

INCH-POUND

MIL-M-38510/3G  
w/AMENDMENT 1  
3 April 2012  
SUPERSEDING  
MIL-M-38510/3G  
28 October 2003

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, BIPOLAR, TTL, NAND BUFFERS MONOLITHIC SILICON

Inactive for new design after 07 September 1995

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

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

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, TTL, positive NAND buffer microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3)

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

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	Dual, 4-input, positive NAND buffer
02	Quadruple, 2-input positive NAND buffer
03	Quadruple, 2-input positive NAND buffer (open collector output)

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

1.2.3 Case outline. The case outline 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>
A <u>1/</u>	GDFP5-F14 or CDFP6-F14	14	Flat pack
B <u>1/</u>	GDFP4-14	14	Flat pack
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack

1/ Inactive package case outline.

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime  
ATTN: DLA Land and Maritime, 3990 East Broad St., Columbus, OH 43218-3990, or email bipolar@dla.mil.  
Since contact information can change, you may want to verify the currency of this address information using  
the ASSIST Online database at <https://assist.daps.dla.mil>.

1.3 Absolute maximum ratings.

Supply voltage range .....	-0.5 V dc to +7.0 V dc
Input voltage range .....	-1.5 V dc at -12 mA to +5.5 V dc
Storage temperature range .....	-65°C to +150°C
Maximum power dissipation (P <sub>D</sub> ) .....	100 mW dc per buffer <u>2/</u>
Lead temperature (soldering, 10 seconds) .....	+300°C.
Junction temperature (T <sub>J</sub> ) .....	+175°C <u>3/</u>
Thermal resistance, junction-to-case (Θ <sub>JC</sub> ):	
Cases A, B, C, and D .....	See MIL-STD-1835

1.4 Recommended operating conditions.

Supply voltage (V <sub>CC</sub> ) .....	4.5 V dc minimum to 5.5 V dc maximum
Minimum high-level input voltage (V <sub>IH</sub> ) .....	2.0 V dc
Maximum low-level input voltage (V <sub>IL</sub> ) .....	0.7 V dc
Normalized fanout (each output) .....	30 maximum <u>4/</u>
Case operating temperature range (T <sub>C</sub> ) .....	-55°C to +125°C

2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

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

DEPARTMENT OF DEFENSE STANDARDS

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

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

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

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

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

4/ The device will fanout in both high and low levels to the specified number of inputs of the same device type as that being tested.

### 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 diagram and terminal connections shall be as specified on figure 1.

3.3.2 Truth tables and logic equations. The truth tables and logic equations 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. 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 2 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ +125°C	Device type	Limits		Units
				Min	Max	
High-level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, V <sub>IN</sub> = 0.8 V, <u>1/</u> I <sub>OH</sub> = -1.2 mA	01, 02	2.4		V
Low-level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 48 mA, <u>1/</u> V <sub>IN</sub> = 2.0 V for all inputs of gate under test	01, 02, 03		0.4	V
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V, I <sub>IN</sub> = -12 mA, T <sub>C</sub> = +25°C	01, 02, 03		-1.5	V
High-level input current	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 2.4 V <u>2/</u>	01, 02, 03		40	μA
High-level input current	I <sub>IH2</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 5.5 V <u>2/</u>	01, 02, 03		100	μA
Low-level input current	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0.4 V <u>1/</u>	01, 02, 03		-1.6	mA
Short-circuit output current	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V <u>2/ 3/</u>	01, 02	-20	-70	mA
Maximum collector cut-off-current	I <sub>CEX</sub>	V <sub>OH</sub> = 5.5 V V <sub>CC</sub> = 4.5 V, V <sub>IN</sub> = 0.7 V	03		250	μA
High-level supply current	I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0 V <u>2/</u>	01		8	mA
			02		15.5	mA
			03		8.5	mA
Low-level supply current	I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 5.5 V <u>1/</u>	01		27	mA
			02		54	mA
			03		54	mA
Propagation delay time high-to-low level	t <sub>PHL</sub>	C <sub>L</sub> = 125 pF ± 10%, R <sub>L</sub> = 133 Ω ± 5%	01, 02	3	30	ns
			03	3	30	
Propagation delay time low-to-high level	t <sub>PLH</sub>	C <sub>L</sub> = 125 pF ± 10%, R <sub>L</sub> = 133 Ω ± 5%	01, 02, 03	3	38	ns

1/ All unspecified inputs at 5.5 volts.

