| QUALIFICATION |
| REQUIREMENTS |
| REMOVED |

MIL-M-38510/155B
7 March 1984
SUPERSEDING
MIL-M-38510/155A(USAF)
1 September 1977

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, TTL, HIGH SPEED, AND GATES
MONOLITHIC SILICON

INACTIVE FOR NEW DESIGN AFTER DATE OF THIS REVISION.

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, TTL, high speed positive AND logic gating microcircuits. One product assurance class and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510, with the exception that the "JAN" or "J" certification shall not be used.

1.2.1 Device type. The device type shall be as follows:

Device type	Circuit
01,04	Quadruple, 2-input positive AND gate
02	Triple, 3-input positive AND gate
03	Dual, 4-input positive AND gate

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

Outline letter	Case outline (see MIL-M-38510, appendix C)
A	F-1 (14-pin, 1/4" x 1/4"), flat package
B	F-3 (14-pin, 3/16" x 1/4"), flat package
C	D-1 (14-pin, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-pin, 1/4" x 3/8"), flat package

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 -8 mA to +5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation per gate, (P_D) 1/	88 mWdc
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Cases A,B,D	0.08°C/mW
Case C	0.09°C/mW
Junction temperature (T_J)	+175°C

1/ Must withstand the added P_D due to short circuit conditions (e.g., I_{OS}) at one output for 5 seconds.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Rome Air Development Center (RBE-2), Griffiss AFB, NY 13441, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.4 Recommended operating conditions.

Supply voltage(V_{CC})	4.5 V dc minimum to 5.5 V dc maximum
Maximum high-level input voltage (V_{IH})	5.0 V dc
Minimum high-level input voltage (V_{IH})	2.0 V dc
Maximum low-level input voltage (V_{IL})	0.8 V dc
Minimum low-level input voltage (V_{IL})	0.0 V dc
Normalized fanout (each output) 2/	10 maximum
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

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 specification shall take precedence.

3. REQUIREMENTS

3.1 Detail specification. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

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

3.2.2 Logic diagram. The logic diagram shall be as specified on figure 1.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

3.2.4 Case outlines. The case outlines shall be as specified in MIL-M-38510 and in 1.2.3 herein.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 and 6.5 herein.

3.4 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.

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

3.5 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.6 Marking. Marking shall be in accordance with MIL-M-38510 and 1.2 herein. The "JAN" or "J" certification mark shall not be used.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$	Device type	Limits		Unit
				Min	Max	
High-level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IN} = 2.0 V I_{OH} = -500 µA for all inputs of gate under test	All	2.4	---	V
Low-level output voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 20 mA V_{IN} = 0.8 V for all inputs of gate under test	All		0.4	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -8 mA T_A = 25°C	All		-1.5	V
High-level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.4 V	All		50	µA
High-level input current	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	All		100	µA
Low-level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	All	-0.7	-2.0	mA
Short circuit output current	I_{OS}	V_{CC} = 5.5 V 2/	All	-40	-100	mA
High-level supply current	I_{CCH}	V_{CC} = 5.5 V V_{IN} = 5.5 V	01,04 02 03		40 30 20	mA mA mA
Low-level supply current	I_{CCL}	V_{CC} = 5.5 V V_{IN} = 0 V	01,04 02 03		64 48 32	mA mA mA
Propagation delay time, high-to-low-level	t_{PHL}	C_L = 50 pF, R_L = 280Ω	All	3	16	ns
Propagation delay time, low-to-high-level	t_{PLH}	C_L = 50 pF, R_L = 280Ω	All	3	16	ns

1/ Complete terminal conditions shall be as specified in table III.
2/ Not more than one output should be shorted at a time.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III) Class B devices
Interim electrical parameters (pre burn-in) (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,9
Group A test requirements (method 5005)	1,2,3,9
Group C and D end-point electrical parameters (method 5005)	1,2,3
Additional electrical subgroups for group C periodic inspections	10,11

*PDA applies to subgroup 1 (see 4.2c).

3.7 Manufacturer eligibility. To be eligible to supply microcircuits to this specification, a manufacturer shall have a manufacturer certification in accordance with MIL-M-38510 for at least one line. Not necessarily the line producing the device type described herein.

3.8 Certification. Certification in accordance with MIL-M-38510 is not required for this device.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007, as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in (method 1015 of MIL-STD-883).

(1) Test condition D or E, using the circuit shown on figure 3, or equivalent.

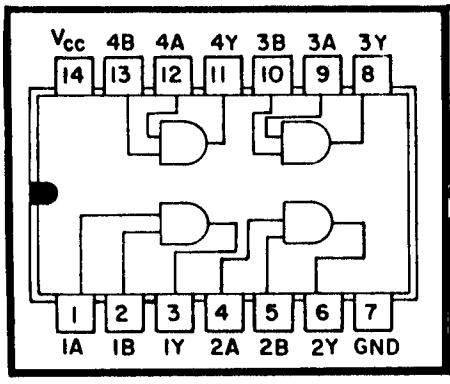
(2) T_A = +125°C minimum.

