

INCH-POUND

MIL-M-38510/77B  
5 October 2005  
SUPERSEDING  
MIL-M-38510/77A  
20 August 1984

## MILITARY SPECIFICATION

### MICROCIRCUITS, DIGITAL, SCHOTTKY TTL, DECODERS, MONOLITHIC SILICON

Inactive for new design after 23 August 1996.

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

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

#### 1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic, silicon, Schottky TTL, decoder 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 For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.4).

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

1.2.1 Device types. The device types are as follows:

<u>Device type</u>	<u>Circuit</u>
01	Single 3 to 8 line decoder
02	Dual 2 to 4 line decoder

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

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat-pack
X	CQCC2-N20	20	Square chip carrier
2	CQCC1-N20	20	Square chip carrier

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

### 1.3 Absolute maximum ratings.

Supply voltage range .....	-0.5 V dc to +7.0 V dc
Input voltage range .....	-1.2 V dc at -18 mA to 5.5 V dc
Storage temperature range .....	-65°C to +150°C
Maximum power dissipation ( $P_D$ ) <u>1/</u>	
Device type 01 .....	333 mW
Device type 02 .....	405 mW
Lead temperature (soldering 10 seconds) .....	300°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ )	
Cases E, F, X, and 2 .....	(See MIL-STD-1835)
Junction temperature ( $T_J$ ) .....	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 ( $V_{IL}$ ) <u>3/</u> .....	0.8 V dc
Case operating temperature range ( $T_C$ ) .....	-55°C to 125°C

## 2.0 APPLICABLE DOCUMENT

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

### 2.2 Government documents.

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

#### DEPARTMENT OF DEFENSE 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 <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this 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 condition (e.g.  $I_{OS}$ ).

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

3/  $V_{IL} = 0.7$  V at +125°C.

### 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 6.3).

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 Case outlines. Case outlines shall be as specified in 1.2.3.

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

3.3.3 Logic diagram. The logic diagram shall be as specified on figure 2.

3.3.4 Truth tables. The truth tables shall be as specified on figure 3.

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

3.4 Lead material and finish. 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 1 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 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

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

- a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.
- b. 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Device type	Limits		Units
				Min	Max	
High level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, V <sub>IH</sub> = 2.0 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = 1.0 mA, T <sub>C</sub> = +125°C, V <sub>IL</sub> = 0.7 V	01, 02	2.5		V
Low level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, V <sub>IH</sub> = 2.0 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 20 mA, T <sub>C</sub> = +125°C, V <sub>IL</sub> = 0.7 V	01, 02		0.5 1/	V
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V, I <sub>IN</sub> = -18 mA T <sub>C</sub> = +25°C	01, 02		-1.2	V
High level input current, all inputs	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 2.7 V	01, 02		50	μA
High level input current, all inputs	I <sub>IH2</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 5.5 V	01, 02		1.0	mA
Low level input current, all inputs	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0.5 V	01, 02	-0.75	-2.0	mA
Short-circuit output current	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V 2/	01, 02	-40	-110	mA
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V	01		74	mA
			02		90	mA
Propagation delay time, low-to-high level through 2 levels of logic (binary select to output)	t <sub>PLH1</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280Ω	01	2	12	ns
			02	2	13	ns
Propagation delay time, high-to-low level through 2 levels of logic (binary select to output)	t <sub>PHL1</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280Ω	01	2	16	ns
			02	2	19	ns
Propagation delay time, low-to-high level through 3 levels of logic (binary select to output)	t <sub>PLH2</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280Ω	01	2	17	ns
			02	2	18	ns
Propagation delay time, high-to-low level through 3 levels of logic (binary select to output)	t <sub>PHL2</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280Ω	01	2	16	ns
			02	2	17	ns

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Device type	Limits		Units
				Min	Max	
Propagation delay time low-to-high level through 3 levels of logic (enable to output)	t <sub>PLH3</sub>	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280Ω	01	2	16	ns
Propagation delay time high-to-low level through 3 levels of logic (enable to output)	t <sub>PHL3</sub>		01	2	16	ns
Propagation delay time low-to-high level through 2 levels of logic G2A to output	t <sub>PLH4</sub>		01	2	12	ns
Propagation delay time high-to-low level through 2 levels of logic G2A to output	t <sub>PHL4</sub>		01	2	16	ns
Propagation delay time low-to-high level through 2 levels of logic G2B to output	t <sub>PLH5</sub>		01	2	12	ns
Propagation delay time high-to-low level through 2 levels of logic G2B to output	t <sub>PHL5</sub>		01	2	16	ns
Propagation delay time low-to-high level through 2 levels of logic (enable to output)	t <sub>PLH6</sub>		02	2	12	ns
Propagation delay time high-to-low level through 2 levels of logic (enable to output)	t <sub>PHL6</sub>		02	2	15	ns

1/ T<sub>C</sub> = +125°C, V<sub>OL(max)</sub> = 0.45 V.

