

INCH-POUND

MIL-M-38510/324D

20 August 2003

SUPERSEDING

MIL-M-38510/324C

15 October 1987

## MILITARY SPECIFICATION

### MICROCIRCUITS, DIGITAL, BIPOLAR, LOW-POWER SCHOTTKY TTL, OCTAL BUFFER GATES WITH THREE STATE OUTPUTS, MONOLITHIC SILICON

Inactive for new design after 18 April 1997.

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, low-power Schottky TTL, octal bus buffer gates with three state outputs. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part number. The part number should be in accordance with MIL-PRF-38535, and as specified herein.

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

<u>Device type</u>	<u>Circuit</u>
01	Inverting octal buffer gate (inverting control inputs)
02	Noninverting octal buffer gate (complementary control inputs)
03	Noninverting octal buffer gates (inverting control inputs)
04	Inverting octal buffer gate (inverting control inputs)
05	Noninverting octal buffer gates (inverting control inputs)

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

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
R	GDIP1-T20 or CDIP2-T20	20	Dual-in-line
S	GDFP2-F20 or CDFP3-F20	20	Flat pack
Z	CQCC1-N20	20	Square leadless chip carrier
X	CQCC2-N20	20	Square leadless chip carrier

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43216-5000, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5962

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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1.3 Absolute maximum ratings.

Supply voltage range .....	-0.5 V to +7.0 V
Input voltage range .....	-1.5 V at -18 mA to +5.5 V
Storage temperature range .....	-65° to +150°C
Maximum power dissipation (P <sub>D</sub> ) <u>1/</u>	
Device type 01 .....	275 mW
Device type 02 and 03 .....	297 mW
Device type 04 .....	286 mW
Device type 05 .....	302 mW
Lead temperature (soldering, 10 seconds) .....	+300°C
Thermal resistance, junction to case (θ <sub>JC</sub> ):	
Cases R, S, X, and 2 .....	(See MIL-STD-1835)
Junction temperature (T <sub>J</sub> ) <u>2/</u> .....	+175°C

1.4 Recommended operating conditions.

Low level output current .....	18 mA maximum
High level output current .....	-12 mA maximum
Supply voltage (V <sub>CC</sub> ) .....	4.5 V minimum to 5.5 V maximum
Minimum high level input voltage (V <sub>IH</sub> ) .....	2.0 V
Maximum low level input voltage (V <sub>IL</sub> ):	
All device types .....	0.7 V
Device types 04 and 05 at +125°C .....	0.6 V
Case operating temperature range (T <sub>C</sub> ) .....	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 shall be those listed in the issue of the Departments of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard for Microelectronics.  
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

1/ Must withstand the added P<sub>D</sub> due to short-circuit test (e.g., I<sub>OS</sub>).

2/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with MIL-PRF-38535.

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document 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.

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

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

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

3.3.4 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. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range, unless otherwise specified.

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.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 9 (see MIL-PRF-38535, appendix A).

### 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 effect the form, fit, or function as described herein.

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

- a. 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. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.
- c. Additional screening for space level product shall be as specified in MIL-PRF-38535, appendix B.

## MIL-M-38510/324D

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Device type	Limits		Unit
				Min	Max	
Input clamp voltage	$V_{IC}$	$V_{CC} = 4.5\text{ V}$ , $I_{IN} = -18\text{ mA}$ , $T_C = +25^{\circ}\text{C}$	All		-1.5	V
High level output voltage	$V_{OH1}$	$V_{CC} = 4.5\text{ V}$ , $V_{IH} = 2.0\text{ V}$ , $I_{OH} = -3\text{ mA}$ $V_{IL} = 0.7\text{ V}$ , $V_{IL} = 0.6\text{ V}$ at $+125^{\circ}\text{C}$ for device types 04 and 05	All	2.4		V
High level output voltage	$V_{OH2}$	$V_{CC} = 4.5\text{ V}$ , $V_{IH} = 2.0\text{ V}$ $V_{IL} = 0.5\text{ V}$ , $I_{OH} = -12\text{ mA}$	All	2.0		V
Low level output voltage	$V_{OL1}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 12\text{ mA}$ , $V_{IH} = 2.0\text{ V}$ , $V_{IL} = 0.7\text{ V}$ , $V_{IL} = 0.6\text{ V}$ at $+125^{\circ}\text{C}$ for device types 04 and 05	All		0.4	V
Low level output voltage	$V_{OL2}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 18\text{ mA}$ , $V_{IH} = 2.0\text{ V}$ , $V_{IL} = 0.7\text{ V}$ , $V_{IL} = 0.6\text{ V}$ at $+125^{\circ}\text{C}$ for device types 04 and 05	All		0.45	V
Off state (high impedance state) output current	$I_{OZH}$	$V_{CC} = 5.5\text{ V}$ , $V_{OH} = 2.7\text{ V}$ , $V_{IH} = 2.0\text{ V}$ , $V_{IL} = 0.7\text{ V}$ , $V_{IL} = 0.6\text{ V}$ at $+125^{\circ}\text{C}$ for device types 04 and 05	All		20	$\mu\text{A}$
Off state (high impedance state) output current	$I_{OZL}$	$V_{CC} = 5.5\text{ V}$ , $V_{OL} = 0.4\text{ V}$ , $V_{IH} = 2.0\text{ V}$ , $V_{IL} = 0.7\text{ V}$ , $V_{IL} = 0.6\text{ V}$ at $+125^{\circ}\text{C}$ for device types 04 and 05	All		-20	$\mu\text{A}$
High level input current (all inputs)	$I_{IH1}$	$V_{CC} = 5.5\text{ V}$ , $V_{IH} = 2.7\text{ V}$	All		20	$\mu\text{A}$
High level input current (all inputs)	$I_{IH2}$	$V_{CC} = 5.5\text{ V}$ , $V_{IH} = 5.5\text{ V}$	All		100	$\mu\text{A}$
Low level input current (all inputs)	$I_{IL}$	$V_{CC} = 5.5\text{ V}$ , $V_{IL} = 0.4\text{ V}$	All	0	-200	$\mu\text{A}$
Supply current	$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ , Outputs high	01, 02, 03, 04		27	mA
			05		32	
	$I_{CCL}$	$V_{CC} = 5.5\text{ V}$ , Outputs low	01		44	mA
			02, 03		46	
			04		45	
			05		52	
	$I_{CCZ}$	$V_{CC} = 5.5\text{ V}$ , Outputs disabled	01		50	mA
			02, 03		54	
04				52		
05				55		
Short circuit output current 1/	$I_{OS}$	$V_{CC} = 5.5\text{ V}$	All	-40	-225	mA

