

INCH-POUND

MIL-M-38510/326C
20 August 2003
SUPERSEDING
MIL-M-38510/326B
24 July 1984

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL,
DEMULTIPLEXERS, 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, demultiplexer microcircuits. 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 For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).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	Dual 2-line to 4-line decoder/demultiplexer (totem pole output)
02	Dual 2-line to 4-line decoder/demultiplexer (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 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>
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
2	CQCC1-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 dc to 7.0 V dc
Input voltage range	-1.5 V dc at -18 mA to 5.5 V dc
Storage temperature range	-65° to +150°C
Maximum power dissipation (P _D) <u>1/</u>	55 mW dc
Output current	4 mA dc
Lead temperature (soldering, 10 seconds)	300°C
Thermal resistance, junction to case (θ _{JC}):	
Cases E, F, and 2	(See MIL-STD-1835)
Junction temperature (T _J) <u>2/</u>	+175°C

1.4 Recommended operating conditions.

Supply voltage (V _{CC})	4.5 V dc minimum to 5.5 V dc maximum
Minimum high level input voltage (V _{IH})	2.0 V dc
Maximum low level input voltage (V _{IL})	0.7 V dc
Case operating temperature range (T _C)	-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.)

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.

1/ Must withstand the added P_D due to short-circuit test (e.g., I_{OS}).

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

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

3.3.2 Logic diagrams. The logic diagrams shall be specified on figure 2.

3.3.3 Truth table. The truth table shall be as specified on figure 3.

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

3.3.5 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 11 (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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C	Device type	Limits		Unit
				Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V, V _{IN} = 2.0 V I _{OH} = -400 μA	01	2.5		V
Collector cutoff current	I _{CEX}	V _{CC} = 4.5 V, V _{IN} = 2.0 V V _{OH} = 5.5 V	02		100	μA
Low level output voltage	V _{OL}	V _{CC} = 4.5 V, V _{IL} = 0.7 V, V _{IH} = 2.0 V, I _{OL} = 4 mA	All		0.4	V
Input diode clamp voltage	V _{IC}	V _{CC} = 4.5 V, I _{IN} = -18 mA, T _C = +25°C	All		-1.5	V
Low level input current	I _{IL1}	V _{CC} = 5.5 V, V _{IN} = 0.4 V	All	-0.03	-0.38	mA
High level input current	I _{IH1}	V _{CC} = 5.5 V, V _{IN} = 2.7 V	All		20	μA
	I _{IH2}	V _{CC} = 5.5 V, V _{IN} = 5.5 V	All		100	μA
Short circuit output current	I _{OS}	V _{CC} = 5.5 V, V _{IH} = 5.5 V, V _{IL} = GND	01	-15	-100	mA
Supply current	I _{CC}	V _{CC} = 5.5 V	All		10	mA
Propagation delay time, low-to-high level, A to Y (2 logic levels)	t _{PLH1}	V _{CC} = 5.0 V C _L = 50 pF ± 10%, R _L = 2 kΩ ± 10%	01	2	26	ns
			02	2	65	
Propagation delay time, low-to-high level, B to Y (2 logic levels)	t _{PLH2}		01	2	26	ns
			02	2	65	
Propagation delay time, low-to-high level, 1G to 1Y0	t _{PLH3}		01	2	26	ns
			02	2	58	
Propagation delay time, low-to-high level, 2G to 2Y0	t _{PLH4}		01	2	26	ns
			02	2	58	
Propagation delay time, low-to-high level, 2C to 2Y0	t _{PLH5}		01	2	26	ns
			02	2	58	
Propagation delay time, low-to-high level, B to Y (3 logic levels)	t _{PLH6}		01	2	40	ns
			02	2	70	
Propagation delay time, low-to-high level, A to Y (3 logic levels)	t _{PLH7}		01	2	40	ns
			02	2	70	
Propagation delay time, low-to-high level, 1C to 1Y0	t _{PLH8}		01	2	42	ns
			02	2	70	