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.

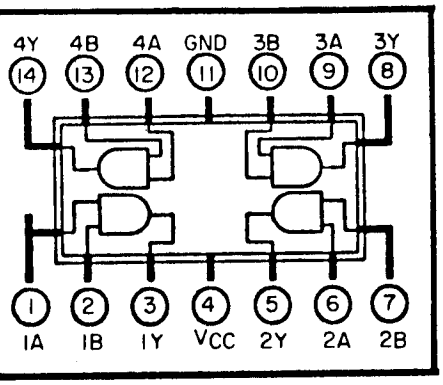
c. The percent defective allowable (PDA) for class B devices shall be 10 percent based on failures from group A, subgroup 1 test after cooldown as final electrical test in accordance with method 5004 of MIL-STD-883, and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical

Device type 01

Case C

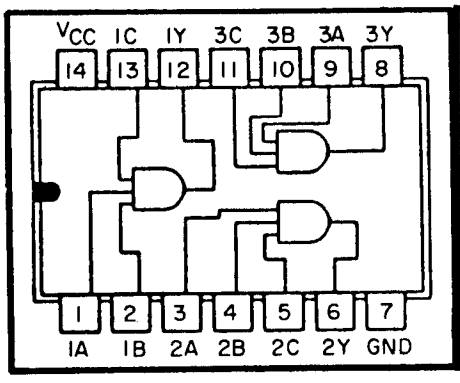


Cases A, B, and D

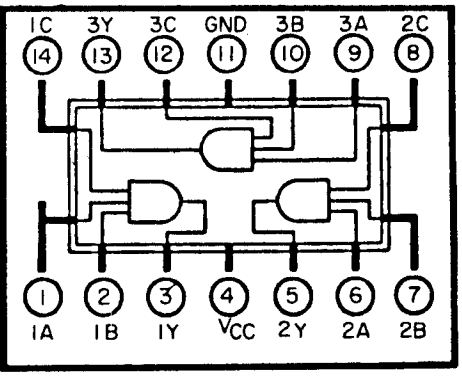


Device type 02

Case C

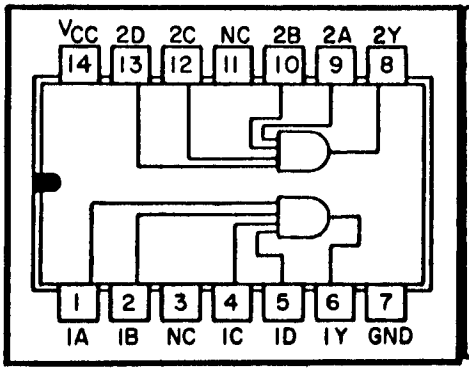


Cases A, B, and D



Device type 03

Case C



Cases A, B, and D

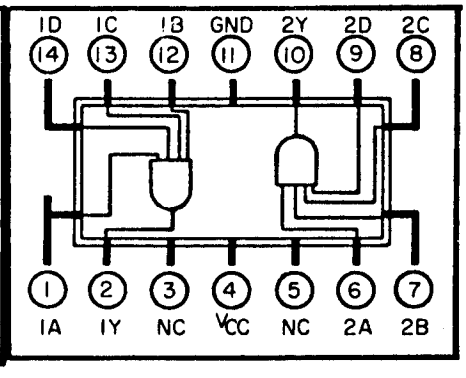


FIGURE 1. Logic diagram and terminal connections (top view).

Device type 04

Cases A, B and D

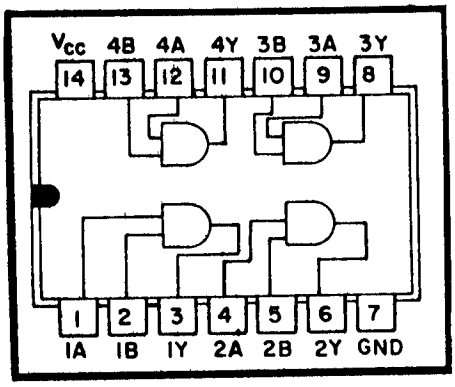


FIGURE 1. Logic diagram and terminal connections (top view) - Continued.