2/ All unspecified inputs grounded.

3/ Not more than one output should be shorted at a 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, 9	1*, 2, 3, 9
Group A test requirements	1, 2, 3, 9, 10, 11	1, 2, 3, 9, 10, 11
Group B electrical test parameters when using the method 5005 QCI option	1,2,3, 9,10,11	N/A
Group C end-point electrical parameters	1, 2, 3, 9, 10, 11	1, 2, 3
Group D end-point electrical parameters	1, 2, 3	1, 2, 3

\*PDA applies to subgroup 1 (see 4.3c).

#### 4. VERIFICATION.

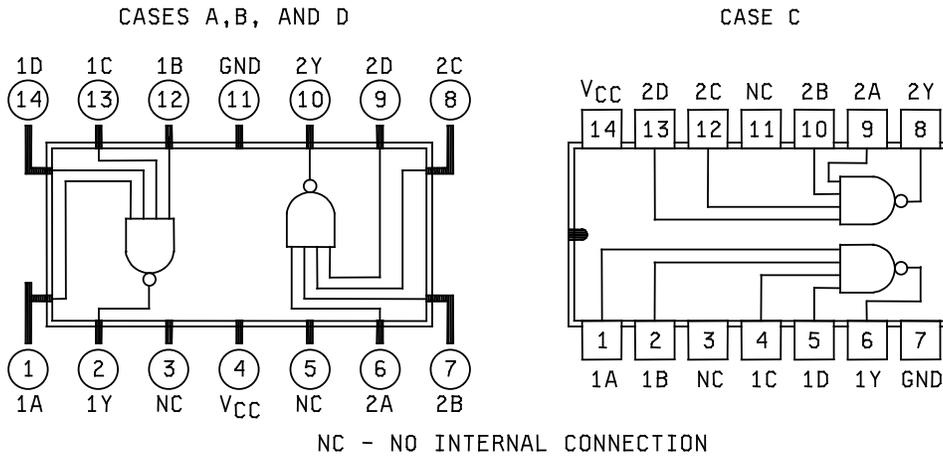
4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as described herein.

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.

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

DEVICE TYPE 01



DEVICE TYPES 02 AND 03  
CASES A, B, C, AND D

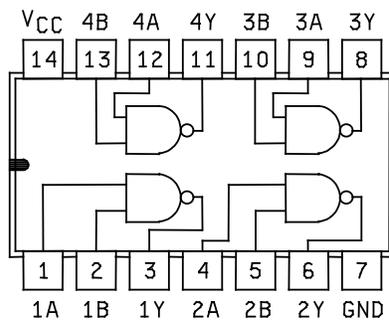


Figure 1. Logic diagrams and terminal connections (top views).

Device type 01

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

Positive logic  $Y = \overline{ABCD}$

Device types 02 and 03

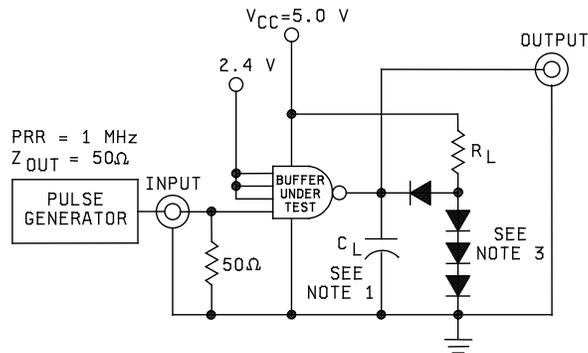
Truth table each gate		
INPUT		OUTPUT
A	B	Y
L	L	H
H	L	H
L	H	H
H	H	L