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Device type	Limits		Unit
				Min	Max	
Propagation delay time, high-to-low level, A to Y (2 logic levels)	t_{PHL1}	$V_{CC} = 5.0 \text{ V}$ $C_L = 50 \text{ pF} \pm 10\%$, $R_L = 2 \text{ k}\Omega \pm 10\%$	01	2	46	ns
			02	2	73	
Propagation delay time, high-to-low level, B to Y (2 logic levels)	t_{PHL2}		01	2	46	ns
			02	2	73	
Propagation delay time, high-to-low level, 1G to 1Y0	t_{PHL3}		01	2	46	ns
			02	2	73	
Propagation delay time, high-to-low level, 2G to 2Y0	t_{PHL4}		01	2	46	ns
			02	2	73	
Propagation delay time, high-to-low level, 2C to 2Y0	t_{PHL5}		01	2	46	ns
			02	2	73	
Propagation delay time, high-to-low level, B to Y (3 logic levels)	t_{PHL6}		01	2	46	ns
			02	2	72	
Propagation delay time, high-to-low level, A to Y (3 logic levels)	t_{PHL7}		01	2	46	ns
			02	2	72	
Propagation delay time, high-to-low level, 1C to 1Y0	t_{PHL8}		01	2	43	ns
			02	2	69	

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, 8, 9, 10, 11	1, 2, 3, 7, 8, 9, 10, 11
Group B electrical test parameters when using the method 5005 QCI option	1, 2, 3, 7, 8 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 7, 8 9, 10, 11	1, 2, 3
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, and 6 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. 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.

Terminal number	Terminal symbols device types 01 and 02	
	Cases E and F	Case 2
1	DATA 1C	NC
2	STROBE 1G	DATA 1C
3	SELECT B	STROBE 1G
4	1Y3	SELECT B
5	1Y2	1Y3
6	1Y1	NC
7	1Y0	1Y2
8	GND	1Y1
9	2Y0	1Y0
10	2Y1	GND
11	2Y2	NC
12	2Y3	2Y0
13	SELECT A	2Y1
14	STROBE 2G	2Y2
15	DATA 2C	2Y3
16	V _{cc}	NC
17		SELECT A
18		STROBE 2G
19		DATA 2C
20		V _{cc}

FIGURE 1. Terminal connections.

DEVICE TYPES 01 AND 02

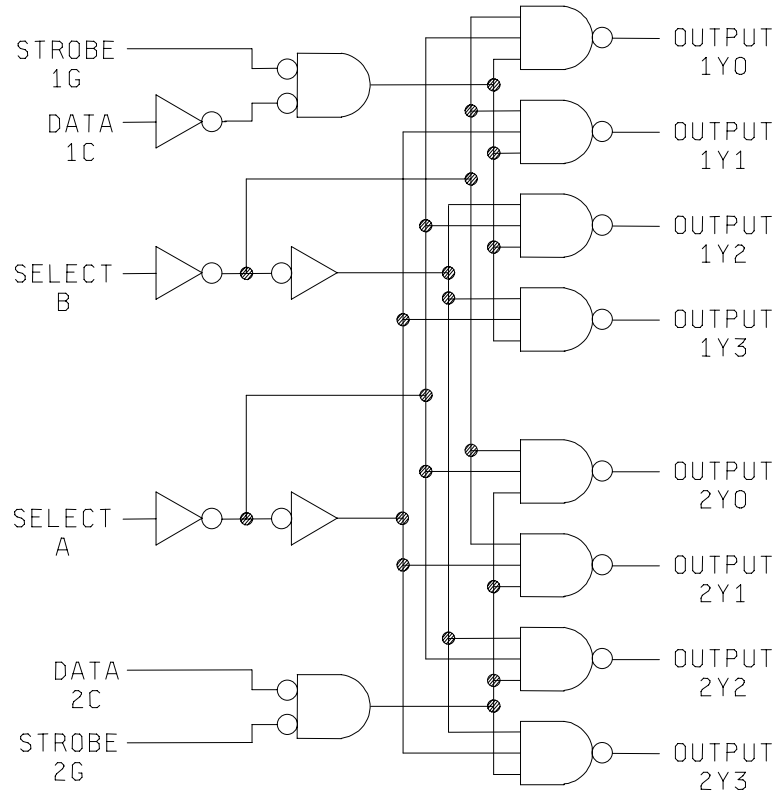


FIGURE 2. Logic diagram.

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Device types 01, 02

Function Tables
2-line to 4-line decoder
or 1-line to 4-line demultiplexer

Inputs				Outputs			
Select		Strobe	Data	1Y0	1Y1	1Y2	1Y3
B	A	1G	1C				
X	X	H	X	H	H	H	H
L	L	L	H	L	H	H	H
L	H	L	H	H	L	H	H
H	L	L	H	H	H	L	H
H	H	L	H	H	H	H	L
X	X	X	L	H	H	H	H

Inputs				Outputs			
Select		Strobe	Data	2Y0	2Y1	2Y2	2Y3
B	A	2G	2C				
X	X	H	X	H	H	H	H
L	L	L	L	L	H	H	H
L	H	L	L	H	L	H	H
H	L	L	L	H	H	L	H
H	H	L	L	H	H	H	L
X	X	X	H	H	H	H	H