Device types 01 and 04

TRUTH TABLE (EACH GATE)		
INPUT		OUTPUT
A	B	Y
L	L	L
H	L	L
L	H	L
H	H	H

Positive logic Y = AB

Device type 02

TRUTH TABLE (EACH GATE)			
INPUT			OUTPUT
A	B	C	Y
L	X	X	L
H	L	X	L
H	H	L	L
H	H	H	H

Positive logic Y = ABC

Device type 03

TRUTH TABLE (EACH GATE)				
INPUT				OUTPUT
A	B	C	D	Y
L	X	X	X	L
H	L	X	X	L
H	H	L	X	L
H	H	H	L	L
H	H	H	H	H

Positive logic Y = ABCD

NOTE:
H = high level (steady-state),
L = low level (steady-state),
X = irrelevant (any input, including transitions).

FIGURE 2. Truth tables and logic equations.

TABLE III. Group A inspection for device type 01.
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	2	3	6	7	5	11	8	9	10	14	12	13	4				
			Test No.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}		Min	Max	Unit
1 T_A = 25°C	V_{OL}	3007	1	0.8 V	2.0 V	20 mA				GND							4.5 V	1Y		0.4	V
			2	2.0 V	0.8 V	20 mA												1Y			
			3				0.8 V	2.0 V	20 mA									2Y			
			4				2.0 V	0.8 V	20 mA									2Y			
			5								20 mA	0.8 V	2.0 V					3Y			
			6								20 mA	2.0 V	0.8 V					3Y			
			7											20 mA	0.8 V	2.0 V		4Y			
			8											20 mA	2.0 V	0.8 V		4Y			
	V_{OH}	3006	9	2.0 V	2.0 V	-.5 mA												1Y	2.4		
			10				2.0 V	2.0 V	-.5 mA									2Y			
			11								-.5 mA	2.0 V	2.0 V					3Y			
			12											-.5 mA	2.0 V	2.0 V		4Y			
	V_{IC}		13	-8 mA														1A		-1.5	
			14		-8 mA													1B			
			15				-8 mA											2A			
			16					-8 mA										2B			
			17									-8 mA						3A			
			18										-8 mA					3B			
			19												-8 mA			4A			
			20													-8 mA		4B			
	I_{IL}	3009	21	0.4 V	5.5 V												5.5 V	1A	-0.7	-2.0	mA
			22	5.5 V	0.4 V													1B			
			23				0.4 V	5.5 V										2A			
			24				5.5 V	0.4 V										2B			
			25									0.4 V	5.5 V					3A			
			26									5.5 V	0.4 V					3B			
			27												0.4 V	5.5 V		4A			
			28												5.5 V	0.4 V		4B			
	I_{IH1}	3010	29	2.4 V	GND													1A		50	µA
			30	GND	2.4 V													1B			
			31				2.4 V	GND										2A			
			32				GND	2.4 V										2B			
			33									2.4 V	GND					3A			
			34									GND	2.4 V					3B			
			35												2.4 V	GND		4A			
			36												GND	2.4 V		4B			
	I_{IH2}	3010	37	5.5 V	GND													1A		100	
			38	GND	5.5 V													1B			
			39				5.5 V	GND										2A			
			40				GND	5.5 V										2B			
			41									5.5 V	GND					3A			
			42									GND	5.5 V					3B			
			43												5.5 V	GND		4A			
			44												GND	5.5 V		4B			

See note at end of device type 01.

TABLE III. Group A inspection for device type 01 - Continued.
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	2	3	6	7	5	11	8	9	10	14	12	13	4				
			Test No.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V_{CC}		Min	Max	Unit
1 T_A = 25°C	I_{OS}	3011	45	5.5 V	5.5 V	GND				GND							5.5 V	1Y	-40	-100	mA
			46				5.5 V	5.5 V	GND									2Y			
			47								GND	5.5 V	5.5 V					3Y			
			48											GND	5.5 V	5.5 V		4Y			
	I_{CCH}	3005	49	5.5 V	5.5 V		5.5 V	5.5 V				5.5 V	5.5 V		5.5 V	5.5 V		V_{CC}		40	
	I_{CCL}	3005	50	GND	GND		GND	GND				GND	GND		GND	GND		V_{CC}		64	
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = 125°C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and V_{IC} tests are omitted.																				
9 T_A = 25°C	t_{PHL}	3003 (Fig 5)	51	IN	5.0 V	OUT				GND							5.0 V	1A to 1Y	3	13	ns
			52				IN	5.0 V	OUT									2A to 2Y			
			53								OUT	IN	5.0 V					3A to 3Y			
			54											OUT	IN	5.0 V		4A to 4Y			
	t_{PLH}		55	IN	5.0 V	OUT												1A to 1Y			
			56				IN	5.0 V	OUT									2A to 2Y			
			57								OUT	IN	5.0 V					3A to 3Y			
			58											OUT	IN	5.0 V		4A to 4Y			
10 T_A = 125°C	t_{PHL}	3003 (Fig 5)	59	IN	5.0 V	OUT												1A to 1Y		16	
			60				IN	5.0 V	OUT									2A to 2Y			
			61								OUT	IN	5.0 V					3A to 3Y			
			62											OUT	IN	5.0 V		4A to 4Y			
	t_{PLH}		63	IN	5.0 V	OUT												1A to 1Y			
			64				IN	5.0 V	OUT									2A to 2Y			
			65								OUT	IN	5.0 V					3A to 3Y			
			66											OUT	IN	5.0 V		4A to 4Y			
11	Same tests, terminal conditions and limits as subgroup 10, except T_A = -55°C.																				

