

INCH POUND

MIL-M-38510/75C  
22 AUGUST 2005  
SUPERSEDING  
MIL-M-38510/75B  
27 NOVEMBER 1985

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, BIPOLAR, SCHOTTKY TTL,  
EXCLUSIVE OR GATES, 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, quadruple 2 input exclusive OR gates 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 For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.4).

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

1.2.1 Device type. The device type is as follows:

<u>Device type</u>	<u>Circuit</u>
01	Quad, 2 input exclusive OR gate
02	Quad, exclusive OR/NOR gate

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

1.2.3 Case outline. 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>
A	GDFP5-F14, CDFP6-F14	14	Flat package
B	GDFP4-F14	14	Flat package
C	GDIP1-T14, CDIP2-T14	14	Dual in line package
D	GDFP1-F14, CDFP2-F14	14	Flat Package
E	GDIP1-T16, CDIP2-T16	16	Dual in line package
F	GDFP2-F16, CDFP3- F16	16	Flat package
2	CQCC1-N20	20	Square chip carrier package
X	CQCC2-N20	20	Square chip carrier package

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 per gate ( $P_D$ ) <u>1/</u> .....	104 mW for type 01
	137 mW for type 02 <u>1/</u>
Lead temperature (soldering, 10 seconds) .....	300°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ ):	
Cases A, B, C, D, E, F, 2, and X .....	(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 ( $V_{IL}$ ) .....	0.8 V dc <u>3/</u>
Case operating temperature range ( $T_C$ ) .....	-55°C to +125°C

## 2.0 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 and standards. The following specification and standard 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.,  $I_{OS}$ ) at one output for 5 seconds duration.

2/ Maximum junction temperature should not be exceeded except for allowable short duration burn-in screening condition per 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 4.2 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 Logic diagram 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 circuit 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. Unless otherwise specified, the electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range.

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 and 1.2 herein.

3.8 Microcircuit group assignment. The microcircuit device type 01, covered by the specification shall be in microcircuit group number 8 (see MIL-PRF-38535, appendix A).

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>IN</sub> = 0.8 V I <sub>OH</sub> = -1 mA @T <sub>C</sub> = 125°C, V <sub>IN</sub> = 0.7 V	All	2.5		V
Low level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V I <sub>OL</sub> = 20 mA	All		0.5	V
		T <sub>C</sub> = 125°C	All		0.45	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	All		-1.2	V
Collector cutoff current	I <sub>CEX</sub>	V <sub>CC</sub> = 5.5 V; V <sub>IN</sub> = GND V <sub>IH</sub> = 5.5 V	All		250	μA
High level input current	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 2.7 V	All		50	μA
High level input current	I <sub>IH2</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 5.5 V	All		1	mA
Low level input current	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = .5 V	All	-1	-2	mA
Short circuit output current	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V <u>1/</u>	All	-40	-100	mA
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V	01		75	mA
			02		99	
Propagation delay low to high level	t <sub>PLH1</sub>	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280 Ω other input low	01	2.0	16.5	ns
Propagation delay high to low level	t <sub>PHL1</sub>	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280 Ω other input low	01	2.0	15.5	ns
Propagation delay low to high level	t <sub>PLH2</sub>	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280 Ω other input high	01	2.0	16.5	ns
Propagation delay high to low level	t <sub>PHL2</sub>	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 50 pF, R <sub>L</sub> = 280 Ω other input high	01	2.0	15.5	ns

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$		Device type	Limits		Units
					Min	Max	
Propagation delay low to high level	$t_{PLH1}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = L, C = L	02	2.0	19.5	ns
Propagation delay high to low level	$t_{PHL1}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = L, C = L	02	2.0	22.0	ns
Propagation delay low to high level	$t_{PLH2}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = H, C = L	02	2.0	18.5	ns
Propagation delay high to low level	$t_{PHL2}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = H, C = L	02	2.0	20.0	ns
Propagation delay low to high level	$t_{PLH3}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = L, C = H	02	2.0	22.0	ns
Propagation delay high to low level	$t_{PHL3}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = L, C = H	02	2.0	15.5	ns
Propagation delay low to high level	$t_{PLH4}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = H, C = H	02	2.0	18.5	ns
Propagation delay high to low level	$t_{PHL4}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From A or B, B or A = H, C = H	02	2.0	17.0	ns
Propagation delay low to high level	$t_{PLH5}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From C to A = B	02	2.0	18.0	ns
Propagation delay high to low level	$t_{PHL5}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From C to A = B	02	2.0	21.5	ns
Propagation delay low to high level	$t_{PLH6}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From C to A $\neq$ B	02	2.0	17.5	ns
Propagation delay high to low level	$t_{PHL6}$	$V_{CC} = 5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 280\ \Omega$	From C to A $\neq$ B	02	2.0	18.0	ns

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

TABLE II. Electrical test requirements.

