MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, HIGH SPEED, CMOS, NOR GATES, MONOLITHIC SILICON, POSITIVE LOGIC

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

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, high speed, CMOS, logic microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510, and as specified herein.

1.2.1 Device types. The device types shall be as follows:

Device type	Circuit
01	Quad 2-input NOR gate
02	Triple 3-input NOR gate
03	Quad 2-input exclusive NOR gate (open-drain output)
04	Dual 4-input NOR gate
05	Quad 2-input exclusive NOR gate

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outlines. The case outlines shall be designated as follows:

Outline letter	Case outline (see MIL-M-38510, appendix C)
C	D-1 (14-lead, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-lead, 1/4" x 3/8"), flat package
2	C-2 (20-terminal, .350" x .350"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage (V_{CC})	-0.5 V dc +7.0 V dc
DC input voltage (V_{IN})	-0.5 V dc to V_{CC} +0.5 V dc
DC output voltage (V_{OUT})	-0.5 V dc to V_{CC} +0.5 V dc
Clamp diode current (I_{OC}, I_{IC})	±20 mA
DC output current per pin (I_{OUT})	±25 mA
DC V_{CC} or GND current per pin (I_{CC})	±50 mA
Storage temperature range (T_{STG})	-65°C to +150°C
Maximum power dissipation (P_D)	300 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Cases C, D	(See MIL-M-38510, appendix C)
Case 2	60°C/W
Junction temperature (T_J)	+175°C

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Rome Air Development Center (RBE-2), Griffiss AFB, NY 13441, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.4 Recommended operating conditions.

Device types 01, 02, 03, 04, 05:

Input low (V_{IL}) maximum voltage - - - -	0.3 V at V_{CC} = 2 V 0.9 V at V_{CC} = 4.5 V 1.2 V at V_{CC} = 6 V
Input high (V_{IH}) minimum voltage- - - -	1.5 V at V_{CC} = 2 V 3.15 V at V_{CC} = 4.5 V 4.2 V at V_{CC} = 6 V
Supply voltage (V_{CC}) - - - - - - - - - -	2 V dc to 6 V dc
Output voltage - - - - - - - - - - - -	0 V dc to V_{CC}
Operating temperature (T_A) - - - - - - -	-55°C to +125°C

Input rise and fall times (t_r, t_f) maximum:

V_{CC} = 2 V	1,000 ns
V_{CC} = 4.5 V	500 ns
V_{CC} = 6 V	400 ns

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standard. The following specification and standard form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Logic diagrams and terminal connections. The logic diagrams and terminal connections shall be as specified on figure 1.

3.2.2 Truth tables and logic equations. The truth tables and logic equations shall be as specified on figure 2.

3.2.3 Schematic circuits. The schematic circuits shall be submitted to the preparing activity prior to inclusion of a manufacturer's device in this specification and shall be submitted to the qualifying activity as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained and available upon request.

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

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 and 6.4 herein.

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

3.5 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.

3.6 Marking. Marking shall be in accordance with MIL-M-38510. At the option of the manufacturer, marking of the country of origin may be omitted from the body of the microcircuit, but shall be retained on the initial container.

3.6.1 Total dose radiation hardness identifier. Total dose radiation hardness identifier shall be in accordance with MIL-M-38510.

3.6.2 Serialization. All class S devices shall be serialized in accordance with MIL-M-38510.

3.6.3 Correctness of indexing and marking. All devices shall be subjected to the final electrical tests specified in table II after part number marking to verify that they are correctly indexed and identified by part number. Optionally, an approved electrical test may be devised especially for this requirement.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 36 (see MIL-M-38510, appendix E).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007, as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. Delete the sequence specified as pre burn-in electrical parameters through interim (post burn-in) electrical parameters and substitute lines 1 through 7 of table II herein.

b. Burn-in (method 1015 of MIL-STD-883).

(1) Static tests (test condition A) using circuit shown on figure 3, or equivalent. 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.
(2) Dynamic test (test condition D) using circuit shown on figure 3, or equivalent. Ambient temperature shall be +125°C minimum. Test duration shall be in accordance with table I of method 1015.

c. Interim and final electrical parameters shall be as specified in table II herein.

d. 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \leq T_C \leq +125°C$ unless otherwise specified	Device type	V_{CC}	Limits		Unit
					Min	Max	
High-level output voltage	V_{OH1} 2/	V_{IH} = 1.5 V V_{IL} = 0.3 V I_{OH} = -20 µA	01, 02, 04, 05	2.0 V	1.95		V
	V_{OH2} 2/	V_{IH} = 3.15 V V_{IL} = 0.9 V I_{OH} = -20 µA	"	4.5 V	4.45		V
	V_{OH3}	V_{IH} = 4.2 V V_{IL} = 1.2 V I_{OH} = -20 µA	"	6.0 V	5.95		V
	V_{OH4} 2/	V_{IH} = 3.15 V V_{IL} = 0.9 V I_{OH} = -4.0 mA	"	4.5 V	3.7		V
	V_{OH5}	V_{IH} = 4.2 V V_{IL} = 1.2 V I_{OH} = -5.2 mA	"	6.0 V	5.2		V
Low-level output voltage	V_{OL1} 2/	V_{IL} = 0.3 V V_{IH} = 1.5 V I_{OL} = 20 µA	All	2.0 V		0.05	V
	V_{OL2} 2/	V_{IL} = 0.9 V V_{IH} = 3.15 V I_{OL} = 20 µA	All	4.5 V		0.05	V
	V_{OL3}	V_{IL} = 1.2 V V_{IH} = 4.2 V I_{OL} = 20 µA	All	6.0 V		0.05	V
	V_{OL4} 2/	V_{IH} = 3.15 V I_{OL} = 4.0 mA	All	4.5 V		0.4	V
	V_{OL5}	V_{IH} = 4.2 V I_{OL} = 5.2 mA	All	6.0 V		0.4	V
Positive input clamp voltage	$V_{IC(pos)}$	V_{CC} = GND I_{IN} = 1 mA T_C = +25°C	All			1.5	V
Negative input clamp voltage	$V_{IC(neg)}$	V_{CC} = Open I_{IN} = -1 mA T_C = +25°C	All			-1.5	V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C < T_C < +125°C$ unless otherwise specified	Device type	V_{CC}	Limits Min	Limits Max	Unit
High-level output current	I_{OH}	V_{IN} = 1.2 V or 4.2 V $V_{OUT} = V_{CC}$	03	6.0 V		10	µA
Input current low	I_{IL}	V_{IN} = GND	All	6.0 V		-0.1	µA
Input current high	I_{IH}	$V_{IN} = V_{CC}$	All	6.0 V		0.1	µA
Short-circuit output current	I_{OS1} 2/	T_C = -55°C to +125°C V_O = GND V_I = GND	01, 02, 04, 05	2.0 V	-2	-50	mA
	I_{OS2} 2/			4.5 V	-15	-150	
	I_{OS3} 2/			6.0 V	-25	-180	
	I_{OS4}			4.0 V	-10	-120	
Supply current quiescent	I_{CC}	V_I = 6.0 V or GND	All	6.0 V		10	µA
Input capacitance	C_{IN}	T_A = +25°C	All			10	pF
Power dissipation capacitance	C_{PD}	T_C = +25°C 2/ 3/	01			26	pF
			02			36	
			03			35	
			04			25	
			05			33	
Propagation delay times 4/ 5/	t_{PHL} t_{PLH}	C_L = 50 pF ±10% R_1 = 1 kΩ ±5% for device type 03 only	01	4.5 V	3	21	ns
			02	4.5 V	3	22	ns
			04	4.5 V	3	28	ns
Propagation delay time, high-to-low level (other input low) 4/ 5/	t_{PHL1}		05	4.5 V	3	29	ns
	t_{PHL1}		03				
Propagation delay time, high-to-low level (other input high) 4/ 5/	t_{PHL2}		05	4.5 V	3	29	ns
	t_{PHL2}		03				

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Device type	V_{CC}	Limits Min	Limits Max	Unit
Propagation delay time, low-to-high level (other input low) 4/ 5/	t_{PLH1}	C_L = 50 pF ±10% R_1 = 1 kΩ ±5% for device type 03 only	05	4.5 V	3	29	ns
	t_{PLH3}		03	4.5 V	3	20	ns
Propagation delay time, low-to-high level (other input high) 4/ 5/	t_{PLH2}		05	4.5 V	3	29	ns
	t_{PLH4}		03	4.5 V	3	20	ns
Transition delay times 4/ 5/	t_{THL} t_{TLH}	C_L = 50 pF +10%	01	4.5 V	3	20	ns
			02	4.5 V	3	20	ns
	t_{THL} only		03	4.5 V	3	20	ns
			04	4.5 V	3	20	ns
			05	4.5 V	3	20	ns

1/ Complete terminal conditions shall be as specified in table III.

2/ Guaranteed but not tested.

3/ Power dissipation capacitance (C_{PD}) per gate.

4/ Tested at V_{CC} = 4.5 V at +125°C for sample testing and V_{CC} = 4.5 V at +25°C for screening. Guaranteed at other V_{CC} voltages and temperatures, see table IA and exception in 4.4.1d.

5/ For propagation and transition delay times at V_{CC} = 2.0 V, increase limit by a factor of 5. For propagation and transition delay times at V_{CC} = 6.0 V, decrease limit by a factor of .85.

TABLE IA. Calculated dynamic figures at -55°C or +25°C case temperature. 1/ 2/

V_{CC}	T_C	
	+125°C	-55°C or +25°C
2.0 V	5	5 x 0.75
4.5 V	1	0.75
6.0 V	0.85	0.85 x 0.75

1/ Normalized numbers (+125°C equals 1)
2/ The 2.0 V and 6.0 V numbers are derived from their 4.5 V integer value. Rounding off according 5/4.