NOTE:
1. Pins not designated are high level logic, low level logic, or open.

TABLE III. Group A inspection for device type 02.
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	2	6	7	8	5	11	13	9	10	12	3	14	4				
			Test No.	1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V_{CC}		Min	Max	Unit
1 T_A = 25°C	V_{OL}	3007	1	0.8 V	2.0 V					GND					20 mA	2.0 V	4.5 V	1Y		0.4	V
			2	2.0 V	0.8 V										20 mA	2.0 V		1Y			
			3	2.0 V	2.0 V										20 mA	0.8 V		1Y			
			4			0.8 V	2.0 V	2.0 V	20 mA									2Y			
			5			2.0 V	0.8 V	2.0 V	20 mA									2Y			
			6			2.0 V	2.0 V	0.8 V	20 mA									2Y			
			7								20 mA	0.8 V	2.0 V	2.0 V				3Y			
			8								20 mA	2.0 V	0.8 V	2.0 V				3Y			
			9								20 mA	2.0 V	2.0 V	0.8 V				3Y			
	V_{OH}	3006	10	2.0 V	2.0 V										-.5 mA	2.0 V		1Y	2.4		
	V_{OH}	3006	11			2.0 V	2.0 V	2.0 V	-.5 mA									2Y	2.4		
	V_{OH}	3006	12								-.5 mA	2.0 V	2.0 V	2.0 V				3Y	2.4		
	V_{IC}		13	-8 mA														1A		-1.5	
			14		-8 mA													1B			
			15													-8 mA		1C			
			16			-8 mA												2A			
			17				-8 mA											2B			
			18					-8 mA										2C			
			19									-8 mA						3A			
			20										-8 mA					3B			
			21											-8 mA				3C			
	I_{IL}	3009	22	0.4 V	5.5 V											5.5 V	5.5 V	1A	-0.7	-2.0	mA
			23	5.5 V	0.4 V											5.5 V		1B			
			24	5.5 V	5.5 V											0.4 V		1C			
			25			0.4 V	5.5 V	5.5 V										2A			
			26			5.5 V	0.4 V	5.5 V										2B			
			27			5.5 V	5.5 V	0.4 V										2C			
			28									0.4 V	5.5 V	5.5 V				3A			
			29									5.5 V	0.4 V	5.5 V				3B			
			30									5.5 V	5.5 V	0.4 V				3C			
	I_{IH1}	3010	31	2.4 V	GND											GND		1A		50	μA
			32	GND	2.4 V											GND		1B			
			33	GND	GND											2.4 V		1C			
			34			2.4 V	GND	GND										2A			
			35			GND	2.4 V	GND										2B			
			36			GND	GND	2.4 V										2C			
			37									2.4 V	GND	GND				3A			
			38									GND	2.4 V	GND				3B			
			39									GND	GND	2.4 V				3C			
	I_{IH2}	3010	40	5.5 V	GND											GND		1A		100	μA
			41	GND	5.5 V											GND		1B			
			42	GND	GND											5.5 V		1C			
			43			5.5 V	GND	GND										2A			
			44			GND	5.5 V	GND										2B			
			45			GND	GND	5.5 V										2C			
			46									5.5 V	GND	GND				3A			
			47									GND	5.5 V	GND				3B			
			48									GND	GND	5.5 V				3C			