MIL-PRF-38535 Test requirements	Subgroups (see table III)	
	Class S Devices 1/	Class B Devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 9, 10, 11	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.

1/ Class S product assurance level not applicable for device type 02.

#### 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 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.

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.
- 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.

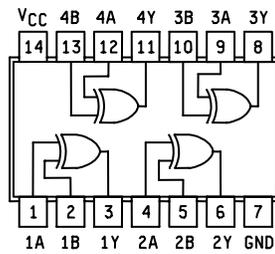
4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

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

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Pin number			Pin name		
Cases			Device type 01		Device type 02
2 and X	E and F	A, B, C, and D	2 and X	A, B, C, and D	E and F
1	1	1	NC	1A	1A
2	2	2	1A	1B	1B
3	3	3	1B	1Y	1Y
4	4	4	1Y	2A	1C, 2C
5	5	5	NC	2B	2A
6	6	6	2A	2Y	2B
7	7	7	NC	GND	2Y
8	8	8	2B	3Y	GND
9	9	9	2Y	3A	3Y
10	10	10	GND	3B	3A
11	11	11	NC	4Y	3B
12	12	12	3Y	4A	3C, 4C
13	13	13	3A	4B	4Y
14	14	14	3B	V <sub>CC</sub>	4A
15	15		NC		4B
16	16		4Y		V <sub>CC</sub>
17			NC		
18			4A		
19			4B		
20			V <sub>CC</sub>		

DEVICE TYPE 01  
CASES A, B, C AND D



DEVICE TYPE 02  
CASES E AND F

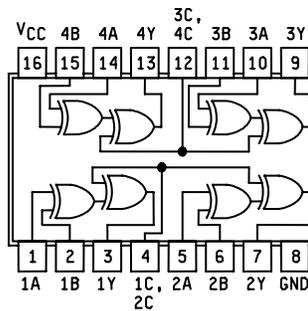


Figure 1. Logic diagram and terminal connections.