Positive logic  $Y = \overline{AB}$

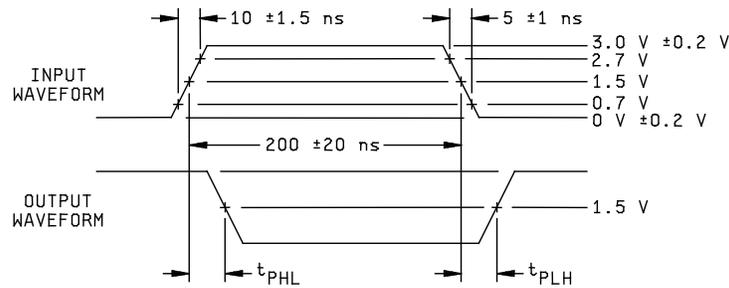
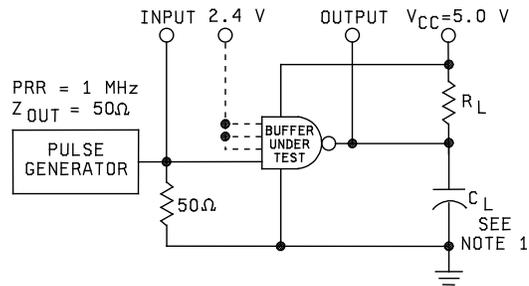
FIGURE 2. Truth tables.

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DEVICE TYPES 01 AND 02



DEVICE TYPE 03



Notes:

1. Including scope probe, wiring, and stray capacitance, without package in test fixture,  $C_L = 125 \text{ pF} \pm 10\%$ .
2. Voltage measurements are to be made with respect to network ground terminal.
3. All diodes are 1N3064 or equivalent.
4.  $R_L = 133 \Omega \pm 5\%$ .

FIGURE 4. Switching time test circuit.

TABLE III. Group A inspection for device type 01.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open)

Subgroup	Symbol	MIL-STD-883 method	Cases A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit	
			Case C	1	6	3	14	11	9	10	12	13	8	7	2	4	5		Min	Max		
			Test no.	1A	1Y	NC	V <sub>CC</sub>	NC	2A	2B	2C	2D	2Y	GND	1B	1C	1D					
1 T <sub>c</sub> = +25°C	V <sub>OL</sub>	3007	1	2.0 V	48 mA		4.5 V		5.5 V	5.5 V	5.5 V	5.5 V		GND	2.0 V	2.0 V	2.0 V	1Y		0.4	V	
		3007	2	5.5 V			"		2.0 V	2.0 V	2.0 V	2.0 V	48 mA	"	5.5 V	5.5 V	5.5 V	2Y		0.4	"	
	V <sub>OH</sub>	3005	3	0.8 V	-1.2 mA		"			5.5 V	5.5 V	5.5 V	5.5 V		"	5.5 V	"	"	1Y	2.4		"
		"	4	5.5 V	"		"		"	"	"	"	"		"	0.8 V	"	"	1Y	"		"
		"	5	"	"		"		"	"	"	"	"		"	5.5 V	0.8 V	"	1Y	"		"
		"	6	"	"		"		"	"	"	"	"		"	"	5.5 V	0.8 V	1Y	"		"
		"	7	"	"		"		"	"	"	"	"		"	"	"	5.5 V	2Y	"		"
		"	8	"	"		"		"	"	0.8 V	0.8 V	"	-1.2 mA	"	"	"	5.5 V	2Y	"		"
		"	9	"	"		"		"	"	5.5 V	5.5 V	0.8 V	"	"	"	"	"	2Y	"		"
		"	10	"	"		"		"	"	5.5 V	5.5 V	0.8 V	"	"	"	"	"	2Y	"		"
	V <sub>IC</sub>			11	-12 mA			"							"	-12 mA			1A		-1.5	"
				12				"							"				1B			"
				13				"							"				1C			"
				14				"							"				1D			"
				15				"							"				2A			"
				16				"			-12 mA				"				2B			"
				17				"				-12 mA			"				2C			"
				18				"					-12 mA		"				2D			"
	I <sub>OS</sub>	3011	19	GND	GND			5.5 V		GND	GND	GND	GND	GND	"	GND	GND	GND	1Y	-20	-70	mA
		3011	20					"							"				2Y	-20	-70	mA
	I <sub>IH1</sub>	3010	21	2.4 V				"		"	"	"	"		"	GND	GND	GND	1A		40	μA
		"	22	GND				"		"	"	"	"		"	2.4 V	"	"	1B			"
		"	23	"				"		"	"	"	"		"	GND	2.4 V	"	1C			"
		"	24	"				"		"	"	"	"		"	"	GND	2.4 V	1D			"
		"	25	"				"		"	"	"	"		"	"	"	2.4 V	2A			"
		"	26	"				"		"	2.4 V	2.4 V	"		"	"	"	"	2B			"
		"	27	"				"		"	GND	GND	2.4 V		"	"	"	"	2C			"
		"	28	"				"		"	"	GND	2.4 V		"	"	"	"	2D			"
	I <sub>IH2</sub>	"	29	5.5 V				"		"	"	"	GND		"	"	"	"	1A		100	"
		"	30	GND				"		"	"	"	"		"	"	"	"	1B			"
		"	31	"				"		"	"	"	"		"	5.5 V	"	"	1C			"
		"	32	"				"		"	"	"	"		"	GND	5.5 V	"	1D			"
		"	33	"				"		"	"	"	"		"	"	"	5.5 V	2A			"
		"	34	"				"		"	5.5 V	"	"		"	"	"	"	2B			"
		"	35	"				"		"	GND	5.5 V	5.5 V		"	"	"	"	2C			"
		"	36	"				"		"	GND	GND	GND	5.5 V		"	"	"	2D			"
	I <sub>IL</sub>	3010	37	0.4 V				"		5.5 V	5.5 V	5.5 V	"		"	5.5 V	5.5 V	5.5 V	1A		-1.6	mA
		"	38	5.5 V				"		"	"	"	"		"	0.4 V	5.5 V	"	1B			"
		"	39	"				"		"	"	"	"		"	5.5 V	0.4 V	"	1C			"
		"	40	"				"		"	"	"	"		"	"	5.5 V	0.4 V	1D			"
		"	41	"				"		"	0.4 V	"	"		"	"	"	5.5 V	2A			"
		"	42	"				"		"	5.5 V	0.4 V	"		"	"	"	"	2B			"
		"	43	"				"		"	"	5.5 V	0.4 V		"	"	"	"	2C			"
		"	44	"				"		"	"	"	0.4 V	0.4 V		"	"	"	2D			"
	I <sub>CCL</sub>	"	45	"			"		"	"	5.5 V	5.5 V		"	"	"	"	V <sub>CC</sub>		27	"	
	I <sub>CCH</sub>	"	46	GND			"		"	GND	GND	GND	GND		"	GND	GND	GND	V <sub>CC</sub>		8	"