TABLE II. Burn-in and electrical test requirements.

Line no.	Applicable tests and MIL-STD-883 test method	Class S device 1/				Class B device 1/			
		Ref. par.	Table III subgroups 2/	Table IV delta limits 3/	Test circuit figure	Ref. par.	Table III subgroups 2/	Table IV delta limits 3/	Test circuit figure
1	Interim electrical parameters (method 5004)		1				1		
2	Static burn-in I (method 1015)	4.2b 4.5.2	Required		3		Not required		
3	Same as line 1		1	Δ					
4	Static burn-in II (method 1015)	4.2b 4.5.2	Required		3	4.2b 4.5.2	4/ Required		3
5	Same as line 1	4.2d	1*	Δ		4.2d	1*	Δ	
6	Dynamic burn-in (method 1015)	4.2b 4.5.2	Required		3		Not required		
7	Same line 1	4.2d	1	Δ					
8	Final electrical parameters (method 5004)		1*,2,3,9				1*,2,9 4/		
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 end-point electrical parameters (method 5005)	4.4.2	+1,2,3,9, 10,11 5/	Δ	3		+1 5/		
11	Group C end-point electrical parameters (method 5005)					4.4.3	1,2	Δ	3
12	Group D end-point electrical parameters (method 5005)	4.4.4	1,2,3			4.4.4	1,2		

1/ Blank spaces indicate tests are not applicable.

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

3/ Δ indicates delta limit 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 (line 1).

4/ The device manufacturer may at his option either complete subgroup 1 electrical parameter measurements, including delta measurements, within 96 hours after burn-in completion (removal of bias); or may complete subgroup 1 electrical measurements without delta measurements within 24 hours after burn-in completion (removal of bias).

5/ + indicates also applies to electrostatic discharge sensitivity tests.

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 failures shall be cumulative for determining the PDA.

c. The PDA for class B devices shall be in accordance with MIL-M-38510 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-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.5).

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510 and as specified herein. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 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 I of method 5005 of MIL-STD-883 and as follows:

a. Tests shall be performed in accordance with table II herein.

b. Subgroups 5, 6, 7, and 8 of table I of method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_i measurement) shall be measured only for initial qualification and after process or design changes which 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.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883 and as follows:

a. Class S steady-state life (accelerated) test circuits shall be submitted to the qualifying activity for approval. When the alternate steady-state life test is used, the circuit on figure 3, or equivalent, shall be used.

b. Electrostatic discharge sensitivity (ESDS) testing shall be performed in accordance with MIL-STD-883, method 3015. The option to categorize devices as ESD sensitive without performing the test is not allowed. Device types categorized as ESD sensitive shall be further tested using method 3015 modified as follows:

(1) Test method 3015, table I pin combinations Δ(V+(A) to common (B)) and 5(V+(B) to common (A)) shall be deleted.

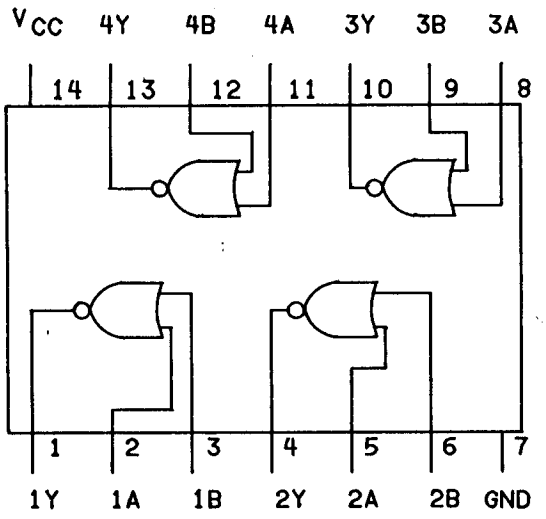
(2) The test sequence specified in 3.b of method 3015 shall be repeated an additional four times instead of two.

(3) The category A limits specified on figure 3015-3, ESD sensitivity category, shall be 1,000 V to 2,000 V. Only those device types that pass this testing at 1,000 V or greater shall be considered as conforming to the requirements of this specification.

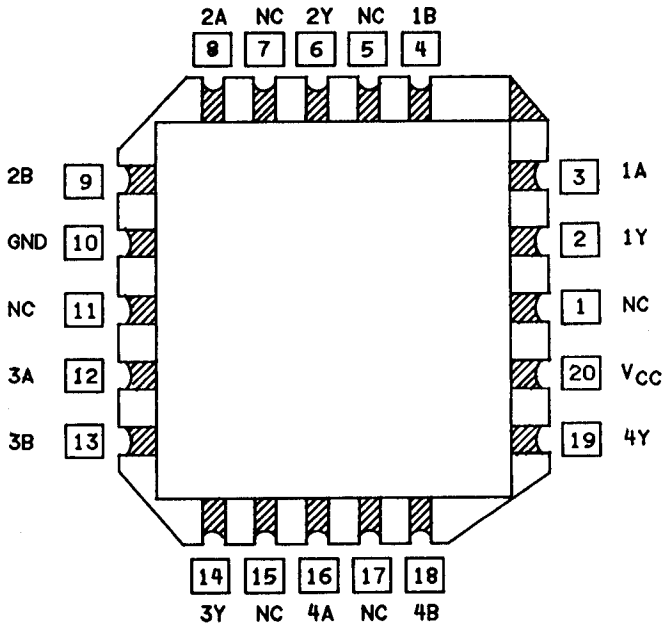
Text continues on page 28.

Device type 01

Cases C and D

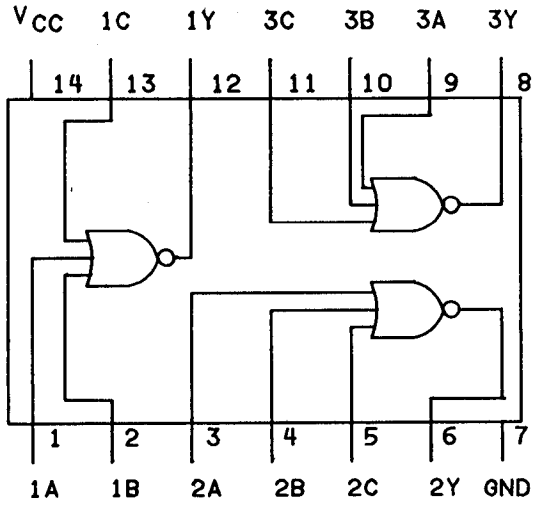


Device type 01
Case 2



Device type 02

Cases C and D



Device type 02
Case 2

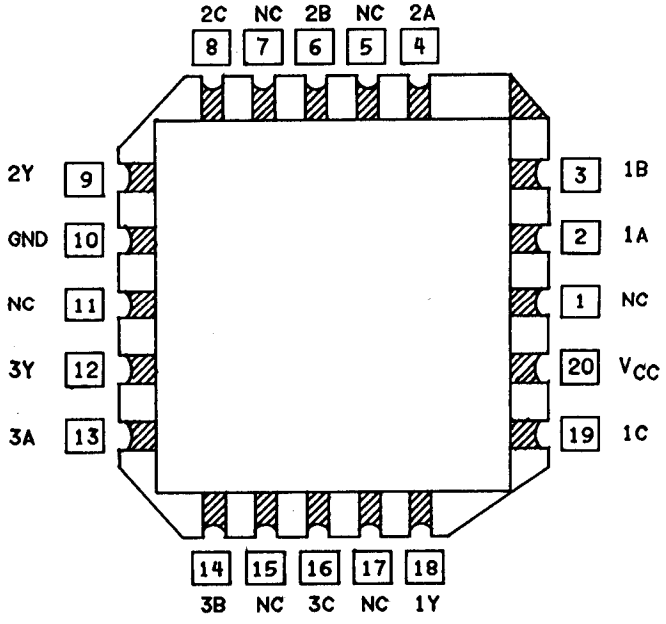
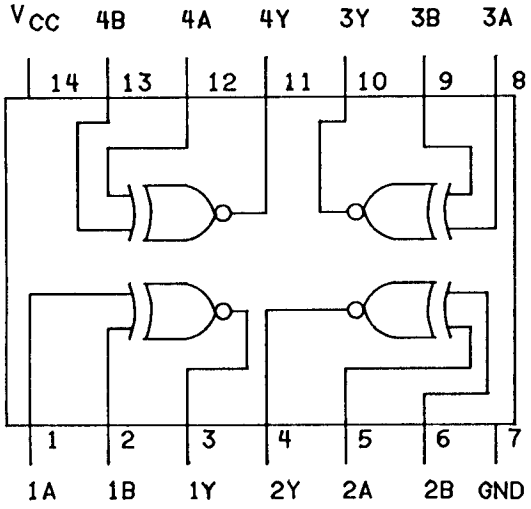


FIGURE 1. Logic diagram and terminal connections (top views).