Device type 01

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

$$Y = \bar{A}B + A\bar{B}$$

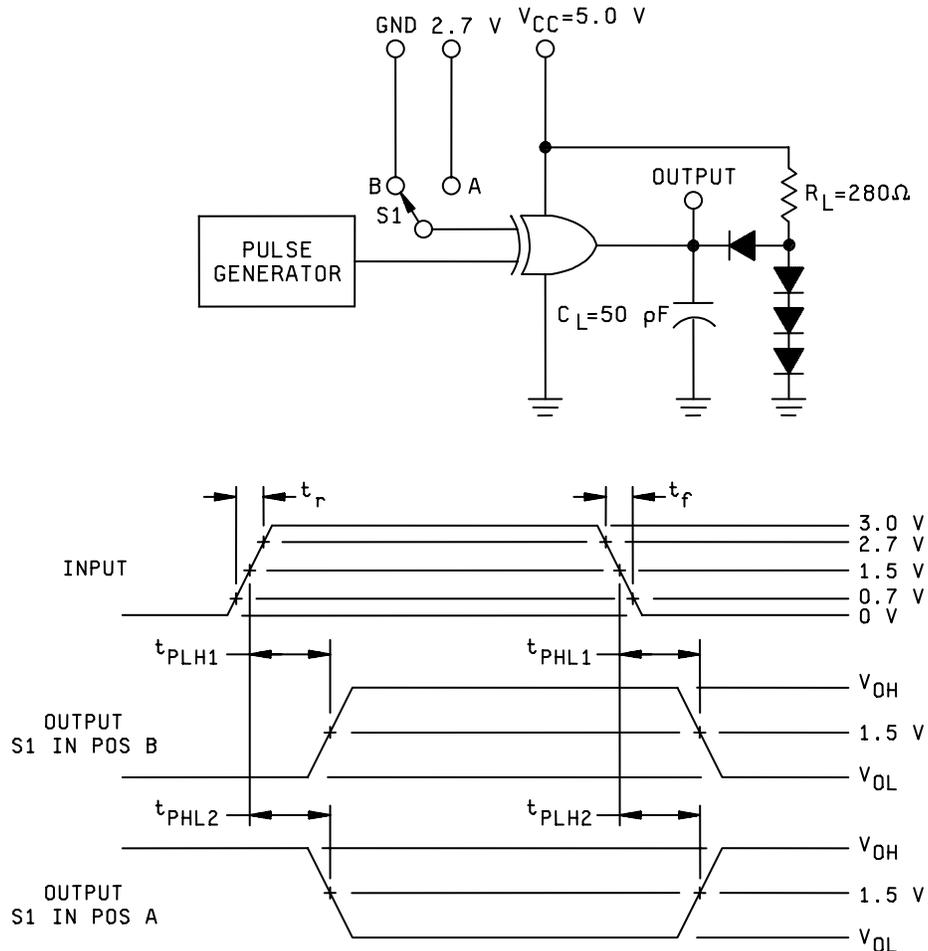
Device type 02

INPUTS			OUTPUT
A	B	C	Y
L	L	L	L
L	H	L	H
H	L	L	H
H	H	L	L
L	L	H	H
L	H	H	L
H	L	H	L
H	H	H	H

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

FIGURE 2. Truth tables and logic equations.

## DEVICE TYPE 01

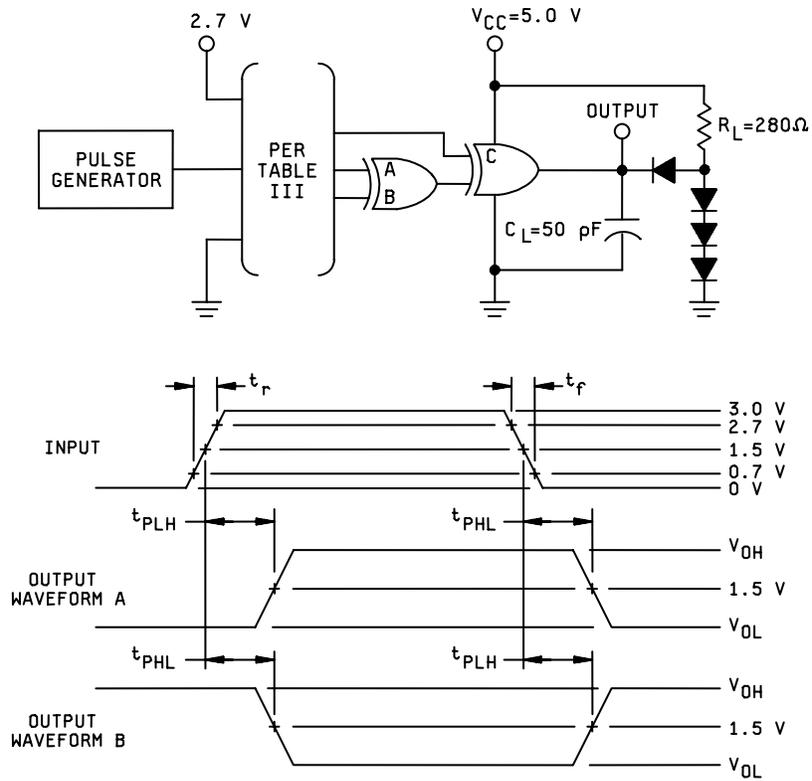


## NOTES:

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

FIGURE 3. Switching time test circuit and waveforms.

## DEVICE TYPE 02



## NOTES:

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

FIGURE 3. Switching time test circuit and waveforms - Continued.