See footnote at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ +125°C	Device type	Limits		Unit
				Min	Max	
Propagation delay time, (low to high level)	t <sub>PLH1</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 110 ohms	01, 04, 05	2	18	ns
			02, 03	2	23	
Propagation delay time, (high to low level)	t <sub>PHL1</sub>		All	2	23	ns
Output enable time to high level	t <sub>PZH</sub>		All	2	39	ns
Output enable time to low level	t <sub>PZL</sub>		All	2	39	ns
Output disable time from high level	t <sub>PHZ</sub>		All	2	45	ns
Output disable time from low level	t <sub>PLZ</sub>		All	2	39	ns

1/ Not more than one output should be shorted at one time.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 7, 9, 10, 11	1*, 2, 3, 7, 9
Group A test requirements	1, 2, 3, 7, 9, 10, 11	1, 2, 3, 7, 9
Group B electrical test parameters when using the method 5005 QCI option	1, 2, 3, 7, 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 7, 9, 10, 11	1, 2, 3
Additional electrical subgroups for group C periodic inspections	N/A	10, 11
Group D end-point electrical parameters	1, 2, 3	1, 2, 3

\*PDA applies to subgroup 1.

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

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

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

- a. Tests shall be as specified in table II herein.
- b. Subgroups 4, 5, 6, and 8 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II 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.
- b. Subgroups 3 and 4 shall be added to the group C inspection parameters for class B devices and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.
- c. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

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

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

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

4.6 Inclusion with other detail specifications. For qualification and quality conformance inspection purposes, devices covered by this specification may be treated as though they were included on the same detail specification as devices covered by MIL-M-38510/328. In addition, if a manufacturer is already qualified for type 32802, and if the respective devices on this specification (MIL-M-38510/324) are designed and manufactured identically (same die, same process, same screening) in all respects except electrical testing, then device type 32402 may be qualified by conducting only group A electrical tests with approval of the qualifying activity including subgroups A-10 and A-11, and submitting data in accordance with MIL-M-38510, appendix D (i.e., groups B, C, and D tests are not required).

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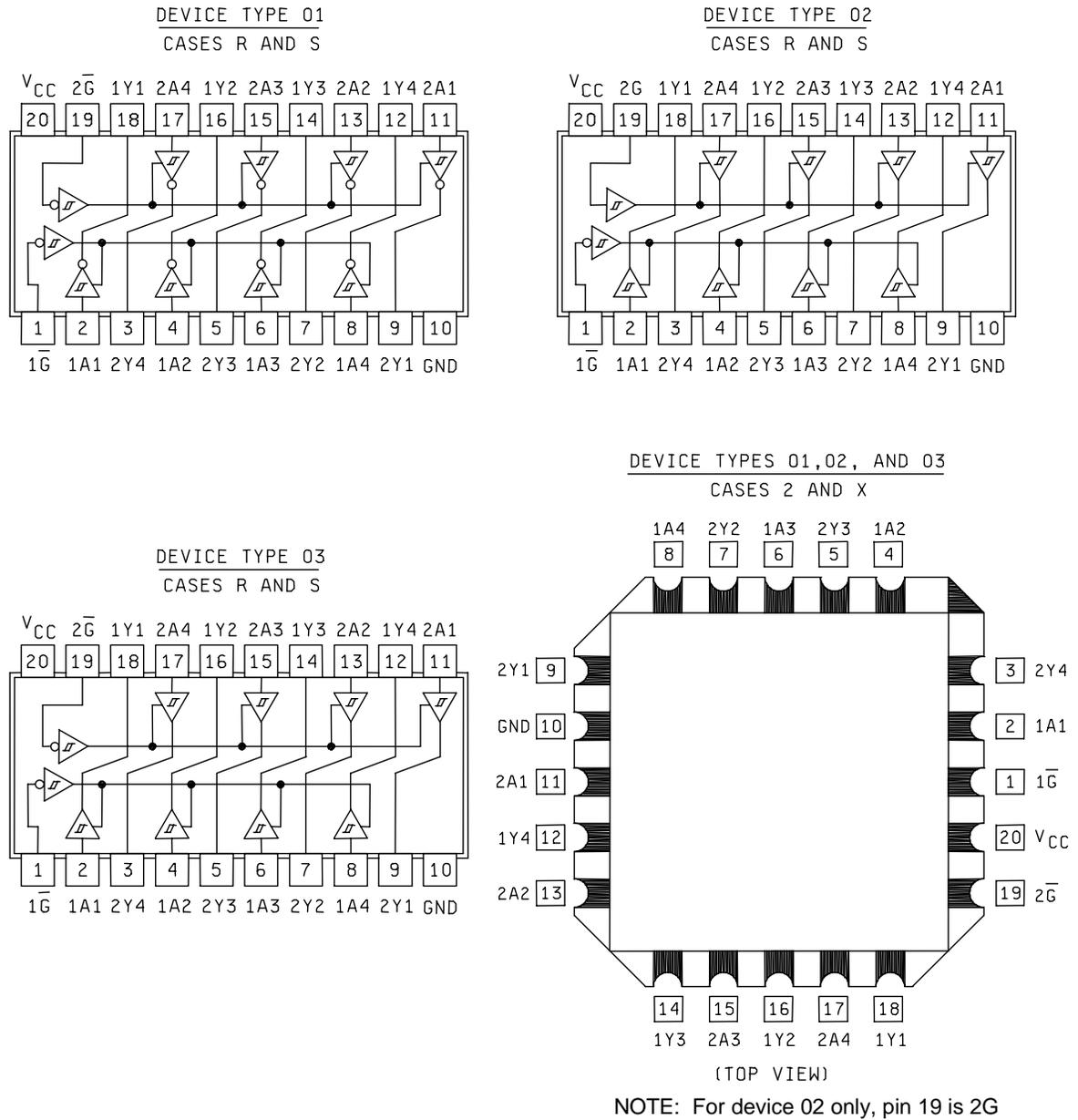


FIGURE 1. Logic diagrams and terminal connections.