See note at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	2	6	7	8	5	11	13	9	10	12	3	14	4				
			Test No.	1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V_{CC}		Min	Max	Unit
1 $T_A = 25°C$	I_{OS}	3011	49	5.5 V	5.5 V					GND					GND	5.5 V	5.5 V	1Y	-40	-100	mA
	I_{OS}	3011	50			5.5 V	5.5 V	5.5 V	GND									2Y	-40	-100	
	I_{OS}	3011	51								GND	5.5 V	5.5 V	5.5 V				3Y	-40	-100	
	I_{CCH}	3005	52	5.5 V	5.5 V	5.5 V	5.5 V	5.5 V				5.5 V	5.5 V	5.5 V				V_{CC}		30	
	I_{CCL}	3005	53	GND	GND	GND	GND	GND				GND	GND	GND				V_{CC}		48	
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = 125°C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and V_{IC} tests are omitted.																				
9 $T_A = 25°C$	t_{PHL}	3003	54	IN	5.0 V					GND					OUT	5.0 V	5.0 V	1A to 1Y	3	13	ns
	t_{PHL}	(Fig 5)	55			IN	5.0 V	5.0 V	OUT									2A to 2Y			
	t_{PHL}		56								OUT	IN	5.0 V	5.0 V				3A to 3Y			
	t_{PLH}		57	IN	5.0 V										OUT	5.0 V		1A to 1Y			
	t_{PLH}		58			IN	5.0 V	5.0 V	OUT									2A to 2Y			
	t_{PLH}		59								OUT	IN	5.0 V	5.0 V				3A to 3Y			
10 $T_A = 125°C$	t_{PHL}	3003	60	IN	5.0 V										OUT	5.0 V		1A to 1Y	3	16	ns
	t_{PHL}	(Fig 5)	61			IN	5.0 V	5.0 V	OUT									2A to 2Y			
	t_{PHL}		62								OUT	IN	5.0 V	5.0 V				3A to 3Y			
	t_{PLH}		63	IN	5.0 V										OUT	5.0 V		1A to 1Y			
	t_{PLH}		64			IN	5.0 V	5.0 V	OUT									2A to 2Y			
	t_{PLH}		65								OUT	IN	5.0 V	5.0 V				3A to 3Y			
11	Same tests, terminal conditions and limits as subgroup 10, except T_A = -55°C.																				

NOTE:
1. Pins not designated are high level logic, low level logic, or open.

TABLE III. Group A inspection for device type 03
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	12	3	13	14	2	11	10	6	7	5	8	9	4		Min	Max	Unit
			Test No.	1A	1B	NC	1C	1D	1Y	GND	2Y	2A	2B	NC	2C	2D	V_{CC}				
1 $T_A = 25°C$	V_{OL}	3007	1	0.8 V	2.0 V		2.0 V	2.0 V	20 mA	GND							4.5 V	1Y		0.4	V
			2	2.0 V	0.8 V		2.0 V	2.0 V										1Y			
			3	2.0 V	2.0 V		0.8 V	2.0 V										1Y			
			4	2.0 V	2.0 V		2.0 V	0.8 V										1Y			
			5								20 mA	0.8 V	2.0 V		2.0 V	2.0 V		2Y			
			6									2.0 V	0.8 V		2.0 V	2.0 V		2Y			
			7									2.0 V	2.0 V		0.8 V	2.0 V		2Y			
			8									2.0 V	2.0 V		2.0 V	0.8 V		2Y			
	V_{OH}	3006	9	2.0 V	2.0 V		2.0 V	2.0 V	-.5 mA									1Y	2.4		
	V_{OH}	3006	10								-.5 mA	2.0 V	2.0 V		2.0 V	2.0 V		2Y	2.4		
	V_{IC}		11	-8 mA														1A		-1.5	
			12		-8 mA													1B			
			13				-8 mA											1C			
			14					-8 mA										1D			
			15									-8 mA						2A			
			16										-8 mA					2B			
			17												-8 mA			2C			
			18													-8 mA		2D			
	I_{IL}	3009	19	0.4 V	5.5 V		5.5 V	5.5 V									5.5 V	1A	-0.7	-2.0	mA
			20	5.5 V	0.4 V		5.5 V	5.5 V										1B			
			21	5.5 V	5.5 V		0.4 V	5.5 V										1C			
			22	5.5 V	5.5 V		5.5 V	0.4 V										1D			
			23									0.4 V	5.5 V		5.5 V	5.5 V		2A			
			24									5.5 V	0.4 V		5.5 V	5.5 V		2B			
			25									5.5 v	5.5 V		0.4 V	5.5 V		2C			
			26									5.5 V	5.5 V		5.5 V	0.4 V		2D			
	I_{IH1}	3010	27	2.4 V	GND		GND	GND										1A		50	µA
			28	GND	2.4 V		GND	GND										1B			
			29	GND	GND		2.4 V	GND										1C			
			30	GND	GND		GND	2.4 V										1D			
			31									2.4 V	GND		GND	GND		2A			
			32									GND	2.4 V		GND	GND		2B			
			33									GND	GND		2.4 V	GND		2C			
			34									GND	GND		GND	2.4 V		2D			
	I_{IH2}	3010	35	5.5 V	GND		GND	GND										1A		100	
			36	GND	5.5 V		GND	GND										1B			
			37	GND	GND		5.5 V	GND										1C			
			38	GND	GND		GND	5.5 V										1D			
			39									5.5 V	GND		GND	GND		2A			
			40									GND	5.5 V		GND	GND		2B			
			41									GND	GND		5.5 V	GND		2C			
			42									GND	GND		GND	5.5 V		2D			

See note at end of device type 03.