TABLE III. Group A inspection for device type 01

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases														Measured terminal	Limits		Unit		
			A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13		14	Min		Max	
			2, X, 2/ 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>OH</sub>	3006	1	2.0 V	0.8 V	-1 mA											4.5 V	1Y	2.5		V	
		"	2	0.8 V	2.0 V	-1 mA											"	1Y	"		"	
		"	3															"	2Y			"
		"	4															"	2Y			"
		"	5															"	3Y			"
		"	6															"	3Y			"
		"	7															"	4Y			"
		"	8															"	4Y			"
	V <sub>OL</sub>	3007	9	2.0 V	2.0 V	20 mA												"	1Y		0.5	"
		"	10	0.8 V	0.8 V	20 mA												"	1Y		"	"
		"	11															"	2Y		"	"
		"	12															"	2Y		"	"
		"	13															"	3Y		"	"
		"	14															"	3Y		"	"
		"	15															"	4Y		"	"
		"	16															"	4Y		"	"
	V <sub>IC</sub>		17	-18 mA														"	1A		-1.2	"
			18		-18 mA													"	1B		"	"
			19															"	2A		"	"
			20															"	2B		"	"
			21															"	3A		"	"
			22															"	3B		"	"
			23															"	4A		"	"
			24															"	4B		"	"
	I <sub>IH1</sub>	3010	25	2.7 V	GND													5.5 V	1A		50	μA
		"	26	GND	2.7 V													"	1B		"	"
		"	27															"	2A		"	"
		"	28															"	2B		"	"
		"	29															"	3A		"	"
		"	30															"	3B		"	"
		"	31															"	4A		"	"
		"	32															"	4B		"	"
	I <sub>IH2</sub>	"	33	5.5 V	GND													"	1A		1.0	mA
		"	34	GND	5.5 V													"	1B		"	"
		"	35															"	2A		"	"
		"	36															"	2B		"	"
		"	37															"	3A		"	"
		"	38															"	3B		"	"
		"	39															"	4A		"	"
		"	40															"	4B		"	"
	I <sub>IL</sub> 1/	3009	41	0.5 V	5.5 V													"	1A	-1	-2	"
		"	42	5.5 V	0.5 V													"	1B	"	"	"
		"	43															"	2A		"	"
		"	44															"	2B		"	"
		"	45															"	3A		"	"
		"	46															"	3B		"	"
		"	47															"	4A		"	"
		"	48															"	4B		"	"

See footnotes at the end of device type 01.

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

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases														Measured terminal	Limits		Unit		
			A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13		14	Min		Max	
			2, X, Z/ 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	I <sub>OS</sub>	3011	49	5.5 V	GND	GND												5.5 V	1Y	-40	-100	mA
		"	50				5.5 V	GND	GND									"	2Y	"	"	"
		"	51															"	3Y	"	"	"
		"	52												GND	5.5 V	GND	"	4Y	"	"	"
	I <sub>CC</sub>	3005	53	GND	GND		GND	GND				GND	GND		GND	GND	"	V <sub>CC</sub>			75	"
	I <sub>CEX</sub>	"	54	5.5 V	GND	5.5 V											"	1Y			250	μA
	"	"	55				5.5 V	GND	5.5 V								"	2Y			"	"
	"	"	56							5.5 V	5.5 V	GND					"	3Y			"	"
	"	"	57										5.5 V	5.5 V	GND		"	4Y			"	"
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, V <sub>IL</sub> = 0.7 V and V <sub>OL(max)</sub> = 0.45 V.																					
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>PLH1</sub>	3003 (Fig. 3)	58	IN	GND	OUT				GND							5.0 V	1Y	2	12.5	ns	
		"	59				IN	GND	OUT	"	OUT	IN	GND				"	2Y	"	"	"	
		"	60							"				OUT	IN	GND		"	3Y	"	"	"
		"	61							"							"	4Y	"	"	"	
	t <sub>PLH2</sub>	"	62	IN	2.7 V	OUT				"							"	1Y	"	"	"	
		"	63				IN	2.7 V	OUT	"	OUT	IN	2.7 V				"	2Y	"	"	"	
		"	64							"	OUT	IN	2.7 V	OUT	IN	2.7 V	"	3Y	"	"	"	
		"	65							"							"	4Y	"	"	"	
	t <sub>PHL1</sub>	"	66	IN	GND	OUT				"							"	1Y	"	"	12.0	
		"	67				IN	GND	OUT	"	OUT	IN	GND				"	2Y	"	"	"	
		"	68							"				OUT	IN	GND	"	3Y	"	"	"	
		"	69							"							"	4Y	"	"	"	
t <sub>PHL2</sub>	"	70	IN	2.7 V	OUT				"							"	1Y	"	"	"		
	"	71				IN	2.7 V	OUT	"	OUT	IN	2.7 V				"	2Y	"	"	"		
	"	72							"	OUT	IN	2.7 V	OUT	IN	2.7 V	"	3Y	"	"	"		
	"	73							"							"	4Y	"	"	"		
10 T <sub>C</sub> =+125°C	t <sub>PLH1</sub>	"	74	IN	GND	OUT			"							"	1Y	"	"	16.5		
		"	75				IN	GND	OUT	"	OUT	IN	GND			"	2Y	"	"	"		
		"	76							"				OUT	IN	GND	"	3Y	"	"	"	
		"	77							"							"	4Y	"	"	"	
	t <sub>PLH2</sub>	"	78	IN	2.7 V	OUT				"							"	1Y	"	"	"	
		"	79				IN	2.7 V	OUT	"	OUT	IN	2.7 V				"	2Y	"	"	"	
		"	80							"							"	3Y	"	"	"	
		"	81							"	OUT	IN	2.7 V	OUT	IN	2.7 V	"	4Y	"	"	"	

See footnotes at the end of device type 01.

