	“	“	
		5	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		6		I _L = -0.1 A	“	“	“	
	V _{RLINE}	7	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -0.5 A	-150	150	mV	See figure 5 waveforms
	V _{RLOAD}	8	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA	-300	300	mV	See figure 5 waveforms
		9	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-450	450	“	
	I _{SCD}	10	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA	
		11	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	12	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₁ – I ₁₂
	ΔI _{SCD} (load)	13	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₀ – I ₁₃
	I _{OS}	14	V _{IN} = 20 V		-3.50	-0.02	A	<u>1/ 4/</u>
		15	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	16	V _{IN} = 18.5 V, forced ΔV _{OUT} = -1.43 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 08 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
2 T _A = +125°C	V _{OUT}	17	V _{IN} = 18.5 V	I _L = -5 mA	14.25	15.75	V	
		18		I _L = -1.0 A	“	“	“	
		19	V _{IN} = 30 V	I _L = -5 mA	“	“	“	
		20		I _L = -1.0 A	“	“	“	
		21	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		22		I _L = -0.1 A	“	“	“	
	V _{RLINE}	23	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -0.5 A	-150	150	mV	See figure 5 waveforms
	V _{RLOAD}	24	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 m A	-300	300	mV	See figure 5 waveforms
		25	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-450	450	“	
	I _{SCD}	26	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA	
		27	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	28	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₂₇ – I ₂₈
	ΔI _{SCD} (load)	29	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₆ – I ₂₉
	I _{OS}	30	V _{IN} = 20 V		-3.50	-0.02	A	<u>1/ 4/</u>
		31	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	32	V _{IN} = 18.5 V, forced ΔV _{OUT} = -1.43 V		-4.0	-1.0	A	See <u>5/</u> figure 6
2 T _A = +150°C	V _{OUT}	33	V _{IN} = 20 V	I _L = -5 mA	14.10	15.90	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 08 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	34	V _{IN} = 18.5 V	I _L =- 5 mA	14.25	15.75	V	
		35		I _L = -1.0 A	“	“	“	
		36	V _{IN} = 30 V	I _L = -5 mA	“	“	“	
		37		I _L = -1.0 A	“	“	“	
		38	V _{IN} = 35 V	I _L = -5 mA	“	“	“	
		39		I _L = -0.1 A	“	“	“	
	V _{RLINE}	40	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -0.5 A	-150	150	mV	See figure 5 waveforms
	V _{RLOAD}	41	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA	-300	300	mV	See figure 5 waveforms
		42	V _{IN} = 35 V	-0.1 A ≤ I _L ≤ -5 mA	-450	450	“	
	I _{SCD}	43	V _{IN} = 20 V	I _L = -5 mA	-7.0	-0.5	mA	
		44	V _{IN} = 35 V	I _L = -5 mA	-8.0	-0.5	“	
	ΔI _{SCD} (line)	45	18.5 V ≤ V _{IN} ≤ 35 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₄ – I ₄₅
	ΔI _{SCD} (load)	46	V _{IN} = 20 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₃ – I ₄₆
	I _{OS}	47	V _{IN} = 20 V		-3.50	-0.02	A	<u>1/ 4/</u>
		48	V _{IN} = 35 V		-2.00	-0.02	“	
	I _{OL}	49	V _{IN} = 18.5 V, forced ΔV _{OUT} = -1.43 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 08 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 $T_A = 25^{\circ}\text{C}$	$\Delta V_{\text{IN}} / \Delta V_{\text{OUT}}$	50	$V_{\text{IN}} = 20\text{ V}$, $e_{\text{i}} = 1\text{ V rms at}$ $f = 2,400\text{ Hz}$	$I_{\text{L}} = -350\text{ mA}$	53		dB	See <u>2/</u> figure 7
7 $T_A = 25^{\circ}\text{C}$	N_{O}	51	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -0.1\text{ A}$		300	$\mu\text{V rms}$	See <u>2/</u> figure 8
	$\Delta V_{\text{OUT}} / \Delta V_{\text{IN}}$	52	$V_{\text{IN}} = 20\text{ V}$, $V_{\text{PULSE}} = 3.0\text{ V}$	$I_{\text{L}} = -5\text{ mA}$		30	mV/V	See figure 9
	$\Delta V_{\text{OUT}} / \Delta I_{\text{L}}$	53	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -100\text{ mA}$ $\Delta I_{\text{L}} = -400\text{ mA}$		2.5	mV/mA	See figure 10
	V_{OUT}	54	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	14.25	15.75	V	See figure 5
8 $T_A = +125^{\circ}\text{C}$	V_{OUT}	55	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -5\text{ mA}$			V	See figure 5
	$\Delta V_{\text{OUT}} / \Delta T$	56	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	-3.75	+3.75	mV/ $^{\circ}\text{C}$	See figure 5, $\Delta V_{\text{OUT}} / \Delta T =$ $(V_{54} - V_{55}) \times$ 10
8 $T_A = -55^{\circ}\text{C}$	V_{OUT}	57	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -5\text{ mA}$			V	See figure 5
	$\Delta V_{\text{OUT}} / \Delta T$	58	$V_{\text{IN}} = 20\text{ V}$	$I_{\text{L}} = -5\text{ mA}$	-3.75	+3.75	mV/ $^{\circ}\text{C}$	See figure 5, $\Delta V_{\text{OUT}} / \Delta T =$ $(V_{54} - V_{57}) \times$ 12.5