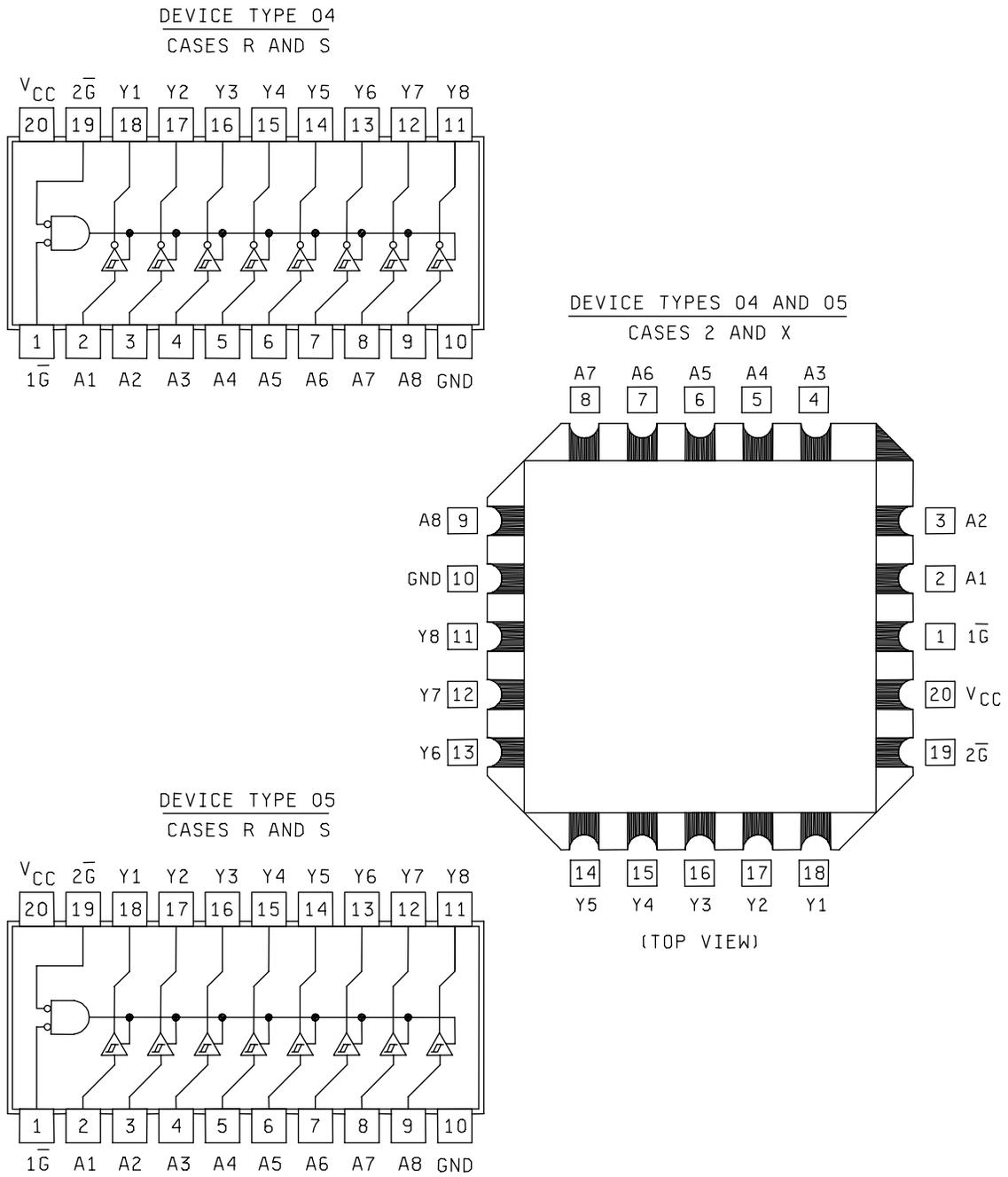


FIGURE 1. Logic diagrams and terminal connections - Continued.

Device type 01

Inputs		Out
$\bar{G}$	A	Y
L	H	L
L	L	H
H	X	Z

Device type 02

Inputs				Outputs	
1G	2G	1A	2A	1Y	2Y
L	H	H	H	H	H
L	H	L	L	L	L
H	L	X	X	Z	Z

Device type 03

Inputs		Out
$\bar{G}$	A	Y
L	L	L
L	H	H
H	X	Z

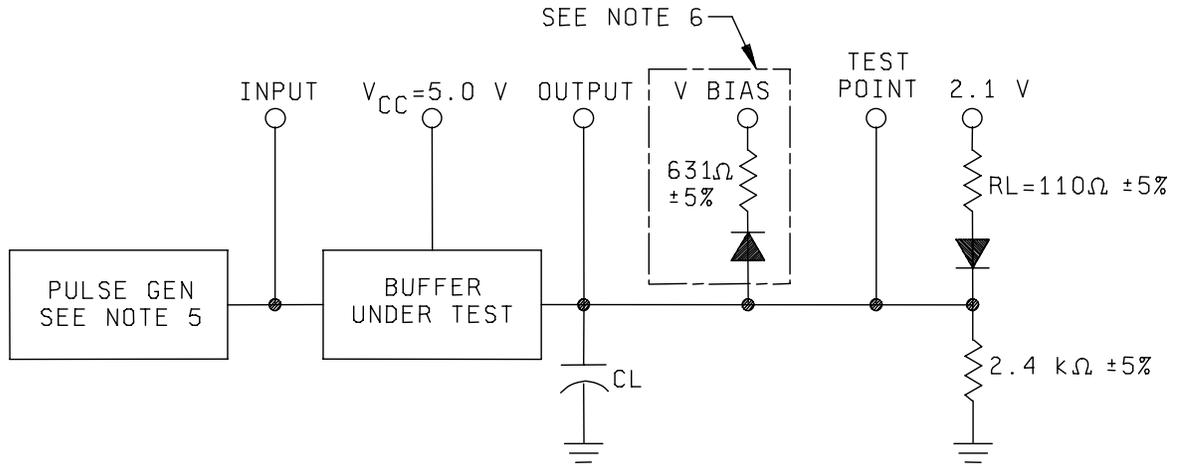
Device type 04

Inputs		Outputs	
1G	2G	A	Y
L	L	H	L
L	L	L	H
X	H	X	Z
H	X	X	Z
H	H	X	Z

Device type 05

Inputs		Outputs	
1G	2G	A	Y
L	L	L	L
L	L	H	H
X	H	X	Z
H	X	X	Z
H	H	X	Z

FIGURE 2. Truth tables.