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

TABLE II. Electrical test requirements.

MIL-PRF-38535 Test requirement	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
Groups 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.

4.4 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 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 as specified in the appropriate tables and as follows:

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

Terminal number	Terminal name		
	Device type 01		Device type 02
	Case E and F	Case X and 2	Case E and F
1	A	NC	1G
2	B	A	1A
3	C	B	1B
4	G2A	C	1Y0
5	G2B	G2A	1Y1
6	G1	NC	1Y2
7	Y7	G2B	1Y3
8	GND	G1	GND
9	Y6	Y7	2Y3
10	Y5	GND	2Y2
11	Y4	NC	2Y1
12	Y3	Y6	2Y0
13	Y2	Y5	2B
14	Y1	Y4	2A
15	Y0	Y3	2G
16	V <sub>cc</sub>	NC	V <sub>cc</sub>
17		Y2	
18		Y1	
19		Y0	
20		V <sub>cc</sub>	

Figure 1. Terminal connections.

DEVICE TYPE 01

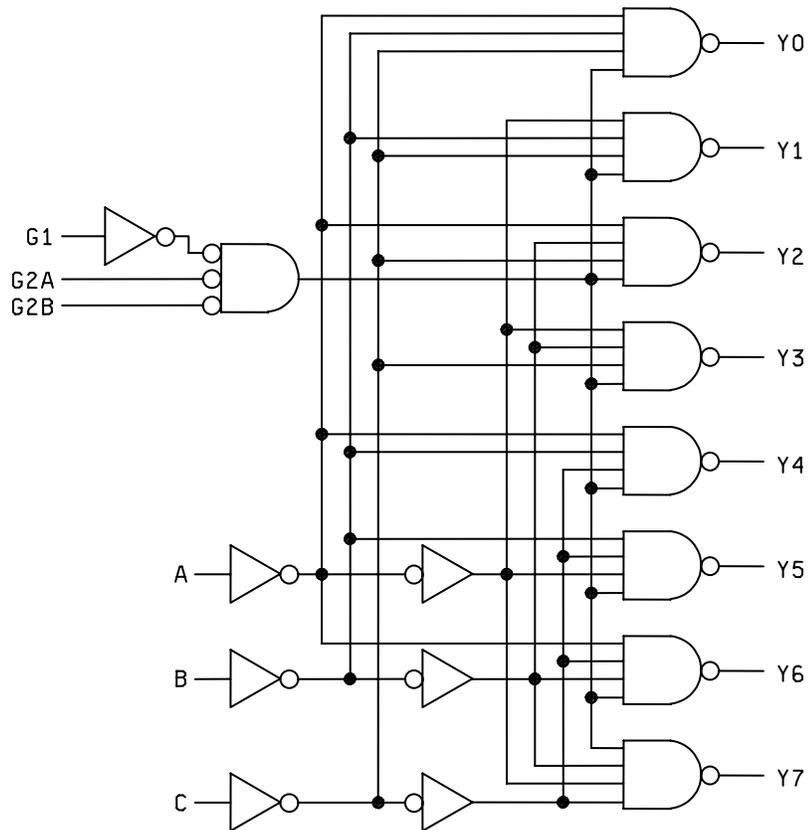


Figure 2. Logic diagram.