TABLE III. Group A inspection for device type 01 – Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open)

Subgroup	Symbol	MIL-STD-883 method	Cases A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case C	1	6	3	14	11	9	10	12	13	8	7	2	4	5		Min	Max	
			Test no.	1A	1Y	NC	V <sub>CC</sub>	NC	2A	2B	2C	2D	2Y	GND	1B	1C	1D				
2	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = 125° C, and V <sub>I C</sub> tests are omitted.																				
3	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = -55° C, and V <sub>I C</sub> tests are omitted.																				
9 T <sub>C</sub> = +25°C	t <sub>PHL</sub>	3003 (Fig. 3)	47	IN	OUT		5.0 V							GND	2.4 V	2.4 V	2.4 V	1A to 1Y	3	22	ns
	t <sub>PHL</sub>		48				"		IN	2.4 V	2.4 V	2.4 V	OUT	"				2A to 2Y	"	22	"
	t <sub>PLH</sub>	"	49	IN	OUT		"							"	2.4 V	2.4 V	2.4 V	1A to 1Y	"	25	"
	t <sub>PLH</sub>		50				"		IN	2.4 V	2.4 V	2.4 V	OUT	"				2A to 2Y	"	25	"
10 T <sub>C</sub> = +125°C	t <sub>PHL</sub>	3003 (Fig. 3)	51	IN	OUT		"							"	2.4 V	2.4 V	2.4 V	1A to 1Y	"	27	"
	t <sub>PHL</sub>		52				"		IN	2.4 V	2.4 V	2.4 V	OUT	"				2A to 2Y	"	27	"
	t <sub>PLH</sub>	"	53	IN	OUT		"							"	2.4 V	2.4 V	2.4 V	1A to 1Y	"	30	"
	t <sub>PLH</sub>		54				"		IN	2.4 V	2.4 V	2.4 V	OUT	"				2A to 2Y	"	30	"
11	Same tests, terminal conditions and limits as for subgroup 10, except T <sub>C</sub> = -55°C.																				