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

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  V, or open).

Subgroup	Symbol	MIL-STD-883 method	Cases														Measured terminal	Limits		Unit		
			A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13		14	Min		Max	
			2, X, 2/	2	3	4	6	8	9	10	12	13	14	16	18	19		20				
			Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V <sub>CC</sub>					
10 T <sub>C</sub> =+125°C	t <sub>PHL1</sub>	3003 (Fig. 3)	82	IN	GND	OUT											5.0 V	1Y	2	15.5	ns	
		"	83				IN	GND	OUT	"							"	2Y	"	"	"	
		"	84								OUT	IN	GND					"	3Y	"	"	"
		"	85								"			OUT	IN	GND		"	4Y	"	"	"
	t <sub>PHL2</sub>	"	86	IN	2.7 V	OUT												"	1Y	"	"	"
		"	87				IN	2.7 V	OUT	"								"	2Y	"	"	"
		"	88							"	OUT	IN	2.7 V					"	3Y	"	"	"
		"	89							"				OUT	IN	2.7 V		"	4Y	"	"	"
11	Same tests, terminal conditions and limits as for subgroup 10, except T <sub>C</sub> = -55°C.																					

1/ I<sub>L</sub> limits for device type 01, circuit B, are -50 μA minimum and -750 μA maximum.

2/ Cases 2 and X pins not designated are NC.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  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			
				1A	1B	1Y	1C 2C	2A	2B	2Y	GND	3Y	3A	3B	3C 4C	4Y	4A	4B	V <sub>CC</sub>		Min	Max				
1 T <sub>C</sub> =+25°C	V <sub>OH</sub>	3006	1	2.0 V	0.8 V	-1 mA	0.8 V				GND								4.5 V	1Y	2.5		V			
		"	2	0.8 V	2.0 V	"	0.8 V				"								"	"	1Y	"		"		
		"	3	0.8 V	0.8 V	"	2.0 V				"									"	"	1Y	"		"	
		"	4	2.0 V	2.0 V	"	2.0 V				"									"	"	1Y	"		"	
		"	5				0.8 V	2.0 V	0.8 V	0.8 V	-1 mA	"								"	"	2Y	"		"	
		"	6				0.8 V	0.8 V	2.0 V	2.0 V	"	"								"	"	2Y	"		"	
		"	7				2.0 V	0.8 V	0.8 V	0.8 V	"	"								"	"	2Y	"		"	
		"	8				2.0 V	2.0 V	2.0 V	2.0 V	"	"								"	"	2Y	"		"	
		"	9									"								"	"	2Y	"		"	
		"	10									"		-1 mA	2.0 V	0.8 V	0.8 V			"	"	3Y	"		"	
		"	11									"		"	0.8 V	0.8 V	0.8 V			"	"	3Y	"		"	
		"	12									"		"	0.8 V	0.8 V	2.0 V			"	"	3Y	"		"	
		"	13									"		"	2.0 V	2.0 V	2.0 V			"	"	4Y	"		"	
		"	14									"		"	0.8 V	"	0.8 V	-1 mA	2.0 V	0.8 V	"	4Y	"		"	
		"	15									"		"	2.0 V	0.8 V	0.8 V	0.8 V	0.8 V	"	"	4Y	"		"	
		"	16									"		"	2.0 V	2.0 V	2.0 V	2.0 V	2.0 V	"	"	4Y	"		"	
	V <sub>OL</sub>	3007	17	17	0.8 V	0.8 V	20 mA	0.8 V				"								"	1Y		0.5	"		
			"	18	2.0 V	0.8 V	"	2.0 V				"									"	"	1Y	"		"
			"	19	0.8 V	2.0 V	"	2.0 V				"									"	"	1Y	"		"
			"	20	2.0 V	2.0 V	"	0.8 V				"									"	"	1Y	"		"
			"	21				0.8 V	0.8 V	0.8 V	20 mA	"									"	"	2Y	"		"
			"	22				2.0 V	2.0 V	0.8 V	"	"									"	"	2Y	"		"
			"	23				2.0 V	0.8 V	2.0 V	"	"									"	"	2Y	"		"
			"	24				0.8 V	2.0 V	2.0 V	"	"									"	"	2Y	"		"
			"	25									"								"	"	3Y	"		"
			"	26									"		20 mA	0.8 V	0.8 V	0.8 V			"	"	3Y	"		"
			"	27									"		"	0.8 V	0.8 V	2.0 V			"	"	3Y	"		"
			"	28									"		"	0.8 V	2.0 V	2.0 V			"	"	3Y	"		"
			"	29									"		"	2.0 V	0.8 V	0.8 V	20 mA	0.8 V	"	"	4Y	"		"
			"	30									"		"	2.0 V	0.8 V	2.0 V	0.8 V	0.8 V	"	"	4Y	"		"
			"	31									"		"	2.0 V	0.8 V	0.8 V	0.8 V	0.8 V	"	"	4Y	"		"
			"	32									"		"	0.8 V	"	2.0 V	2.0 V	2.0 V	"	"	4Y	"		"
V <sub>IC</sub>	3010	33	33	-18 mA							"								"	1A		-1.2	"			
		"	34		-18 mA						"								"	"	1B			"		
		"	35								"								"	"	1C,2C			"		
		"	36				-18 mA				"								"	"	2A			"		
		"	37					-18 mA			"								"	"	2B			"		
		"	38						-18 mA		"								"	"	3A			"		
		"	39								"								"	"	3B			"		
		"	40								"			-18 mA					"	"	3C,4C			"		
		"	41								"								"	"	4A			"		
		"	42								"									"	"	4B			"	
		I <sub>IH1</sub>	3010	43	43	2.7 V	GND						"								5.5 V	1A		50	μA	
"	44			GND	2.7 V						"								"	"	1B			"		
"	45			GND	GND						"								"	"	1C,2C			"		
"	46						2.7 V	GND	GND		"								"	"	2A			"		
"	47							2.7 V	GND	2.7 V	"								"	"	2B			"		
"	48										"								"	"	3A			"		
"	49										"								"	"	3B			"		
"	50										"				2.7 V	GND	2.7 V			"	"	3C,4C			"	
"	51										"									"	"	4A			"	
"	52										"									"	"	4B			"	