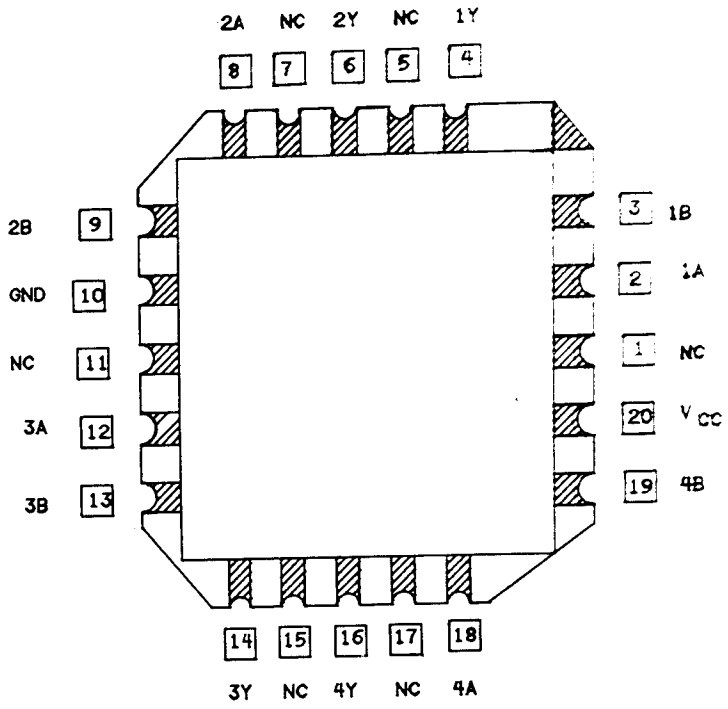
Device types 03 and 05

Cases C and D



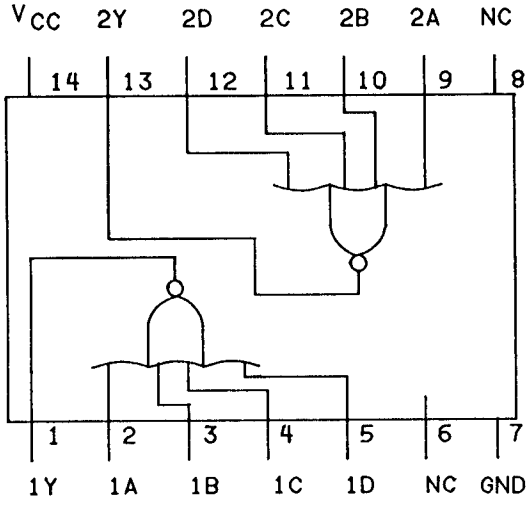
Device types 03, 05

Case 2



Device type 04

Cases C and D



Device type 04

Case 2

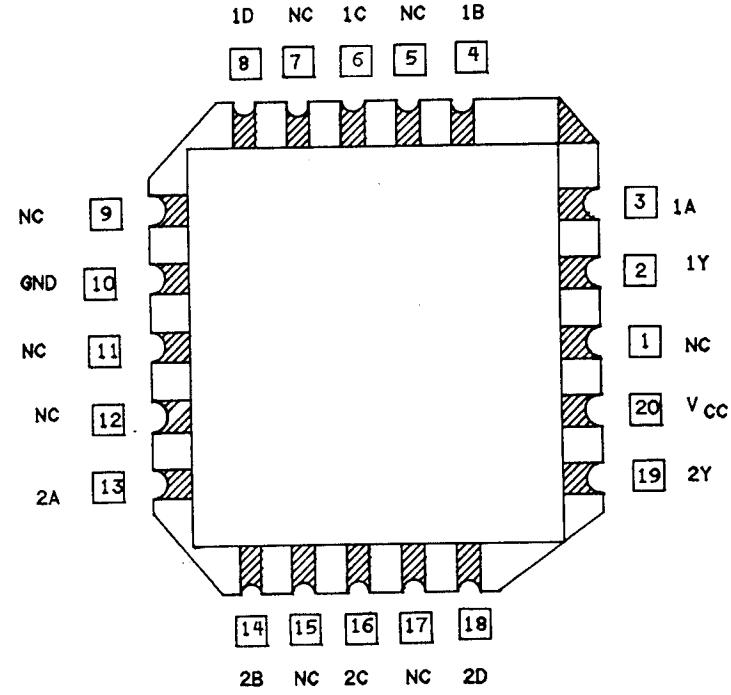


FIGURE 1. Logic diagram and terminal connections (top views) - Continued.

Device type 01

Truth table each gate		
Input		Output
A	B	Y
H	X	L
X	H	L
L	L	H

X = Irrelevant

Positive logic: $Y = \overline{A + B}$

Device type 02

Truth table each gate			
Input			Output
A	B	C	Y
H	X	X	L
X	H	X	L
X	X	H	L
L	L	L	H

X = Irrelevant

Positive logic: $Y = \overline{A + B + C}$

Device type 04

Truth table each gate				
Input				Output
A	B	C	D	Y
L	L	L	L	H
H	L	L	L	L
L	H	L	L	L
H	H	L	L	L
L	L	H	L	L
H	L	H	L	L
L	H	H	L	L
H	H	H	L	L
L	L	L	H	L
H	L	L	H	L
L	H	L	H	L
H	H	L	H	L
L	L	H	H	L
H	L	H	H	L
L	H	H	H	L
H	H	H	H	L

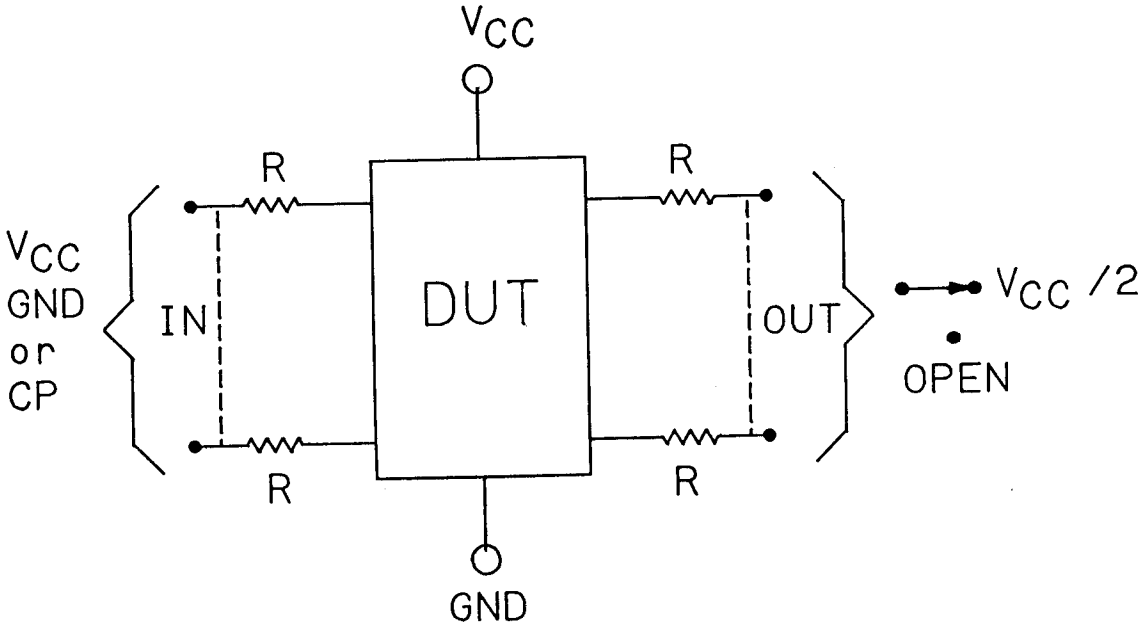
Positive logic: $Y = \overline{A + B + C + D}$

Device type 03, 05

Truth table each gate		
Input		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	H

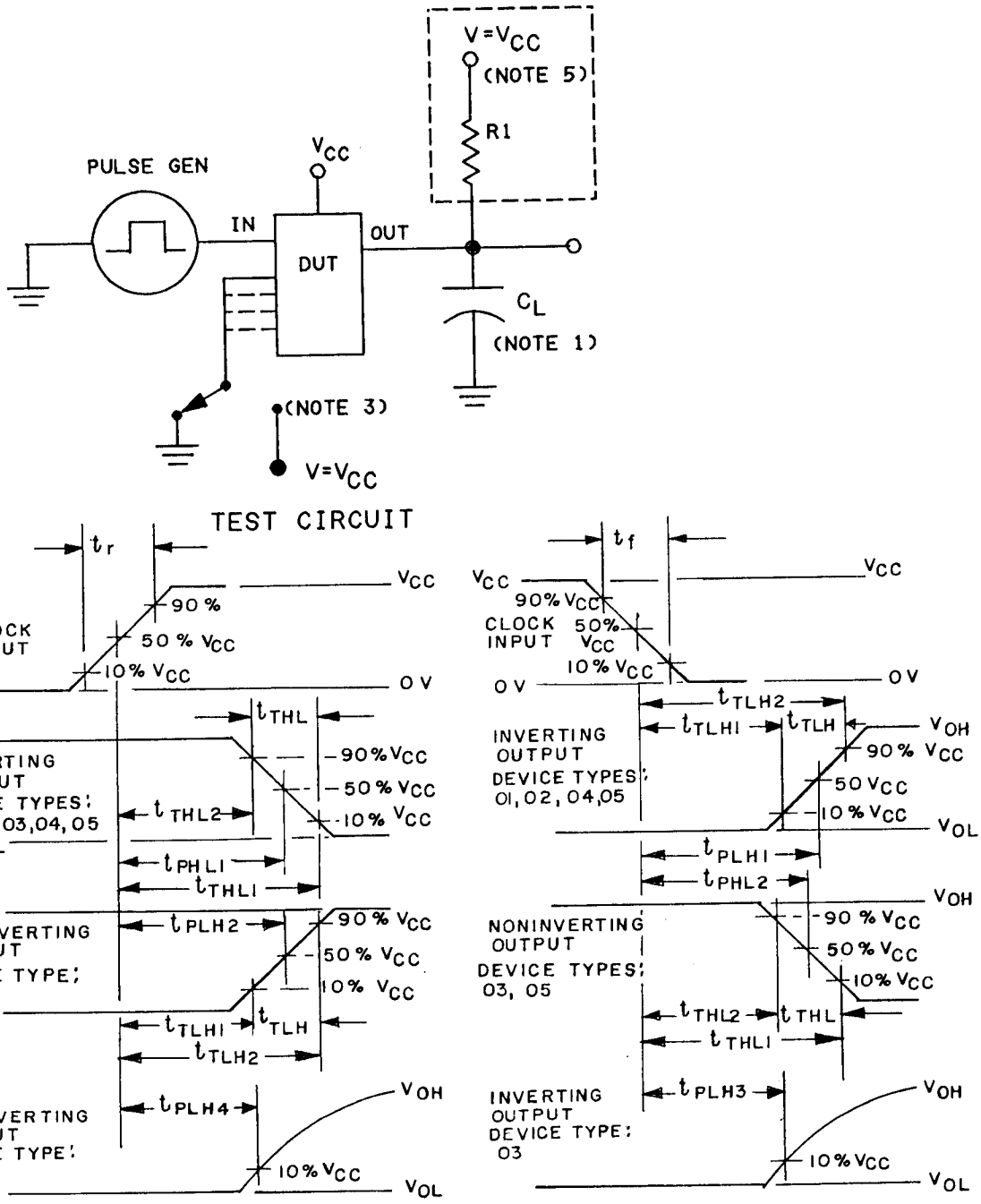
Positive logic: $Y = \overline{A \oplus B} = AB + \overline{A}\,\overline{B}$

FIGURE 2. Truth tables and logic equations.