TEST CIRCUIT

## NOTES:

1.  $C_L = 50\text{ pF} \pm 10\%$ .  $C_L$  includes probe and jig capacitance.
2. All diodes are 1N3064 or equivalent.
3. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
4. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.
5. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $t_P = 500\text{ ns}$ ,  $Z_{OUT} \approx 50\text{ ohms}$ ,  $V_{GEN} = 3.0\text{ V}$ ,  $t_{TLH} \leq 15\text{ ns}$  and  $t_{THL} \leq 6\text{ ns}$  between 0.7 V and 2.7 V.
6. The diode and resistor shown within the dotted area are optional. When the diode and resistor are used,  $V_{BIAS}$  shall be 5.5 V for all tests except for  $t_{PHZ}$ , for  $t_{PHZ}$  tests,  $V_{BIAS}$  shall be -0.6V.

FIGURE 4. Switching time test circuit and waveforms for device types 01, 02, 03, 04 and 05.

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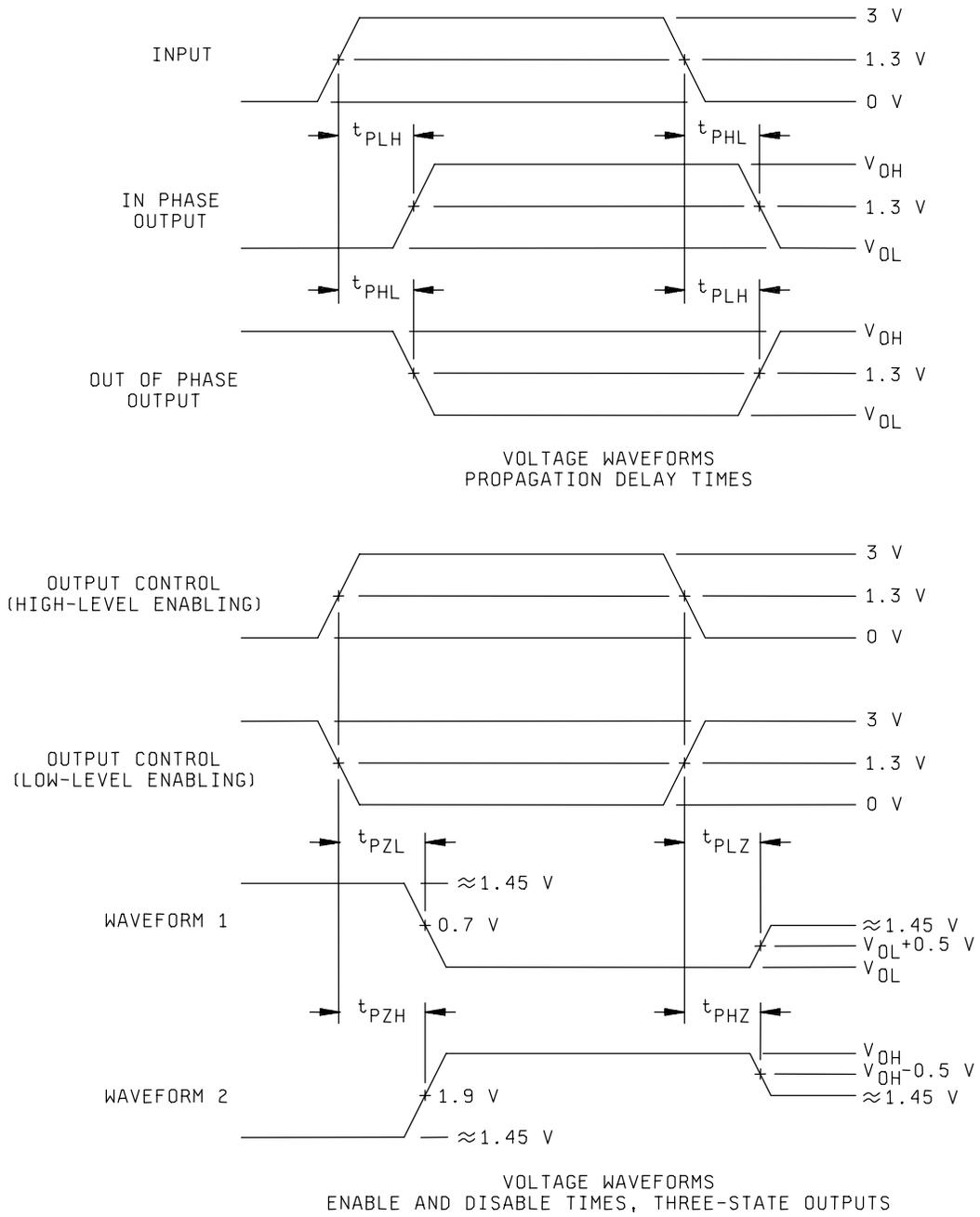


FIGURE 4. Switching time test circuit and waveforms for device types 01, 02, 03, 04 and 05. - Continued.