DEVICE TYPE 02

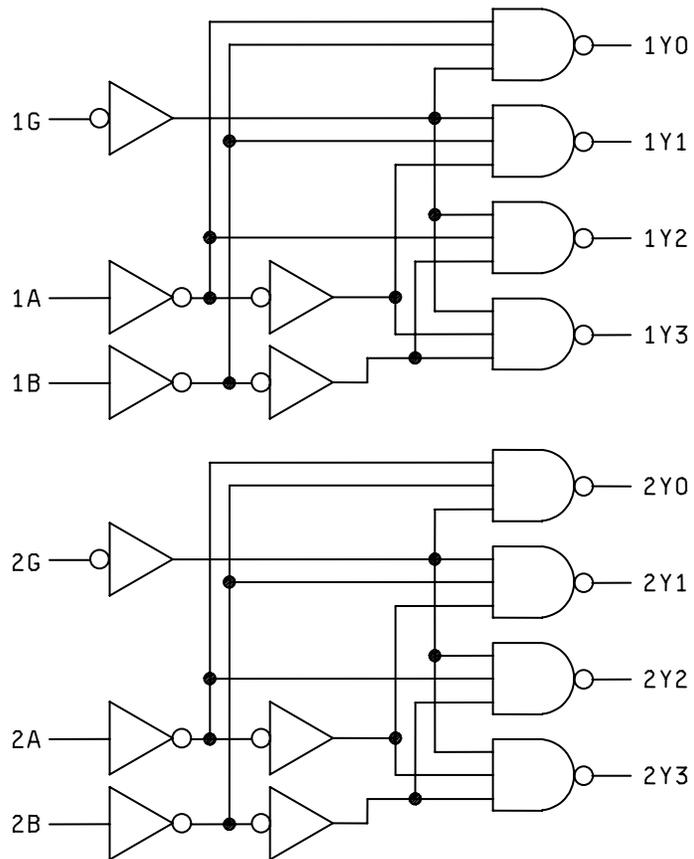


Figure 2. Logic diagram - Continued.

Device type 01

Inputs					Outputs							
Enable		Select			Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
G1	G2*	C	B	A								
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

\*G2 = G2A + G2B

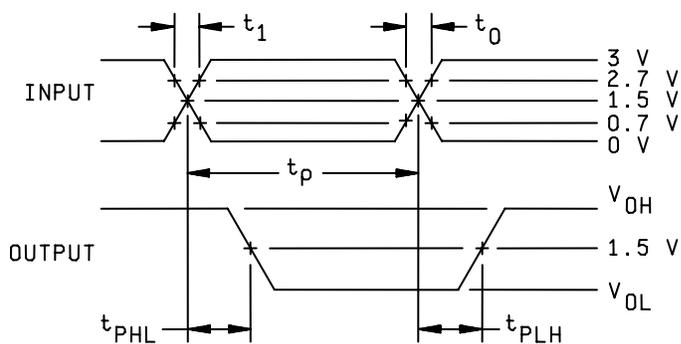
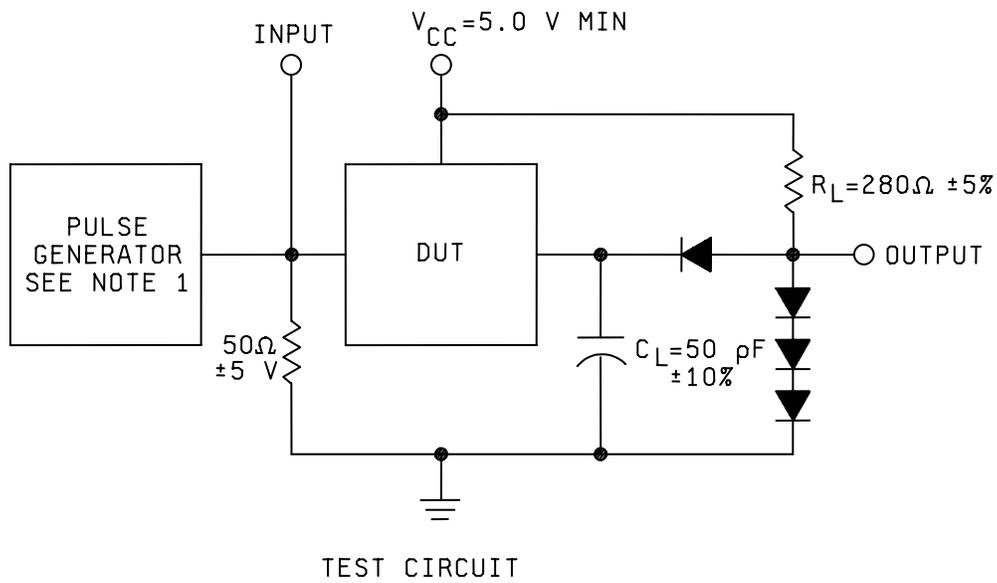
H = high level, L = low level, X = irrelevant.

Device type 02

Inputs			Outputs			
Enable G	Select		Y0	Y1	Y2	Y3
	B	A				
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

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

Figure 3. Truth tables.



## NOTES:

1. Pulse generator has the following characteristics:  $t_1 = t_0 < 2.5$  ns,  $t_p = 60 - 200$  ns,  $Z_{OUT} \approx 50\Omega$ .
2.  $C_L = 50$  pF  $\pm 10\%$ , including scope probe, wiring, and stray capacitance without package in fixture.
3. Voltage measurements are to be made with respect to network ground terminal.
4. All diodes are 1N3064, or equivalent.

Figure 4. Switching time test circuit and waveforms for device types 01 and 02.