TABLE III. Group A inspection for device type 03 - Continued.
Terminal conditions (see note 1)

Subgroup	Symbol	MIL-STD-883 method	Case C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits		
			Case A, B, D	1	12	3	13	14	2	11	10	6	7	5	8	9	4				
			Test No.	1A	1B	NC	1C	1D	1Y	GND	2Y	2A	2B	NC	2C	2D	V_{CC}		Min	Max	Unit
1 $T_A = 25°C$	I_{OS}	3011	43	5.5 V	5.5 V		5.5 V	5.5 V	GND	GND							5.5 V	1Y	-40	-100	mA
	I_{OS}	3011	44								GND	5.5 V	5.5 V		5.5 V	5.5 V		2Y	-40	-100	
	I_{CCH}	3005	45	5.5 V	5.5 V		5.5 V	5.5 V				5.5 V	5.5 V		5.5 V	5.5 V		V_{CC}		20	
	I_{CCL}	3005	46	GND	GND		GND	GND				GND	GND		GND	GND		V_{CC}		32	
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = 125°C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55°C and V_{IC} tests are omitted.																				
9 $T_A = 25°C$	t_{PHL}	3003	47	IN	5.0 V		5.0 V	5.0 V	OUT	GND							5.0 V	1A to 1Y	3	13	ns
	t_{PHL}	(Fig 5)	48								OUT	IN	5.0 V		5.0 V	5.0 V		2A to 2Y			
	t_{PLH}		49	IN	5.0 V		5.0 V	5.0 V	OUT									1A to 1Y			
	t_{PLH}		50								OUT	IN	5.0 V		5.0 V	5.0 V		2A to 2Y			
10 $T_A = 125°C$	t_{PHL}		51	IN	5.0 V		5.0 V	5.0 V	OUT									1A to 1Y	3	16	
	t_{PHL}		52								OUT	IN	5.0 V		5.0 V	5.0 V		2A to 2Y			
	t_{PLH}		53	IN	5.0 V		5.0 V	5.0 V	OUT									1A to 1Y			
	t_{PLH}		54								OUT	IN	5.0 V		5.0 V	5.0 V		2A to 2Y			
11	Same tests, terminal conditions and limits as subgroup 10, except T_A = -55°C.																				

NOTE:
1. Pins not designated are high level logic, low level logic, or open.

TABLE III. Group A inspection for device type 04.

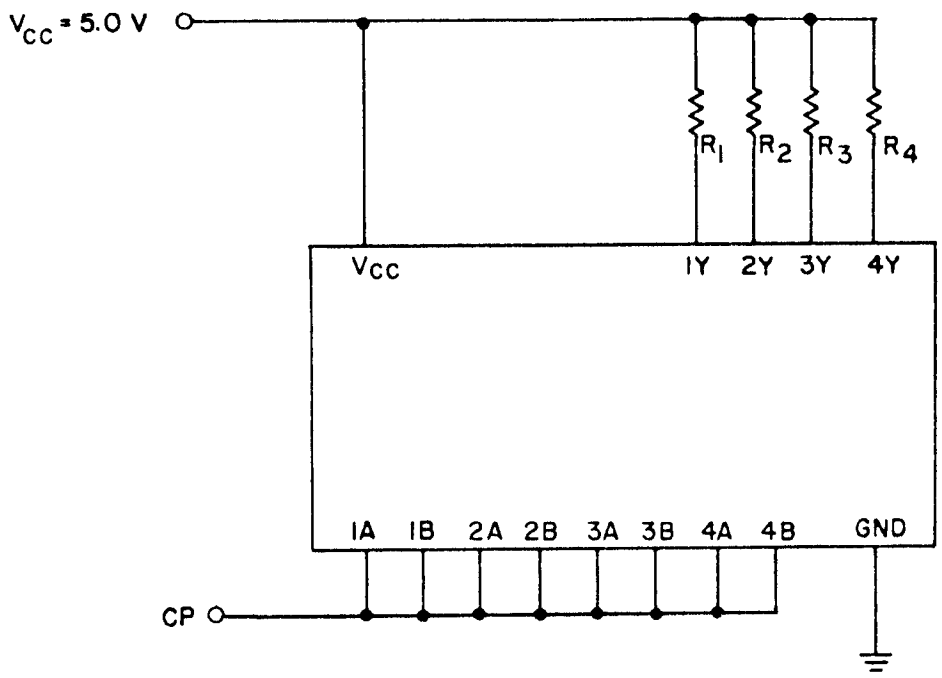
Subgroup	Symbol	MIL-STD-883 method	Case A, B, D Test No.	Terminal conditions 1/ 1 1A	2 1B	3 1Y	4 2A	5 2B	6 2Y	7 GND	8 3Y	9 3A	10 3B	11 4Y	12 4A	13 4B	14 V_{CC}	Meas. terminal	Test limits Min	Max	Unit
1 $T_A = 25^\circ C$	V_{OL}	3007	1	0.8 V	2.0 V	20 mA				GND							4.5 V	1Y		0.4	V
			2	2.0 V	0.8 V	20 mA												1Y			
			3				0.8 V	2.0 V	20 mA									2Y			
			4				2.0 V	0.8 V	20 mA									2Y			
			5								20 mA	0.8 V	2.0 V					3Y			
			6								20 mA	2.0 V	0.8 V					3Y			
			7											20 mA	0.8 V	2.0 V		4Y			
			8											20 mA	2.0 V	0.8 V		4Y			
	V_{OH}	3006	9	2.0 V	2.0 V	-.5 mA												1Y	2.4		
			10				2.0 V	2.0 V	-.5 mA									2Y			
			11								-.5 mA	2.0 V	2.0 V					3Y			
			12											-.5 mA	2.0 V	2.0 V		4Y			
	V_{IC}		13	-8 mA														1A		-1.5	
			14		-8 mA													1B			
			15				-8 mA											2A			
			16					-8 mA										2B			
			17									-8 mA						3A			
			18										-8 mA					3B			
			19												-8 mA			4A			
			20													-8 mA		4B			
	I_{IL}	3009	21	0.4 V	5.5 V												5.5 V	1A	-0.7	-2.0	mA
			22	5.5 V	0.4 V													1B			
			23				0.4 V	5.5 V										2A			
			24				5.5 V	0.4 V										2B			
			25									0.4 V	5.5 V					3A			
			26									5.5 V	0.4 V					3B			
			27												0.4 V	5.5 V		4A			
			28												5.5 V	0.4 V		4B			
	I_{IH1}	3010	29	2.4 V	GND													1A		50	µA
			30	GND	2.4 V													1B			
			31				2.4 V	GND										2A			
			32				GND	2.4 V										2B			
			33									2.4 V	GND					3A			
			34									GND	2.4 V					3B			
			35												2.4 V	GND		4A			
			36												GND	2.4 V		4B			
	I_{IH2}		37	5.5 V	GND													1A		100	
			38	GND	5.5 V													1B			
			39				5.5 V	GND										2A			
			40				GND	5.5 V										2B			
			41									5.5 V	GND					3A			
			42									GND	5.5 V					3B			
			43												5.5 V	GND		4A			
			44												GND	5.5 V		4B			