See footnotes at end of table.

TABLE III. Group A inspection for all device type 09. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes	
			see figure 5, unless otherwise specified		Min	Max			
			Input voltage	Load current					
1 T _A = +25°C	V _{OUT}	1	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V		
		2		I _L = -1.0 A					“
		3	V _{IN} = 38 V	I _L = -5 mA	“	“	“		“
		4		I _L = -1.0 A					
		5	V _{IN} = 40 V	I _L = -5 mA	“	“	“		“
		6		I _L = -0.1 A					
	V _{RLINE}	7	28 V ≤ V _{IN} ≤ 40 V	I _L = -0.1 A	-720	720	mV	See figure 5 waveforms	
		8	28 V ≤ V _{IN} ≤ 38 V	I _L = -0.5 A	-240	240	“		
	V _{RLOAD}	9	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms	
		10	V _{IN} = 40 V	-0.1 A ≤ I _L ≤ -5 mA	-720	720	“		
	I _{SCD}	11	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA		
		12	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	“		
	ΔI _{SCD} (line)	13	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₁₂ – I ₁₃	
	ΔI _{SCD} (load)	14	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₁₁ – I ₁₄	
	I _{OS}	15	V _{IN} = 30 V		-2.50	-0.02	A	<u>1/ 4/</u>	
		16	V _{IN} = 35 V		-2.00	-0.005	“		
	I _{OL}	17	V _{IN} = 28 V, forced ΔV _{OUT} = -2.28 V		-4.0	-1.0	A	See <u>5/</u> figure 6	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 09 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes	
			see figure 5, unless otherwise specified		Min	Max			
			Input voltage	Load current					
2 T _A = +125°C	V _{OUT}	18	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V		
		19		I _L = -1.0 A					“
		20	V _{IN} = 38 V	I _L = -5 mA	“	“	“		
		21		I _L = -1.0 A					
		22	V _{IN} = 40 V	I _L = -5 mA	“	“	“		
		23		I _L = -0.1 A					
	V _{RLINE}	24	28 V ≤ V _{IN} ≤ 40 V	I _L = -0.1 A	-720	720	mV	See figure 5 waveforms	
		25	28 V ≤ V _{IN} ≤ 38 V	I _L = -0.5 A	-240	240	“		
	V _{RLOAD}	26	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms	
		27	V _{IN} = 40 V	-0.1 A ≤ I _L ≤ -5 mA	-720	720	“		
	I _{SCD}	28	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA		
		29	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	“		
	ΔI _{SCD} (line)	30	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₃₀ – I ₃₁	
	ΔI _{SCD} (load)	31	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₂₉ – I ₃₂	
	I _{OS}	32	V _{IN} = 30 V		-2.50	-0.02	A	<u>1/ 4/</u>	
		33	V _{IN} = 35 V		-2.00	-0.005	“		
	I _{OL}	34	V _{IN} = 28 V, forced ΔV _{OUT} = -2.28 V		-4.0	-1.0	A	See <u>5/</u> figure 6	
	2 T _A = +150°C	V _{OUT}	35	V _{IN} = 30 V	I _L = -5 mA	22.56	25.44	V	