TABLE III. Group A inspection for device type 01.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases X, 2 1/ E, F Test no.	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20	Measured terminal	Test limits		Unit	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Min	Max		
				A	B	C	G2A	G2B	G1	Y7	GND	Y6	Y5	Y4	Y3	Y2	Y1	Y0	V <sub>CC</sub>					
1 T <sub>C</sub> = +25°C	V <sub>OH</sub>	3006	1						0.8 V		GND								4.5 V	Y0	2.5		V	
		"	2						"		"								"	Y1	"		"	
		"	3						"		"									"	Y2	"		"
		"	4						"		"									"	Y3	"		"
		"	5						"		"									"	Y4	"		"
		"	6						"		"									"	Y5	"		"
		"	7						"		"									"	Y6	"		"
		"	8						"		"									"	Y7	"		"
	V <sub>OL</sub>	3007	9	0.8 V	2.0 V											"	Y0		0.5	"				
		"	10	2.0 V	0.8 V	"	"	"	"											"	Y1	"	"	"
		"	11	0.8 V	2.0 V	"	"	"	"											"	Y2	"	"	"
		"	12	2.0 V	2.0 V	"	"	"	"											"	Y3	"	"	"
		"	13	0.8 V	0.8 V	2.0 V	"	"	"											"	Y4	"	"	"
		"	14	2.0 V	0.8 V	"	"	"	"											"	Y5	"	"	"
		"	15	0.8 V	2.0 V	"	"	"	"											"	Y6	"	"	"
		"	16	2.0 V	2.0 V	"	"	"	"											"	Y7	"	"	"
	V <sub>IC</sub>		17	-18 mA																"	A		-1.2	"
			18		-18 mA															"	B		"	"
			19			-18 mA														"	C		"	"
			20				-18 mA													"	G2A		"	"
			21					-18 mA												"	G2B		"	"
			22						-18 mA											"	G1		"	"
	I <sub>IL</sub>	3009	23	0.5 V																5.5 V	A	-1.0 2/	-2.0	mA
		"	24		0.5 V															"	B	"	"	"
		"	25			0.5 V														"	C	"	"	"
		"	26				0.5 V													"	G2A	"	"	"
		"	27					0.5 V												"	G2B	"	"	"
		"	28						0.5 V											"	G1	"	"	"
I <sub>IH1</sub>	3010	29	2.7 V																"	A		50	μA	
	"	30		2.7 V															"	B		"	"	
	"	31			2.7 V														"	C		"	"	
	"	32				2.7 V													"	G2A		"	"	
	"	33					2.7 V												"	G2B		"	"	
I <sub>IH2</sub>		34						2.7 V											"	G1		"	"	
	"	35	5.5 V																"	A		1.0	mA	
	"	36		5.5 V															"	B		"	"	
	"	37			5.5 V														"	C		"	"	
	"	38				5.5 V													"	G2A		"	"	
I <sub>OS</sub>		39					5.5 V												"	G2B		"	"	
		40						5.5 V											"	G1		"	"	
	3011	41				5.5 V	5.5 V												"	Y0	-40	-100 3/	"	
	"	42				"	"												"	Y1	"	"	"	
	"	43				"	"												"	Y2	"	"	"	
	"	44				"	"												"	Y3	"	"	"	
I <sub>CC</sub>		45				"	"												"	Y4	"	"	"	
		46				"	"												"	Y5	"	"	"	
		47				"	"												"	Y6	"	"	"	
		48				"	"												"	Y7	"	"	"	
	3005	49	GND	GND	GND	GND	GND	GND	GND	GND									"	V <sub>CC</sub>		74	"	

See footnotes at end of table.