TABLE III. Group A inspection for device type 04 -Continued.

Subgroup	Symbol	MIL-STD-883 method	Cases A, B, D Test No.	Terminal conditions 1/ 1 1A	2 1B	3 1Y	4 2A	5 2B	6 2Y	7 GND	8 3Y	9 3A	10 3B	11 4Y	12 4A	13 4B	14 V_{CC}	Meas. terminal	Test limits Min	Max	Unit
1 T_A=25° C	I_{OS}	3011	45 46 47 48	5.5 V	5.5 V	GND	5.5 V	5.5 V	GND	GND	GND	5.5 V	5.5 V	GND	5.5 V	5.5 V	5.5 V	1Y 2Y 3Y 4Y	-40	-100	mA
	I_{CCH}	3005	49	5.5 V	5.5 V		5.5 V	5.5 V							5.5 V	5.5 V		V_{CC}		40	
	I_{CCL}	3005	50	GND	GND		GND	GND							GND	GND		V_{CC}		64	
2	Same tests, terminal conditions and limits as subgroup 1, except T_A = 125° C and V_{IC} tests are omitted.																				
3	Same tests, terminal conditions and limits as subgroup 1, except T_A = -55° C and V_{IC} tests are omitted.																				
9 T_A=25° C	t_{PHL}	3003 (Fig. 5)	51 52 53 54	IN	5.0 V	OUT	IN	5.0 V	OUT	GND	OUT	IN	5.0 V	OUT	IN	5.0 V	5.0 V	1A to 1Y 2A to 2Y 3A to 3Y 4A to 4Y	3	13	ns
	t_{PLH}		55 56 57 58	IN	5.0 V	OUT	IN	5.0 V	OUT		OUT	IN	5.0 V	OUT	IN	5.0 V		1A to 1Y 2A to 2Y 3A to 3Y 4A to 4Y			
10 T_A=125° C	t_{PHL}		59 60 61 62	IN	5.0 V	OUT	IN	5.0 V	OUT		OUT	IN	5.0 V	OUT	IN	5.0 V		1A to 1Y 2A to 2Y 3A to 3Y 4A to 4Y		16	
	t_{PLH}		63 64 65 66	IN	5.0 V	OUT	IN	5.0 V	OUT		OUT	IN	5.0 V	OUT	IN	5.0 V		1A to 1Y 2A to 2Y 3A to 3Y 4A to 4Y			
11	Same tests, terminal conditions and limits as subroup 10, except T_A = -55°C.																				