NOTES:
1. For static burn-in I, all inputs shall be connected to GND. Outputs shall be open or connected to $V_{CC}/2$. Resistors are optional on outputs if open. Resistors are required on inputs and required on outputs connected to $V_{CC}/2$. R = 470Ω to 47 kΩ.
2. For static burn-in II, all inputs shall be connected through resistors to V_{CC}. Outputs shall be open or connected to $V_{CC}/2$. Resistors are optional on outputs if open. Resistors are required on inputs and required on outputs connected to $V_{CC}/2$. R = 470 to 47 kΩ.
3. For dynamic burn-in, all inputs shall be connected through the resistors in parallel to a CP. Outputs shall be connected to $V_{CC}/2$ ±.5 V through the resistors. R = 1 kΩ ±5% for outputs, 470Ω to 47 kΩ for inputs. For device type 03 and 05 only, one input for each gate shall be connected to V_{CC} or GND.
4. CP = 25 kHz to 1 MHz square wave; duty cycle = 50 ±15%; V_{IH} = 4.5 V to V_{CC}; V_{IL} = 0 ±.5 V, transition time ≤ 0.5 µs.
5. V_{CC} = 6.0 V ±0.5 V.

FIGURE 3. Burn-in and life test circuits.



NOTES:
1. C_L = 50 pF ±10% includes probe and jig capacitance.
2. Input pulse shall have the following characteristics: $t_r = t_f \leq 6$ ns.
3. All unused inputs are tied to V = V_{CC} or GND for device types 03 and 05, and to GND for device types 01, 02 and 04 as defined in table III.
4. $t_{THL1} - t_{THL2} = t_{THL}$; $t_{TLH2} - t_{TLH1} = t_{TLH}$.
5. R1 = 1kΩ ±5% tied to a voltage equal to V_{CC} for loading device type 03 only.

FIGURE 4. Switching time test circuit and waveforms.

TABLE III. Group A inspection for device type 01.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits						Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T_C = +25°C		Subgroup 2 T_C = +125°C		Subgroup 3 T_C = -55°C		
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1Y	1A	1B	2Y	2A	2B	GND	3A	3B	3Y	4A	4B	4Y	V_{CC}		Min	Max	Min	Max	Min	Max	
V_{IC} (pos) 1/		1		1 mA					1/							GND	1A	1/	1.5					V
		2			1 mA				"							"	1B	"	"					"
		3					1 mA		"							"	2A	"	"					"
		4						1 mA	"							"	2B	"	"					"
		5							"	1 mA						"	3A	"	"					"
		6							"		1 mA					"	3B	"	"					"
		7							"				1 mA			"	4A	"	"					"
		8							"					1 mA		"	4B	"	"					"
V_{IC} (neg) 1/		9		-1 mA					GND							1/	1A		-1.5					"
		10			-1 mA				"							"	1B		"					"
		11					-1 mA		"							"	2A		"					"
		12						-1 mA	"							"	2B		"					"
		13							"	-1 mA						"	3A		"					"
		14							"		-1 mA					"	3B		"					"
		15							"				-1 mA			"	4A		"					"
		16							"					-1 mA		"	4B		"					"
I_{CC}	3005	17		6 V GND	6 V GND		6 V GND	6 V GND	"	6 V GND	6 V GND		6 V GND	6 V GND		6 V "	V_{CC}		0.1		10			µA
		18							"							"	V_{CC}		0.1		10			µA
V_{OH3}	3006	19	-20 µA	1.2 V	1.2 V				"							"	1Y	5.95		5.95		5.95		V
		20				-20 µA	1.2 V	1.2 V	"							"	2Y	"		"		"		"
		21							"	1.2 V	1.2 V	-20 µA				"	3Y	"		"		"		"
		22							"				1.2 V	1.2 V	-20 µA	"	4Y	"		"		"		"
V_{OH5}	3006	23 to 26	Same tests, terminal conditions, and limits as for V_{OH3}, except as noted on the following line.															5.48		5.2		5.48		V
			-5.2 mA			-5.2 mA						-5.2 mA			-5.2 mA									
V_{OL3}	3007	27	20 µA	4.2 V	1.2 V				GND							6 V	1Y		.05		.05		.05	"
		28	20 µA	1.2 V	4.2 V				"							"	1Y		"		"		"	"
		29				20 µA	4.2 V	1.2 V	"							"	2Y		"		"		"	"
		30				20 µA	1.2 V	4.2 V	"							"	2Y		"		"		"	"
		31							"	4.2 V	1.2 V	20 µA				"	3Y		"		"		"	"
		32							"	1.2 V	4.2 V	20 µA				"	3Y		"		"		"	"
		33							"				4.2 V	1.2 V	20 µA	"	4Y		"		"		"	"
		34							"				1.2 V	4.2 V	20 µA	"	4Y		"		"		"	"
V_{OL5}	3007	35 to 42	Same tests, terminal conditions, and limits as for V_{OL3}, except as noted on the following line.																						
			5.2 mA			5.2 mA						5.2 mA			5.2 mA				.26		.4		.26	V
I_{OS4}	3011	43	GND	GND	GND				GND							4 V	1Y	-10	-120	-10	-120	-10	-120	mA
		44				GND	GND	GND	"	GND	GND	GND				"	2Y	"	"	"	"	"	"	"
		45							"				GND	GND	GND	"	3Y	"	"	"	"	"	"	"
		46							"							"	4Y	"	"	"	"	"	"	"

See footnotes at end of table.

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

Symbol	MIL-STD-883 method	Case 2 C, D Test no.	Terminal conditions 1/ 2 1Y	3 1A	4 1B	6 2Y	8 2A	9 2B	10 GND	12 3A	13 3B	14 3Y	16 4A	18 4B	19 4Y	20 V_{CC}	Measured terminal	Test limits Subgroup 1 T_C = +25°C Min	Max	Subgroup 2 T_C = +125°C Min	Max	Subgroup 3 T_C = -55°C Min	Max	Unit
I_{IH}	3010	47		6 V	GND		6 V	GND	GND							6 V	1A		.05		.1			µA
		48		GND	6 V		GND	6 V	"							"	1B		"		"			"
		49							"							"	2A		"		"			"
		50							"							"	2B		"		"			"
		51							"	6 V	GND					"	3A		"		"			"
		52							"	GND	6 V					"	3B		"		"			"
		53							"				6 V	GND		"	4A		"		"			"
		54							"				GND	6 V		"	4B		"		"			"
I_{IL}	3009	55		GND	6 V				"							"	1A		-.05		-.1			"
		56		6 V	GND				"							"	1B		"		"			"
		57					GND	6 V	"							"	2A		"		"			"
		58					6 V	GND	"							"	2B		"		"			"
		59							"	GND	6 V					"	3A		"		"			"
		60							"	6 V	GND					"	3B		"		"			"
		61							"				GND	6 V		"	4A		"		"			"
		62							"				6 V	GND		"	4B		"		"			"
																		Subgroup 4 T_C = +25°C Min	Max					
C_i	3012	63		2/					GND							GND	1A		10					pF
		64			2/				"							"	1B		"					"
		65					2/		"							"	2A		"					"
		66						2/	"							"	2B		"					"
		67							"	2/						"	3A		"					"
		68							"		2/					"	3B		"					"
		69							"				2/			"	4A		"					"
		70							"					2/		"	4B		"					"
																		3/ Subgroup 9 T_C = +25°C Min	Max	Subgroup 10 T_C = +125°C Min	Max	3/ Subgroup 11 T_C = -55°C Min	Max	
t_{PHL}	3003 (Fig. 4)	71	OUT	IN	GND				GND							4.5 V	1A to 1Y	3	16	3	21	3	16	ns
		72	OUT	GND	IN				"							"	1B to 1Y	"	"	"	"	"	"	"
		73				OUT	IN	GND	"							"	2A to 2Y	"	"	"	"	"	"	"
		74				OUT	GND	IN	"							"	2B to 2Y	"	"	"	"	"	"	"
		75							"	IN	GND	OUT				"	3A to 3Y	"	"	"	"	"	"	"
		76							"	GND	IN	OUT				"	3B to 3Y	"	"	"	"	"	"	"
		77							"				IN	GND	OUT	"	4A to 4Y	"	"	"	"	"	"	"
		78							"				GND	IN	OUT	"	4B to 4Y	"	"	"	"	"	"	"

See footnotes at end of table.