TABLE III. Group A inspection for device type 01 – Continued.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases X, 2 1/ Test no.	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20	Measured terminal	Test limits		Unit			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Min	Max				
				A	B	C	G2A	G2B	G1	Y7	GND	Y6	Y5	Y4	Y3	Y2	Y1	Y0	V <sub>CC</sub>							
9 T <sub>c</sub> = +25°C	t <sub>PLH2</sub>	3003 (Fig. 4)	99	GND	GND	IN	GND	GND	5.0 V		GND				OUT					5.0 V	C to Y4	2	17	ns		
			100	5.0 V	GND	"	"	"	"	"	"	"	OUT	OUT						"	C to Y5	"	"	"		
			101	GND	5.0 V	"	"	"	"	"	"	"	"								"	C to Y6	"	"	"	
			102	5.0 V	5.0 V	"	"	"	"	"	"	OUT	"								"	C to Y7	"	"	"	
	t <sub>PHL2</sub>	"	"	103	IN	GND	GND	"	"	"	"	"						OUT			"	A to Y1	"	16	"	
				104	"	5.0 V	GND	"	"	"	"	"	"				OUT				"	A to Y3	"	"	"	
				105	"	GND	5.0 V	"	"	"	"	"	"			OUT					"	A to Y5	"	"	"	
				106	"	5.0 V	5.0 V	"	"	"	"	"	OUT	"			OUT				"	A to Y7	"	"	"	
				107	GND	IN	GND	"	"	"	"	"	"					OUT				"	B to Y2	"	"	"
				108	5.0 V	"	GND	"	"	"	"	"	"					OUT				"	B to Y3	"	"	"
				109	GND	"	5.0 V	"	"	"	"	"	"		OUT							"	B to Y6	"	"	"
				110	5.0 V	"	5.0 V	"	"	"	"	"	OUT	"								"	B to Y7	"	"	"
				111	GND	GND	IN	"	"	"	"	"	"				OUT					"	C to Y4	"	"	"
				112	5.0 V	GND	GND	"	"	"	"	"	"			OUT						"	C to Y5	"	"	"
				113	GND	5.0 V	"	"	"	"	"	"	"			OUT						"	C to Y6	"	"	"
				114	5.0 V	5.0 V	"	"	"	"	"	"	OUT	"								"	C to Y7	"	"	"
	t <sub>PLH3</sub>	"	"	115	GND	GND	GND	"	"	IN		"							OUT	"	G1 to Y0	"	"	"		
				116	5.0 V	GND	"	"	"	"	"	"	"								"	G1 to Y1	"	"	"	
				117	GND	5.0 V	"	"	"	"	"	"	"								OUT	G1 to Y2	"	"	"	
				118	5.0 V	5.0 V	"	"	"	"	"	"	"				OUT					G1 to Y3	"	"	"	
				119	GND	GND	5.0 V	"	"	"	"	"	"				OUT					G1 to Y4	"	"	"	
				120	5.0 V	GND	"	"	"	"	"	"	"		OUT		OUT					G1 to Y5	"	"	"	
	t <sub>PHL3</sub>	"	"	121	GND	5.0 V	"	"	"	"	"			OUT							"	G1 to Y6	"	"	"	
				122	5.0 V	5.0 V	"	"	"	"	"	"			OUT						"	G1 to Y7	"	"	"	
				123	GND	GND	GND	"	"	"	"	"	"								OUT	G1 to Y0	"	"	"	
				124	5.0 V	GND	"	"	"	"	"	"	"									G1 to Y1	"	"	"	
				125	GND	5.0 V	"	"	"	"	"	"	"									G1 to Y2	"	"	"	
				126	5.0 V	5.0 V	"	"	"	"	"	"	"				OUT					G1 to Y3	"	"	"	
	t <sub>PLH4</sub>	"	"	127	GND	GND	5.0 V	"	"	"	"					OUT					"	G1 to Y4	"	"	"	
				128	5.0 V	GND	"	"	"	"	"	"				OUT					"	G1 to Y5	"	"	"	
				129	GND	5.0 V	"	"	"	"	"	"			OUT						"	G1 to Y6	"	"	"	
				130	5.0 V	5.0 V	"	"	"	"	"	"			OUT						"	G1 to Y7	"	"	"	
				131	GND	GND	GND	"	"	"	"	5.0 V		"								OUT	G2A to Y0	"	12	"
				132	5.0 V	GND	"	"	"	"	"	"	"									"	G2A to Y1	"	"	"
	t <sub>PHL4</sub>	"	"	133	GND	5.0 V	"	"	"	"	"										"	G2A to Y2	"	"	"	
				134	5.0 V	5.0 V	"	"	"	"	"	"					OUT				"	G2A to Y3	"	"	"	
				135	GND	GND	5.0 V	"	"	"	"	"					OUT				"	G2A to Y4	"	"	"	
				136	5.0 V	GND	"	"	"	"	"	"				OUT					"	G2A to Y5	"	"	"	
				137	GND	5.0 V	"	"	"	"	"	"			OUT							"	G2A to Y6	"	"	"
				138	5.0 V	5.0 V	"	"	"	"	"	"			OUT							"	G2A to Y7	"	"	"
	t <sub>PHL4</sub>	"	"	139	GND	GND	GND	"	"	"	"	"								OUT	G2A to Y0	"	16	"		
				140	5.0 V	GND	"	"	"	"	"	"									"	G2A to Y1	"	"	"	
				141	GND	5.0 V	"	"	"	"	"	"									"	G2A to Y2	"	"	"	
				142	5.0 V	5.0 V	"	"	"	"	"	"					OUT				"	G2A to Y3	"	"	"	
				143	GND	GND	5.0 V	"	"	"	"	"					OUT					"	G2A to Y4	"	"	"
				144	5.0 V	GND	"	"	"	"	"	"				OUT					"	G2A to Y5	"	"	"	
				145	GND	5.0 V	"	"	"	"	"	"			OUT						"	G2A to Y6	"	"	"	
				146	5.0 V	5.0 V	"	"	"	"	"	"			OUT						"	G2A to Y7	"	"	"	