TABLE III. Group A inspection for device type 01.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R.S.X.2 Test.no.	Terminal conditions (pins not designated may be high $\geq 2.0$ V; low $\leq 0.7$ V; or open)																	Test limits		Unit						
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		20	Measured terminal	Min	Max		
1 Tc = 25°C	V <sub>OH1</sub>	3006	1	1G	2V4	1A2	2Y3	1A3	2Y2	1A4	2Y1	GND	2A1	1Y4	2A2	1Y3	2A3	1Y2	2A4	1Y1	2G	V <sub>CC</sub>	1Y1	2.4		V			
			2	"	"	0.7 V	"	"	0.7 V	"	"	"	"	"	"	"	"	"	-3 mA	"	"	"	"	1Y2	"	"	"	"	
			3	"	"	"	"	"	"	0.7 V	"	"	"	"	-3 mA	"	"	"	"	"	"	"	"	1Y3	"	"	"	"	
			4	"	"	"	"	"	"	0.7 V	"	"	"	"	-3 mA	"	"	"	"	"	"	"	"	1Y4	"	"	"	"	
			5	"	"	"	"	"	"	"	-3 mA	"	"	0.7 V	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"	
			6	"	"	"	"	"	"	"	-3 mA	"	"	"	0.7 V	"	"	"	"	"	"	"	"	2Y2	"	"	"	"	
			7	"	"	"	"	"	"	"	-3 mA	"	"	"	"	"	"	"	0.7 V	"	"	"	"	2Y3	"	"	"	"	
			8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	0.7 V	"	"	"	2Y4	"	"	"	"	
	V <sub>OH2</sub>	3007	9	0.5 V	0.5 V	"	"	"	"	"	"	"	"	"	"	"	"	"	-12 mA	"	"	"	1Y1	2.0	"	"	"		
			10	"	"	"	0.5 V	"	"	"	"	"	"	"	"	"	"	"	"	-12 mA	"	"	"	1Y2	"	"	"	"	
			11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	-12 mA	"	"	"	1Y3	"	"	"	"
			12	"	"	"	"	"	"	"	0.5 V	"	"	"	-12 mA	"	"	"	"	"	"	"	"	1Y4	"	"	"	"	
			13	"	"	"	"	"	"	"	0.5 V	"	"	"	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"	
			14	"	"	"	"	"	"	"	-12 mA	"	"	"	0.5 V	"	"	"	"	"	"	"	"	2Y2	"	"	"	"	
			15	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y3	"	"	"	"	
			16	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y4	"	"	"	"	
V <sub>OL1</sub>	3007	17	0.7 V	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y1	"	0.4	"	"			
		18	"	"	"	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y2	"	"	"	"			
		19	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y3	"	"	"	"		
		20	"	"	"	"	"	"	"	2.0 V	"	"	"	12 mA	"	"	"	"	"	"	"	"	1Y4	"	"	"	"		
		21	"	"	"	"	"	"	"	"	"	"	2.0 V	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"		
		22	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y2	"	"	"	"		
		23	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y3	"	"	"	"		
		24	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y4	"	"	"	"		
		V <sub>OL2</sub>	3007	25	0.7 V	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y1	"	0.45	"	"	
				26	"	"	"	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y2	"	"	"	"	
				27	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y3	"	"	"	"
				28	"	"	"	"	"	"	"	2.0 V	"	"	"	18 mA	"	"	"	"	"	"	"	"	1Y4	"	"	"	"
				29	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"
				30	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y2	"	"	"	"
				31	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y3	"	"	"	"
				32	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y4	"	"	"	"
I <sub>OZH</sub>	3007	33	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y1	"	20	"	"			
		34	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y2	"	"	"	"			
		35	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y3	"	"	"	"		
		36	"	"	"	"	"	"	"	"	"	"	"	2.7 V	"	"	"	"	"	"	"	"	1Y4	"	"	"	"		
		37	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"		
		38	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y2	"	"	"	"		
		39	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y3	"	"	"	"		
		40	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y4	"	"	"	"		
I <sub>OZL</sub>	3007	41	2.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y1	"	-20	"	"			
		42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y2	"	"	"	"			
		43	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1Y3	"	"	"	"		
		44	"	"	"	"	"	"	"	"	"	"	"	0.4 V	"	"	"	"	"	"	"	"	1Y4	"	"	"	"		
		45	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y1	"	"	"	"		
		46	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y2	"	"	"	"		
		47	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y3	"	"	"	"		
		48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2Y4	"	"	"	"		
I <sub>IL</sub>	3009	49	0.4 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1G	"	1/	"	"			
		50	GND	0.4 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1A1	"	"	"			
		51	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1A2	"	"	"			
		52	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1A3	"	"	"			
		53	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	1A4	"	"	"			
		54	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	GND	"	"	"			
		55	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2A1	"	"	"			
		56	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2A2	"	"	"			
57	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2A3	"	"	"					
58	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2A4	"	"	"					

See footnotes at end of device type 01.





TABLE III. Group A inspection for device type 01 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R, S, X, 2 method	Cases Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured terminal	Test limits		Unit	
				1G	IN	1A1	2Y4	1A2	2Y3	1A3	2Y2	1A4	2Y1	GND	2A1	1Y4	2A2	1Y3	2A3	1Y2	2A4	1Y1	2G		V <sub>CC</sub>	Min		Max
9	$t_{PHZ}$	3003	142	IN	GND		GND						GND								OUT		1G to 1Y1	2	35	ns		
Tc = 25°C		See fig. 3	143	"			GND																1G to 1Y2	"	"	"		
		"	144	"											OUT								1G to 1Y3	"	"	"		
		"	145	"							GND												1G to 1Y4	"	"	"		
		"	146										GND		OUT								2G to 2Y1	"	"	"		
		"	147								OUT												2G to 2Y2	"	"	"		
Tc = 125°C		"	148					OUT										GND					2G to 2Y3	"	"	"		
		"	149			OUT														GND			2G to 2Y4	"	"	"		
10	$t_{PLH}$	Same tests and terminal conditions as subgroup 9, except Tc = 125°C.																								"	18	ns
Tc = 125°C	$t_{PHL}$	Same tests, terminal conditions, and limits as subgroup 9, except Tc = -55°C.																								"	23	"
	$t_{ZL}$	Same tests, terminal conditions, and limits as subgroup 9, except Tc = -55°C.																								"	39	"
	$t_{ZH}$	Same tests, terminal conditions, and limits as subgroup 9, except Tc = -55°C.																								"	39	"
	$t_{PLZ}$	Same tests, terminal conditions, and limits as subgroup 9, except Tc = -55°C.																								"	39	"
	$t_{PHZ}$	Same tests, terminal conditions, and limits as subgroup 9, except Tc = -55°C.																								"	45	"

1/  $I_{IL}$  limits shall be as follows:

Test	Min/max limits ( $\mu A$ ) for circuit						
	A	B	C	D	E	F	G
$I_{IL}$	0/-200	0/-150	0/-150	0/-150	0/-200	-5/-200	0/-150

2/ A = 3.0 V min; B = 0.0 V or GND.