Function Table
3-line to 8-line decoder
or 1-line to 8-line demultiplexer

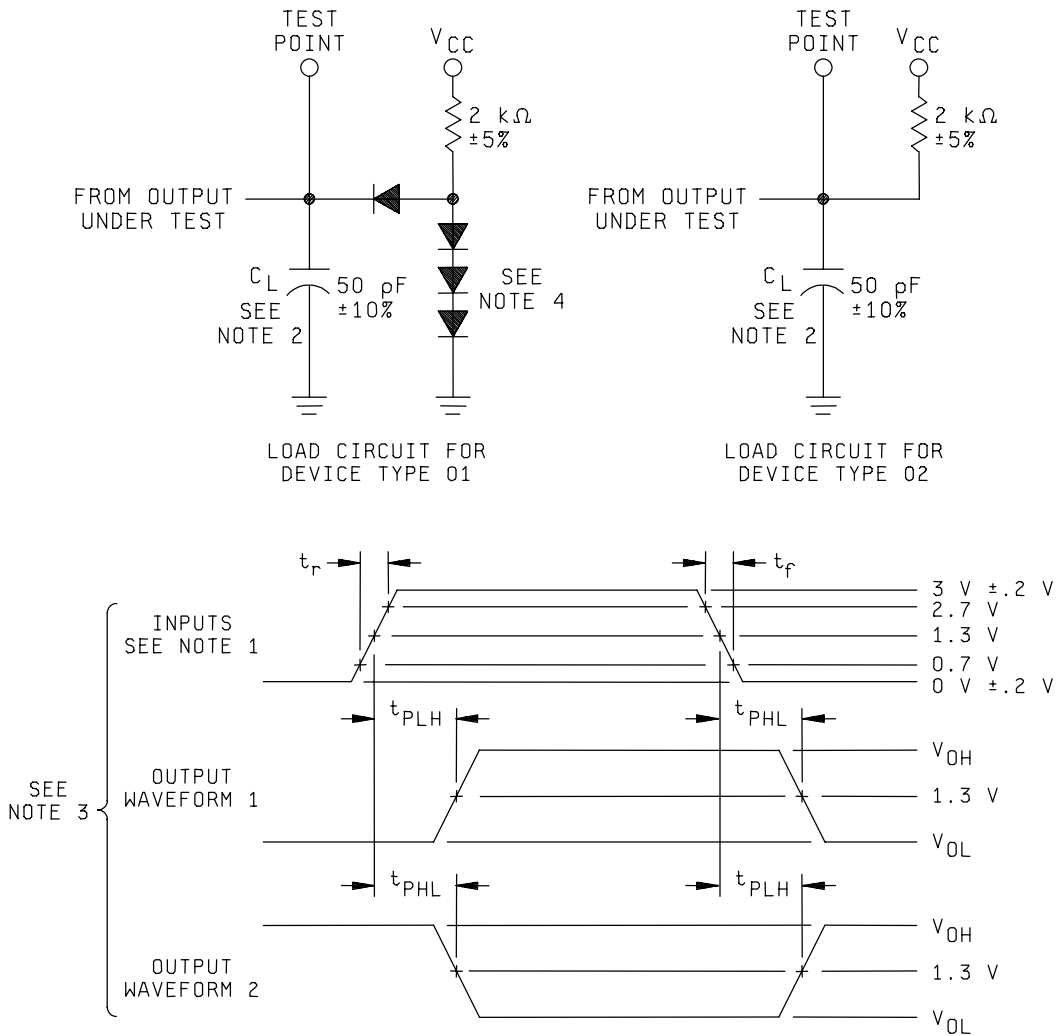
Inputs				Outputs							
Select			Strobe or data	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C†	B	A	G‡	2Y0	2Y1	2Y2	2Y3	1Y0	1Y1	1Y2	1Y3
X	X	X	H	H	H	H	H	H	H	H	H
L	L	L	L	L	H	H	H	H	H	H	H
L	L	H	L	H	L	H	H	H	H	H	H
L	H	L	L	H	H	L	H	H	H	H	H
L	H	H	L	H	H	H	L	H	H	H	H
H	L	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	L	H	H
H	H	L	L	H	H	H	H	H	H	L	H
H	H	H	L	H	H	H	H	H	H	H	L

C† = Inputs 1C and 2C connected together.

G‡ = Inputs 1G and 2G connected together.

H = High level, L = low level, X = irrelevant.

FIGURE 3. Truth table.



