

MILITARY SPECIFICATION
MICROCIRCUITS, DIGITAL, CMOS, SWITCHES,
MONOLITHIC SILICON, POSITIVE LOGIC

Reactivated after 10 Dec. 2004 and may be used for new and existing designs and acquisitions.

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

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF 38535

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, CMOS, logic microcircuits. Two product assurance classes and a choice of case outlines, lead finishes, and radiation hardness assurance (RHA) are provided and are reflected in the complete Part or Identifying Number (PIN). For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535 (see 6.3).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 follows:

<u>Device type</u>	<u>Circuit</u>
01	Quad bilateral switch
02	Quad bilateral switch
51	Quad bilateral switch
52	Quad bilateral switch

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 are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
A	GDFP5-F14 or CDFP6-F14	14	Flat pack
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
T	CDFP3-F14	14	Flat pack
X <u>1/ 2/</u>	GDFP5-F14 or CDFP6-F14	14	Flat pack, except A dimension equals 0.1" (2.54 mm) max
Y <u>1/ 2/</u>	GDFP1-F14 or CDFP2-F14	14	Flat pack, except A dimension equals 0.1" (2.54 mm) max

1/ As an exception to the nickel plate or undercoating paragraph of MIL-PRF-38535, appendix A, for case outlines X and Y only, the leads of bottom brazed ceramic packages (i.e., configuration 2 of case outlines A or D) may have electroless nickel undercoating which is 50 to 200 microinches (1.27 to 5.08 μm) thick provided the lead finish is hot solder dip (i.e., finish letter A) and provided that, after any lead forming, an additional hot solder dip coating is applied which extends from the outer tip of the lead to no more than 0.015 inch (0.38 mm) from the package edge.

2/ For bottom or side brazed packages, case outlines X and Y only, the S_1 dimension may go to .000 inch (.00 mm) minimum.

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or email CMOS@dsccl.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>.

MIL-M-38510/58D

1.3 Absolute maximum ratings.

Supply voltage range ($V_{DD} - V_{SS}$):	
Device types 01 and 02	-0.5 V dc to +15.5 V dc
Device types 51 and 52	-0.5 V dc to +18.0 V dc
Input current (each input)	± 10 mA
Input voltage range.....	$(V_{SS} - 0.5 \text{ V}) \leq V_I \leq (V_{DD} + 0.5 \text{ V})$
Storage temperature range (T_{STG}).....	-65° to +175°C
Maximum power dissipation (P_D)	175 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction to case (θ_{JC}).....	See MIL-STD-1835
Junction temperature (T_J)	175°C

1.4 Recommended operating conditions.

Supply voltage range ($V_{DD} - V_{SS}$):	
Device types 01 and 02	4.5 V dc to 12.5 V dc
Device types 51 and 52	4.5 V dc to 15.0 V dc
Input high voltage range (V_{IH}):	
Device types 01 and 02	2.05 V to 5.0 V dc @ $V_{DD} = 5.0 \text{ V dc}$ 11.85 V to 12.5 V dc @ $V_{DD} = 12.5 \text{ V dc}$
Device types 51 and 52	$V_{OL} = 10\% V_{DD}$, $V_{OH} = 90\% V_{DD}$ 3.5 V to 5.0 V dc @ $V_{DD} = 5.0 \text{ V dc}$ 8.0 V to 10.0 V dc @ $V_{DD} = 10.0 \text{ V dc}$ 11.0 V to 15.0 V dc @ $V_{DD} = 15.0 \text{ V dc}$
Input low voltage range (V_{IL}):	
Device types 01 and 02	0.0 V to 0.95 V dc @ $V_{DD} = 5.0 \text{ V dc}$ 0.0 V to 2.4 V dc @ $V_{DD} = 12.5 \text{ V dc}$
Device types 51 and 52	$V_{OL} = 10\% V_{DD}$, $V_{OH} = 90\% V_{DD}$ 0.0 V to 1.5 V dc @ $V_{DD} = 5.0 \text{ V dc}$ 0.0 V to 2.0 V dc @ $V_{DD} = 10.0 \text{ V dc}$ 0.0 V to 4.0 V dc @ $V_{DD} = 15.0 \text{ V dc}$
Load capacitance	50 pF maximum
Case operating temperature range (T_C)	-55°C to +125°C

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 and Standards. 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 SPECIFICATION

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

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
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 document and the references cited herein, the text of this document takes 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. Although eutectic die bonding is preferred, epoxy die bonding may be performed. However, the resin used shall be Dupont 5504 Conductive Silver Paste, or equivalent, which is cured at $200^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for a minimum of 2 hours. The use of equivalent epoxies or cure cycles shall be approved by the qualifying activity. Equivalency shall be demonstrated in data submitted to the qualifying activity for verification.

3.3.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3.2 Truth table. The truth table shall be as specified on figure 2.

3.3.3 Switching time test circuit and waveforms. The switching time test circuit and waveforms shall be as specified on figures 3 and 4.

3.3.4 ON resistance test. The ON resistance test shall be as specified on figures 5, 6, and 7.

3.3.5 Switch leakage current. The switch leakage current shall be specified on figure 8.

3.3.6 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity or preparing activity upon request.

3.3.7 Case outlines. The case outlines shall be as specified in 1.2.3.

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

3.5 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range.

3.6 Electrical test requirements. The 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.

3.7.1 Radiation hardness assurance identifier. The radiation hardness assurance identifier shall be in accordance with MIL-PRF-38535 and 4.5.4 herein.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 39 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T _C ≤ +125°C, V _{SS} = 0 V Unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Positive clamping input to V _{DD}	V _{IC} (pos)	T _C = 25°C, V _{DD} = GND, V _{SS} = Open, Output = Open, I _I = 1 mA	All		1.5	V
Negative clamping input to V _{SS}	V _{IC} (neg)	T _C = 25°C, V _{DD} = Open, V _{SS} = GND, Output = Open, I _I = -1 mA	All		-6	V
Quiescent supply current	I _{SS}	V _{DD} = 15 V dc Any combination of inputs	All		-550	nA
High level output voltage	V _{OH1}	V _{IN} = 5 V, V _{DD} = 5 V dc, I _{OH} = 0, Control input = V _{IH} (see table III)	01, 02	4.95		V
	V _{OH2}	V _{IN} = 12.5 V, V _{DD} = 12.5 V dc I _{OH} = 0, Control input = V _{IH} (see table III)	01, 02	11.25		V
	V _{OH3}	V _{IN} = 15 V, V _{DD} = 15 V dc, I _{OH} = 0, Control input = V _{IH}	51, 52	14.95		V
Low level output voltage	V _{OL1}	V _{IN} = 0 V, V _{DD} = 5 V dc, I _{OL} = 0, Control input = V _{IH} (see table III)	01, 02		-0.05	V
	V _{OL2}	V _{IN} = 0 V, V _{DD} = 12.5 V dc, I _{OL} = 0, Control input = V _{IH} (see table III)	01, 02		1.25	V
	V _{OL3}	V _{IN} = 0 V, V _{DD} = 15 V dc, I _{OL} = 0, Control input = V _{IH}	51, 52		0.05	V
Input high control voltage	V _{IH1}	V _{DD} = 5 V dc V _O ≥ 4.5 V	51, 52	3.5		V
	V _{IH2}	V _{DD} = 10 V dc V _O ≥ 9.0 V	51, 52	7.0		V
	V _{IH3}	V _{DD} = 15 V dc V _O ≥ 13.5 V	51, 52	11.0		V

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ -55°C ≤ T _C ≤ 125°C, V _{SS} = 0 V unless otherwise specified		Device type	Limits		Unit
					Min	Max	
Input low control voltage	V _{IL1}	V _{DD} = 5 V dc V _O ≤ 0.5 V		52		1.5	V
				51		1.0	V
	V _{IL2}	V _{DD} = 10 V dc V _O ≤ 1.0 V		52		3.0	V
				51		2.0	V
	V _{IL3}	V _{DD} = 15 V dc V _O ≤ 1.5 V		52		4.0	V
				51		2.5	V
Output low (sink) current	I _{OL1}	V _{DD} = 5 V dc, V _{IN} = 5 V V _{OL} = 0.4 V dc		51, 52	0.36		mAdc
	I _{OL2}	V _{DD} = 15 V dc, V _{IN} = 15 V V _{OL} = 1.5 V dc		51, 52	2.4		mAdc
Output high (source) current	I _{OH1}	V _{DD} = 5 V dc, V _{OH} = 4.6 V V _{IN} = 5 V		51, 52	-0.36		mAdc
	I _{OH2}	V _{DD} = 15 V dc V _{IN} = 15 V V _{OH} = 13.5 V dc		51, 52	-2.4		mAdc
Input leakage current 2/	I _{IH}	Measure inputs sequentially	V _{DD} = 15 V dc	01, 02		45	nA
			V _{DD} = 18 V dc	51		45	
				52		100	
	I _{IL}	Measure inputs sequentially	V _{DD} = 15 V dc	01, 02		-45	nA
			V _{DD} = 18 V dc	51		-45	
				52		-100	
Input capacitance	C _{ic}	V _{DD} = 0 V dc, f = 1 MHz T _C = 25°C		All		12	pF
Input capacitance	C _{is}	V _{DD} = 5 V dc, f = 1 MHz T _C = 25°C		All		20	pF
Output capacitance	C _{os}			01, 51		15	pF
				02, 52		20	
Feedthrough capacitance	C _{ics}			All		20	pF

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions ^{1/} -55°C ≤ T _C ≤ 125°C, V _{SS} = 0 V unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Propagation delay times, switch input to output	t _{PHL}	V _{DD} = 5 V dc, C _L = 50 pF (see figure 3)	01, 51	4	156	ns
	t _{PLH}	R _L = 200 kΩ	02, 52	4	80	ns
			01, 51	4	130	ns
			02, 52	4	85	ns
Propagation delay time, control input to switch output	t _{PZH} , t _{PZL} , t _{PHZ} , t _{PLZ}	V _{DD} = 5 V dc, C _L = 50 pF (see figure 4) R _L = 1 kΩ	All	4	90	ns
Switch “ON” resistance	R _{ON1}	V _{DD} = 5.0 V dc V _{SS} = GND	01, 51		1.8	kΩ
			02, 52		600	Ω
	R _{ON2}	V _{DD} = 7.5 V dc V _{SS} = -7.5 V dc	01, 51		450	Ω
			02, 52		250	Ω
	R _{ON3}	V _{DD} = 10.0 V dc V _{SS} = GND	01, 51		750	Ω
			02, 52		350	Ω
Switch leakage current	I _{DOFF1}	V _{DD} = +5.0 V dc, V _{SS} = 0 V dc	All		45	nA
	I _{DOFF2}	V _{DD} = 0 V dc, V _{SS} = -5.0 V dc				
	I _{DOFF3}	V _{DD} = +10.0 V dc, V _{SS} = 0 V dc				
	I _{DOFF4}	V _{DD} = 0 V dc, V _{SS} = -10.0 V dc				
	I _{DOFF5}	V _{DD} = +15 V dc, V _{SS} = 0 V dc				
	I _{DOFF6}	V _{DD} = 0 V dc, V _{SS} = -15.0 V dc				

^{1/} Complete terminal conditions shall be as specified in table III.^{2/} Input current at node.