3/ H > 1.5 V; L < 1.5 V.



TABLE III. Group A inspection for device type 02 and 03 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R.S.X.2 Test no.	Cases	Terminal conditions (pins not designated may be high $\geq 2.0$ V; low $\leq 0.7$ V; or open)																Test limits		Unit									
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		19	20	Measured terminal	M/n	Max				
1	$T_c = 25^\circ\text{C}$	3010	59	2.7 V	1A1	2Y4	1A2	2Y3	1A3	2Y2	1A4	2Y1	GND	2A1	1Y4	2A2	1Y3	2A3	1Y2	2A4	1Y1	2G	1G	5.5 V	1G	20	$\mu\text{A}$				
			60	2.7 V																											
			61	2.7 V																											
			62	2.7 V																											
			63	2.7 V																											
			64	2.7 V																											
			65	2.7 V																											
			66	2.7 V																											
			67	2.7 V																											
			68	2.7 V																											
			69	5.5 V																											
			70	5.5 V																											
			71	5.5 V																											
			72	5.5 V																											
			73	5.5 V																											
			74	5.5 V																											
			75	5.5 V																											
			76	5.5 V																											
			77	5.5 V																											
78	5.5 V																														
79	5.5 V																														
80	5.5 V																														
81	5.5 V																														
82	5.5 V																														
83	5.5 V																														
84	5.5 V																														
85	5.5 V																														
86	5.5 V																														
87	5.5 V																														
88	5.5 V																														
89	5.5 V																														
90	5.5 V																														
91	5.5 V																														
92	5.5 V																														
93	5.5 V																														
94	5.5 V																														
95	5.5 V																														
96	5.5 V																														
97	5.5 V																														
98	5.5 V																														
99	5.5 V																														
2																															
3																															
7 2/	Truth table tests	3014	100	B	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B				
$T_c = 25^\circ\text{C}$		3014	101	B	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A	H	A				
9	$t_{pUH}$	3003	102	GND	IN																										
$T_c = 25^\circ\text{C}$		See fig. 3	103				IN																								
			104					IN																							
			105																												
			106																												
			107																												
			108																												
			109																												

See footnotes at end of device types 02 and 03.

TABLE III. Group A inspection for device type 02 and 03 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R.S.X.2 Test no. method	Cases	Terminal conditions (pins not designated may be high $\geq 2.0$ V; low $\leq 0.7$ V; or open)																Test limits		Unit																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		19	20	Measured terminal	M/n	Max													
9	$t_{PHL1}$	3003 See fig. 3	110	1G	1A1	2Y4	1A2	2Y3	1A3	2Y2	1A4	2Y1	GND	2A1	1Y4	2A2	1Y3	2A3	1Y2	2A4	1Y1	2G 1/	V <sub>CC</sub>	1A1 to 1Y1	2	18	ns													
			111	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"											
			112	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"										
			113	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"										
			114	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"										
			115	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"									
			116	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"									
			117	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"								
			118	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"							
			119	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"						
			120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"					
			121	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
			122	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
			123	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
124	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
125	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
126	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
127	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
128	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
129	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
130	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
131	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
132	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
133	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
134	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
135	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
136	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
137	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
138	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
139	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
140	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
141	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

See footnotes at end of device types 02 and 03.

TABLE III. Group A inspection for device type 02 and 03 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R, S, X, 2 method	Cases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Test limits		Unit					
																								Measured terminal	Min		Max				
9	$t_{PHZ}$	3003	142	IN	4.5 V								GND	2A1	1Y4	2A2	1Y3	2A3	1Y2	2A4	1Y1	2G	$V_{CC}$	2	35	ns					
				"											"																
				"												"															
				"												"															
				"												"															
				"												"															
10	$t_{PLH}$ $t_{PHL}$ $t_{ZL}$ $t_{ZHL}$ $t_{PLZ}$ $t_{PHZ}$	Same tests and terminal conditions as subgroup 9, except $T_c = 125^\circ\text{C}$ .	143																												
				"																											
				"																											
				"																											
				"																											
				"																											
11	Same tests, terminal conditions, and limits as subgroup 9, except $T_c = -55^\circ\text{C}$ .	144	145																												
				"																											
				"																											
				"																											
				"																											
				"																											

- 1/ For type 02, pin 19 is 2G; for type 03, pin 19 is 2G.
- 2/ Apply 2.0 V for type 02; apply 0.7 V for type 03.
- 3/ Apply 2.0 V for type 02; apply 0.5 V for type 03.
- 4/ Apply 0.7 V for type 02; apply 2.0 V for type 03.
- 5/  $I_{IL}$  limits shall be as follows:

Test	Min/max limits ( $\mu\text{A}$ ) for circuit						
	A	B	C	D	E	F	G
$I_{IL}$	0/-200	0/-150	0/-150	0/-150	0/-200	-5/-200	0/-150

- 6/ Apply 5.5 V for type 02; apply GND for type 03.
- 7/ Apply GND for type 02; apply 5.5 V for type 03.
- 8/ A = 3.0 V min; B = 0.0 V or GND.
- 9/ Apply A for type 02; apply B for type 03.
- 10/ H > 1.5 V; L < 1.5 V.