NOTES:

1. The pulse generator has the following characteristics: $t_r \leq 15$ ns, $t_f \leq 6$ ns, $PRR \leq 1.0$ MHz.
2. C_L includes probe and jig capacitance.
3. Input - output waveform combination in accordance with the truth tables (see figure 3).
4. All diodes are 1N3064 or equivalent.

FIGURE 4. Switching times for device types 01 and 02.

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

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit				
			Case 1/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20		Min	Max					
			Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C	V _{CC}								
1 T _c = 25°C	V _{OH}	3006	1		2.0 V						-400 μA	-400 μA	GND							4.5 V	1Y0	2.5		V			
			2		"																	"					
			3		"																	"					
			4		"																	"					
			5																			"					
			6																			"					
			7																			"					
			8																			"					
	V _{OL}	3007	9	2.0 V	0.7 V	0.7 V						4 mA	4 mA									1Y0		0.4			
			10	"	"	0.7 V																	1Y1				
			11	"	"	2.0 V																	"				
			12	"	"	2.0 V	4 mA																"				
			13			0.7 V																	"				
			14			0.7 V																	"				
			15			2.0 V																	"				
			16			2.0 V																	"				
	V _{IC}		17	-18 mA																		"		-1.5			
			18		-18 mA																		"				
			19			-18 mA																	"				
			20																				"				
			21																				"				
			22																				"				
	I _{IL1}	3009	23	0.4 V																		"					
			24		0.4 V																		"				
			25			0.4 V																	"				
			26																				"				
			27																				"				
			28																				"				
	I _{IH1}	3010	29	2.7 V																		"		20		μA	
			30		2.7 V																	"					
			31			2.7 V																"					
			32																			"					
			33																			"					
			34																			"					
	I _{IH2}		35	5.5 V																		"		100			
			36		5.5 V																	"					
			37			5.5 V																"					
			38																			"					
			39																			"					
			40																			"					
	I _{OS}		41		5.5 V																	"		3/	3/	mA	
			42		"																	"					
			43		"																	"					
			44																			"					
			45																			"					
			46																			"					
			47																			"					
			48																			"					
I _{CC}	3005	49	4.5 V	GND	4.5 V															"		10					
2	Same tests, terminal conditions, and limits as subgroup 1, except T _c = +125°C and V _{IC} tests are omitted.																										
3	Same tests, terminal conditions, and limits as subgroup 1, except T _c = -55°C and V _{IC} tests are omitted.																										