See footnotes at end of table.

TABLE III. Group A inspection for all device type 09 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
3 T _A = -55°C	V _{OUT}	36	V _{IN} = 28 V	I _L = -5 mA	22.80	25.20	V	
		37		I _L = -1.0 A	"	"	"	
		38	V _{IN} = 38 V	I _L = -5 mA	"	"	"	
		39		I _L = -1.0 A	"	"	"	
		40	V _{IN} = 40 V	I _L = -5 mA	"	"	"	
		41		I _L = -0.1 A	"	"	"	
	V _{RLINE}	42	28 V ≤ V _{IN} ≤ 40 V	I _L = -0.1 A	-720	720	mV	See figure 5 waveforms
		43	28 V ≤ V _{IN} ≤ 38 V	I _L = -0.5 A	-240	240	"	
	V _{RLOAD}	44	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-480	480	mV	See figure 5 waveforms
		45	V _{IN} = 40 V	-0.1 A ≤ I _L ≤ -5 mA	-720	720	"	
	I _{SCD}	46	V _{IN} = 30 V	I _L = -5 mA	-7.0	-0.5	mA	
		47	V _{IN} = 40 V	I _L = -5 mA	-8.0	-0.5	"	
	ΔI _{SCD} (line)	48	28 V ≤ V _{IN} ≤ 40 V	I _L = -5 mA	-1.0	1.0	mA	ΔI _{SCD} = I ₄₉ – I ₅₀
	ΔI _{SCD} (load)	49	V _{IN} = 30 V	-1.0 A ≤ I _L ≤ -5 mA	-0.5	0.5	mA	ΔI _{SCD} = I ₄₈ – I ₅₁
	I _{OS}	50	V _{IN} = 30 V		-2.50	-0.02	A	<u>1/ 4/</u>
		51	V _{IN} = 35 V		-2.00	-0.005	"	
	I _{OL}	52	V _{IN} = 28 V, forced ΔV _{OUT} = -2.28 V		-4.0	-1.0	A	See <u>5/</u> figure 6

See footnotes at end of table.

TABLE III. Group A inspection for all device type 09 – Continued. 3/

Subgroup	Symbol	Test no.	Conditions		Limits		Unit	Notes
			see figure 5, unless otherwise specified		Min	Max		
			Input voltage	Load current				
4 T _A = 25°C	ΔV _{IN} / ΔV _{OUT}	53	V _{IN} = 30 V, e _i = 1 V rms at f = 2,400 Hz	I _L = -350 mA	50		dB	See <u>2</u> / figure 7
7 T _A = 25°C	N _O	54	V _{IN} = 30 V	I _L = -0.1 A		500	μV rms	See <u>2</u> / figure 8
	ΔV _{OUT} / ΔV _{IN}	55	V _{IN} = 30 V, V _{PULSE} = 3.0 V	I _L = -5 mA		30	mV/V	See figure 9
	ΔV _{OUT} / ΔI _L	56	V _{IN} = 30 V	I _L = -100 mA ΔI _L = -400 mA		2.5	mV/mA	See figure 10
	V _{OUT}	57	V _{IN} = 30 V	I _L = -5 mA	22.80	25.20	V	See figure 5
8 T _A = +125°C	V _{OUT}	58	V _{IN} = 30 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	59	V _{IN} = 30 V	I _L = -5 mA	-6.0	6.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₅₇ – V ₅₈) × 10
8 T _A = -55°C	V _{OUT}	60	V _{IN} = 30 V	I _L = -5 mA			V	See figure 5
	ΔV _{OUT} / ΔT	61	V _{IN} = 30 V	I _L = -5 mA	-6.0	+6.0	mV/°C	See figure 5, ΔV _{OUT} / ΔT = (V ₅₇ – V ₆₀) × 12.5