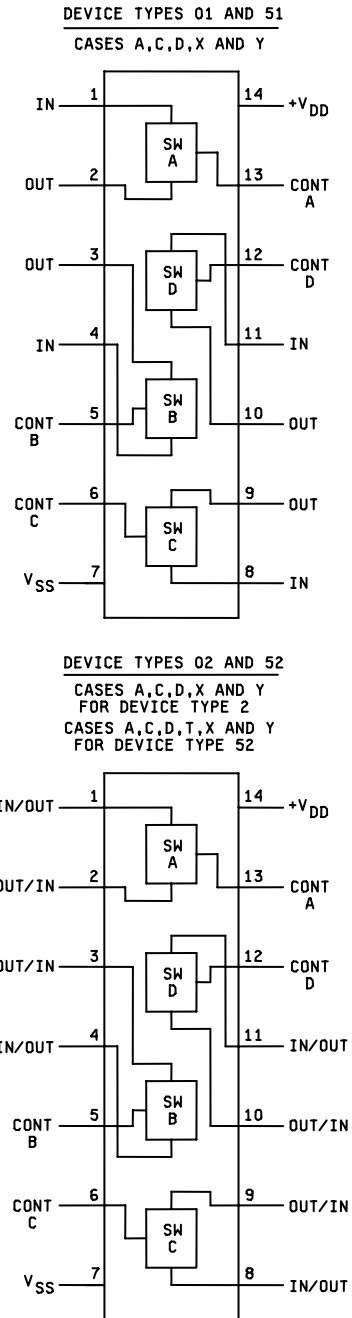
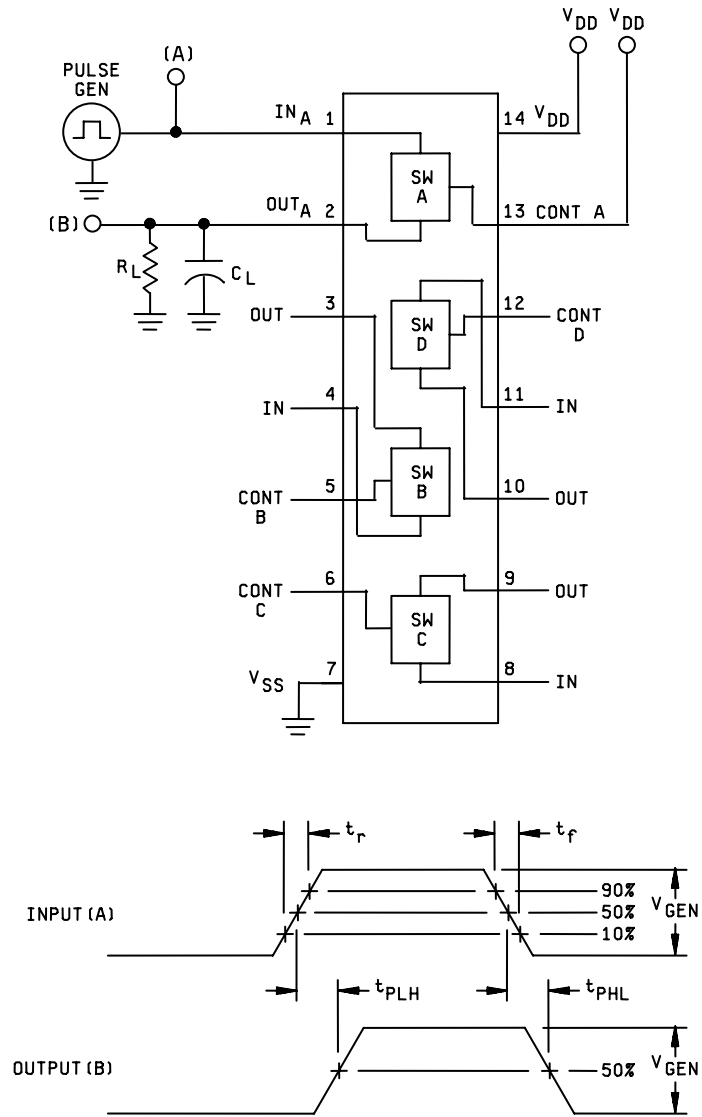


FIGURE 1. Terminal connections.

Truth table, each switch		
Input		Output
V_C	V_{IS}	V_{OS}
1	0	0
1	1	1
0	0	Open
0	1	Open

Positive logic: Switch on $V_C = "1"$
Switch off $V_C = "0"$

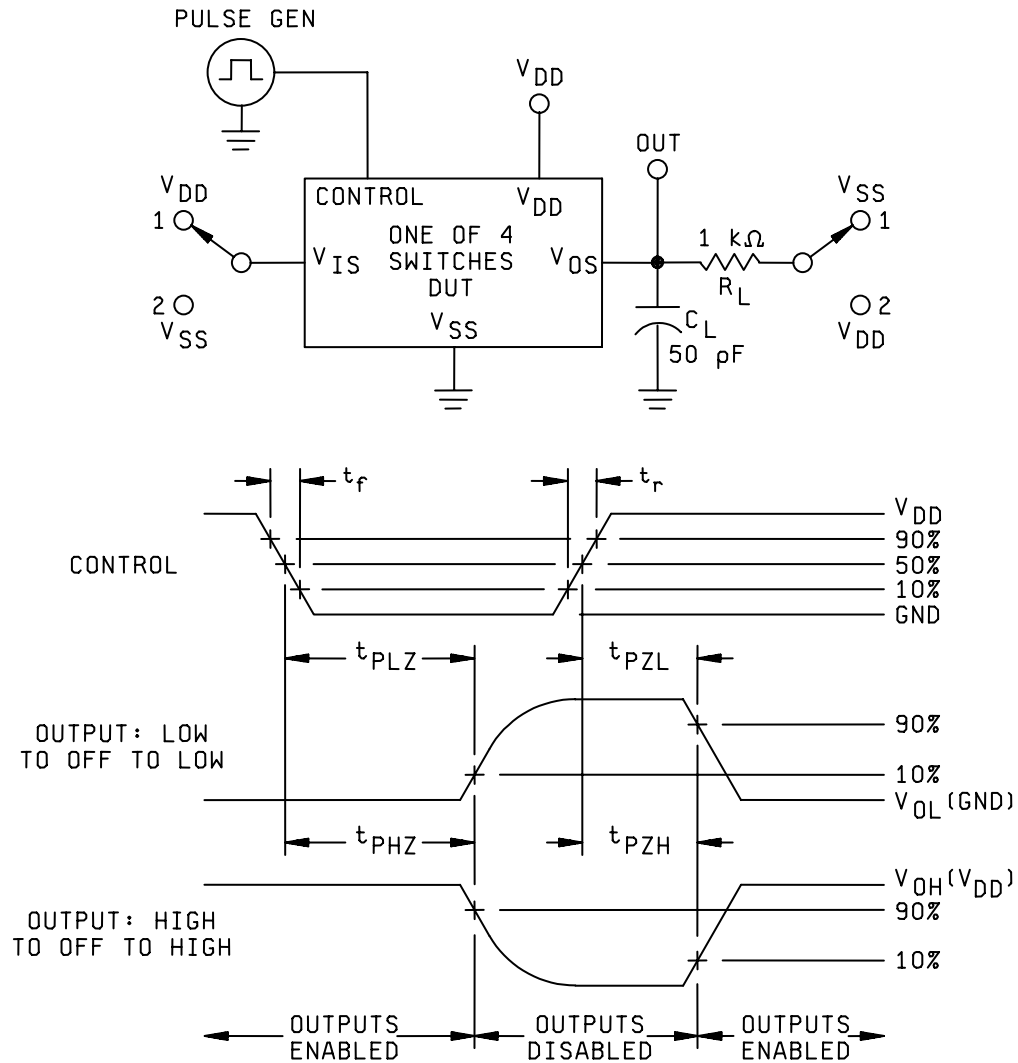
FIGURE 2. Truth table.



NOTES:

1. Pulse generator conditions: $V_{GEN} = V_{DD} \pm 1\%$, duty cycle = 50%, t_r and $t_f = 20 \text{ ns} \pm 2.0 \text{ ns}$, PRR = 500 kHz, and $Z_{OUT} = 50\Omega$.
2. $C_L = 50 \text{ pF}$, $R_L = 200 \text{ k}\Omega \pm 10\%$, includes probe and jig impedance.
3. Identical switching measurements are obtained from switch A, switch B, switch C, and switch D.

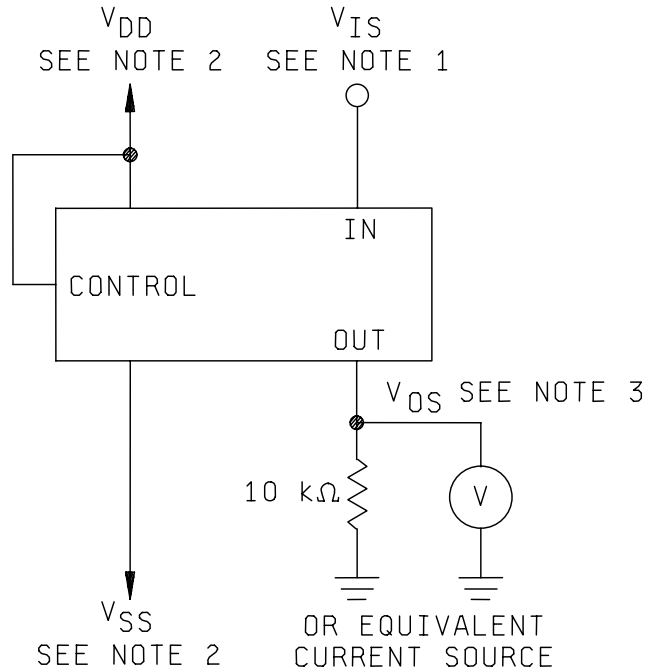
FIGURE 3. Switching time test circuit and waveforms, switch input to switch output.