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

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  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		
				1A	1B	1Y	1C 2C	2A	2B	2Y	GND	3Y	3A	3B	3C 4C	4Y	4A	4B	V <sub>CC</sub>		Min	Max			
1 T <sub>C</sub> =+25°C	I <sub>IH2</sub>	3010	53	5.5 V	GND						GND								5.5 V	1A		1.0	mA		
		"	54	GND	5.5 V						"								"	"	1B		"	"	
		"	55	GND	GND			5.5 V				"								"	"	1C,2C		"	"
		"	56						5.5 V			"								"	"	2A		"	"
		"	57							GND		"								"	"	2B		"	"
		"	58							GND		"								"	"	3A		"	"
	"	59								GND		"							"	"	3B		"	"	
	"	60									"								"	"	3C,4C		"	"	
	"	61									"								"	"	4A		"	"	
	"	62									"								"	"	4B		"	"	
	I <sub>IL</sub>	3009	63	0.5 V	5.5 V							"								"	1A	-1.0	-2	"	
		"	64	5.5 V	0.5 V							"								"	"	1B		"	"
		"	65	5.5 V	GND			0.5 V				"								"	"	1C,2C		"	"
		"	66						5.5 V			"								"	"	2A		"	"
		"	67						0.5 V			"								"	"	2B		"	"
		"	68						5.5 V			"								"	"	3A		"	"
		"	69						0.5 V			"								"	"	3B		"	"
		"	70									"								"	"	3C,4C		"	"
		"	71									"								"	"	4A		"	"
		"	72									"								"	"	4B		"	"
I <sub>OS</sub>	3011	73	5.5 V	GND	GND						"								"	1Y	-40	-100	"		
	"	74					GND				"								"	"	2Y		"	"	
	"	75					GND	5.5 V			"								"	"	3Y		"	"	
	"	76					GND		GND		"								"	"	4Y		"	"	
I <sub>CC</sub>	3005	77	GND	GND			GND	GND	GND		"								"	V <sub>CC</sub>		99	"		
											"								"						
I <sub>CEX</sub>		78	5.5 V	GND	5.5 V						"								"	1Y		250	μA		
		79					GND				"								"	"	2Y		"	"	
		80					GND	5.5 V			"								"	"	3Y		"	"	
		81					GND		5.5 V		"	5.5 V	5.5 V	GND					"	"	4Y		"	"	
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, V <sub>IL</sub> = 0.7 V and V <sub>OL(max)</sub> = 0.45 V.																								
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>PLH1</sub>	3003 (Fig. 3)	82	IN	GND	OUT A	GND				GND								5.0 V	1Y		15	ns		
		"	83				GND					"							"	"	2Y		"	"	
		"	84				GND	IN				"							"	"	3Y		"	"	
		"	85				GND					"	OUT A	IN	GND	GND				"	"	4Y		"	"
	t <sub>PLH2</sub>	"	86	IN	2.7 V	OUT B	GND					"								"	1Y		14	"	
		"	87				GND					"								"	"	2Y		"	"
		"	88				GND	IN				"								"	"	3Y		"	"
		"	89				GND					"								"	"	4Y		"	"
	t <sub>PLH3</sub>	"	90	IN	GND	OUT B	2.7 V					"								"	1Y		17	"	
		"	91				2.7 V					"								"	"	2Y		"	"
		"	92				2.7 V	IN				"								"	"	3Y		"	"
		"	93				2.7 V					"								"	"	4Y		"	"