TABLE III. Group A inspection for device types 04 and 05.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R.S.X.2 Test no.	Cases 1 G	2 A1	3 A2	4 A3	5 A4	6 A5	7 A6	8 A7	9 A8	10 GND	11 Y8	12 Y7	13 Y6	14 Y5	15 Y4	16 Y3	17 Y2	18 Y1	19 2G	20 V <sub>CC</sub>	Test limits		Unit		
																							Min	Max			
1 T <sub>c</sub> = 25°C	V <sub>OH1</sub>	3006	1 0.7 V	1/	1/	1/	1/	1/	1/	1/	1/	GND	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	0.7 V	4.5 V	2.4		V		
		"	2	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	3	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
		"	4	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
		"	5	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
		"	6	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
		"	7	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
		"	8	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	V <sub>OH2</sub>	"	9	0.5 V	2/	2/	2/	2/	2/	2/	2/	1/	"	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	0.5 V	"	2.0		"	
		"	10	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	11	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	12	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	13	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	14	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	15	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	16	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
V <sub>OL1</sub>	3007	17	0.7 V	3/	3/	3/	3/	3/	3/	3/	2/	"	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	0.7 V	"	0.4		"		
	"	18	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	19	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	20	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	21	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	22	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	23	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	24	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	V <sub>OL2</sub>	"	25	"	3/	3/	3/	3/	3/	3/	3/	3/	"	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	"	"	0.45		"	
		"	26	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	27	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	28	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	29	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	30	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	31	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
		"	32	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
I <sub>OPH</sub>	"	33	2.0 V	"	"	"	"	"	"	"	3/	GND	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	5.5 V	"	20		μA		
	"	34	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	35	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	36	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	37	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	38	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	39	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	40	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	41	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	43	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	44	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	45	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	46	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	47	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
	"	48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 R.S.X.2 Test.no.	Cases	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Test limits		Unit																
																								Method	Min		Max															
1	$I_{OZL}$	883	R.S.X.2	49	2.0 V	1G	A1	A2	A3	A4	A5	A6	A7	A8	GND	GND	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	2G	V <sub>CC</sub>	4.5 V	Y1	-20	$\mu$ A												
				50	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"									
				51	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"								
				52	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"							
				53	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"						
				54	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"					
				55	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"					
				56	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
				57	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
				58	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
				59	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
				60	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
				61	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		
				62	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				63	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				64	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				65	3009	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				66	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				67	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
				68	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
				69	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
				70	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
				71	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
				72	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
73	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
75	3010	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
76	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
77	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
78	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
79	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
80	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
81	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
82	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
83	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
84	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
85	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
87	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
88	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
89	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
90	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
91	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
92	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"			
93	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				
94	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"				

See footnotes at end of device types 04 and 05.



TABLE III. Group A inspection for device types 04 and 05 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R.S.X.2 Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured terminal		Test limits		Unit	
				1 G	A1	A2	A3	A4	A5	A6	A7	A8	GND	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	2 G	IN	2 G	2 G to Y1	Min	Max		
9	Tc = 25°C	3003 Fig 3	142	GND	14/								GND							OUT			2 G	2 G to Y1	2	30	ns		
			143	"		14/								"							OUT			2 G	2 G to Y2	"	"	"	
			144	"			14/							"							OUT			2 G	2 G to Y3	"	"	"	
			145	"					14/					"						OUT				2 G	2 G to Y4	"	"	"	
			146	"						14/				"					OUT					2 G	2 G to Y5	"	"	"	
			147	"							14/			"				OUT						2 G	2 G to Y6	"	"	"	
			148	"									14/	"			OUT							2 G	2 G to Y7	"	"	"	
			149	"										14/	"	OUT							OUT	GND	2 G	2 G to Y8	"	"	"
			150	"		IN	15/								"							OUT			1 G	1 G to Y1	"	"	"
			151	"											"							OUT			1 G	1 G to Y2	"	"	"
			152	"						15/					"							OUT			1 G	1 G to Y3	"	"	"
			153	"							15/				"						OUT				1 G	1 G to Y4	"	"	"
			154	"								15/			"							OUT			1 G	1 G to Y5	"	"	"
			155	"									15/		"							OUT			1 G	1 G to Y6	"	"	"
			156	"										15/	"		OUT								1 G	1 G to Y7	"	"	"
			157	"											15/	"	OUT							OUT	1 G	1 G to Y8	"	"	"
			158	"		GND	15/								"								OUT		IN	2 G	2 G to Y1	"	"
159	"											"								OUT			2 G	2 G to Y2	"	"	"		
160	"						15/					"							OUT				2 G	2 G to Y3	"	"	"		
161	"							15/				"						OUT					2 G	2 G to Y4	"	"	"		
162	"								15/			"											2 G	2 G to Y5	"	"	"		
163	"									15/		"						OUT					2 G	2 G to Y6	"	"	"		
164	"										15/	"			OUT								2 G	2 G to Y7	"	"	"		
165	"											15/	"	OUT									2 G	2 G to Y8	"	"	"		
166	"		IN	14/								"									OUT	GND	1 G	1 G to Y1	"	"	"		
167	"											"								OUT			1 G	1 G to Y2	"	"	"		
168	"						14/					"							OUT				1 G	1 G to Y3	"	"	"		
169	"											"						OUT					1 G	1 G to Y4	"	"	"		
170	"								14/			"											1 G	1 G to Y5	"	"	"		
171	"									14/		"											1 G	1 G to Y6	"	"	"		
172	"										14/	"			OUT								1 G	1 G to Y7	"	"	"		
173	"											14/	"	OUT									1 G	1 G to Y8	"	"	"		