NOTES:

1. Pulse generator has the following characteristics: $V_{GEN} = V_{DD} \pm 1\%$, duty cycle = 50%, t_r and $t_f \leq 20$ ns and $Z_{OUT} = 50\Omega$.
2. $C_L = 50$ pF, $R_L = 1$ kΩ, includes probe and jig impedance.
3. Identical switching measurements are obtained from switch A, switch B, switch C, and switch D.
4. Switch position 1 for t_{PZH} and t_{PHZ} tests; switch position 2 for t_{PLZ} and t_{PZL} tests.

FIGURE 4. Switching time test circuit and waveforms, switch control input to switch output.



NOTES:

1.

R _{ON1} Number	R _{ON1} (1)	R _{ON1} (2)	R _{ON1} (3)	R _{ON1} (4)
V _{IS}	+0.5 V	1.0 V	4.0 V	5.0 V

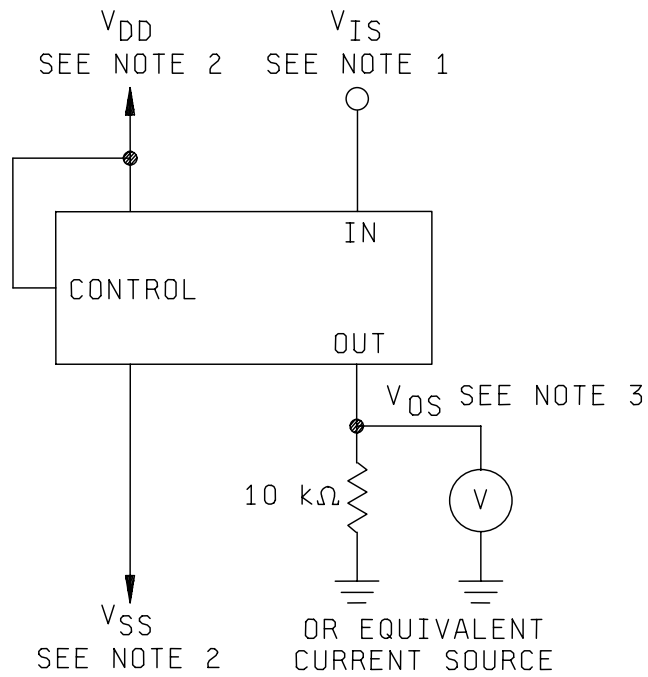
2. Conditions for V_{DD} and V_{SS}: V_{DD} = 5.0 V, V_{SS} = 0 V.

3. Translation from V_{OS} to R_{ON}:

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

FIGURE 5. ON resistance test, R_{ON1}.



NOTES:

1.

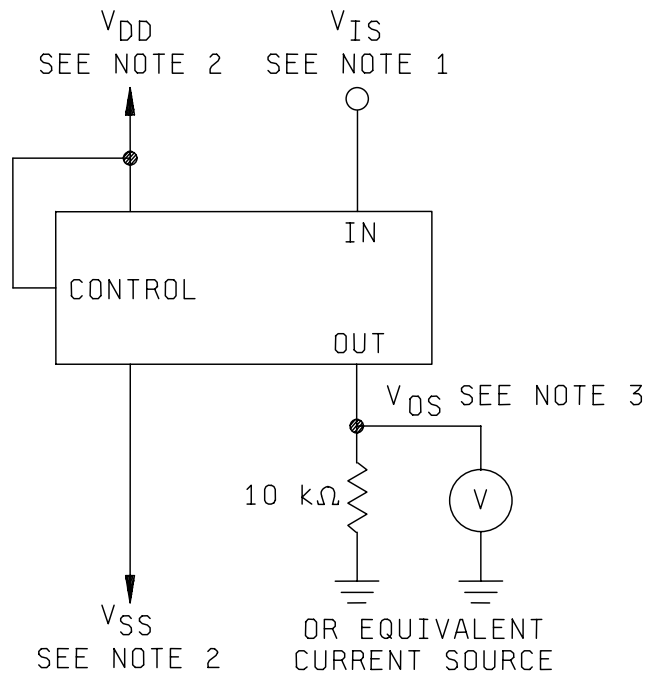
R _{ON2} Number	R _{ON2} (1)	R _{ON2} (2)	R _{ON2} (3)
V _{IS}	-5.0 V	+0.6 V	+5.0 V

2. Conditions for V_{DD} and V_{SS}: V_{DD} = +7.5 V, V_{SS} = -7.5 V.3. Translation from V_{OS} to R_{ON}:

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

5. At the manufacturer's option, during R_{ON2} tests, V_{DD}, V_{SS}, and V_{IS} may be varied provided the absolute value equals +15.0 V.FIGURE 6. ON resistance test, R_{ON2}.



NOTES:

1.

R_{ON3} Number	R_{ON3} (1)	R_{ON3} (2)	R_{ON3} (3)
V_{IS}	+2.5 V	5.0 V	7.5 V

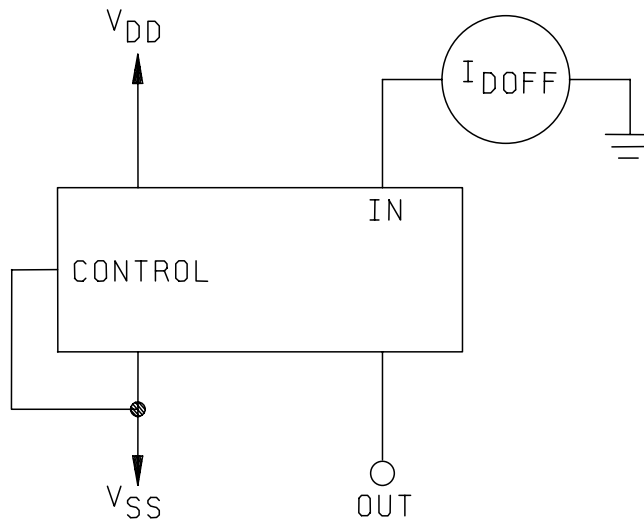
2. Conditions for V_{DD} and V_{SS} : $V_{DD} = +10.0$ V, $V_{SS} = 0$ V.

3. Translation from V_{OS} to R_{ON} :

$$R_{ON} = \frac{V_{IS} - V_{OS}}{V_{OS} / 10 \text{ k}\Omega}$$

4. See table III for complete terminal conditions.

FIGURE 7. ON resistance test, R_{ON3} .



NOTES:

1.

I_{DOFF} NUMBERS	V_{DD}	V_{SS}	Out
I_{DOFF-1}	+5.0 V	GND	+2.5 V
I_{DOFF-2}	GND	-5.0 V	-2.5 V
I_{DOFF-3}	+10.0 V	GND	+5.0 V
I_{DOFF-4}	GND	-10.0 V	-5.0 V
I_{DOFF-5}	+15.0 V	GND	+7.5 V
I_{DOFF-6}	GND	-15.0 V	-7.5 V

2. Identical measurements shall be performed on switch A, switch B, switch C, and switch D.

FIGURE 8. Switch leakage current.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall 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 affect 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 conformance inspection. The following additional criteria shall apply:

- a. 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.
- b. Delete the sequence specified as interim (pre-burn-in) electrical parameters through interim (post-burn-in) electrical parameters of table IA of MIL-PRF-38535 and substitute lines 1 through 7 of table II herein.
- c. Burn-in (method 1015 of MIL-STD-883).
 - (1) Unless otherwise specified in the manufacturers QM plan for static tests (test condition A), ambient temperature (T_A) shall be +125°C minimum. Test duration for each static test shall be 24 hours minimum for class S devices and in accordance with table I of method 1015 for class B devices.
 - i. For static burn-in I, all inputs shall be connected to 0.0 V.
 - ii. For static burn-in II, all inputs shall be connected to V_{DD} .
 - iii. Except for V_{DD} and V_{SS} , the terminal shall be connected through resistors whose value is 2 k Ω to 47 k Ω . The actual measured value of the resistor selected shall not exceed $\pm 20\%$ of its branded value due to use, heat or age.
 - iv. Output may be open or connected to $V_{DD}/2$.
 - v. V_{DD} = 12.5 V minimum, 15 V maximum for device types 01 and 02.
 V_{DD} = 15 V minimum, 18 V maximum for device types 51 and 52.
 $V_{DD}/2$ = $V_{DD}/2 \pm 1.0$ V for all devices.
 V_{SS} = 0.0 V.
 - (2) Unless otherwise specified in the manufacturers QM plan for dynamic test (test condition D), ambient temperature shall be +125°C minimum. Test duration shall be in accordance with table I of method 1015.
 - i. Except for V_{DD} and V_{SS} , the terminals shall be connected through resistors whose value is 2 k Ω to 47 k Ω . The actual measured value of the resistor selected shall not exceed $\pm 20\%$ of its branded value due to use, heat or age.
 - ii. Input signal requirements: Square wave, 50% duty cycle; 25 kHz < PRR < 1 MHz; t_{TLH} and t_{THL} < 1 μ s. Voltage level: Minimum = $V_{SS} - 0.5$ V, +10% V_{DD} ; Maximum = $V_{DD} + 0.5$ V, -10% V_{DD} .
 - iii. V_{DD} = 12.5 V minimum, 15 V maximum for device types 01 and 02.
 V_{DD} = 15 V minimum, 18 V maximum for device types 51 and 52.
 $V_{DD}/2$ = $V_{DD}/2 \pm 1.0$ V for all devices.
 V_{SS} = 0.0 V.

- d. Interim and final electrical test parameters shall be as specified in table II.
- e. For class S devices, post dynamic burn-in, or class B devices, post static burn-in, electrical parameter measurements may, at the manufacturer's option, be performed separately or included in the final electrical parameter requirements.
- f. When device types 01 and 02 are qualified by extension (see 4.3.1), they shall be screened in accordance with the requirements for corresponding device types 51 and 52.

TABLE II. Electrical test requirements.

Line no.	MIL-PRF-38535 test requirements	Class S device <u>1/</u>			Class B device <u>1/</u>		
		Ref. par.	Table III Subgroups <u>2/</u>	Table IV delta limits <u>3/</u>	Ref. par.	Table III subgroups <u>2/</u>	Table IV delta limits <u>3/</u>
1	Interim electrical parameters		1			1	
2	Static burn-in I (method 1015)	4.2c 4.5.2					
3	Same as line 1		1	Δ			
4	Static burn-in II (method 1015)	4.2c 4.5.2			4.2c 4.5.2	<u>4/</u>	
5	Same as line 1	4.2e	1*	Δ	4.2e	1*	Δ
6	Dynamic burn-in (method 1015)	4.2c 4.5.2					
7	Same as line 1	4.2e	1*	Δ			
8	Final electrical parameters (method 5004)		1*, 2, 3, 9			1*, 2, 3, 9	
9	Group A test requirements (method 5005)	4.4.1	1, 2, 3, 4, 9, 10, 11		4.4.1	1, 2, 3, 4, 9, 10, 11	
10	Group B test when using method 5005 QCI option	4.4.2	1, 2, 3, 9, 10, 11	Δ			
11	Group C end-point electrical parameters (method 5005)				4.4.3	1, 2, 3	Δ
12	Group D end-point electrical parameters (method 5005)	4.4.4	1, 2, 3		4.4.4	1, 2, 3	

1/ Blank spaces indicate tests are not applicable.