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 – Continued.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases X, 2 1/ E, F Test no.	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20	Measured terminal	Test limits		Unit				
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Min	Max					
9 T <sub>c</sub> = +25°C	t <sub>PLH5</sub>	3003 (Fig. 4)	147	GND	GND	GND	GND	IN	5.0 V		GND						OUT	OUT	OUT	5.0 V	G2B to Y0	2	12	ns			
			148	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y1	"	"	"		
			149	GND	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y2	"	"	"	
			150	5.0 V	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y3	"	"	"	
			151	GND	GND	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y4	"	"	"	
			152	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y5	"	"	"	
			153	GND	5.0 V	"	"	"	"	"	"	"	"	OUT	"	"	G2B to Y6	"	"	"							
			154	5.0 V	5.0 V	"	"	"	"	"	"	"	OUT	"	OUT	OUT	OUT	OUT	OUT	OUT	"	"	G2B to Y7	"	"	"	
						155	GND	GND	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y0	"	16	"
						156	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y1	"	"	"
						157	GND	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y2	"	"	"
						158	5.0 V	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y3	"	"	"
						159	GND	GND	5.0 V	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y4	"	"	"
						160	5.0 V	GND	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	G2B to Y5	"	"	"
			161	GND	5.0 V	"	"	"	"	"	"	OUT	"	"	G2B to Y6	"	"	"									
			162	5.0 V	5.0 V	"	"	"	"	OUT	"	OUT	"	"	G2B to Y7	"	"	"									
10	Same as subgroup 9 except t <sub>PLH1</sub> = 18, t <sub>PHL1</sub> = 24, t <sub>PLH2</sub> = 25, t <sub>PHL2</sub> = 24, t <sub>PLH3</sub> = 24, t <sub>PHL3</sub> = 24, t <sub>PLH4</sub> = 18, t <sub>PHL4</sub> = 24, t <sub>PLH5</sub> = 18, t <sub>PHL5</sub> = 24, T <sub>c</sub> = +125°C(Max)																										
11	Same as subgroup 10 except T <sub>c</sub> = -55°C.																										

- 1/ Cases X and 2 terminals not designated are NC.
- 2/ For circuit B, I<sub>IL</sub>(min) = -0.75 mA.
- 3/ For circuit B, I<sub>OS</sub> (max) = -110 mA.
- 4/ Inputs: A = 2.4 V minimum and B = 0.4 V maximum.
- 5/ Outputs: H ≥ 1.5 V, L ≤ 1.5 V

TABLE III. Group A inspection for device type 02.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Test limits		Unit				
				1G	1A	1B	1Y0	1Y1	1Y2	1Y3	GND	2Y3	2Y2	2Y1	2Y0	2B	2A	2G	V <sub>CC</sub>		Min	Max					
1 T <sub>c</sub> = +25°C	V <sub>OH</sub>	3006	1	2.0 V																4.5 V	1Y3	2.5		V			
			2	"																	"	1Y2	"		"		
			3	"																	"	1Y1	"		"		
			4	"																	"	1Y0	"		"		
			5	"				-1 mA		-1 mA												"	2Y3	"		"	
			6	"																		2.0 V	2Y2	"		"	
			7	"																		"	2Y1	"		"	
			8	"																		"	2Y0	"		"	
	V <sub>OL</sub>	3007	9	0.8 V	2.0 V	2.0 V															"	1Y3		0.5	"		
			10	"	0.8 V	2.0 V															"	1Y2		"	"		
			11	"	2.0 V	0.8 V			20 mA		20 mA											"	1Y1		"	"	
			12	"	0.8 V	0.8 V																"	1Y0		"	"	
			13	"				20 mA											2.0 V	2.0 V	0.8 V	"	2Y3		"	"	
			14	"											20 mA			2.0 V	0.8 V	"	"	"	2Y2		"	"	
			15	"												20 mA		0.8 V	2.0 V	"	"	"	2Y1		"	"	
			16	"													20 mA	0.8 V	0.8 V	"	"	"	2Y0		"	"	
	V <sub>IC</sub>			17	-18 mA																"	1G		-1.2	"		
				18		-18 mA																"	1A		"	"	
				19			-18 mA															"	1B		"	"	
				20																		"	2B		"	"	
				21																			"	2A		"	"
				22																			"	2G		"	"
	I <sub>IL</sub>	3009	23	0.5 V																	5.5 V	1G	-1.0	-2.0	mA		
			24		0.5 V																"	1A		"	"		
			25			0.5 V															"	1B		"	"		
			26				0.5 V															"	2B		"	"	
			27																0.5 V			"	2A		"	"	
			28																	0.5 V		"	2G		"	"	
	I <sub>IH1</sub>	3010	29	2.7 V																	"	1G		50	μA		
			30		2.7 V																"	1A		"	"		
			31			2.7 V															"	1B		"	"		
			32				2.7 V															"	2B		"	"	
			33																2.7 V			"	2A		"	"	
	34																	2.7 V		"	2G		"	"			
	I <sub>IH2</sub>		35	5.5 V																	"	1G		1.0	mA		
			36		5.5 V																"	1A		"	"		
			37			5.5 V															"	1B		"	"		
			38				5.5 V														"	2B		"	"		
			39																		"	2A		"	"		
	40																		"	2G		"	"				
	I <sub>OS</sub>		41	5.5 V				GND													"	1Y0	-40	-100	"		
			42	"					GND												"	1Y1	"	"	"		
			43	"						GND											"	1Y2	"	"	"		
			44	"							GND										"	1Y3	"	"	"		
			45	"																	"	2Y3	"	"	"		
			46	"																	5.5 V	2Y2	"	"	"		
			47	"																	"	2Y1	"	"	"		
			48	"																	"	2Y0	"	"	"		
I <sub>CC</sub>	3005	49	GND	GND	GND														"	V <sub>CC</sub>	---	90	"				