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 ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit					
			Case 1/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20		Min	Max						
			Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C	V _{CC}									
7	Truth table tests	3014	50	B	A	A	H	H	H	H	GND	H	H	H	H	A	2G	A	2C	V _{CC}	5/							
			51	"	"	B	"	"	"	"	"	"	"	"	"	A	"	"	"	"				"	"	"	"	
			52	"	"	A	"	"	"	"	"	"	"	"	"	B	"	"	"	"				"	"	"	"	"
			53	"	"	B	"	"	"	"	"	"	"	"	"	"	"	"	"	"				"	"	"	"	"
			54	A	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	B				"	"	"	"	"
			55	"	B	"	"	"	"	"	L	"	L	"	"	"	"	B	"	"				"	"	"	"	"
			56	"	"	"	"	"	"	"	L	H	"	H	L	"	A	"	"	"				"	"	"	"	"
			57	"	"	A	"	"	L	H	"	"	"	H	L	"	B	"	"	"				"	"	"	"	"
			58	"	"	"	"	L	H	"	"	"	"	"	H	L	A	"	"	"				"	"	"	"	"
			59	B	"	"	"	H	"	"	"	"	"	"	H	A	"	A	"	"				"	"	"	"	"
			60	B	A	"	"	H	"	"	"	"	"	"	H	A	A	A	"	"				"	"	"	"	"
61	B	A	B	H	"	"	"	"	"	"	"	H	B	A	A	"	"	"	"	"	"	"						
8	Same tests, terminal conditions, and limits as for subgroup 7 tests at T _C = +125°C and T _C = -55°C.																											
9	T _C = 25°C	3003 Fig. 4	62	4.5 V	GND	GND	"	"	"	OUT	GND	"	OUT	"	"	IN	"	GND	GND	5.0 V	A to 1Y0	2	20	ns				
			63	"	"	"	GND	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	A to 2Y0	"	"	"			
			64	4.5 V	GND	4.5 V	"	OUT	"	"	"	"	"	"	"	"	"	"	"	"	"	"	A to 1Y2	"	"	"		
			65	"	"	"	4.5 V	"	"	"	"	"	"	OUT	"	"	"	GND	GND	"	"	"	A to 2Y2	"	"	"		
			t _{PLH2}	66	4.5 V	GND	IN	"	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	B to 1Y0	"	"	"	
				67	"	"	"	"	"	"	"	"	"	"	OUT	"	"	GND	GND	GND	"	"	"	B to 2Y0	"	"	"	
				68	4.5 V	GND	"	"	"	"	"	OUT	"	"	"	"	"	4.5 V	"	"	"	"	"	B to 1Y1	"	"	"	
				69	"	"	"	"	"	"	"	"	"	"	OUT	"	"	4.5 V	GND	GND	"	"	"	B to 2Y1	"	"	"	
			t _{PLH3}	70	4.5 V	IN	GND	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	1G to 1Y0	"	"	"		
			t _{PLH4}	71	"	"	GND	"	"	"	"	"	OUT	"	"	"	GND	IN	GND	"	"	"	2G to 2Y0	"	"	"		
			t _{PLH5}	72	"	"	GND	"	"	"	"	"	OUT	"	"	"	GND	GND	IN	"	"	"	2C to 2Y0	"	"	"		
			t _{PLH6}	73	4.5 V	GND	IN	"	OUT	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	B to 1Y2	"	31	"	
				74	"	"	"	"	"	"	"	"	"	"	"	OUT	"	GND	GND	GND	"	"	"	B to 2Y2	"	"	"	
				75	4.5 V	GND	"	OUT	"	"	"	"	"	"	"	"	"	4.5 V	"	"	"	"	"	B to 1Y3	"	"	"	
				76	"	"	"	"	"	"	"	"	"	"	"	"	OUT	4.5 V	GND	GND	"	"	"	B to 2Y3	"	"	"	
			t _{PLH7}	77	4.5 V	GND	GND	"	"	"	OUT	"	"	"	"	"	"	IN	"	"	"	"	"	A to 1Y1	"	"	"	
				78	"	"	GND	"	"	"	"	"	"	"	"	OUT	"	"	GND	GND	"	"	"	A to 2Y1	"	"	"	
				79	"	"	4.5 V	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	"	A to 2Y3	"	"	"	
				80	4.5 V	GND	4.5 V	OUT	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	A to 1Y3	"	"	"	
			t _{PLH8}	81	IN	GND	GND	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	1C to 1Y0	"	32	"		
			t _{PHL1}	82	4.5 V	GND	GND	"	"	"	"	"	OUT	"	"	"	"	IN	"	"	"	"	"	A to 1Y0	"	35	"	
				83	"	"	GND	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	"	A to 2Y0	"	"	"	
				84	4.5 V	GND	4.5 V	"	OUT	"	"	"	"	"	"	"	"	"	"	"	"	"	"	A to 1Y2	"	"	"	
			t _{PHL2}	85	"	"	4.5 V	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	"	A to 2Y2	"	"	"	
				86	4.5 V	GND	IN	"	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	B to 1Y0	"	"	"	
				87	"	"	"	"	"	"	"	"	"	"	OUT	"	"	GND	GND	GND	"	"	"	B to 2Y0	"	"	"	
				88	4.5 V	GND	"	"	"	"	"	OUT	"	"	"	"	"	4.5 V	"	"	"	"	"	B to 1Y1	"	"	"	
			t _{PHL3}	89	"	"	"	"	"	"	"	"	"	"	"	OUT	"	4.5 V	GND	GND	"	"	"	B to 2Y1	"	"	"	
				90	4.5 V	IN	GND	"	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	1G to 1Y0	"	"	"	
			t _{PHL4}	91	"	"	GND	"	"	"	"	"	"	OUT	"	"	GND	IN	GND	"	"	"	2G to 2Y0	"	"	"		
			t _{PHL5}	92	"	"	GND	"	"	"	"	"	"	"	OUT	"	GND	GND	IN	"	"	"	2C to 2Y0	"	"	"		
			t _{PHL6}	93	4.5 V	GND	IN	"	OUT	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	B to 1Y2	"	"	"	
				94	"	"	"	"	"	"	"	"	"	"	"	"	"	GND	GND	GND	"	"	"	B to 2Y2	"	"	"	
				95	4.5 V	GND	"	OUT	"	"	"	"	"	"	"	"	"	4.5 V	"	"	"	"	"	B to 1Y3	"	"	"	
				96	"	"	"	"	"	"	"	"	"	"	"	"	OUT	4.5 V	GND	GND	"	"	"	B to 2Y3	"	"	"	
			t _{PHL7}	97	4.5 V	GND	GND	"	"	"	"	OUT	"	"	"	"	"	IN	"	"	"	"	"	A to 1Y1	"	"	"	
				98	"	"	GND	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	"	A to 2Y1	"	"	"	
				99	"	"	4.5 V	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	"	A to 2Y3	"	"	"	
				100	4.5 V	GND	4.5 V	OUT	"	"	"	"	"	"	"	"	"	"	"	GND	GND	"	"	A to 1Y3	"	"	"	
			t _{PHL8}	101	IN	GND	GND	"	"	"	"	"	OUT	"	"	"	"	GND	"	"	"	"	"	1C to 1Y0	"	33	"	

See footnotes at end of device types 01.