2/ * indicates PDA applies to subgroup 1 (see 4.2.1).

3/ Δ indicates delta limits shall be required only on table III subgroup 1, where specified, and the delta values shall be computed with reference to the previous interim electrical parameters.

4/ The device manufacturer may at his option either perform delta measurements or within 24 hours after burn-in (or removal of bias) perform the final electrical parameter measurements.

4.2.1 Percent defective allowable (PDA).

- a. The PDA for class S devices shall be 5 percent for static burn-in and 5 percent for dynamic burn-in, based on the exact number of devices submitted to each separate burn-in.
- b. Static burn-in I and II failure shall be cumulative for determining the PDA.
- c. The PDA for class B devices shall be in accordance with MIL-PRF-38535 for static burn-in. Dynamic burn-in is not required.
- d. Those devices whose measured characteristics, after burn-in, exceed the specified delta (Δ) limits or electrical parameter limits specified in table III, subgroup 1, are defective and shall be removed from the lot. The verified failures divided by the total number of devices in the lot initially submitted to burn-in shall be used to determine the percent defective for the lot and the lot shall be accepted or rejected based on the specified PDA.

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

4.3.1 Qualification extension. When authorized by the qualifying activity, if a manufacturer qualifies to a 51 or 52 device type which is manufactured identically to a 01 or 02 device type on this specification, then the 01 or 02 device type may be part I qualified by conducting only group A electrical tests and any electrical tests specified as additional group C subgroups and submitting data 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, D, and E inspections (see 4.4.1 through 4.4.5).

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 performed in accordance with table II herein.
- b. Subgroups 5, 6, 7, and 8 shall be omitted.
- c. Subgroup 4 (C_i measurement) shall be measured only for initial qualification and after process or design changes that may affect input capacitance. Capacitance shall be measured between the designated terminal and V_{SS} at a frequency of 1 MHz.
- d. Subgroups 9 and 11 shall be measured only for initial qualification and after process or design changes which may affect dynamic performance.
- e. At the manufacturers option, test tapes may be programmed simultaneously for each identical section provided that each output is measured and each specified input combination is tested.
- f. When device types 01 and 02 are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the requirements for device types 51 and 52, respectively.

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

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

- a. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 1 of group C inspection and shall consist of tests specified in table IV 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.
- c. When device types 01 and 02 are qualified by extension (see 4.3.1), these device types will be inspected (QCI) according to the requirements for device types 51 and 52, respectively.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
V _{IC} (pos)		1 2 3 4					1 mA		1 mA						1 mA	GND	CA CB CC CD	1.5	"					V
V _{IC} (neg)		6 7 8					-1 mA		-1 mA	GND						-1 mA	CA CB CC CD	-6	"					"
I _{SS} 2/ 3/	3095	9 10 11	15 V GND	GND 15 V	GND 15 V	15 V GND	GND "	GND 15V	"	15 V GND	GND 15 V	GND 15 V	15 V GND	GND 15 V	GND 15 V	15 V	V _{SS}							nA
V _{OH1} 4/	3006	12 13 14 15				5.0V GND	V _{IH1} V _{IL1}	V _{IL1} V _{IH1}	"	"						GND	OB OC OD OA	4.95						"
			GND 5.0V				GND	GND	"	5.0V			5.0V GND	V _{IH1} V _{IL1}	V _{IL1} V _{IH1}	"	"	4.95			4.95		V	"
V _{OH2} 4/	"	16 17 18 19				12.5V GND	V _{IH2} V _{IL2}	V _{IL2} V _{IH2}	"	GND 12.5V						GND	OB OC OD OA	11.25						"
			GND 12.5V				GND	GND	"				12.5V GND	V _{IH2} V _{IL2}	V _{IL2} V _{IH2}	"	"	11.25			11.25		"	"
V _{OL1} 4/	3007	20 21 22 23				GND 5.0V	V _{IH1} V _{IL1}	V _{IL1} V _{IH1}	"	5.0V GND						GND	OB OC OD OA							mV
			5.0V GND				GND	GND	"				GND 5.0V	V _{IH1} V _{IL1}	V _{IL1} V _{IH1}	"	"	50			50		50	"
V _{OL2} 4/	"	24 25 26 27				GND 12.5V	V _{IH2} V _{IL2}	V _{IL2} V _{IH2}	"	12.5V GND						GND	OB OC OD OA							V
			12.5V GND				GND	GND	"				GND 12.5V	V _{IH2} V _{IL2}	V _{IL2} V _{IH2}	"	"	1.25			1.25		1.25	"
I _{IH1} 5/	3010	28	15V				15V	15V	"	15V			15V	15V	15V	15V	All inputs together		+12					nA
I _{IH2}	"	29 30 31 32 33 34 35 36	GND		15V	GND	15V GND	GND 15V GND	"	GND			GND	GND	GND	"	CB CC CD CA IA IB IC ID		1.0					"
			"				"	"	"	"			"	15V GND	"	"	"		"					"
			15V GND			15V GND	"	"	"	"			"	"	"	"	"	2.0						"
			"				"	"	"	15V GND			"	"	"	"	"	"	"					"
I _{IL1} 5/	3009	37	"				"	"	"	"			GND	"	"	"	All inputs together		-12					"
I _{IL2}	3009	38 39 40 41 42 43 44 45	GND			GND	GND	GND	GND	GND			GND	GND	GND	15V	CB CC CD CA IA IB IC ID		-1.0					nA
			"				"	"	"	"			"	"	"	"	"		"					"
			"				"	"	"	"			"	"	"	"	"		"					"
			"				"	"	"	"			"	"	"	"	"		"					"
			"				"	"	"	"			"	"	"	"	"		-2.0					"
			"				"	"	"	"			"	"	"	"	"		"					"
			"				"	"	"	"			"	"	"	"	"		"					"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 01 - Continued.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
R _{ON1}		46	0.5V	<u>6</u> /	<u>6</u> /	0.5V	5.0V	5.0V	GND		0.5V	<u>6</u> /	<u>6</u> /	0.5V	5.0V	5.0V	OA	700	1.0 k	1.1 k	750	Ω		
		47															OB							
		48															OC							
		49															OD							
		50	1.0V	<u>6</u> /	<u>6</u> /	1.0V	5.0V	5.0V						5.0V			OA							
		51															OB							
		52								1.0V	<u>6</u> /						OC							
		53									<u>6</u> /	1.0V	5.0V		5.0V		OD							
		54	4.0V	<u>6</u> /	<u>6</u> /	4.0V	5.0V	5.0V									OA							
		55															OB							
		56							5.0V		4.0V	<u>6</u> /					OC							
		57									<u>6</u> /	4.0V	5.0V		5.0V		OD							
	58	5.0V	<u>6</u> /	<u>6</u> /	5.0V	5.0V	5.0V				<u>6</u> /	5.0V		5.0V		OA								
	59										<u>6</u> /					OB								
	60									5.0V	<u>6</u> /					OC								
	61											<u>6</u> /	5.0V	5.0V		OD								
R _{ON2}		62	-5.0V	<u>7</u> /	<u>7</u> /	-5.0V	7.5V	7.5V	-7.5V		-5.0V	<u>7</u> /	<u>7</u> /	-5.0V	7.5V	7.5V	OA	250	400	450	300			
		63															OB							
		64															OC							
		65											<u>7</u> /	7.5V			OD							
		66	0.6V	<u>7</u> /	<u>7</u> /	0.6V	7.5V	7.5V			0.6V	<u>7</u> /			7.5V		OA							
		67															OB							
		68										<u>7</u> /	0.6V	7.5V		OC								
		69										<u>7</u> /				OD								
		70	5.0V	<u>7</u> /	<u>7</u> /	5.0V	7.5V	7.5V							7.5V		OA							
		71															OB							
		72									5.0V	<u>7</u> /	<u>7</u> /	5.0V			OC							
		73											<u>7</u> /	5.0V	7.5V		OD							
R _{ON3}		74	2.5V	<u>8</u> /	<u>8</u> /	2.5V	10V	10V	GND		2.5V	<u>8</u> /	<u>8</u> /	2.5V	10V	10V	OA	450	650	700	500			
		75															OB							
		76															OC							
		77											<u>8</u> /	2.5V	10V		OD							
		78	5.0V	<u>8</u> /	<u>8</u> /	5.0V	10V	10V			5.0V	<u>8</u> /			10V		OA							
		79															OB							
		80															OC							
		81											<u>8</u> /	5.0V	10V		OD							
		82	7.5V	<u>8</u> /	<u>8</u> /	7.5V	10V	10V			7.5V	<u>8</u> /					OA							
		83															OB							
		84															OC							
		85											<u>8</u> /	7.5V	10V		OD							
I _{DOFF1}	Fig. 8	86	9/	9/	9/	9/	9/	9/		9/	9/	9/	9/	9/	5.0V	9/		45		45		45	nA	
I _{DOFF2}		87							-5.0V						GND									
I _{DOFF3}		88							GND						10V									
I _{DOFF4}		89							-10V						GND									
I _{DOFF5}		90							GND						15V									
I _{DOFF6}		91							15V						GND									

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 01 - Continued.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 4 T _C = 25°C									
			IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA	V _{DD}		Min	Max	Min	Max	Min	Max				
C _C	3012	92 93 94 95					10/		GND							GND	CB CC CD CA	12	"					pF			
							10/																				
C _{is}	3012	96 97 98 99	10/				10/		GND		GND				GND	GND	5.0V	IA IB IC ID	20	"					"		
C _{os}	"	100 101 102 103		—/			11/										OA OB OC OD	15	"					"			
C _{ios}	"	104 105 106 107	12/	12/			12/										IA, OA IB, OB IC, OC ID, OD		20	"					"		
																		Subgroup 9 T _C = 25°C		Subgroup 10 T _C = 125°C		Subgroup 11 T _C = -55°C					
																		Min	Max	Min	Max	Min	Max				
t _{PLH}	3003 Fig. 3	108 109 110 111	IN	OUT		OUT	IN	GND 5.0V GND	GND "	GND "		IN	OUT		OUT	IN	GND 5.0V "	5.0V GND "	5.0V "	IA to OA IB to OB IC to OC ID to OD	4	125	7	130	4	114	ns
	"	112 113 114 115	IN	OUT		OUT	IN	5.0V GND	5.0V GND	"		IN	OUT		OUT	IN	GND 5.0V "	5.0V GND "	"	IA to OA IB to OB IC to OC ID to OD	"	130	"	156	"	130	"
	"																										
t _{PHZ}	Fig. 4	116 117 118 119	5.0V	OUT		OUT	5.0V	IN GND	IN GND	"		5.0V	OUT		OUT	5.0V	GND "	IN GND "	"	CA to OA CB to OB CC to OC CD to OD	"	70	"	90	"	50	"
	"																										
t _{PZH}	Fig. 4	120 121 122 123	5.0V	OUT		OUT	5.0V	IN GND	IN GND	"		5.0V	OUT		OUT	5.0V	GND "	IN GND "	"	CA to OA CB to OB CC to OC CD to OD	"	"	"	"	"	"	"
	"																										
t _{PLZ}	Fig. 4	124 125 126 127	GND	OUT		OUT	GND	IN GND	IN GND	"		GND	OUT		OUT	GND	GND "	IN GND "	"	CA to OA CB to OB CC to OC CD to OD	"	"	"	"	"	"	"
	"																										
t _{PZL}	Fig. 4	128 129 130 131	GND	OUT		OUT	GND	IN GND	IN GND	"		GND	OUT		OUT	GND	GND "	IN GND "	"	CA to OA CB to OB CC to OC CD to OD	"	"	"	"	"	"	"
	"																										