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

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits 3/ Subgroup 9 T_C = +25°C		Subgroup 10 T_C = +125°C		Subgroup 11 T_C = -55°C		Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20								
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1Y	1A	1B	2Y	2A	2B	GND	3A	3B	3Y	4A	4B	4Y	V_{CC}		Min	Max	Min	Max	Min	Max	
t_{PLH}	3003 (Fig. 4)	79 to 86	Same terminal conditions and limits as specified above for t_{PHL}.																					
t_{THL}	3004 (Fig. 4)	87	OUT	IN	GND	OUT	IN	GND	GND							4.5 V	1Y	3	15	3	20	3	15	ns
		88							"	IN	GND	OUT				"	2Y	"	"	"	"	"	"	"
		89							"				IN	GND	OUT	"	3Y	"	"	"	"	"	"	"
		90															2Y							
t_{TLH}	3004 (Fig. 4)	91 to 94	Same terminal conditions and limits as specified above for t_{THL}.																					

See footnotes at end of table.

TABLE III. Group A inspection for device type 02.

Symbol	MIL-STD-883 method	Case 2 / C, D / Test no.	Terminal conditions 1/ 2 / 1 / 1A	3 / 2 / 1B	4 / 3 / 2A	6 / 4 / 2B	8 / 5 / 2C	9 / 6 / 2Y	10 / 7 / GND	12 / 8 / 3Y	13 / 9 / 3A	14 / 10 / 3B	16 / 11 / 3C	18 / 12 / 1Y	19 / 13 / 1C	20 / 14 / V_{CC}	Measured terminal	Test limits: Subgroup 1 T_C = +25°C Min	Subgroup 1 T_C = +25°C Max	Subgroup 2 T_C = +125°C Min	Subgroup 2 T_C = +125°C Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 T_C = -55°C Max	Unit
V_{IC} (pos) 1/		1	1 mA						1/							GND	1A	1/	1.5					V
		2		1 mA					"							"	1B	"	"					"
		3							"						1 mA	"	1C	"	"					"
		4			1 mA				"							"	2A	"	"					"
		5				1 mA			"							"	2B	"	"					"
		6					1 mA		"							"	2C	"	"					"
		7							"		1 mA					"	3A	"	"					"
		8							"			1 mA				"	3B	"	"					"
		9							"				1 mA			"	3C	"	"					"
V_{IC} (neg) 1/		10	-1 mA						GND							1/	1A		-1.5					"
		11		-1 mA					"							"	1B		"					"
		12							"						-1 mA	"	1C		"					"
		13			-1 mA				"							"	2A		"					"
		14				-1 mA			"							"	2B		"					"
		15					-1 mA		"							"	2C		"					"
		16							"		-1 mA					"	3A		"					"
		17							"			-1 mA				"	3B		"					"
		18							"				-1 mA			"	3C		"					"
I_{CC}	3005	19	6 V GND	6 V GND	6 V GND	6 V GND	6 V GND		"		6 V GND	6 V GND	6 V GND		6 V GND	6 V "	V_{CC}		0.1		10			µA
		20							"								V_{CC}		0.1		10			µA
V_{OH3}	3006	21	1.2 V	1.2 V					"							"	1Y	5.95		5.95		5.95		V
		22			1.2 V	1.2 V	1.2 V	-20 µA	"	-20 µA	1.2 V	1.2 V	1.2 V	-20 µA	1.2 V	"	2Y	"		"		"		"
		23							"							"	3Y	"		"		"		"
V_{OH5}	3006	24 to 26	Same tests, terminal conditions, and limits as for V_{OH3}, except as noted on the following line.					-5.2 mA		-5.2 mA				-5.2 mA				5.48		5.2		5.48		V
V_{OL3}	3007	27	4.2 V	1.2 V					GND					20 µA	1.2 V	6 V	1Y		.05		.05		.05	"
		28	1.2 V	4.2 V					"					"	1.2 V	"	1Y		"		"		"	"
		29	1.2 V	1.2 V					"						4.2 V	"	1Y		"		"		"	"
		30			4.2 V	1.2 V	1.2 V	20 µA	"							"	2Y		"		"		"	"
		31			1.2 V	4.2 V	1.2 V	"	"							"	2Y		"		"		"	"
		32					4.2 V		"							"	2Y		"		"		"	"
		33							"	20 µA	4.2 V	1.2 V	1.2 V			"	3Y		"		"		"	"
		34							"	"	1.2 V	4.2 V	1.2 V			"	3Y		"		"		"	"
		35							"	"	1.2 V	1.2 V	4.2 V			"	3Y		"		"		"	"
V_{OL5}	3007	36 to 44	Same tests, terminal conditions, and limits as for V_{OL3}, except as noted on the following line.					+5.2 mA		+5.2 mA				+5.2 mA					.26		.4		.26	V
I_{OS4}	3011	45	GND	GND					GND					GND	GND	4 V	1Y	-10	-120	-10	-120	-10	-120	mA
		46			GND	GND	GND	GND	"	GND	GND	GND	GND			"	2Y	"	"	"	"	"	"	"
		47							"							"	3Y	"	"	"	"	"	"	"

See footnotes at end of table.

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

Symbol	MIL-STD-883 method	Case 2 C, D	Terminal conditions 1/ 2	3	4	6	8	9	10	12	13	14	16	18	19	20	Measured terminal	Test limits: Subgroup 1 T_C = +25°C Min	Subgroup 1 Max	Subgroup 2 T_C = +125°C Min	Subgroup 2 Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 Max	Unit
		Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
			1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V_{CC}								
I_{IH}	3010	48	6 V	GND					GND						GND	6 V	1A		.05		.1			μA
		49	GND	6 V					"						GND	"	1B		"		"			"
		50	GND	GND					"						6 V	"	1C		"		"			"
		51			6 V	GND	GND		"							"	2A		"		"			"
		52			GND	6 V	GND		"							"	2B		"		"			"
		53			GND	GND	6 V		"							"	2C		"		"			"
		54							"		6 V	GND	GND			"	3A		"		"			"
		55							"		GND	6 V	GND			"	3B		"		"			"
		56							"		GND	GND	6 V			"	3C		"		"			"
I_{IL}	3009	57	GND	6 V					"						6 V	"	1A		-.05		-.1			"
		58	6 V	GND					"						6 V	"	1B		"		"			"
		59	6 V	6 V					"						GND	"	1C		"		"			"
		60			GND	6 V	6 V		"							"	2A		"		"			"
		61			6 V	GND	6 V		"							"	2B		"		"			"
		62			6 V	6 V	GND		"							"	2C		"		"			"
		63							"		GND	6 V	6 V			"	3A		"		"			"
		64							"		6 V	GND	6 V			"	3B		"		"			"
		65							"		6 V	6 V	GND			"	3C		"		"			"
																		Subgroup 4 T_C = +25°C Min	Subgroup 4 Max					
C_i	3012	66	2/						GND						2/	GND	1A		10					pF
		67		2/					"							"	1B		"					"
		68							"							"	1C		"					"
		69			2/				"							"	2A		"					"
		70				2/			"							"	2B		"					"
		71					2/		"							"	2C		"					"
		72							"		2/					"	3A		"					"
		73							"			2/				"	3B		"					"
		74							"				2/			"	3C		"					"
																		3/ Subgroup 9 T_C = +25°C Min	Subgroup 9 Max	Subgroup 10 T_C = +125°C Min	Subgroup 10 Max	3/ Subgroup 11 T_C = -55°C Min	Subgroup 11 Max	
t_{PHL}	3003 (Fig. 4)	75	IN	GND					GND					OUT	GND	4.5 V	1A to 1Y	3	17	3	22	3	17	ns
		76	GND	IN					"					"	GND	"	1B to 1Y	"	"	"	"	"	"	"
		77	GND	GND					"					"	IN	"	1C to 1Y	"	"	"	"	"	"	"
		78			IN	GND	GND	OUT	"							"	2A to 2Y	"	"	"	"	"	"	"
		79			GND	IN	GND	"	"							"	2B to 2Y	"	"	"	"	"	"	"
		80			GND	GND	IN	"	"							"	2C to 2Y	"	"	"	"	"	"	"
		81							"	OUT	IN	GND	GND			"	3A to 3Y	"	"	"	"	"	"	"
		82							"	"	GND	IN	GND			"	3B to 3Y	"	"	"	"	"	"	"
		83							"	"	GND	GND	IN			"	3C to 3Y	"	"	"	"	"	"	"

See footnotes at end of table.

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

Symbol	MIL-STD-883 method	Case 2 / C, D / Test no.	Terminal conditions 1/ 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Test limits: 3/ Subgroup 9 T_C = +25°C Min	Max	Subgroup 10 T_C = +125°C Min	Max	3/ Subgroup 11 T_C = -55°C Min	Max	Unit
			2	3	4	6	8	9	10	12	13	14	16	18	19	20								
			1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V_{CC}								
t_{PLH}	3003 (Fig. 4)	84 to 92	Same terminal conditions and limits as specified above for t_{PHL}.																					
t_{THL}	3004 (Fig. 4	93	IN	GND					GND					OUT	GND	4.5 V	1Y	3	15	3	20	3	15	ns
		94			IN	GND	GND	OUT	"							"	2Y	"	"	"	"	"	"	"
		95							"	OUT	IN	GND	GND			"	3Y	"	"	"	"	"	"	"
t_{TLH}	3004 (Fig. 4)	96 to 98	Same terminal conditions and limits as specified above for t_{THL}.																					

See footnotes at end of table.

TABLE III. Group A inspection for device type 03.