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

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit	
				Case 1/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19		20	Min		Max
				Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C		V _{CC}	2		26
10 T _c = 125°C	t _{PLH1}	3003	102-105																			ns		
	t _{PLH2}	Fig. 4	106-109																			"		
	t _{PLH3}	"	110																			"		
	t _{PLH4}	"	111																			"		
	t _{PLH5}	"	112																			"		
	t _{PLH6}	"	113-116	Same tests and terminal conditions as for subgroup 9, except T _c = +125°C.																	40	"		
	t _{PLH7}	"	117-120																		40	"		
	t _{PLH8}	"	121																		42	"		
	t _{PHL1}	"	122-125																		46	"		
	t _{PHL2}	"	126-129																		46	"		
	t _{PHL3}	"	130																		"	"		
	t _{PHL4}	"	131																		"	"		
	t _{PHL5}	"	132																		"	"		
	t _{PHL6}	"	133-136																		"	"		
	t _{PHL7}	"	137-140																		"	"		
t _{PHL8}	"	141																		43	"			
11	Same tests, terminal conditions and limits as for subgroup 10, except T _c = -55°C.																							

1/ Case 2 pins not referenced are NC.

2/

Symbol	Min/Max limits (mA) for circuit:					
	A	B	C	D	E	F
I _L	-12/-36	-03/-30	-15/-38		-10/-34	-12/-36

3/

Symbol	Min/Max limits (mA) for circuit:					
	A	B	C	D	E	F
I _{OS}	-15/-100	-15/-100	-15/-100		-15/-100	-15/-100

4/ Inputs: A = 3.0 V min.; B = 0.0 V or GND.

5/ Outputs: H > 1.5 V; L < 1.5 V.

TABLE III. Group A inspection for device type 02. 1/
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit						
			Case 2/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20		Min	Max							
			Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C	V _{CC}										
1 T _c = 25°C	I _{CEX}		1		2.0 V															4.5 V	1Y0		100	μA					
			2		"					5.5 V	5.5 V	GND											1Y1		"	"			
			3		"					5.5 V														1Y2		"	"		
			4		"				5.5 V															1Y3		"	"		
			5																			5.5 V			2Y0		"	"	
			6																			5.5 V			2Y1		"	"	
			7																						2Y2		"	"	
			8																						2Y3		"	"	
	V _{OL}	3007		9	2.0 V	0.7 V	0.7 V					4 mA											1Y0		0.4	V			
				10	"	"	0.7 V					4 mA													1Y1		"	"	
				11	"	"	2.0 V				4 mA														1Y2		"	"	
				12	"	"	2.0 V	4 mA																	1Y3		"	"	
				13	"	"	0.7 V																4 mA		2Y0		"	"	
				14	"	"	0.7 V																4 mA		2Y1		"	"	
				15	"	"	2.0 V																4 mA		2Y2		"	"	
				16	"	"	2.0 V																		2Y3		"	"	
	V _{IC}			17	-18 mA																		1C		-1.5	"			
				18		-18 mA																			1G		"	"	
				19			-18 mA																		B		"	"	
				20																					A		"	"	
				21																					-18 mA		"	"	
				22																						2G		"	"
	I _{IL1}	3009		23	0.4 V																		1C	3/	3/	mA			
				24		0.4 V																			1G		"	"	
				25			0.4 V																		B		"	"	
				26				0.4 V																		A		"	"
				27																						2G		"	"
				28																						2C		"	"
	I _{IH1}	3010		29	2.7 V																			1C		20	μA		
				30		2.7 V																			1G		"	"	
				31			2.7 V																			B		"	"
				32																						A		"	"
				33																						2G		"	"
				34																						2C		"	"
	I _{IH2}			35	5.5 V																			1C		100	"		
				36		5.5 V																			1G		"	"	
				37			5.5 V																		B		"	"	
				38																					5.5 V		"	"	
				39																						2G		"	"
				40																						2C		"	"
	I _{CC}	3005	41	4.5 V	GND	4.5 V																4.5 V	GND	GND		V _{CC}		10	mA
2	Same tests, terminal conditions, and limits as subgroup 1, except T _c = +125°C and V _{IC} tests are omitted.																												
3	Same tests, terminal conditions, and limits as subgroup 1, except T _c = -55°C and V _{IC} tests are omitted.																												