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
V _{IC} (pos)		2 3 4				1 mA	1 mA						1 mA	1 mA	GND	CB CC CD CA	1.5	"					V	
V _{IC} (neg)	1	6 7 8				-1 mA	-1 mA	GND					-1 mA	-1 mA	CB	CC CD CA	-6	"					"	
I _{SS} 2/ 3/	3005	9 10 11	15 V GND	GND 15 V	GND 15 V	15 V GND	GND 15 V	GND 15 V	"	15 V GND	GND 15 V	15 V GND	GND 15 V	GND 15 V	15 V	V _{SS}		"					nA	
V _{OH1} 4/	3006	12 13 14 15	GND 5.0V			5.0V GND	V _{IH1} V _{IL1} GND	V _{IL1} V _{IH1} GND	"	5.0V		5.0V GND	GND V _{IH1} V _{IL1}	GND V _{IL1} V _{IH1}	5.0V	OB OC OD OA	4.95	4.95	4.95	4.95		V		
V _{OH2} 4/		16 17 18 19	GND 12.5V			12.5V GND	V _{IH2} V _{IL2} GND	V _{IL2} V _{IH2} GND	"	GND 12.5V		12.5V GND	GND V _{IH2} V _{IL2}	GND V _{IL2} V _{IH2}	12.5V	OB OC OD OA	11.25	11.25	11.25	11.25				
V _{OL1} 4/	3007	20 21 22 23	5.0V GND			GND 5.0V	V _{IH1} V _{IL1} GND	V _{IL1} V _{IH1} GND	"	5.0V GND		GND 5.0V	GND V _{IH1} V _{IL1}	GND V _{IL1} V _{IH1}	5.0V	OB OC OD OA	50	50	50	50		mV		
V _{OL2} 4/		24 25 26 27	12.5V GND			GND 12.5V	V _{IH2} V _{IL2} GND	V _{IL2} V _{IH2} GND	"	12.5V GND		GND 12.5V	GND V _{IH2} V _{IL2}	GND V _{IL2} V _{IH2}	12.5V	OB OC OD OA	1.25	1.25	1.25	1.25		V		
I _{IH1} 5/	3010	28	15V			15V	15V	15V	"	15V		15V	15V	15V	15V	All inputs together						nA		
I _{IH2}		29 30 31 32 33 34 35 36	GND " " " " " " " "			GND " " " " " " " "	15V GND " " " " " " " "	GND 15V GND " " " " " " " "	"	GND " " " " " " " "		GND " " " " " " " "	GND 15V GND 15V GND " " " " " " " "	GND " " " " " " " "	"	CB CC CD CA IA IB IC ID	+12	1.0 " " " " " " " "	45	" " " " " " " "		"		
I _{IL1} 5/	3009	37	"				"	"	"	"		GND	"	"	"	All inputs together						"		
I _{IL2}	3009	38 39 40 41 42 43 44 45	GND " " " " " " " "			GND " " " " " " " "	GND " " " " " " " "	GND " " " " " " " "	GND " " " " " " " "	GND " " " " " " " "		GND " " " " " " " "	GND " " " " " " " "	GND 15V " " " " " " " "	15V	CB CC CD CA IA IB IC ID	-12	-1.0 " " " " " " " "	-45	" " " " " " " "	-2.0 " " " " " " " "		nA	

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminals conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
		Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA	V _{DD}	Min	Max	Min	Max	Min	Max		
R _{ON1}		46	0.5V	<u>6</u> /	<u>6</u> /	0.5V	5.0V	5.0V	GND	0.5V	<u>6</u> /	<u>6</u> /	0.5V	5.0V	5.0V	OA	400	450	500	450	Ω			
		47														OB								
		48														OC								
		49														OD								
		50	1.0V	<u>6</u> /	<u>6</u> /	1.0V	5.0V	5.0V		1.0V	<u>6</u> /	<u>6</u> /	1.0V	5.0V	5.0V	OA								
		51														OB								
		52														OC								
		53														OD								
		54	4.0V	<u>6</u> /	<u>6</u> /	4.0V	5.0V	5.0V		4.0V	<u>6</u> /	<u>6</u> /	4.0V	5.0V	5.0V	OA								
		55														OB								
		56														OC								
		57														OD								
		58	5.0V	<u>6</u> /	<u>6</u> /	5.0V	5.0V	5.0V		5.0V	<u>6</u> /	<u>6</u> /	5.0V	5.0V	5.0V	OA								
		59														OB								
		60														OC								
		61										<u>6</u> /	5.0V	5.0V		OD								
R _{ON2}		62	-5.0V	<u>Z</u> /	<u>Z</u> /	-5.0V	7.5V	7.5V	-7.5V	-5.0V	<u>Z</u> /	<u>Z</u> /	-5.0V	7.5V	7.5V	OA	200	250	200					
		63														OB								
		64														OC								
		65														OD								
		66	0.6V	<u>Z</u> /	<u>Z</u> /	0.6V	7.5V	7.5V		0.6V	<u>Z</u> /	<u>Z</u> /	0.6V	7.5V	7.5V	OA								
		67														OB								
		68														OC								
		69														OD								
		70	5.0V	<u>Z</u> /	<u>Z</u> /	5.0V	7.5V	7.5V		5.0V	<u>Z</u> /	<u>Z</u> /	5.0V	7.5V	7.5V	OA								
		71														OB								
		72														OC								
		73										<u>Z</u> /	5.0V	7.5V		OD								
R _{ON3}		74	2.5V	<u>8</u> /	<u>8</u> /	2.5V	10V	10V	GND	2.5V	<u>8</u> /	<u>8</u> /	2.5V	10V	10V	OA	300	350	300	250				
		75														OB								
		76														OC								
		77														OD								
		78	5.0V	<u>8</u> /	<u>8</u> /	5.0V	10V	10V		5.0V	<u>8</u> /	<u>8</u> /	5.0V	10V	10V	OA								
		79														OB								
		80														OC								
		81														OD								
		82	7.5V	<u>8</u> /	<u>8</u> /	7.5V	10V	10V		7.5V	<u>8</u> /	<u>8</u> /	7.5V	10V	10V	OA								
		83														OB								
		84														OC								
		85										<u>8</u> /	7.5V	10V		OD								
I _{DOFF1}	Fig. 8	86	<u>9</u> /	<u>9</u> /	<u>9</u> /	<u>9</u> /	<u>9</u> /		<u>9</u> /	<u>9</u> /	<u>9</u> /	<u>9</u> /	<u>9</u> /	5.0V	<u>9</u> /		45		45		45	nA		
I _{DOFF2}		87							-5.0V						GND									
I _{DOFF3}		88							GND						10V									
I _{DOFF4}		89							-10V						GND									
I _{DOFF5}		90							GND						15V									
I _{DOFF6}		91							-15V						GND									

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 4 T _C = 25°C												
			IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA	V _{DD}		Min	Max	Min	Max	Min	Max							
C _C	3012	92 93 94 95					10/ 10/ 10/ 10/	GND 10/ 10/ 10/	GND 10/ 10/ 10/					10/ 10/ 10/ 10/	GND 10/ 10/ 10/	CB CC CD CA	12	"					pF							
C _{is}	3012	96 97 98 99	10/ 10/ 10/ 10/			10/ 10/ 10/ 10/	GND 10/ 10/ 10/	GND 10/ 10/ 10/	GND 10/ 10/ 10/					GND 10/ 10/ 10/	GND 10/ 10/ 10/	5.0V 10/ 10/ 10/								IA IB IC ID	20 20 20 20					pF
C _{os}	"	100 101 102 103		—/ 11/ 11/ 11/		11/ 11/ 11/ 11/					11/ 11/ 11/ 11/					OA OB OC OD								20 20 20 20						
C _{ios}	"	104 105 106 107	12/ 12/ 12/ 12/	12/ 12/ 12/ 12/		12/ 12/ 12/ 12/										IA, OA IB, OB IC, OC ID, OD								20 20 20 20						
																	Subgroup 9 T _C = 25°C		Subgroup 10 T _C = 125°C		Subgroup 11 T _C = -55°C									
																	Min	Max	Min	Max	Min	Max								
t _{PLH}	3003 Fig. 3	108 109 110 111	IN	OUT	OUT	IN	GND 5.0V GND	GND 10/ 5.0V GND	GND 10/ 10/ 10/	IN	OUT	OUT	IN	GND 5.0V 5.0V	5.0V GND 10/ 5.0V	5.0V GND 10/ 10/	IA to OA IB to OB IC to OC ID to OD	4 70 70 70	70 70 70 70	7 85 85 85	4 70 70 70	70 70 70 70	ns							
t _{PHL}	"	112 113 114 115	IN	OUT	OUT	IN	5.0V GND 5.0V GND	10/ 10/ 5.0V GND	10/ 10/ 10/ 10/	IN	OUT	OUT	IN	GND 5.0V 5.0V	5.0V GND 10/ 5.0V	10/ 10/ 10/ 10/	IA to OA IB to OB IC to OC ID to OD	60 60 60 60	60 60 60 60	80 80 80 80	50 50 50 50	50 50 50 50								
t _{PHZ}	Fig. 4	116 117 118 119	5.0V	OUT	OUT	5.0V	IN GND 10/ IN GND	10/ 10/ IN GND	10/ 10/ 10/ 10/	5.0V	OUT	OUT	5.0V	GND 10/ IN	IN GND 10/ IN	10/ 10/ 10/ 10/	CA to OA CB to OB CC to OC CD to OD	70 70 70 70	70 70 70 70	90 90 90 90	55 55 55 55	55 55 55 55								
t _{PZH}	Fig. 4	120 121 122 123	5.0V	OUT	OUT	5.0V	IN GND 10/ IN GND	10/ 10/ IN GND	10/ 10/ 10/ 10/	5.0V	OUT	OUT	5.0V	GND 10/ IN	IN GND 10/ IN	10/ 10/ 10/ 10/	CA to OA CB to OB CC to OC CD to OD	70 70 70 70	70 70 70 70	90 90 90 90	55 55 55 55	55 55 55 55								
t _{PLZ}	Fig. 4	124 125 126 127	GND	OUT	OUT	GND	IN GND 10/ IN GND	10/ 10/ IN GND	10/ 10/ 10/ 10/	GND	OUT	OUT	GND	GND 10/ IN	IN GND 10/ IN	10/ 10/ 10/ 10/	CA to OA CB to OB CC to OC CD to OD	70 70 70 70	70 70 70 70	90 90 90 90	55 55 55 55	55 55 55 55								
t _{PZL}	Fig. 4	128 129 130 131	GND	OUT	OUT	GND	IN GND 10/ IN GND	10/ 10/ IN GND	10/ 10/ 10/ 10/	GND	OUT	OUT	GND	GND 10/ IN	IN GND 10/ IN	10/ 10/ 10/ 10/	CA to OA CB to OB CC to OC CD to OD	70 70 70 70	70 70 70 70	90 90 90 90	55 55 55 55	55 55 55 55								

See footnotes on next sheet.