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

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  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			
				1A	1B	1Y	1C 2C	2A	2B	2Y	GND	3Y	3A	3B	3C 4C	4Y	4A	4B	V <sub>CC</sub>		Min	Max				
9 T <sub>C</sub> =+25°C	t <sub>PLH4</sub>	3003 (Fig. 3)	94	IN	2.7 V	OUT A	2.7 V 2.7 V	IN	2.7 V	OUT A	GND	OUT A	IN	2.7 V	2.7 V 2.7 V	OUT A	IN	2.7 V	5.0 V	1Y	2	14	ns			
			95																		2Y					
			96																			3Y				
			97																			4Y				
	t <sub>PHL1</sub>	"	"	98	IN	GND	OUT A	GND GND	IN	GND	OUT A	"	OUT A	IN	GND	GND GND	OUT A	IN	GND	"	1Y	"	17	"		
				99																		2Y				
				100 101																			3Y 4Y			
	t <sub>PHL2</sub>	"	"	102	IN	2.7 V	OUT B	GND GND	IN	2.7 V	OUT B	"	OUT B	IN	2.7 V	GND GND	OUT B	IN	2.7 V	"	1Y	"	15.5	"		
				103 104 105																			2Y 3Y 4Y			
	t <sub>PHL3</sub>	"	"	106	IN	GND	OUT B	2.7 V 2.7 V	IN	GND	OUT B	"	OUT B	IN	GND	2.7 V 2.7 V	OUT B	IN	GND	"	1Y	"	12	"		
107 108 109																						2Y 3Y 4Y				
t <sub>PHL4</sub>	"	"	110	IN	2.7 V	OUT A	2.7 V 2.7 V	IN	2.7 V	OUT A	"	OUT A	IN	2.7 V	2.7 V 2.7 V	OUT A	IN	2.7 V	"	1Y	"	13	"			
			111 112 113																			2Y 3Y 4Y				
t <sub>PLH5</sub>	"	"	114	GND	GND	OUT A	IN IN	GND	GND	OUT A	"	OUT A	GND	GND	IN IN	OUT A	GND	GND	"	1Y	"	14	"			
			115 116 117																			2Y 3Y 4Y				
t <sub>PLH6</sub>	"	"	118	2.7 V	GND	OUT B	IN IN	2.7 V	GND	OUT B	"	OUT B	2.7 V	GND	IN IN	OUT B	2.7 V	GND	"	1Y	"	13.5	"			
			119 120 121																			2Y 3Y 4Y				
t <sub>PHL5</sub>	"	"	122	GND	GND	OUT A	IN IN	GND	GND	OUT A	"	OUT A	GND	GND	IN IN	OUT A	GND	GND	"	1Y	"	16.5	"			
			123 124 125																			2Y 3Y 4Y				
t <sub>PHL6</sub>	"	"	126	2.7 V	GND	OUT B	IN IN	2.7 V	GND	OUT B	"	OUT B	2.7 V	GND	IN IN	OUT B	2.7 V	GND	"	1Y	"	14	"			
			127 128 129																			2Y 3Y 4Y				
10 T <sub>C</sub> =+125°C	t <sub>PLH1</sub>	"	130	IN	GND	OUT A	GND GND	IN	GND	OUT A	"	OUT A	IN	GND	GND GND	OUT A	IN	GND	"	1Y	"	19.5	"			
			131																			2Y				
			132																				3Y			
			133																				4Y			