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued. 1/
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F																				Measured terminal	Limits		Unit
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Min	Max						
			Case 2/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20							
7 T _c = 25°C 4/	Truth table tests	3014	Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C	V _{CC}							
			42	B	A	A	H	H	H	H	GND	H	H	H	H	A	A	A	A	5.0 V						
			43	"	"	B	"	"	"	"	"	"	"	"	"	"	A	"	"	"						
			44	"	"	A	"	"	"	"	"	"	"	"	"	"	B	"	"	"						
			45	"	"	B	"	"	"	"	"	"	"	"	"	"	"	"	"	"						
			46	A	"	"	"	"	"	"	"	"	"	"	"	"	"	"	B	"						
			47	"	B	"	"	"	"	"	L	"	L	"	"	"	"	B	"	"						
			48	"	"	"	"	"	"	"	L	H	"	H	L	"	A	"	"	"						
			49	"	"	A	"	"	L	H	"	"	"	H	L	"	B	"	"	"						
			50	"	"	"	L	H	"	"	"	"	"	H	L	A	"	"	"	"						
			51	B	"	"	H	"	"	"	"	"	"	"	H	A	"	A	"	"						
			52	B	A	"	"	"	"	"	"	"	"	"	H	A	A	A	"	"						
			53	B	A	B	H	"	"	"	"	"	"	"	H	B	A	A	"	"						
8	Same tests, terminal conditions, and limits as for subgroup 7 tests at T _c = +125°C and T _c = -55°C.																									
9 T _c = 25°C	t _{PLH1}	3003 Fig. 4	54	4.5 V	GND	GND				OUT	GND				IN			5.0 V	A to 1Y0	2	50	ns				
			55			GND						"	OUT			"	GND	GND	"	A to 2Y0	"	"	"			
			56	4.5 V	GND	4.5 V		OUT									"	"	"	"	A to 1Y2	"	"	"		
	t _{PLH2}	"	57			4.5 V							OUT			"	GND	GND	"	A to 2Y2	"	"	"			
			58	4.5 V	GND	IN					OUT	"				GND			"	B to 1Y0	"	"	"			
			59			"							OUT			GND	GND	GND	"	B to 2Y0	"	"	"			
	t _{PLH3}	"	60	4.5 V	GND	"			OUT							4.5 V	GND	GND	"	B to 1Y1	"	"	"			
			61			"							OUT			4.5 V	GND	GND	"	B to 2Y1	"	"	"			
			62	4.5 V	IN	GND					OUT	"				GND			"	1G to 1Y0	"	45	"			
	t _{PLH4}	"	63			GND					OUT				GND	IN	GND	"	2G to 2Y0	"	"	"				
	t _{PLH5}	"	64			GND					OUT				GND	GND	IN	"	2C to 2Y0	"	"	"				
	t _{PLH6}	"	65	4.5 V	GND	IN		OUT								GND			"	B to 1Y2	"	54	"			
			66			"								OUT		GND	GND	GND	"	B to 2Y2	"	"	"			
			67	4.5 V	GND	"	OUT									4.5 V	GND	GND	"	B to 1Y3	"	"	"			
	t _{PLH7}	"	68			"									OUT	4.5 V	GND	GND	"	B to 2Y3	"	"	"			
			69	4.5 V	GND	GND			OUT							IN			"	A to 1Y1	"	"	"			
			70			GND								OUT		"	GND	GND	"	A to 2Y1	"	"	"			
	t _{PLH8}	"	71			4.5 V										OUT	"	GND	GND	"	A to 2Y3	"	"	"		
			72	4.5 V	GND	4.5 V	OUT									"	"	"	"	A to 1Y3	"	"	"			
			73	IN	GND	GND						OUT	"			GND			"	1C to 1Y0	"	"	"			
	t _{PHL1}	"	74	4.5 V	GND	GND					OUT	"				IN			"	A to 1Y0	"	56	"			
			75			GND							OUT			"	GND	GND	"	A to 2Y0	"	"	"			
			76	4.5 V	GND	4.5 V		OUT								"	"	"	"	A to 1Y2	"	"	"			
	t _{PHL2}	"	77			4.5 V								OUT		"	GND	GND	"	A to 2Y2	"	"	"			
			78	4.5 V	GND	IN					OUT	"				GND			"	B to 1Y0	"	"	"			
			79			"							OUT			GND	GND	GND	"	B to 2Y0	"	"	"			
	t _{PHL3}	"	80	4.5 V	GND	"			OUT							4.5 V	GND	GND	"	B to 1Y1	"	"	"			
			81			"							OUT			4.5 V	GND	GND	"	B to 2Y1	"	"	"			
			82	4.5 V	IN	GND					OUT	"				GND			"	1G to 1Y0	"	"	"			
	t _{PHL4}	"	83			GND						OUT			GND	IN	GND	"	2G to 2Y0	"	"	"				
	t _{PHL5}	"	84			GND						OUT			GND	GND	IN	"	2C to 2Y0	"	"	"				
	t _{PHL6}	"	85	4.5 V	GND	IN		OUT								GND			"	B to 1Y2	"	"	"			
			86			"								OUT		GND	GND	GND	"	B to 2Y2	"	"	"			
87			4.5 V	GND	"	OUT									4.5 V	GND	GND	"	B to 1Y3	"	"	"				
t _{PHL7}	"	88			"					OUT	"				4.5 V	GND	GND	"	B to 2Y3	"	"	"				
		89	4.5 V	GND	GND				OUT	"					IN			"	A to 1Y1	"	"	"				
		90			GND								OUT		"	GND	GND	"	A to 2Y1	"	"	"				
t _{PHL8}	"	91			4.5 V										"	GND	GND	"	A to 2Y3	"	"	"				
		92	4.5 V	GND	4.5 V	OUT									"	"	"	"	A to 1Y3	"	"	"				
		93	IN	GND	GND						OUT	"			GND			"	1C to 1Y0	"	53	"				