TABLE III. Group A inspection for device type 02 - Continued.

- 1/ Pins not designated may be "High" level logic, "Low" level logic, or open. Exceptions are as follows:
 $I_{C(pos)}$ tests, the V_{SS} terminal shall be open; $V_{IC(neg)}$ tests, the V_{DD} terminal shall be open.
- 2/ I_{SS} measurements shall be run in sequence.
- 3/ When performing quiescent current measurements (I_{SS}), the meter shall be placed to that all currents flow through the meter. The outputs during the I_{SS} measurement shall be open.
- 4/ $V_{IH1} = 3.8 \text{ V}$ at 25°C , 3.6 V at 125°C , 3.95 V at -55°C .
 $I_{H2} = 11.4 \text{ V}$ at 25°C , 10.95 V at 125°C , 11.85 V at -55°C .
 $V_{IL1} = 1.1 \text{ V}$ at 25°C , 0.85 V at 125°C , 1.25 V at -55°C .
 $V_{IL2} = 3.3 \text{ V}$ at 25°C , 2.55 V at 125°C , 4.05 V at -55°C .
- 5/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.
- 6/ See figure 5.
- 7/ See figure 6.
- 8/ See figure 7.
- 9/ See figure 8.
- 10/ C_c and C_{is} – connect capacitance bridge between measured input terminal and V_{SS} , frequency = 1 MHz.
- 11/ C_{os} – connect capacitance bridge between measured output terminal and V_{SS} , frequency = 1 MHz.
- 12/ C_{ios} – connect capacitance bridge between measured input and output terminals, frequency = 1 MHz.

TABLE III. Group A inspection for device type 51.

Symbol	MIL-STD-883 method	Cases A, C, D, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
V _{IC} (pos)		2 3 4					1 mA	1 mA						1 mA	1 mA	GND	CA CB CC CD	1.5						V
V _{IC} (neg)	1	6 7 8					-1 mA	-1 mA	GND						-1 mA		CA CB CC CD	-6						
I _{SS} 2/ 3/	3065	9 10 11	18 V GND	GND 18 V	GND 18 V	18 V GND	GND	GND	GND	18 V GND	GND 18 V	GND 18 V	18 V GND	GND	GND	18 V	V _{SS}							nA
V _{OH3}	3006	12 13 14 15				15V GND	15V GND	GND 15V GND		15V GND			15V GND	GND	GND	15V	OB OC OD OA	14.95						
V _{OL3}	3007	16 17 18 19	GND			15V GND	15V GND	15V GND		15V GND			15V GND	GND	GND	15V	OB OC OD OA	.05						
V _{IH1}		21 22 23				5.0V GND	3.5V GND	3.5V GND		5.0V GND			5.0V GND	3.5V GND	GND	5V	OB OC OD OA	4.5						
V _{IH2}	20	25 26 27	GND			10V GND	7.0V GND	7.0V GND		10V GND			10V GND	7.0V GND	GND	10.0V	OB OC OD OA	9.0						
V _{IH3}	24	29 30 31	GND			15V GND	11.0V GND	11.0V GND		15V GND			15V GND	11.0V GND	GND	15V	OB OC OD OA	13.5						
V _{IL1}	28	33 34 35	GND			5.0V GND	1.0V GND	1.0V GND		5.0V GND			5.0V GND	1.0V GND	GND	5.0V	OB OC OD OA	0.5						
V _{IL2}	32	37 38 39	GND			10.0V GND	2.0V GND	GND 2.0V GND		10.0V GND			10.0V GND	2.0V GND	GND	10.0V	OB OC OD OA	1.0						
V _{IL3}	36	41 42 43	GND			15.0V GND	2.5V GND	2.5V GND		15.0V GND			15.0V GND	2.5V GND	GND	15.0V	OB OC OD OA	1.5						
I _{OL1}	40	44 45 46 47	GND		0.4V	5.0V GND	5.0V GND	5.0V GND		5.0V GND	0.4V	0.4V	5.0V GND	5.0V GND	GND	5V	OB OC OD OA	0.51						mA
I _{OL2}		48 49 50 51		1.5V	1.5V	15V GND	15V GND	15V GND		15V GND	1.5V	1.5V	GND 15V	15V GND	GND	15V	OB OC OD OA	3.4						

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A, C, D, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C			
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min		Max
I _{OH1}		52	GND		4.6V	5.0V	5.0V	GND	GND	GND	4.6V	4.6V	GND	GND	GND	5.0V	OB	-0.51	Max	-0.36	Max	-0.64	Max	mA	
		53			GND	GND							OC												
		54											OD												
		55	5.0V		4.6V					5.0V			5.0V	5.0V		OA									
I _{OH2}		56	GND		13.5V	15V	15V				13.5V	13.5V			GND	15V	OB	-3.4	Max	-2.4	Max	-4.2	Max		
		57			GND					OC															
		58								OD															
		59	15V		13.5V					15V			15V	15V	OA										
I _{IH1} 4/	3010	60	18V				18V	18V		18V			18V	18V	18V	All inputs together							nA		
I _{IH2}		61	GND		18V	GND	18V	GND		GND		18V	GND	GND	GND		CB	+8	1.0	45					
		62			GND	18V							CC												
		63											CD												
		64											CA												
		65	18V										IA												
		66	GND			18V							IB												
		67											IC												
		68											ID												
I _{IL1} 4/	3009	69										GND				All inputs together									
I _{IL2}		70	GND			GND	GND	GND	GND	GND			GND	GND	GND	18V	CB	-8.0	-1.0	-45					
		71											CC												
		72											CD												
		73											CA												
		74											IA												
		75											IB												
		76											IC												
		77											ID												
R _{ON1}		78	0.5V	5/	5/	0.5V	5.0V	5.0V		0.5V	5/	5/	5/	0.5V	5.0V	5.0V	5.0V	OA	700	1.0 k	750	1.1 k	750	Ω	
		79													OB										
		80													OC										
		81	1.0V	5/											OD										
		82													OA										
		83													OB										
		84													OC										
		85													OD										
		86	4.0V	5/											OA										
		87													OB										
		88													OC										
		89													OD										
		90	5.0V	5/											OA										
		91													OB										
		92													OC										
		93													OD										

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A, C, D, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
R _{OH2}		94	-5.0V	<u>6/</u>	<u>6/</u>	-5.0V	7.5V	7.5V	-7.5V						7.5V	7.5V	OA	250	400	300	450	300		Ω
		95									-5.0V	<u>6/</u>					OB							
		96											6/	-5.0V	7.5V		OC							
		97															OD							
		98	0.6V	<u>6/</u>	<u>6/</u>	0.6V	7.5V	7.5V							7.5V		OA							
		99									0.6V	<u>6/</u>					OB							
		100											6/	0.6V	7.5V		OC							
		101															OD							
		102	5.0V	<u>6/</u>	<u>6/</u>	5.0V	7.5V	7.5V					6/	0.6V	7.5V	7.5V	OA							
		103															OB							
		104									5.0V	<u>6/</u>					OC							
		105											6/	5.0V	7.5V		OD							
R _{OH3}		106	2.5V	<u>7/</u>	<u>7/</u>	2.5V	10V	10V	GND						10V	10V	OA	450	650	500	700	500		Ω
		107										2.5V	<u>7/</u>				OB							
		108												7/	2.5V	10V	OC							
		109	5.0V	<u>7/</u>	<u>7/</u>	5.0V	10V	10V									OD							
		110															OA							
		111															OB							
		112									5.0V	<u>7/</u>					OC							
		113											7/	5.0V	10V	10V	OD							
		114	7.5V	<u>7/</u>	<u>7/</u>	7.5V	10V	10V									OA							
		115															OB							
		116									7.5V	<u>7/</u>					OC							
		117											7/	7.5V	10V		OD							
I _{DOFF1}	Fig 8	118	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	GND	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	5.0V	<u>8/</u>				45		45	nA	
I _{DOFF2}		119							-5.0V						GND									
I _{DOFF3}		120							GND						10V									
I _{DOFF4}		121							-10.0V						GND									
I _{DOFF5}		122							GND						15V									
I _{DOFF6}		123							-15.0V						GND									
																	Subgroup 4 T _C = 25°C							
																	Min	Max						
C _C	3012	124					<u>9/</u>	<u>9/</u>	GND						GND	CB	12						pF	
		125														CC								
		126												<u>9/</u>		CD								
		127												<u>9/</u>		CA								
C _{IS}		128	<u>9/</u>			<u>9/</u>	GND	GND						GND	GND	5.0V	IA		20					
		129								<u>9/</u>						IB								
		130														IC								
		131										<u>9/</u>				ID								
C _{OS}		132		<u>—/</u>	<u>10/</u>											OA	15							
		133														OB								
		134	10								<u>10/</u>					OC								
		135										<u>10/</u>				OD								
C _{IOS}		136	<u>11/</u>	<u>11/</u>	<u>11/</u>	<u>11/</u>										IA, OA		20						
		137														IB, OB								
		138								<u>11/</u>	<u>11/</u>					IC, OC								
		139										<u>11/</u>	<u>11/</u>			ID, OD								

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 51 – Continued.