TABLE III. Group A inspection for device type 02.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open)

Subgroup	Symbol	MIL-STD-883 method	Cases A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit		
			Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max			
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V <sub>CC</sub>						
1 T <sub>C</sub> = +25°C	V <sub>OL</sub>	3007	1	2.0 V	2.0 V	48 mA	5.5 V	5.5 V		GND		5.5 V	5.5 V		5.5 V	5.5 V	4.5 V	1Y		0.4	V		
		"	2	5.5 V	5.5 V		2.0 V	2.0 V	48 mA	"	48 mA	5.5 V	5.5 V		5.5 V	5.5 V	"	2Y	"	"	"		
		"	3	"	"	"	5.5 V	5.5 V	"	"	"	2.0 V	2.0 V	48 mA	"	"	"	3Y	"	"	"	"	
		"	4	"	"	"	"	"	"	"	"	5.5 V	5.5 V	"	2.0 V	2.0 V	"	4Y	"	"	"	"	
	V <sub>OH</sub>	3006	5	0.8 V	"	-1.2 mA	"	"	"	"	"	"	"	"	5.5 V	5.5 V	"	1Y	2.4		"	"	
		"	6	5.5 V	0.8 V	-1.2 mA	"	"	"	"	"	"	"	"	"	"	"	1Y	"	"	"	"	
		"	7	"	5.5 V	"	0.8 V	"	"	-1.2 mA	"	"	"	"	"	"	"	2Y	"	"	"	"	
		"	8	"	"	"	5.5 V	0.8 V	-1.2 mA	"	"	"	"	"	"	"	"	2Y	"	"	"	"	
		"	9	"	"	"	"	5.5 V	0.8 V	-1.2 mA	"	-1.2 mA	0.8 V	"	"	"	"	3Y	"	"	"	"	
		"	10	"	"	"	"	"	"	"	"	-1.2 mA	5.5 V	0.8 V	"	"	"	3Y	"	"	"	"	
		"	11	"	"	"	"	"	"	"	"	"	"	0.8 V	-1.2 mA	0.8 V	"	4Y	"	"	"	"	
		"	12	"	"	"	"	"	"	"	"	"	"	5.5 V	-1.2 mA	5.5 V	0.8 V	4Y	"	"	"	"	
	V <sub>IC</sub>		13	-12 mA	-12 mA													1A		-1.5	"	"	
			14															1B		"	"	"	
			15		-12 mA													2A		"	"	"	
			16				-12 mA											2B		"	"	"	
			17					-12 mA					-12 mA					3A		"	"	"	
			18											-12 mA				3B		"	"	"	
	I <sub>OS</sub>	3011	21	GND	GND	GND	GND	GND	GND	GND	"	GND	GND	GND				5.5 V	1Y	-20	-70	mA	
		"	22								"							"	2Y	"	"	"	
		"	23								"	GND	GND	GND				"	3Y	"	"	"	
		"	24								"				GND	GND	GND	"	4Y	"	"	"	
		I <sub>IH1</sub>	3010	25	2.4 V	GND		GND	GND			"		GND	GND		"	"	"	1A		40	μA
			"	26	GND	2.4 V		GND	"			"		"	"		"	"	"	1B		"	"
"	27		"	GND		2.4 V	"			"		"	"		"	"	"	2A		"	"		
"	28		"	"		GND	"			"		"	"		"	"	"	2B		"	"		
"	29		"	"		"	2.4 V			"		"	"		"	"	"	3A		"	"		
"	30		"	"		"	GND			"		2.4 V	"		"	"	"	3B		"	"		
"	31		"	"		"	"			"		"	2.4 V		"	"	"	4A		"	"		
"	32		"	"		"	"			"		"	GND	2.4 V	2.4 V	2.4 V	"	4B		"	"		
I <sub>IH2</sub>	"	33	5.5 V	"		"	"			"		"	"		"	GND	"	1A		100	"		
	"	34	GND	5.5 V		"	"			"		"	"		"	"	"	1B		"	"		
	"	35	"	GND		5.5 V	"			"		"	"		"	"	"	2A		"	"		
	"	36	"	"		GND	"			"		"	"		"	"	"	2B		"	"		
	"	37	"	"		"	5.5 V			"		"	"		"	"	"	3A		"	"		
	"	38	"	"		"	GND			"		5.5 V	"		"	"	"	3B		"	"		
	"	39	"	"		"	"			"		"	GND	5.5 V	"	"	"	4A		"	"		
	"	40	"	"		"	"			"		"	GND	GND	5.5 V	5.5 V	"	4B		"	"		
I <sub>IL</sub>	"	41	0.4 V	5.5 V		5.5 V	5.5 V			"		5.5 V	5.5 V		5.5 V	"	"	1A		-1.6	mA		
	"	42	5.5 V	0.4 V		5.5 V	"			"		"	"		"	"	"	1B		"	"		
	"	43	"	5.5 V		0.4 V	"			"		"	"		"	"	"	2A		"	"		
	"	44	"	"		5.5 V	"			"		"	"		"	"	"	2B		"	"		
	"	45	"	"		"	"			"		"	"		"	"	"	3A		"	"		
	"	46	"	"		"	0.4 V			"		0.4 V	"		"	"	"	3B		"	"		
	"	47	"	"		"	"			"		5.5 V	0.4 V		0.4 V	"	"	4A		"	"		
	"	48	"	"		"	"			"		"	5.5 V	5.5 V	5.5 V	0.4 V	"	4B		"	"		
I <sub>CCL</sub>	"	49	5.0 V	5.0 V		5.0 V	5.0 V			"		5.0 V	5.0 V		5.0 V	5.0 V	V <sub>CC</sub>		54	"			
I <sub>CCH</sub>	"	50	GND	GND		GND	GND			"		GND	GND		GND	GND	V <sub>CC</sub>		15.5	"			