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V; low  $\leq 0.7$  V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases R,S,X,2 Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Measured terminal		Test limits		Unit	
				1G	A1	A2	A3	A4	A5	A6	A7	A8	GND	Y8	Y7	Y6	Y5	Y4	Y3	Y2	Y1	2G	IN	2G	V <sub>cc</sub>	Min	Max		
9	T <sub>c</sub> = 25°C	3003 Fig. 3	174	"	14/	"	"	"	"	"	"	"	GND	Y8	"	"	"	"	"	OUT	"	"	"	2G to Y1	2	30	ns		
			175	"	"	14/	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	"	"	"	"	2G to Y2	"	"	"	
			176	"	"	"	14/	"	"	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	"	2G to Y3	"	"	"
			177	"	"	"	"	"	14/	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	2G to Y4	"	"	"
			178	"	"	"	"	"	"	14/	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	2G to Y5	"	"	"
			179	"	"	"	"	"	"	"	14/	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	2G to Y6	"	"	"
			180	"	"	"	"	"	"	"	"	14/	"	"	"	"	OUT	"	"	"	"	"	"	"	"	2G to Y7	"	"	"
			181	"	"	"	"	"	"	"	"	"	"	14/	"	"	OUT	"	"	"	"	"	"	"	"	2G to Y8	"	"	"
			182	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	1G to Y1	"	35	"
			183	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	1G to Y2	"	"	"
			184	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	1G to Y3	"	"	"
			185	"	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	OUT	"	"	"	"	1G to Y4	"	"	"
			186	"	"	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	OUT	"	"	"	"	"	1G to Y5	"	"	"
			187	"	"	"	"	"	"	"	"	"	15/	"	"	"	"	"	OUT	"	"	"	"	"	"	1G to Y6	"	"	"
			188	"	"	"	"	"	"	"	"	"	"	15/	"	"	"	OUT	"	"	"	"	"	"	"	1G to Y7	"	"	"
			189	"	"	"	"	"	"	"	"	"	"	"	15/	"	OUT	"	"	"	"	"	"	"	"	1G to Y8	"	"	"
			190	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	2G to Y1	"	"	"
191	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	2G to Y2	"	"	"			
192	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	"	"	OUT	"	"	"	2G to Y3	"	"	"			
193	"	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	OUT	"	"	"	"	2G to Y4	"	"	"			
194	"	"	"	"	"	"	"	"	15/	"	"	"	"	"	"	"	"	"	"	"	"	"	2G to Y5	"	"	"			
195	"	"	"	"	"	"	"	"	"	15/	"	"	"	"	"	OUT	"	"	"	"	"	"	2G to Y6	"	"	"			
196	"	"	"	"	"	"	"	"	"	"	15/	"	"	"	OUT	"	"	"	"	"	"	"	2G to Y7	"	"	"			
197	"	"	"	"	"	"	"	"	"	"	"	15/	"	OUT	"	"	"	"	"	"	"	"	2G to Y8	"	"	"			
10	t <sub>pLH1</sub> t <sub>pHL1</sub> t <sub>pZL</sub> t <sub>pZH</sub> t <sub>pLZ</sub> t <sub>pHZ</sub>	Same tests and terminal conditions as subgroup 9, except T <sub>c</sub> = +125°C.																											
																													18
																													23
																													39
																													"
11	Same tests, terminal conditions, and limits as subgroup 9, except T <sub>c</sub> = -55°C.																												
																													"
																													"
																													"
																													45

See footnotes on next page.

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- 1/ For device type 04; 0.7 V (0.6 V at +125°C). For device type 05; 2.0 V.
- 2/ For device type 04; 0.5 V. For device type 05; 2.0 V.
- 3/ For device type 04; 2.0 V. For device type 05; 0.7 V (0.6 V at +125°C).
- 4/  $I_{IL}$  limits shall be as follows:

Test	Min/max limits ( $\mu$ A) for circuit						
	A	B	C	D	E	F	G
$I_{IL}$	0/-200						

- 5/ For device type 04; GND. For device type 05; 5.5 V.
- 6/ For device type 04; 5.5 V. For device type 05; GND.
- 7/ For device type 04; 27 mA. For device type 05; 32 mA.
- 8/ For device type 04; 45 mA. For device type 05; 52 mA.
- 9/ For device type 04; 52 mA. For device type 05; 55 mA.
- 10/ A = 3.0 V min; B = 0.0 V or GND.
- 11/  $H > 1.5$  V;  $L < 1.5$  V.
- 12/ For device type 04; use B. For device type 05; use A.
- 13/ For device type 04; use A. For device type 05; use B.
- 14/ For device type 04; 4.5 V. For device type 05; GND.
- 15/ For device type 04; GND. For device type 05; 4.5 V.

## 5. PACKAGING

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

## 6. NOTES

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

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Complete part number (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 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.
- j. Requirements for "JAN" marking.

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

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

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

GND .....	Ground zero voltage potential.
$V_{IN}$ .....	Voltage level at an input terminal.
$I_{IN}$ .....	Current flowing into an input terminal.
$t_{PHZ}$ .....	Output disable time from high level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined high level to a high impedance (off) state.
$t_{PLZ}$ .....	Output disable time from low level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined low level to a high impedance (off) state.
$t_{PZH}$ .....	Output enable time to high level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined high level.
$t_{PZL}$ .....	Output enable time to low level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined low level.
$I_{OZH}$ .....	Output current in the high impedance mode with the output voltage low.
$I_{OLH}$ .....	Output current in the high impedance mode with the output voltage high.

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

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

Military device type	Generic-industry type
01	54LS240
02	54LS241
03	54LS244
04	54LS540
05	54LS541

6.8 Manufacturers' designation. Manufacturers' circuits, which form a part of this specification, are designated with an "X" as shown in table IV herein.

TABLE IV. Manufacturer's designator.

Device type	Circuit						
	A	B	C	D	E	F	G
	Texas Instruments	Signetics Corp.	National Semiconductor	Raytheon Co.	Fairchild Semiconductor	Motorola Inc.	Advanced Micro Devices
01	X	X	X	X	X	X	X
02	X	X	X	X	X	X	X
03	X	X	X	X	X	X	X
04	X						
05	X						

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

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

Preparing activity:  
 DLA - CC  
 (Project 5962-1971)

Review activities:  
 Army - MI, SM  
 Navy - AS, CG, MC, SH, TD  
 Air Force - 03, 19, 99

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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### I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-M-38510/324D

2. DOCUMENT DATE (YYYYMMDD)  
2003-08-20

3. DOCUMENT TITLE  
MICROCIRCUITS, DIGITAL, BIPOLAR, LOW-POWER SCHOTTKY TTL, OCTAL BUFFER GATES WITH THREE STATE OUTPUTS, MONOLITHIC SILICON

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

### 6. SUBMITTER

a. NAME *(Last, First Middle Initial)*

b. ORGANIZATION

c. ADDRESS *(Include Zip Code)*

d. TELEPHONE *(Include Area Code)*  
(1) Commercial  
(2) DSN  
*(If applicable)*

7. DATE SUBMITTED  
(YYYYMMDD)

### 8. PREPARING ACTIVITY

a. NAME  
Defense Supply Center, Columbus

b. TELEPHONE *(Include Area Code)*  
(1) Commercial 614-692-0536      (2) DSN 850-0536

c. ADDRESS *(Include Zip Code)*  
DSCC-VA  
P. O. Box 3990  
Columbus, Ohio 43216-5000

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8725 John J. Kingman Road, Suite 2533  
Fort Belvoir, Virginia 22060-6221  
Telephone (703)767-6888 DSN 427-6888