Symbol	MIL-STD-883 method	Case 2 / C, D / Test no.	Terminal conditions 1/ 2	3	4	6	8	9	10	12	13	14	16	18	19	20	Measured terminal	Test limits: Subgroup 1 T_C = +25°C Min	Subgroup 1 T_C = +25°C Max	Subgroup 2 T_C = +125°C Min	Subgroup 2 T_C = +125°C Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 T_C = -55°C Max	Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14								
			1A	1B	1Y	2Y	2A	2B	GND	3A	3B	3Y	4Y	4A	4B	V_{CC}								
V_{IC} (pos) 1/		1	1 mA						1/							GND	1A	1/	1.5					V
		2		1 mA					"							"	1B	"	"					"
		3					1 mA		"							"	2A	"	"					"
		4						1 mA	"							"	2B	"	"					"
		5							"	1 mA						"	3A	"	"					"
		6							"		1 mA					"	3B	"	"					"
		7							"					1 mA		"	4A	"	"					"
		8							"						1 mA	"	4B	"	"					"
V_{IC} (neg) 1/		9	-1 mA						GND							1/	1A		-1.5					"
		10		-1 mA					"							"	1B		"					"
		11					-1 mA		"							"	2A		"					"
		12						-1 mA	"							"	2B		"					"
		13							"	-1 mA						"	3A		"					"
		14							"		-1 mA					"	3B		"					"
		15							"					-1 mA		"	4A		"					"
		16							"						-1 mA	"	4B		"					"
I_{CC}		17	6 V	6 V			6 V	6 V	"	6 V	6 V			6 V	6 V	6 V	V_{CC}		0.1		10			µA
		18	GND	6 V			GND	6 V	"	GND	6 V			GND	6 V	6 V	V_{CC}		0.1		10			µA
I_{OH}		19	1.2 V	1.2 V	6 V				"							6 V	1Y		0.5		10		0.5	"
		20	4.2 V	4.2 V	6 V				"							"	1Y		"		"		"	"
		21				6 V	1.2 V	1.2 V	"							"	2Y		"		"		"	"
		22				6 V	4.2 V	4.2 V	"							"	2Y		"		"		"	"
		23							"	1.2 V	1.2 V	6 V				"	3Y		"		"		"	"
		24							"	4.2 V	4.2 V	6 V				"	3Y		"		"		"	"
		25							"				6 V	1.2 V	1.2 V	"	4Y		"		"		"	"
		26							"				6 V	4.2 V	4.2 V	"	4Y		"		"		"	"
V_{OL3}	3007	27	4.2 V	1.2 V	20 µA				"							"	1Y		.05		.05		.05	V
		28	1.2 V	4.2 V	20 µA				"							"	1Y		"		"		"	"
		29				20 µA	4.2 V	1.2 V	"							"	2Y		"		"		"	"
		30				20 µA	1.2 V	4.2 V	"							"	2Y		"		"		"	"
		31							"	4.2 V	1.2 V	20 µA				"	3Y		"		"		"	"
		32							"	1.2 V	4.2 V	20 µA				"	3Y		"		"		"	"
		33							"				20 µA	4.2 V	1.2 V	"	4Y		"		"		"	"
		34							"				20 µA	1.2 V	4.2 V	"	4Y		"		"		"	"
V_{OL5}	3007	35 to 42	Same tests, terminal conditions, as for V_{OL3}, except as noted on the following line.																					
					5.2 mA	5.2 mA						5.2 mA	5.2 mA						.26		.4		.26	V
I_{IH}	3010	43	6 V	GND					GND							6 V	1A		.05		.1			µA
		44	GND	6 V					"							"	1B		"		"			"
		45					6 V	GND	"							"	2A		"		"			"
		46					GND	6 V	"							"	2B		"		"			"
		47							"	6 V	GND					"	3A		"		"			"
		48							"	GND	6 V					"	3B		"		"			"
		49							"					6 V	GND	"	4A		"		"			"
		50							"					GND	6 V	"	4B		"		"			"

See footnotes at end of table.

TABLE III. Group A inspection for device type 03 - Continued.

Symbol	MIL-STD-883 method	Case 2 C, D Test no.	Terminal conditions 1/ 2 1 1A	3 2 1B	4 3 1Y	6 4 2Y	8 5 2A	9 6 2B	10 7 GND	12 8 3A	13 9 3B	14 10 3Y	16 11 4Y	18 12 4A	19 13 4B	20 14 V_{CC}	Measured terminal	Test limits: Subgroup 1 T_C = +25°C Min	Subgroup 1 T_C = +25°C Max	Subgroup 2 T_C = +125°C Min	Subgroup 2 T_C = +125°C Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 T_C = -55°C Max	Unit
I_{IL}	3009	51	GND	6 V					GND							6 V	1A		-.05		-.1			µA
		52	6 V	GND					"							"	1B		"		"			"
		53					GND	6 V	"							"	2A		"		"			"
		54					6 V	GND	"							"	2B		"		"			"
		55							"	GND	6 V					"	3A		"		"			"
		56							"	6 V	GND					"	3B		"		"			"
		57							"					GND	6 V	"	4A		"		"			"
		58							"					6 V	GND	"	4B		"		"			"
																		Subgroup 4 T_C = +25°C Min	Subgroup 4 T_C = +25°C Max					
C_i	3012	59	2/						GND							GND	1A		10					pF
		60		2/					"							"	1B		"					"
		61					2/		"							"	2A		"					"
		62						2/	"							"	2B		"					"
		63							"	2/						"	3A		"					"
		64							"		2/					"	3B		"					"
		65							"					2/		"	4A		"					"
		66							"						2/	"	4B		"					"
																		3/ Subgroup 9 T_C = +25°C Min	3/ Subgroup 9 T_C = +25°C Max	Subgroup 10 T_C = +125°C Min	Subgroup 10 T_C = +125°C Max	3/ Subgroup 11 T_C = -55°C Min	3/ Subgroup 11 T_C = -55°C Max	
t_{PHL1}	3003 (Fig. 4)	67	IN	GND	OUT				GND							4.5 V	1A to 1Y	3	22	3	29	3	22	ns
		68	GND	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"
		69				OUT	IN	GND	"							"	2A to 2Y	"	"	"	"	"	"	"
		70				OUT	GND	IN	"							"	2B to 2Y	"	"	"	"	"	"	"
		71							"	IN	GND	OUT				"	3A to 3Y	"	"	"	"	"	"	"
		72							"	GND	IN	OUT				"	3B to 3Y	"	"	"	"	"	"	"
		73							"				OUT	IN	GND	"	4A to 4Y	"	"	"	"	"	"	"
		74							"				OUT	GND	IN	"	4B to 4Y	"	"	"	"	"	"	"
t_{PLH3}	3003 (Fig. 4)	75 to 82	Same terminal conditions as specified above for t_{PZL1}.															"	15	"	20	"	15	"
t_{PHL2}	3004 (Fig. 4)	83	IN	4.5 V	OUT				GND							4.5 V	1A to 1Y	"	22	"	29	"	22	"
		84	4.5 V	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"
		85				OUT	IN	4.5 V	"							"	2A to 2Y	"	"	"	"	"	"	"
		86				OUT	4.5 V	IN	"							"	2B to 2Y	"	"	"	"	"	"	"
		87							"	IN	4.5 V	OUT				"	3A to 3Y	"	"	"	"	"	"	"
		88							"	4.5 V	IN	OUT				"	3B to 3Y	"	"	"	"	"	"	"
		89							"				OUT	IN	4.5 V	"	4A to 4Y	"	"	"	"	"	"	"
		90							"				OUT	4.5 V	IN	"	4B to 4Y	"	"	"	"	"	"	"
t_{PLH4}	3004 (Fig. 4)	91 to 98	Same terminal conditions as specified above for t_{PZL2}.															"	15	"	20	"	15	"

See footnotes at end of table.

TABLE III. Group A inspection for device type 03 - Continued.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits						Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 9 3/ T_C = +25°C		Subgroup 10 T_C = +125°C		Subgroup 11 3/ T_C = -55°C		
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1A	1B	1Y	2Y	2A	2B	GND	3A	3B	3Y	4Y	4A	4B	V_{CC}		Min	Max	Min	Max	Min	Max	
t_{THL}	3004 (Fig. 4)	99	IN	GND	OUT				GND							4.5 V	1Y	3	15	3	20	3	15	ns
		100	GND	IN	OUT				"							"	1Y	"	"	"	"	"	"	"
		101				OUT	IN	GND	"							"	2Y	"	"	"	"	"	"	"
		102				OUT	GND	IN	"							"	2Y	"	"	"	"	"	"	"
		103							"	IN	GND	OUT				"	3Y	"	"	"	"	"	"	"
		104							"	GND	IN	OUT				"	3Y	"	"	"	"	"	"	"
		105							"				OUT	IN	GND	"	4Y	"	"	"	"	"	"	"
		106							"				OUT	GND	IN	"	4Y	"	"	"	"	"	"	"