Symbol	MIL-STD-883 method	Cases A, C,D,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 9 T _C = 25°C		Subgroup 10 T _C = 125°C		Subgroup 11 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
t _{PLH}	3003 Fig. 3 " "	140 141 142 143	IN	OUT	OUT	IN	GND 5.0V GND "	GND 5.0V GND "	GND " "	IN	OUT	OUT	IN	GND 5.0V	5.0V GND "	5.0V "	IA to OA IB to OB IC to OC ID to OD	4 " " "	125 " " "	7 " " "	130 " " "	4 " " "	114 " " "	ns " " "
t _{PHL}	" " " "	144 145 146 147	IN	OUT	OUT	IN	GND 5.0V GND "	GND 5.0V GND "	GND " "	IN	OUT	OUT	IN	GND 5.0V	5.0V GND "	5.0V "	IA to OA IB to OB IC to OC ID to OD	" " " "	130 " " "	" " " "	156 " " "	" " " "	130 " " "	" " " "
t _{PHZ}	Fig. 4 " " "	148 149 150 151	5.0V	OUT	OUT	5.0V	IN GND "	IN GND "	IN GND "	5.0V	OUT	OUT	5.0V	GND IN GND "	IN GND "	IN GND "	CA to OA CB to OB CC to OC CD to OD	" " " "	70 " " "	" " " "	90 " " "	" " " "	50 " " "	" " " "
t _{PZH}	" " " "	152 153 154 155	5.0V	OUT	OUT	5.0V	IN GND "	IN GND "	IN GND "	5.0V	OUT	OUT	5.0V	GND IN GND "	IN GND "	IN GND "	CA to OA CB to OB CC to OC CD to OD	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
t _{PLZ}	" " " "	156 157 158 159	GND	OUT	OUT	GND	IN GND "	IN GND "	IN GND "	GND	OUT	OUT	GND	GND IN GND "	IN GND "	IN GND "	CA to OA CB to OB CC to OC CD to OD	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "
t _{PZL}	" " " "	160 161 162 163	GND	OUT	OUT	GND	IN GND "	IN GND "	IN GND "	GND	OUT	OUT	GND	GND IN GND "	IN GND "	IN GND "	CA to OA CB to OB CC to OC CD to OD	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "	" " " "

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52.

Symbol	MIL-STD-883 method	Cases A, C,D,T,X,Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
V _{IC} (POS)		2 3 4					1 mA	1 mA						1 mA		GND	CB CC CD CA	1.5						V
V _{IC} (NEG)	1	6 7 8					-1 mA	-1 mA	GND					-1 mA			CB CC CD CA	-6						
I _{SS} 2/ 3/	3005	9 10 11	18 V GND	GND 18 V	GND 18 V	18 V GND	GND	GND		18 V GND	GND 18 V	GND 18 V	18 V GND	GND	18 V	V _{SS}								nA
V _{OH3}	3006	12 13 14 15				15 V GND	15 V GND	GND 15 V GND		15 V GND				15 V GND	15 V GND	15 V	OB OC OD OA	14.95						
V _{OL3}	3007	16 17 18 19	GND 15 V GND			15 V GND	15 V GND	15 V GND		15 V GND				15 V GND	15 V	15 V	OB OC OD OA	.05						
V _{IH1}		20 21 22 23				5.0 V GND	3.5 V GND	GND 3.5 V GND		5.0 V GND			GND 5.0 V GND	GND 3.5 V GND	GND 3.5 V	5.0 V	OB OC OD OA	4.5						
V _{IH2}		25 26 27	GND			10 V GND	7.0 V GND	7.0 V GND		10 V GND			10 V GND	GND 7.0 V GND	GND 7.0 V	10.0V	OB OC OD OA	9.0						
V _{IH3}	24	29 30 31	GND			15 V GND	11.0 V GND	11.0 V GND		15 V GND			15 V GND	GND 11.0V GND	GND 11.0V	15 V	OB OC OD OA	13.5						
V _{IL1}	28	33 34 35	GND			5.0V GND	1.5V GND	GND 1.5V GND		5.0V GND			5.0V GND	GND 1.5V GND	GND 1.5V	5.0V	OB OC OD OA	0.5						
V _{IL2}	32	37 38 39	GND			10V GND	3.0V GND	GND 3.0V GND		10V GND			10V GND	GND 3.0V GND	GND 3.0V	10V	OB OC OD OA	1.0						
V _{IL3}	36	41 42 43	GND			15V GND	4.0V GND	4.0V GND		15V GND			15V GND	GND 4.0V GND	GND 4.0V	15V	OB OC OD OA	1.5						
I _{OL1}	40	44 45 46 47	GND 5.0V GND	0.4V	0.4V	5.0V GND	5.0V GND	5.0V GND		5.0V GND	0.4V	0.4V	5.0V GND	5.0V GND	5.0V	5.0V	OB OC OD OA	0.51	0.36		0.64			mA

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 method	Cases A, C, D, T, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
I _{OL2}		48 49 50 51	GND 15V GND	 1.5V	1.5V 	GND 15V GND	15V GND	GND 15V GND	GND 	15V GND	1.5V 	 1.5V	GND 15V GND	GND 15V GND	GND 15V GND	15V GND	OB OC OD OA	3.4 	 2.4	 	 4.2	 	 mA	
I _{OH1}		52 53 54 55	 5.0V	 4.6V	4.6V 	5.0V GND	5.0V GND	 5.0V GND	 	 5.0V GND	4.6V 	 4.6V	GND 5.0V GND	 5.0V GND	GND 5.0V GND	5.0V 	OB OC OD OA	-0.51 	 -0.36	 	 -0.64	 	 	
I _{OH2}		56 57 58 59	GND 15V	 13.5V	13.5V 	15V GND	15V GND	 15V GND	 	 15V GND	13.5V 	 13.5V	 15V GND	 15V GND	GND 15V GND	15V 	OB OC OD OA	-3.4 	 -2.4	 	 -4.2	 	 	
I _{IH1} 4/	3010	60	18 V			18 V	18 V	18 V		18 V			18 V	18 V	18 V	18 V	All inputs together							nA
I _{IH2}		61 62 63 64 65 66 67 68	GND 18 V GND			GND 18 V GND	18 V GND	GND 18 V GND		GND			GND 18 V GND	GND 18 V GND	GND 18 V GND		CB CC CD CA IA IB IC ID	+800 100			100			
I _{IL1} 4/	3009	69											GND				All inputs together							
I _{IL2}		70 71 72 73 74 75 76 77	GND 			GND 	GND 	GND 	GND 	GND 			GND 	GND 	GND 	18 V 	CB CC CD CA IA IB IC ID	-800 -100			-100			
R _{ON1}		78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93	0.5 V 1.0 V 4.0 V 5.0 V	5/ 5/ 5/ 5/	5/ 5/ 5/ 5/	0.5 V 1.0 V 4.0 V 5.0 V	5.0 V 5.0 V 5.0 V 5.0 V	5.0 V 5.0 V 5.0 V 5.0 V	 	0.5 V 1.0 V 4.0 V 5.0 V	5/ 5/ 5/ 5/	5/ 5/ 5/ 5/	0.5 V 1.0 V 4.0 V 5.0 V	5.0 V 5.0 V 5.0 V 5.0 V	5.0 V 5.0 V 5.0 V 5.0 V	OA OB OC OD OA OB OC OD OA OB OC OD	 400	 450 550 400	 450 600 450	 500 600 450	 400 550 400	 450 550 400	Ω 	

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 method	Cases A, C, D, T, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 1 T _C = 25°C		Subgroup 2 T _C = 125°C		Subgroup 3 T _C = -55°C				
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min		Max	
R _{OH2}		94	-5.0V	<u>6/</u>		<u>6/</u>	-5.0V	7.5V		-7.5V						7.5V	7.5V	OA	200	"	250	"	200	"	Ω	
		95																OB								
		96																OC								
		97																OD								
		98	0.6V	<u>6/</u>		<u>6/</u>	0.6V	7.5V				6/	-5.0V	7.5V		7.5V		OA								
		99																OB								
		100																OC								
		101																OD								
		102	5.0V	<u>6/</u>		<u>6/</u>	5.0V	7.5V				<u>6/</u>	0.6V	7.5V		7.5V		OA								
		103				<u>6/</u>												OB								
		104							7.5V		5.0V	<u>6/</u>						OC								
		105										<u>6/</u>	5.0V	7.5V				OD								
R _{OH3}		106	2.5V	<u>7/</u>		<u>7/</u>	2.5V	10V		GND						10V	10V	OA	300	"	350	"	300	"	"	
		107																OB								
		108																OC								
		109																OD								
		110	5.0V	<u>7/</u>									7/	2.5V	10V		10V									OA
		111				<u>7/</u>	5.0V	10V										OB								
		112																OC								
		113																OD								
		114	7.5V	<u>7/</u>									<u>7/</u>	5.0V	10V		10V									OA
		115				<u>7/</u>	7.5V	10V																		OB
		116																								OC
		117											<u>7/</u>	7.5V	10V											OD
I _{DOFF1}	Fig. 8	118	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	GND	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	<u>8/</u>	5.0V	<u>8/</u>			-45		-45		-45	nA		
I _{DOFF2}	"	119	"	"	"	"	"	"	-5.0V	"	"	"	"	"	GND	"					45		45	"		
I _{DOFF3}	"	120	"	"	"	"	"	"	GND	"	"	"	"	"	"	10V	"			-45		-45		-45	"	
I _{DOFF4}	"	121	"	"	"	"	"	"	-10.0V	"	"	"	"	"	"	GND	"			45		45		45	"	
I _{DOFF5}	"	122	"	"	"	"	"	"	GND	"	"	"	"	"	"	15V	"	45		-45		-45		-45	"	
I _{DOFF6}	"	123	"	"	"	"	"	"	-15.0V	"	"	"	"	"	"	GND	"			45		45		45	"	
																		Subgroup 4 T _C = 25°C								
																		Min	Max							
C _C	3012	124					<u>9/</u>	<u>9/</u>	GND							GND	CB	12	"					pF		
	"	125															CC									
	"	126															CD									
	"	127											<u>9/</u>	<u>9/</u>		CA										
C _{IS}	"	128	<u>9/</u>				<u>9/</u>	GND	GND							GND	GND	5.0V	IA	20	"				"	
	"	129																IB								
	"	130									<u>9/</u>							IC								
	"	131											<u>9/</u>					ID								
C _{OS}	"	132																OA	"	"				"		
	"	133		<u>—/</u>														OB								
	"	134	10		<u>10/</u>													OC								
	"	135									<u>10/</u>							OD								
C _{IOS}	"	136	<u>11/</u>	<u>11/</u>														IA, OA	"	"				"		
	"	137			<u>11/</u>	<u>11/</u>												IB, OB								
	"	138									<u>11/</u>	<u>11/</u>						IC, OC								
	"	139											<u>11/</u>	<u>11/</u>				ID, OD								

See footnotes at end of device type 52.