TABLE III. Group A inspection for device type 02 – Continued.  
Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open)

Subgroup	Symbol	MIL-STD-883 method	Cases A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V <sub>CC</sub>				
2	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = +125°C and V <sub>IC</sub> tests are omitted.																				
3	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = -55°C and V <sub>IC</sub> tests are omitted.																				
9 T <sub>C</sub> = +25°C	t <sub>PHL</sub>	3003 (Fig. 3)	51	IN	2.4 V	OUT	IN	2.4 V	OUT	GND							5.0 V	1A to 1Y	3	22	ns
		"	52							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"
		"	53							"				OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	54							"						"	"	4A to 4Y	"	"	"
9 T <sub>C</sub> = +25°C	t <sub>PLH</sub>	3003 (Fig. 3)	55	IN	2.4 V	OUT	IN	2.4 V	OUT	"							"	1A to 1Y	"	25	"
		"	56							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"
		"	57							"				OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	58							"						"	"	4A to 4Y	"	"	"
10 T <sub>C</sub> = +125°C	t <sub>PHL</sub>	3003 (Fig. 3)	59	IN	2.4 V	OUT	IN	2.4 V	OUT	"							"	1A to 1Y	"	30	"
		"	60							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"
		"	61							"				OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	62							"						"	"	4A to 4Y	"	"	"
10 T <sub>C</sub> = +125°C	t <sub>PLH</sub>	3003 (Fig. 3)	63	IN	2.4 V	OUT	IN	2.4 V	OUT	"							"	1A to 1Y	"	30	"
		"	64							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"
		"	65							"				OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	66							"						"	"	4A to 4Y	"	"	"
11	Same tests, terminal conditions and limits as for subgroup 10, except T <sub>C</sub> = -55°C.																				