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

Terminal conditions (pins not designated may be high  $\geq 2.0$  V or low  $\leq 0.8$  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			
				1A	1B	1Y	1C 2C	2A	2B	2Y	GND	3Y	3A	3B	3C 4C	4Y	4A	4B	V <sub>CC</sub>		Min	Max				
10 T <sub>C</sub> =+125°C	t <sub>PLH2</sub>	3003 (Fig. 3)	134	IN	2.7 V	OUT B	GND	IN	2.7 V	OUT B	GND								5.0 V	1Y	2	18.5	ns			
			135				GND														2Y					
			136																			3Y				
			137																			4Y				
	t <sub>PLH3</sub>	"	"	138	IN	GND	OUT B	2.7 V	IN	GND	OUT B	"									"	1Y	"	22	"	
				139				2.7 V				"										"	2Y	"	"	"
				140				2.7 V				"										"	3Y	"	"	"
				141				2.7 V				"										"	4Y	"	"	"
	t <sub>PLH4</sub>	"	"	142	IN	2.7 V	OUT A	2.7 V	IN	2.7 V	OUT A	"									"	1Y	"	18.5	"	
				143				2.7 V				"										"	2Y	"	"	"
				144				2.7 V				"										"	3Y	"	"	"
				145				2.7 V				"										"	4Y	"	"	"
	t <sub>PHL1</sub>	"	"	146	IN	GND	OUT A	GND	IN	GND	OUT A	"									"	1Y	"	22	"	
				147				GND				"										"	2Y	"	"	"
148							GND				"										"	3Y	"	"	"	
149							GND				"										"	4Y	"	"	"	
t <sub>PHL2</sub>	"	"	150	IN	2.7 V	OUT B	GND	IN	2.7 V	OUT B	"									"	1Y	"	20	"		
			151				GND				"										"	2Y	"	"	"	
			152				GND				"										"	3Y	"	"	"	
			153				GND				"										"	4Y	"	"	"	
t <sub>PHL3</sub>	"	"	154	IN	GND	OUT B	2.7 V	IN	GND	OUT B	"									"	1Y	"	15.5	"		
			155				2.7 V				"										"	2Y	"	"	"	
			156				2.7 V				"										"	3Y	"	"	"	
			157				2.7 V				"										"	4Y	"	"	"	
t <sub>PHL4</sub>	"	"	158	IN	2.7 V	OUT A	2.7 V	IN	2.7 V	OUT A	"									"	1Y	"	17	"		
			159				2.7 V				"										"	2Y	"	"	"	
			160				2.7 V				"										"	3Y	"	"	"	
			161				2.7 V				"										"	4Y	"	"	"	
t <sub>PLH5</sub>	"	"	162	GND	GND	OUT A	IN	GND	GND	OUT A	"									"	1Y	"	18	"		
			163				IN				"										"	2Y	"	"	"	
			164				IN				"										"	3Y	"	"	"	
			165				IN				"										"	4Y	"	"	"	
t <sub>PHL6</sub>	"	"	166	2.7 V	GND	OUT B	IN	2.7 V	GND	OUT B	"									"	1Y	"	17.5	"		
			167				IN				"										"	2Y	"	"	"	
			168				IN				"										"	3Y	"	"	"	
			169				IN				"										"	4Y	"	"	"	
t <sub>PHL5</sub>	"	"	170	GND	GND	OUT A	IN	GND	GND	OUT A	"									"	1Y	"	21.5	"		
			171				IN				"										"	2Y	"	"	"	
			172				IN				"										"	3Y	"	"	"	
			173				IN				"										"	4Y	"	"	"	
t <sub>PHL6</sub>	"	"	174	2.7 V	GND	OUT B	IN	2.7 V	GND	OUT B	"									"	1Y	"	18	"		
			175				IN				"										"	2Y	"	"	"	
			176				IN				"										"	3Y	"	"	"	
			177				IN				"										"	4Y	"	"	"	

11 Same tests, terminal conditions and limits as for subgroup 10, except T<sub>C</sub> = -55°C.

## 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 it 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 the acquiring 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. Requirement for product assurance options.
- h. Requirements for special carriers, 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)
$I_{IN}$ .....	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) and lead material and finish A (see 3.4). Longer length leads 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	54S86
02	54S135

6.8 Manufacturers' designations. Manufacturers' circuits included in this specification are designated as shown in table IV.

<u>Table IV. Manufacturers' designations</u>			
Device Type	Texas Instruments	Signetics Corporation	Fairchild Semiconductor
	Circuits		
	A	B	C
01	X	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 extent of the changes.

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

Preparing activity:

DLA - CC

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

(Project 5962-2005-029)

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> .