TABLE III. Group A inspection for device type 04.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits						Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T_C = +25°C		Subgroup 2 T_C = +125°C		Subgroup 3 T_C = -55°C		
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1Y	1A	1B	1C	1D	NC	GND	NC	2A	2B	2C	2D	2Y	V_{CC}		Min	Max	Min	Max	Min	Max	
V_{IC} (pos) 1/		1		1 mA					1/							GND	1A	1/	1.5					V
		2			1 mA				"							"	1B	"	"					"
		3				1 mA			"							"	1C	"	"					"
		4					1 mA		"							"	1D	"	"					"
		5							"		1 mA					"	2A	"	"					"
		6							"			1 mA				"	2B	"	"					"
		7							"				1 mA			"	2C	"	"					"
		8							"					1 mA		"	2D	"	"					"
V_{IC} (neg) 1/		9		-1 mA					GND							1/	1A		-1.5					"
		10			-1 mA				"							"	1B		"					"
		11				-1 mA			"							"	1C		"					"
		12					-1 mA		"							"	1D		"					"
		13							"		-1 mA					"	2A		"					"
		14							"			-1 mA				"	2B		"					"
		15							"				-1 mA			"	2C		"					"
		16							"					-1 mA		"	2D		"					"
I_{CC}	3005	17		6 V GND	6 V GND	6 V GND	6 V GND		"		6 V GND	6 V GND	6 V GND	6 V GND		6 V	V_{CC}		0.1		10			µA
		18							"							6 V	V_{CC}		0.1		10			µA
V_{OH3}	3006	19	-20 µA	1.2 V	1.2 V	1.2 V	1.2 V		"							"	1Y	5.95		5.95		5.95		V
		20							"		1.2 V	1.2 V	1.2 V	1.2 V	-20 µA	"	2Y	5.95		5.95		5.95		V
V_{OH5}	3006	21 and	Same tests, terminal conditions, and limits as for V_{OH3}, except as noted on the following line.																					
		22	-5.2 mA												-5.2 mA			5.48		5.2		5.48		V
V_{OL3}	3007	23	20 µA	4.2 V	1.2 V	1.2 V	1.2 V		GND							6 V	1Y		.05		.05		.05	V
		24	"	1.2 V	4.2 V	1.2 V	"		"							"	1Y		"		"		"	"
		25	"	"	1.2 V	4.2 V	"		"							"	1Y		"		"		"	"
		26	"	"	1.2 V	1.2 V	4.2 V		"							"	1Y		"		"		"	"
		27							"		1.2 V	1.2 V	1.2 V	4.2 V	20 µA	"	2Y		"		"		"	"
		28							"		"	1.2 V	4.2 V	1.2 V	"	"	2Y		"		"		"	"
		29							"		"	4.2 V	1.2 V	"	"	"	2Y		"		"		"	"
		30							"		4.2 V	1.2 V	1.2 V	"	"	"	2Y		"		"		"	"
V_{OL5}	3007	31 to	Same tests, terminal conditions, and limits as for V_{OL3}, except as noted on the following line.																					
		38	5.2 mA												5.2 mA				.26		.4		.26	V
I_{OS4}	3011	39	GND	GND	GND	GND	GND		GND							4 V	1Y	-10	-120	-10	-120	-10	-120	mA
		40							GND		GND	GND	GND	GND	GND	4 V	2Y	-10	-120	-10	-120	-10	-120	mA

See footnotes at end of table.

TABLE III. Group A inspection for device type 04 - Continued.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/															Measured terminal	Test limits						Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20			Subgroup 1 T_C = +25°C		Subgroup 2 T_C = +125°C		Subgroup 3 T_C = -55°C		
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14			Min	Max	Min	Max	Min	Max	
		Test no.	1Y	1A	1B	1C	1D	NC	GND	NC	2A	2B	2C	2D	2Y	V_{CC}									
I_{IH}	3010	41		6 V	GND	GND	GND		GND							6 V	1A		.05		.1				µA
		42		GND	6 V	GND	"		"							"	1B		"		"				"
		43		"	GND	6 V	"		"							"	1C		"		"				"
		44			GND	GND	6 V		"		6 V	GND	GND	GND		"	1D		"		"				"
		45							"		GND	6 V	GND	GND		"	2A		"		"				"
		46							"		GND	GND	6 V	GND		"	2B		"		"				"
		47							"		GND	GND	GND	6 V		"	2C		"		"				"
		48							"		GND	GND	GND	GND		"	2D		"		"				"
I_{IL}	3009	49		GND	6 V	6 V	6 V		GND							6 V	1A		-.05		-.1				"
		50		6 V	GND	6 V	"		"							"	1B		"		"				"
		51		"	6 V	GND	"		"							"	1C		"		"				"
		52		"	6 V	GND	GND		"							"	1D		"		"				"
		53							"		GND	6 V	6 V	6 V		"	2A		"		"				"
		54							"		6 V	GND	6 V	6 V		"	2B		"		"				"
		55							"		"	6 V	GND	6 V		"	2C		"		"				"
		56							"		"	6 V	6 V	GND		"	2D		"		"				"
																			Subgroup 4 T_C = +25°C						
																			Min	Max					
C_i	3012	57		2/	2/	2/	2/		GND							GND	1A		10						pF
		58							"							"	1B		"						"
		59							"							"	1C		"						"
		60							"							"	1D		"						"
		61							"		2/	2/	2/	2/		"	2A		"						"
		62							"							"	2B		"						"
		63							"							"	2C		"						"
		64							"							"	2D		"						"
																			3/ Subgroup 9 T_C = +25°C		3/ Subgroup 10 T_C = +125°C		3/ Subgroup 11 T_C = -55°C		
																			Min	Max	Min	Max	Min	Max	
t_{PHL}	3003 (Fig. 4)	65	OUT	IN	GND	GND	GND		GND							4.5 V	1A to 1Y		3	21	3	28	3	21	ns
		66	"	GND	IN	GND	"		"							"	1B to 1Y		"	"	"	"	"	"	"
		67	"	"	GND	IN	"		"							"	1C to 1Y		"	"	"	"	"	"	"
		68			GND	GND	IN		"		IN	GND	GND	GND	OUT	"	1D to 1Y		"	"	"	"	"	"	"
		69							"		GND	IN	GND	GND	"	"	2A to 2Y		"	"	"	"	"	"	"
		70							"		GND	GND	IN	GND	"	"	2B to 2Y		"	"	"	"	"	"	"
		71							"		GND	GND	GND	IN	"	"	2C to 2Y		"	"	"	"	"	"	"
		72							"		GND	GND	GND	GND	"	"	2D to 2Y		"	"	"	"	"	"	"
t_{PLH}	3003 (Fig. 4)	73 to 80	Same terminal conditions and limits as specified above for t_{PHL}.																						
t_{THL}	3004 (Fig. 4)	81	OUT	IN	GND	GND	GND		GND							4.5 V	1Y		3	15	3	20	3	15	ns
		82							GND		IN	GND	GND	GND	OUT	4.5 V	2Y		3	15	3	20	3	15	ns
t_{TLH}	3004 (Fig. 4)	83 and 84	Same terminal conditions and limits as specified above for t_{THL}.																						

See footnotes at end of table.

TABLE III. Group A inspection for device type 05.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits						Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T_C = +25°C		Subgroup 2 T_C = +125°C		Subgroup 3 T_C = -55°C		
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1A	1B	1Y	2Y	2A	2B	GND	3A	3B	3Y	4Y	4A	4B	V_{CC}		Min	Max	Min	Max	Min	Max	
V_{IC} (pos) 1/		1	1 mA						1/							GND	1A	1/	1.5					V
		2		1 mA					"							"	1B	"	"					"
		3					1 mA		"							"	2A	"	"					"
		4						1 mA	"							"	2B	"	"					"
		5							"	1 mA						"	3A	"	"					"
		6							"		1 mA					"	3B	"	"					"
		7							"					1 mA		"	4A	"	"					"
		8							"						1 mA	"	4B	"	"					"
V_{IC} (neg) 1/		9	-1 mA						GND							1/	1A		-1.5					"
		10		-1 mA					"							"	1B		"					"
		11					-1 mA		"							"	2A		"					"
		12						-1 mA	"							"	2B		"					"
		13							"	-1 mA						"	3A		"					"
		14							"		-1 mA					"	3B		"					"
		15							"					-1 mA		"	4A		"					"
		16							"						-1 mA	"	4B		"					"
I_{CC}	3005	17	6 V	6 V			6 V	6 V	"	6 V	6 V			6 V	6 V	6 V	V_{CC}		.1		10			µA
		18	GND	6 V			GND	6 V	"	GND	6 V			GND	6 V	6 V	V_{CC}		.1		10			µA
V_{OH3}	3006	19	1.2 V	1.2 V	-20 µA		1.2 V	1.2 V	"							"	1Y	5.95		5.95		5.95		V
		20				-20 µA			"							"	2Y	"		"		"		"
		21							"	1.2 V	1.2 V	-20 µA				"	3Y	"		"		"		"
		22						"	"				-20 µA	1.2 V	1.2 V	"	4Y	"		"		"		"
V_{OH5}	3006	23 to 26	Same tests, terminal conditions, and limits as for V_{OH3}, except as noted on the following line.																						
					-5.2 mA	-5.2 mA						-5.2 mA	-5.2 mA					5.48		5.2		5.48		V
V_{OL3}	3007	27	4.2 V	1.2 V	20 µA				"							6 V	1Y		.05		.05		.05	V
		28	1.2 V	4.2 V	20 µA				"							"	1Y		"		"		"	"
		29				20 µA	4.2 V	1.2 V	"							"	2Y		"		"		"	"
		30				20 µA	1.2 V	4.2 V	"							"	2Y		"		"		"	"
		31							"	4.2 V	1.2 V	20 µA				"	3Y		"		"		"	"
		32							"	1.2 V	4.2 V	20 µA				"	3Y		"		"		"	"
		33							"				20 µA	4.2 V	1.2 V	"	4Y		"		"		"	"
		34							"				20 µA	1.2 V	4.2 V	"	4Y		"		"		"	"
V_{OL5}	3007	35 to 42	Same tests, terminal conditions, and limits as for V_{OL3}, except as noted on the following line.																						
					5.2 mA	5.2 mA						5.2 mA	5.2 mA						.26		.4		.26	V
I_{OS4}	3011	43	GND	GND	GND		GND	GND	GND							4 V	1Y	-10	-120	-10	-120	-10	-120	mA
		44				GND			"							"	2Y	"	"	"	"	"	"	"
		45							"	GND	GND	GND				"	3Y	"	"	"	"	"	"	"
		46							"				GND	GND	GND	"	4Y	"	"	"	"	"	"	"

See footnotes at end of table.