See footnotes at end of table.

TABLE III. Group A inspection for device type 02 – Continued.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Test limits		Unit				
				1G	1A	1B	1Y0	1Y1	1Y2	1Y3	GND	2Y3	2Y2	2Y1	2Y0	2B	2A	2G	V <sub>CC</sub>		Min	Max					
2				Same tests, terminal conditions, and limits as for subgroup 1, except delete V <sub>IC</sub> tests, V <sub>OL(max)</sub> = 0.45 V, V <sub>IL</sub> = 0.7 V.																							
3				Same tests, terminal conditions, and limits as for subgroup 1, except delete V <sub>IC</sub> tests.																							
7 1/2				Same tests, terminal conditions, and limits as for subgroup 1, except delete V <sub>IC</sub> tests.																							
7 1/2	Truth table tests	3014	50	A	A	A	H	H	H	H	GND	H	H	H	H	A	A	A	5.0 V								
			51	"	B	A	"	"	"	"	"	"	"	"	"	B	A	"	"								
			52	"	A	B	"	"	"	"	"	"	"	"	"	B	A	"	"								
			53	"	B	"	"	"	"	"	"	"	"	"	"	"	B	A	"	"							
			54	B	B	"	L	"	"	"	"	"	"	"	L	"	B	B	"	"							
			55	"	A	"	H	L	"	"	"	"	"	L	H	"	A	"	"	"							
			56	"	B	A	"	H	L	"	"	"	L	H	"	A	B	"	"	"							
			57	"	A	A	"	H	H	L	"	L	H	H	"	A	A	"	"	"							
8				Same tests and terminal conditions as subgroup 7, except T <sub>C</sub> = -55°C, T <sub>C</sub> = +125°C, and delete V <sub>IC</sub> tests.																							
9	t <sub>PLH1</sub>	3003 (Fig. 4)	58	GND	IN	GND	OUT				GND									5.0 V	1A to 1Y0	2	13	ns			
			59	"	IN	5.0 V	OUT	OUT	OUT											"	"	"	"	"	"		
			60	"	GND	IN	OUT	OUT	OUT												"	"	"	"	"	"	
			61	"	5.0 V	IN	OUT	OUT	OUT												"	"	"	"	"	"	
			62	"																	"	"	"	"	"	"	
	t <sub>PHL1</sub>			66	GND	IN	GND	OUT													"	1A to 1Y0	"	19	"		
				67	"	IN	5.0 V	OUT	OUT	OUT											"	"	"	"	"	"	
				68	"	GND	IN	OUT	OUT	OUT												"	"	"	"	"	"
				69	"	5.0 V	IN	OUT	OUT	OUT												"	"	"	"	"	"
				70	"																	"	"	"	"	"	"
	t <sub>PLH2</sub>			74	GND	IN	GND		OUT												"	1A to 1Y1	"	18	"		
				75	"	IN	5.0 V		OUT	OUT											"	"	"	"	"	"	
				76	"	GND	IN		OUT	OUT												"	"	"	"	"	"
				77	"	5.0 V	IN		OUT	OUT												"	"	"	"	"	"
				78	"																	"	"	"	"	"	"
	t <sub>PHL2</sub>			82	GND	IN	GND		OUT												"	1A to 1Y1	"	17	"		
				83	"	IN	5.0 V		OUT	OUT											"	"	"	"	"	"	
				84	"	GND	IN		OUT	OUT												"	"	"	"	"	"
				85	"	5.0 V	IN		OUT	OUT												"	"	"	"	"	"
				86	"																	"	"	"	"	"	"
			87	"																"	2A to 2Y1	"	"	"			
			88	"																"	"	"	"	"	"		
			89	"																"	"	"	"	"	"		
																				"	"	"	"	"	"		