See footnotes at end of device types 02.

TABLE III. Group A inspection for device type 02 - Continued. 1/
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits		Unit	
			Case 2/2	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20		Min	Max		
			Test no.	1C	1G	B	1Y3	1Y2	1Y1	1Y0	GND	2Y0	2Y1	2Y2	2Y3	A	2G	2C	V _{CC}					
10 T _C = 125°C	t _{PLH1}	3003	94-97																		2	65	ns	
	t _{PLH2}	Fig. 4	98-101																			"	65	"
	t _{PLH3}	"	102																			"	58	"
	t _{PLH4}	"	103																			"	"	"
	t _{PLH5}	"	104																			"	"	"
	t _{PLH6}	"	105-108																			"	70	"
	t _{PLH7}	"	109-112																			"	70	"
	t _{PLH8}	"	113																			"	70	"
	t _{PHL1}	"	114-117																			"	73	"
	t _{PHL2}	"	118-121																			"	73	"
	t _{PHL3}	"	122																			"	"	"
	t _{PHL4}	"	123																			"	"	"
	t _{PHL5}	"	124																			"	"	"
	t _{PHL6}	"	125-128																			"	72	"
	t _{PHL7}	"	129-132																			"	72	"
t _{PHL8}	"	133																			"	69	"	
11	Same tests, terminal conditions and limits as for subgroup 10, except T _C = -55°C.																							

1/ A pullup resistor of 0.5 kΩ to 2 kΩ shall be placed from each output to V_{CC} (pin 16).

2/ Case 2 pins not referenced are NC.

3/

Symbol	Min/Max limits (mA) for circuit:					
	A	B	C	D	E	F
I _{IL}	-12/-36	-.03/-30	-.15/-38		-.10/-34	-.12/-36

4/ Inputs: A = 3.0 V min.; B = 0.0 V or GND.

5/ Outputs: H > 1.5 V; L < 1.5 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.
- I_{IN} Current flowing into an input terminal.
- V_{IN} Voltage level at an input terminal.

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	54LS155
02	54LS156

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	Manufacturer					
	Texas Instruments	Signetics Corp.	National Semiconductor	Raytheon Co.	Fairchild Co.	Motorola Inc.
	Circuit A	Circuit B	Circuit C	Circuit D	Circuit E	Circuit F
01	X	X	X		X	X
02	X	X	X		X	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 5962-1973)

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

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1. DOCUMENT NUMBER
MIL-M-38510/326C

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

3. DOCUMENT TITLE

MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL, DEMULTIPLEXERS, MONOLITHIC SILICON

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

5. REASON FOR RECOMMENDATION

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

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c. ADDRESS (*Include Zip Code*)

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(1) Commercial
(2) DSN
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8. PREPARING ACTIVITY

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