1/ One second maximum test duration.2/ The meter for e_i and e_o shall have a minimum bandwidth from 10 Hz to 10 kHz and shall measure true rms voltages.3/ For device types 02 through 09, all tests performed at $T_A = +125^\circ\text{C}$ may, at the manufacturer's option, be performed at $T_A = +150^\circ\text{C}$. Specifications for $T_A = +125^\circ\text{C}$ shall then apply at $T_A = +150^\circ\text{C}$.4/ A 1 μF capacitor may be added to dampen oscillations during the I_{OS} test for device types 02 through 09.5/ The overload current test checks the device current limiting, and it is not a measure of the output peak current.

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	Line regulation	V_{RLINE}	$\pm 10 \text{ mV}$	-50	+50	mV
	Load regulation	V_{RLOAD}	$\pm 10 \text{ mV}$	-50	+50	mV
	Standby current drain	I_{SCD}	$\pm 1 \text{ mA}$	-10	0.5	mA
	Output voltage	V_{OUT}	$\pm 25 \text{ mV}$	4.70	5.40	V
02, 06	Output voltage	V_{OUT}	$\pm 25 \text{ mV}$	4.75	5.25	V
	Standby current drain	I_{SCD}	$\pm 20 \%$	-7.0	-0.5	mA
03, 07	Output voltage	V_{OUT}	$\pm 60 \text{ mV}$	11.40	12.60	V
	Standby current drain	I_{SCD}	$\pm 20 \%$	-7.0	-0.5	mA
04, 08	Output voltage	V_{OUT}	$\pm 75 \text{ mV}$	14.25	15.75	V
	Standby current drain	I_{SCD}	$\pm 20 \%$	-7.0	-0.5	mA
05, 09	Output voltage	V_{OUT}	$\pm 120 \text{ mV}$	22.80	25.20	V
	Standby current drain	I_{SCD}	$\pm 20 \%$	-7.0	-0.5	mA

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

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 actual 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's service 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

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 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.

6.4 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 43123-1199.

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

6.5.1 Line regulation. The change in output voltage for a specified change in input voltage (V_{RLINE}) (for device type 01: "The percentage change")

6.5.2 Load regulation. The change in output voltage for a specified change in load current (V_{RLOAD}) (for device type 01: "The percentage change")

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 Average temperature coefficient of output voltage. The percentage change in output voltage for a specified change in ambient temperature ($\Delta V_{OUT} / \Delta T$).

6.5.5 Output noise voltage. The rms output noise voltage with constant load and no input ripple (N_O).

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

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.

6.5.10 Start-up input voltage. The minimum input voltage required to obtain the specified output voltage (for device type 01 only).

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 C (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	LM109
02	LM140H-05, 78M05
03	LM140H-12, 78M12
04	LM140H-15, 78M15
05	LM140H-24, 78M24
06	LM140K-05, 7805
07	LM140K-12, 7812
08	LM140K-15, 7815
09	LM140K-24, 7824

6.8 Changes from previous issue. Asterisks 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
NASA - NA

Preparing activity:

DLA - CC

Project 5962-2021

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 ASSIT Online database at www.dodssp.daps.mil.