TABLE III. Group A inspection for device type 52 – Continued.

Symbol	MIL-STD-883 method	Cases A, C, D, T, X, Y	Terminal conditions 1/														Measured terminal	Test limits						Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Subgroup 9 T _C = 25°C		Subgroup 10 T _C = 125°C		Subgroup 11 T _C = -55°C		
			Test no.	IA	OA	OB	IB	CB	CC	V _{SS}	IC	OC	OD	ID	CD	CA		V _{DD}	Min	Max	Min	Max	Min	
t _{PLH}	3003 Fig. 3	140 141 142 143	IN	OUT	OUT	IN	GND 5.0V GND	GND “ 5.0V GND	GND “ “	IN	OUT	“ OUT	IN	GND “ 5.0V “	5.0V GND “	5.0V “	IA to OA IB to OB IC to OC ID to OD	4 “ “ “	70 “ “ “	7 “ “ “	85 “ “ “	4 “ “ “	70 “ “ “	ns “ “ “
t _{PHL}	“	144 145 146 147	IN	OUT	OUT	IN	GND 5.0V GND	GND “ 5.0V GND	GND “ “	IN	OUT	“ OUT	IN	GND “ 5.0V “	5.0V GND “	“	IA to OA IB to OB IC to OC ID to OD	“ “ “ “	60 “ “ “	“ “ “ “	80 “ “ “	“ “ “ “	50 “ “ “	“ “ “ “
t _{PHZ}	Fig. 4	148 149 150 151	5.0V	OUT	OUT	5.0V	IN GND	“ IN GND	“ “ “	5.0V	OUT	“ OUT	5.0V	GND IN	IN GND	“	CA to OA CB to OB CC to OC CD to OD	“ “ “ “	70 “ “ “	“ “ “ “	90 “ “ “	“ “ “ “	55 “ “ “	“ “ “ “
t _{PZH}	Fig. 4	152 153 154 155	5.0V	OUT	OUT	5.0V	IN GND	“ IN GND	“ “ “	5.0V	OUT	“ OUT	5.0V	GND IN	IN GND	“	CA to OA CB to OB CC to OC CD to OD	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “
t _{PLZ}	Fig. 4	156 157 158 159	GND	OUT	OUT	GND	IN GND	“ IN GND	“ “ “	GND	OUT	“ OUT	GND	GND IN	IN GND	“	CA to OA CB to OB CC to OC CD to OD	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “
t _{PZL}	Fig. 4	160 161 162 163	GND	OUT	OUT	GND	IN GND	“ IN GND	“ “ “	GND	OUT	“ OUT	GND	GND IN	IN GND	“	CA to OA CB to OB CC to OC CD to OD	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “	“ “ “ “

1/ Pins not designated may be “High” level logic, “Low” level logic, or open. Exceptions are as follows: V_{IC(pos)} tests, the V_{SS} terminal shall be open; V_{IC(neg)} tests, the V_{DD} terminal shall be open.

2/ I_{SS} measurements shall be run in sequence.

3/ When performing quiescent current measurements (I_{SS}), the meter shall be placed so that all currents flow through the meter. The outputs during the I_{SS} measurement shall be open.

4/ The device manufacturer may, at his option, measure I_{IL} and I_{IH} at 25°C for each individual input or measure all inputs together.

5/ See figure 5.

6/ See figure 6.

7/ See figure 7.

8/ See figure 8.

9/ C_c and C_{is} – connect capacitance bridge between measured input terminal and V_{SS}, frequency = 1 MHz.

10/ C_{os} – connect capacitance bridge between measured output terminal and V_{SS}, frequency = 1 MHz.

11/ C_{ios} – connect capacitance bridge between measured input and output terminals, frequency = 1 MHz.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

4.4.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.7 herein). RHA levels for device classes B and S shall be as specified in MIL-PRF-38535 and 4.5.4 herein.

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

4.5.1 Voltage and current. Unless otherwise specified, all voltages given are referenced to the microcircuit V_{SS} terminal. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cool down procedures. When the burn-in and life tests are completed and prior to removal of bias voltages, the devices under test (DUT) shall be cooled to a temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$; then, electrical parameter end-point measurements shall be performed.

TABLE IV. Delta limits at 25°C .

Parameter ^{1/}	Device types	
	01, 02	51, 52
I_{SS}	$\pm 25 \text{ nA}$	$\pm 25 \text{ nA}$
V_{OL1}	$\pm 0.04 \text{ V}$	
V_{OH1}	$\pm 0.08 \text{ V}$	
I_{OL1}		$\pm 15\%$
I_{OH1}		$\pm 15\%$

^{1/} Each of the above parameters shall be recorded before and after the required burn-in and life tests to determine delta (Δ).

4.5.3 Quiescent supply current (I_{SS} test). When performing quiescent supply current measurements (I_{SS}), the meter shall be placed so that all currents flow through the meter.

4.5.4 Radiation hardness assurance (RHA) testing. The RHA testing shall be performed in accordance with test procedures and sampling specified in MIL-PRF-38535 and herein.

- Before irradiation, selected samples shall be assembled in qualified packages and pass the governing electrical parameters (group A subgroup 1 at 25°C) and also be subjected to the threshold-voltage test in table VII in order to calculate the delta threshold (ΔV_T) after irradiation.
- The devices shall be subjected to a total radiation dose as specified in MIL-PRF-38535 for the radiation hardness assurance level being tested, and meet the end-point electrical parameters as defined in table V at 25°C , after exposure. The start and completion of the end-point electrical parameter measurements shall not exceed 2 hours following irradiation.
- Threshold-voltage test circuit conditions shall be as specified in table VII on figure 9. In situ and remote testing, the tests shall be performed with the devices biased in accordance with table VI and the bias may be interrupted for up to 1 minute to remove devices to the remote bias fixture.
- After irradiation, the devices shall pass the truth table test as specified in subgroup 7 in table III or if subgroup 7 is not required, then an equivalent truth table test shall be performed.

TABLE V. Radiation hardened end-point electrical parameters at 25°C.

Parameter	Test limits (All device types)	V _{DD}	
		Device types	
		01, 02	51, 52
V _{TN}	0.3 V min	V _{DD} = 10 V	V _{DD} = 10 V
V _{TP}	2.8 V max	V _{DD} = 10 V	V _{DD} = 10 V
ΔV _T	1.4 V max	V _{DD} = 10 V	V _{DD} = 10 V
I _{SS}	100 x max limit	V _{DD} = 15 V	V _{DD} = 18 V
t _{PLH}	1.35 x max limit	V _{DD} = 5 V	V _{DD} = 5 V
t _{PHL}	1.35 x max limit	V _{DD} = 5 V	V _{DD} = 5 V

TABLE VI. Bias during exposure to radiation.

Device type	Pin connections 1/		
	V _{DD} = 10 V dc (through a 30 kΩ to 60 kΩ resistor)	V _{SS} = GND	V _{DD} = 10 V dc
01, 51	1, 4, 5, 6, 8, 11, 12, 13	7	14
02, 52	1, 4, 5, 6, 8, 11, 12, 13	7	14

1/ Pins not designated are open, or tied to 10 V dc through a 30 kΩ to 60 kΩ resistor.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements are as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Defense Agency, or within the military service's system commands. 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.

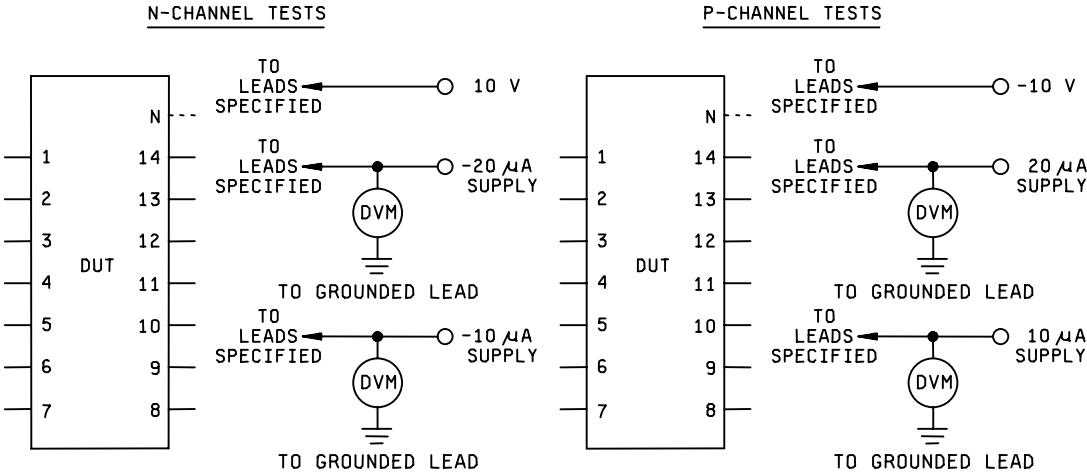


FIGURE 9. Threshold-voltage test circuit.

TABLE VII. Threshold-voltage test circuit conditions.

Device	GND	10 V	V _{TN} measured at		GND	-10 V	V _{TP} measured at	
			-20 μA supply	-10 μA supply			20 μA supply	10 μA supply
01, 51	13	5, 6, 12, 14		7	13	5-7, 12		14
02, 52	13	5, 6, 12, 14		7	13	5-7, 12		14

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 quality 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 and radiation hardness 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 contractors 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, P.O. Box 3990, Columbus, Ohio 43218-3990.

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:

C_I and C_C	Input terminal-to- V_{SS} capacitance.
C_{ios}	Switch input to output capacitance.
C_{os}	Output terminal-to- V_{SS} capacitance.
GND	Ground zero voltage potential.
I_{SS}	Quiescent supply current.
R_{on}	Switch on resistance in voltage using 1 mA current.
T_A	Free air temperature.
V_{DD}	Positive supply voltage.
V_{is}	Input signal.
V_{os}	output signal.
V_{SS}	Negative supply voltage.

MIL-M-38510/58D

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 S for National Aeronautics and Space Administration or class B for Department of Defense (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Data reporting. When specified in the purchase order or contract, a copy of the following data, as applicable, will be supplied.

- a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and steady-state life tests (see 3.6).
- b. A copy of each radiograph.
- c. The technology conformance inspection (TCI) data (see 4.4).
- d. Parameter distribution data on parameters evaluated during burn-in (see 3.6).
- e. Final electrical parameters data (see 4.2d).
- f. RHA delta limits.

6.8 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, post irradiation performance 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.

Military device type	Generic-industry type
01	4016A
02	4066A
51	4016B
52	4066B

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

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

Preparing activity:
 DLA - CC
 (Project 5962-2079)

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 ASSIST Online database at <http://assist.daps.dla.mil>.