TABLE III. Group A inspection for device type 05 - Continued.

Symbol	MIL-STD-883 method	Case 2 / C, D / Test no.	Terminal conditions 1/ 2 / 1 / 1A	3 / 2 / 1B	4 / 3 / 1Y	6 / 4 / 2Y	8 / 5 / 2A	9 / 6 / 2B	10 / 7 / GND	12 / 8 / 3A	13 / 9 / 3B	14 / 10 / 3Y	16 / 11 / 4Y	18 / 12 / 4A	19 / 13 / 4B	20 / 14 / V_{CC}	Measured terminal	Test limits: Subgroup 1 T_C = +25°C Min	Subgroup 1 T_C = +25°C Max	Subgroup 2 T_C = +125°C Min	Subgroup 2 T_C = +125°C Max	Subgroup 3 T_C = -55°C Min	Subgroup 3 T_C = -55°C Max	Unit
I_{IH}	3010	47	6 V	GND					GND							6 V	1A		.05		.1			µA
		48	GND	6 V					"							"	1B		"		"			"
		49					6 V	GND	"							"	2A		"		"			"
		50					GND	6 V	"							"	2B		"		"			"
		51							"	6 V	GND					"	3A		"		"			"
		52							"	GND	6 V					"	3B		"		"			"
		53							"					6 V	GND	"	4A		"		"			"
		54							"					GND	6 V	"	4B		"		"			"
I_{IL}	3009	55	GND	6 V					"							"	1A		-.05		-.1			"
		56	6 V	GND					"							"	1B		"		"			"
		57					GND	6 V	"							"	2A		"		"			"
		58					6 V	GND	"							"	2B		"		"			"
		59							"	GND	6 V					"	3A		"		"			"
		60							"	6 V	GND					"	3B		"		"			"
		61							"					GND	6 V	"	4A		"		"			"
		62							"					6 V	GND	"	4B		"		"			"
																		Subgroup 4 T_C = +25°C Min	Subgroup 4 T_C = +25°C Max					
C_i	3012	63	2/						GND							GND	1A		10					pF
		64		2/					"							"	1B		"					"
		65					2/		"							"	2A		"					"
		66						2/	"							"	2B		"					"
		67							"	2/						"	3A		"					"
		68							"		2/					"	3B		"					"
		69							"					2/		"	4A		"					"
		70							"						2/	"	4B		"					"
																		3/ Subgroup 9 T_C = +25°C Min	3/ Subgroup 9 T_C = +25°C Max	3/ Subgroup 10 T_C = +125°C Min	3/ Subgroup 10 T_C = +125°C Max	3/ Subgroup 11 T_C = -55°C Min	3/ Subgroup 11 T_C = -55°C Max	
t_{PHL1}	3003 (Fig. 4)	71	IN	GND	OUT				GND							4.5 V	1A to 1Y	3	22	3	29	3	22	ns
		72	GND	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"
		73				OUT	IN	GND	"							"	2A to 2Y	"	"	"	"	"	"	"
		74				OUT	GND	IN	"							"	2B to 2Y	"	"	"	"	"	"	"
		75							"	IN	GND	OUT	OUT			"	3A to 3Y	"	"	"	"	"	"	"
		76							"	GND	IN	OUT	OUT			"	3B to 3Y	"	"	"	"	"	"	"
		77							"					IN	GND	"	4A to 4Y	"	"	"	"	"	"	"
		78							"					GND	IN	"	4B to 4Y	"	"	"	"	"	"	"
t_{PLH1}	3003 (Fig. 4)	79 to 86	Same terminal conditions and limits as specified above for t_{PHL1}.																					
t_{PHL2}	3003 (Fig. 4)	87	IN	4.5 V	OUT				GND							4.5 V	1A to 1Y	3	22	3	29	3	22	ns
		88	4.5 V	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"
		89				OUT	IN	4.5 V	"							"	2A to 2Y	"	"	"	"	"	"	"
		90				OUT	4.5 V	IN	"							"	2B to 2Y	"	"	"	"	"	"	"
		91							"	IN	4.5 V	OUT	OUT			"	3A to 3Y	"	"	"	"	"	"	"
		92							"	4.5 V	IN	OUT	OUT			"	3B to 3Y	"	"	"	"	"	"	"
		93							"					IN	4.5 V	"	4A to 4Y	"	"	"	"	"	"	"
		94							"					4.5 V	IN	"	4B to 4Y	"	"	"	"	"	"	"
t_{PLH2}	3003 (Fig. 4)	95 to 102	Same terminal conditions and limits as specified above for t_{PHL2}.																					

See footnotes at end of table.

TABLE III. Group A inspection for device type 05 - Continued.

Symbol	MIL-STD-883 method	Case	Terminal conditions 1/														Measured terminal	Test limits 3/ Subgroup 9 T_C = +25°C		Subgroup 10 T_C = +125°C		Subgroup 11 T_C = -55°C		Unit
		2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	Min	Max	Min	Max	
		C, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14								
		Test no.	1A	1B	1Y	2Y	2A	2B	GND	3A	3B	3Y	4Y	4A	4B	V_{CC}								
t_{THL}	3004 (Fig. 4)	103	IN	GND	OUT				GND							4.5 V	1Y	3	15	3	20	3	15	ns
		104	GND	IN	OUT				"							"	1Y	"	"	"	"	"	"	"
		105				OUT	IN	GND	"							"	2Y	"	"	"	"	"	"	"
		106				OUT	GND	IN	"							"	2Y	"	"	"	"	"	"	"
		107							"	IN	GND	OUT				"	3Y	"	"	"	"	"	"	"
		108							"	GND	IN	OUT				"	3Y	"	"	"	"	"	"	"
		109							"				OUT	IN	GND	"	4Y	"	"	"	"	"	"	"
		110							"				OUT	GND	IN	"	4Y	"	"	"	"	"	"	"
t_{TLH}	3004 (Fig. 4)	111 to 118	Same terminal conditions and limits as specified above for t_{THL}.																					

1/ Input pins not designated shall be high level logic or low level logic, or may be left open provided they do not influence the outcome of the measurement. Output pins not designated shall be tied to the loads or left open provided they do not influence the outcome of the measurement. Exceptions are as follows:

a. V_{IC}(pos) tests: The GND terminal shall be open. A minimum limit of 0.4 V applies to test being performed on equipment not capable of opening GND pin during test.

b. V_{IC}(neg) tests: The V_{CC} terminal shall be open.

c. I_{CC} tests: The output terminal shall be open.

2/ See 4.4.1c. For all type input terminals (e.g., clock, clear, data, etc.), a minimum of 3 inputs of each per device shall be tested.

3/ See 4.4.1d.

c. End-point electrical parameters shall be as specified in table II herein. Delta limits shall apply only to subgroup 5 of group B inspection and shall consist of tests specified in table IV herein.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table III of method 5005 of MIL-STD-883 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. Steady-state life test (method 1005 of MIL-STD-883) conditions:

(1) Test condition D, as specified in 4.5.2 herein, and as shown on figure 3 (note 3), or equivalent.

(2) T_A = +125°C minimum.

(3) Test duration, 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

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

4.5.1 Voltage and current. Unless otherwise specified, all voltages given are referenced to the microcircuit GND 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 within 10°C of their power stable condition at room temperature; then, electrical parameter end-point measurements shall be performed.

TABLE IV. Delta limits at +25°C.

Parameter 1/	Device types	
	All	
I_{CC}		±30 nA

1/ The above parameter shall be recorded before and after the required burn-in and life tests to determine deltas (Δ).

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

4.6 Data reporting. When specified in the purchase order or contract, a copy of the following data, as applicable, shall 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 3.5).

b. A copy of each radiograph.

c. The quality conformance inspection data (see 4.4).

d. Parameter distribution data on parameters evaluated during burn-in (see 3.5).

e. Final electrical parameters data (see 4.2c).

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

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

6.2 Ordering data. The acquisition document should specify the following:

a. Complete part number (see 1.2).

b. 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.

c. Requirements for certificate of compliance, if applicable.

d. Requirements for notification of change of product or process to the contracting activity in addition to notification to the qualifying activity, if applicable.

e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action and reporting of results, if applicable.

f. Requirements for product assurance options.

g. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements shall not apply to direct purchase by, or direct shipment to the Government.

h. Requirements for "JAN" marking.

i. Requirements for total dose radiation testing (see 3.6.1), if applicable.

6.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

C_i	Input terminal-to-GND capacitance.
C_{PD}	Power dissipation capacitance.
GND	Ground zero voltage potential.
I_{CC}	Quiescent supply current.
T_A	Free air temperature.
T_C	Case temperature.
V_{CC}	Positive supply voltage.

6.4 Logistic support. Lead materials and finishes (see 3.3) 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 finish C (see 3.3). Longer length leads and lead forming shall not affect the part number.

6.5 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 shall 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-M-38510.

Military device type	Generic-industry type
01	54HC02
02	54HC27
03	54HC266
04	54HC4002
05	54HC7266

6.6 Handling. MOS devices must be handled with certain precautions to avoid damage due to accumulation of static charge. Input protective devices have been designed in the chip to minimize the effect of this static buildup. However, the following handling practices are recommended:

a. Devices should be handled on benches with conductive and grounded surface.

b. Ground test equipment and tools.

c. Do not handle devices by the leads.

d. Store devices in conductive foam or carriers.

e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent, if practical.

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, MI
Air Force - 11, 19, 85, 99
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC, OS, SH

Preparing activity:
Air Force - 17

Agent:
DLA - ES

(Project 5962-1011-1)