See footnotes at end of table.

TABLE III. Group A inspection for device type 02 – Continued.  
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F Test no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Test limits		Unit			
				1G	1A	1B	1Y0	1Y1	1Y2	1Y3	GND	2Y3	2Y2	2Y1	2Y0	2B	2A	2G	V <sub>CC</sub>		Min	Max				
9 T <sub>C</sub> = +25°C	t <sub>PLH6</sub>	3003 (Fig. 4)	90	IN	GND	GND	OUT		OUT		GND								5.0 V	1G to 1Y0	2	12	ns			
			91	"	5.0 V	GND			OUT		"								"	"	1G to 1Y1	"	"	"		
			92	"	GND	5.0 V					OUT		"							"	"	1G to 1Y2	"	"	"	
			93	"	5.0 V	5.0 V					OUT		"							"	"	1G to 1Y3	"	"	"	
			94	"									"			OUT		GND	GND	IN	"	2G to 1Y0	"	"	"	
			95	"									"			OUT	GND	5.0 V	"	"	"	2G to 1Y1	"	"	"	
			96	"									"		OUT		5.0 V	GND	"	"	"	2G to 1Y2	"	"	"	
	97	"									"	OUT			5.0 V	5.0 V	"	"	"	2G to 1Y3	"	"	"			
	t <sub>PHL6</sub>			98	IN	GND	GND	OUT		OUT		"								5.0 V	1G to 1Y0	"	15	"		
				99	"	5.0 V	GND				OUT		"							"	"	1G to 1Y1	"	"	"	
				100	"	GND	5.0 V					OUT		"						"	"	1G to 1Y2	"	"	"	
				101	"	5.0 V	5.0 V					OUT		"						"	"	1G to 1Y3	"	"	"	
				102	"									"			OUT		GND	GND	IN	"	2G to 1Y0	"	"	"
				103	"									"			OUT	GND	5.0 V	"	"	"	2G to 1Y1	"	"	"
				104	"									"		OUT		5.0 V	GND	"	"	"	2G to 1Y2	"	"	"
105				"									"	OUT			5.0 V	5.0 V	"	"	"	2G to 1Y3	"	"	"	
10	Same as subgroup 9 except t <sub>PLH1</sub> = 19, t <sub>PHL1</sub> = 27, t <sub>PLH2</sub> = 26, t <sub>PHL2</sub> = 25, t <sub>PLH6</sub> = 18, t <sub>PHL6</sub> = 22, T <sub>C</sub> = +125°C (Max)																									
11	Same as subgroup 10 except T <sub>C</sub> = -55°C.																									

1/ Inputs: A = 2.4 V minimum and B = 0.4 V maximum.

2/ 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 packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service'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 that may be helpful, but is not mandatory)

6.1 Intended use. Microcircuits conforming to this specification are intended for 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 conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- d. Requirement for certificate of compliance, if applicable.
- e. Requirements for notification of change of product or process to acquiring activity in addition to notification to the qualifying activity, if applicable.
- f. Requirements for failure analysis (including required test condition of method 5003), corrective action and reporting of results, if applicable.
- g. Requirements for product assurance options.
- h. Requirements for carriers, special lead lengths or lead forming, if applicable. These requirements shall 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 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.

6.4 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.

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

GND .....	Electrical ground (common terminal)
V <sub>IN</sub> .....	Voltage level at an input terminal
V <sub>IC</sub> .....	Input clamp voltage
I <sub>IN</sub> .....	Current-flowing into an input terminal

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 lead lengths and lead forming shall 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-35810 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>Device type</u>	<u>Commercial type</u>
01	54S138
02	54S139

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

TABLE IV. Manufacturers' designations.

Device type	Circuits			
	A	B	C	E
	Texas Instruments	Signetics	National Semiconductor	Fairchild Semiconductor
01	X	X	X	X
02			X	X

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

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

Preparing activity:  
DLA - CC  
  
(Project 5962-2005-028)

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

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