TABLE III. Group A inspection for device type 03.  
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 A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit			
			Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max				
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V <sub>CC</sub>							
1 T <sub>C</sub> = +25°C	V <sub>OL</sub>	3007	1	2.0 V	2.0 V	48 mA	5.5 V	5.5 V										1Y		0.4	V			
			2	5.5 V	5.5 V		2.0 V	2.0 V	48 mA	GND									2Y					
			3				5.5 V	5.5 V				48 mA								3Y				
			4												48 mA					4Y				
	I <sub>CEX</sub>			5	0.7 V		5.5 V												1Y		250	μA		
				6	5.5 V	0.7 V	5.5 V													1Y				
				7		5.5 V		0.7 V													2Y			
				8				5.5 V		0.7 V		5.5 V									2Y			
				9						5.5 V				5.5 V							3Y			
				10																	3Y			
				11									5.5 V	0.7 V							4Y			
				12										5.5 V		5.5 V	5.5 V	0.7 V			4Y			
	V <sub>IC</sub>			13	-12 mA													4.5	1A		-1.5	V		
				14		-12 mA														1B				
				15																2A				
				16						-12 mA											2B			
				17							-12 mA										3A			
				18																	3B			
				19																	4A			
				20																	4B			
I <sub>IH1</sub>	3010		21	2.4 V	GND		GND	GND					GND	GND		GND	GND	5.5 V	1A		40	μA		
			22	GND	2.4 V		GND													1B				
			23		GND		2.4 V														2A			
			24					GND	2.4 V												2B			
			25							2.4 V											3A			
			26							GND											3B			
			27																		4A			
			28																		4B			
I <sub>IH2</sub>			29	5.5 V															1A		100			
			30	GND	5.5 V															1B				
			31		GND																2A			
			32					5.5 V													2B			
			33						5.5 V												3A			
			34							5.5 V				5.5 V							3B			
			35																		4A			
			36																		4B			
I <sub>IL</sub>	3009		37	0.4 V	5.5 V		5.5 V	5.5 V					5.5 V	5.5 V		5.5 V			1A		-1.6	mA		
			38	5.5 V	0.4 V		5.5 V													1B				
			39		5.5 V			0.4 V													2A			
			40					5.5 V													2B			
			41						0.4 V												3A			
			42							5.5 V											3B			
			43																		4A			
			44																		4B			
I <sub>CCL</sub>	3005	45														5.5 V	V <sub>CC</sub>		54					
I <sub>CCH</sub>	3005	46	GND	GND		GND	GND					GND	GND		GND	GND		V <sub>CC</sub>		8.5				

TABLE III. Group A inspection for device type 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 method	Cases A,B,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit	
			Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max		
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V <sub>CC</sub>					
2	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = +125°C and V <sub>IC</sub> tests are omitted.																					
3	Same tests, terminal conditions and limits as for subgroup 1, except T <sub>C</sub> = -55°C and V <sub>IC</sub> tests are omitted.																					
9 T <sub>C</sub> = +25°C	t <sub>PHL</sub>	3003 (Fig. 3)	47	IN	2.4 V	OUT	IN	2.4 V	OUT	GND							5.0 V	1A to 1Y	3	22	ns	
		"	48							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"	
		"	49							"					OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	50							"							"	4A to 4Y	"	"	"	
10 T <sub>C</sub> = +125°C	t <sub>PLH</sub>	3003 (Fig. 3)	51	IN	2.4 V	OUT	IN	2.4 V	OUT	"							"	1A to 1Y	3	25	"	
		"	52							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"	
		"	53							"					OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	54							"							"	4A to 4Y	"	"	"	
11	t <sub>PHL</sub>	3003 (Fig. 3)	55	IN	2.4 V	OUT	IN	2.4 V	OUT	GND							"	1A to 1Y	"	30	"	
		"	56							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"	
		"	57							"					OUT	IN	2.4 V	"	3A to 3Y	"	"	"
		"	58							"							"	4A to 4Y	"	"	"	
11	t <sub>PLH</sub>	3003 (Fig. 3)	59	IN	2.4 V	OUT	IN	2.4 V	OUT	"							"	1A to 1Y	"	38	"	
		"	60							"	OUT	IN	2.4 V				"	2A to 2Y	"	"	"	
		"	61							"							"	3A to 3Y	"	"	"	
		"	62							"							"	4A to 4Y	"	"	"	
11	Same tests, terminal conditions and limits as for subgroup 10, except T <sub>C</sub> = -55° C.																					

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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, 7, and 8 shall be omitted.

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

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

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

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. 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 voltage values given are referenced to the microcircuit ground terminals. Currents given are conventional current and positive when flowing into the referenced terminal.

## 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

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

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

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

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

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

- GND ----- Ground zero voltage potential.
- V<sub>IN</sub> ----- Voltage level at an input terminal
- V<sub>IC</sub> ----- Input clamp voltage

6.6 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 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.

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

<u>Military device type</u>	<u>Generic-industry type</u>
01	5440
02	5437
03	5438

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

Custodians:  
Army - CR  
Navy - EC  
Air Force - 85  
DLA - CC

Preparing activity:  
DLA - CC  
Project 5962-2012-002

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

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