1/ Pins not designated are high level logic, low level logic, or open.

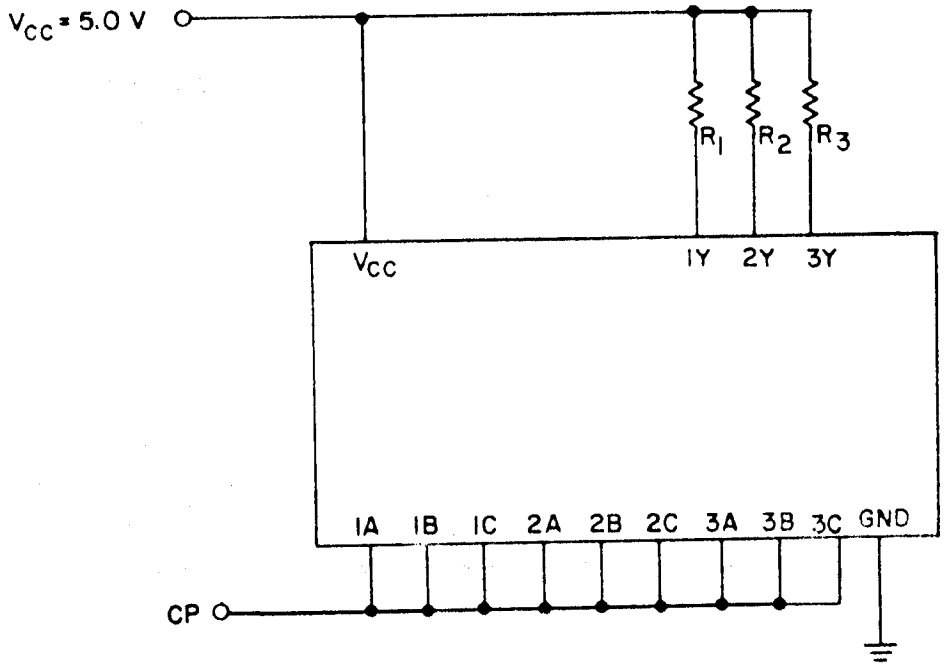
Device types 01 and 04



NOTES:
1. R_1 thru R_4 = 220Ω ±5%.
2. The clock frequency shall be 100 kHz with V_{IN} = 3 V minimum and minimum duty cycle of 50%.

FIGURE 3. Burn-in and life test circuit.

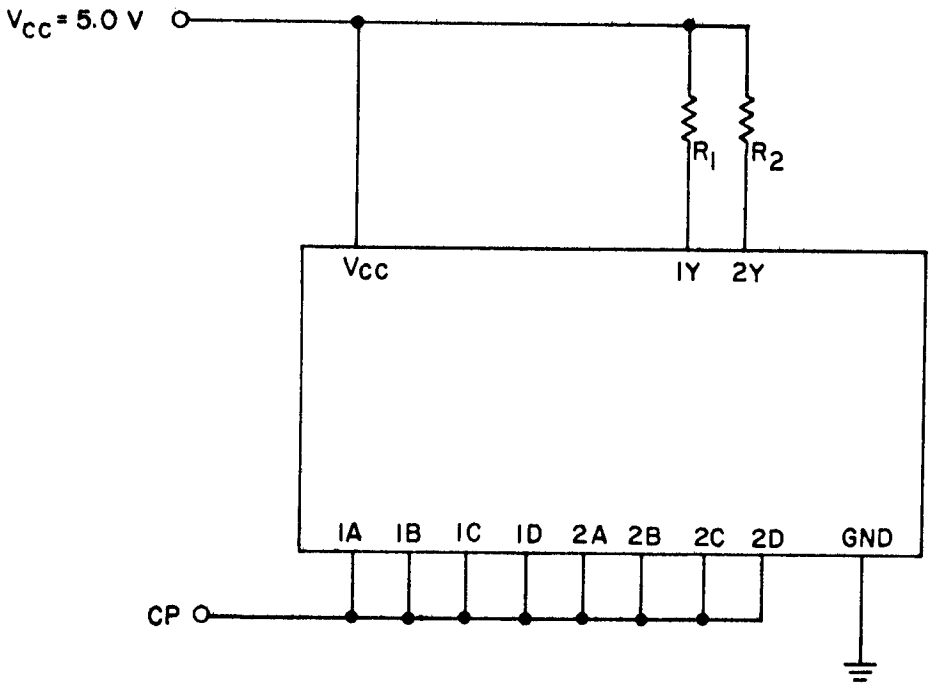
Device type 02



NOTES:
1. R_1 thru R_3 = 220Ω ±5%.
2. The clock frequency shall be 100 kHz with V_{IN} = 3 V minimum and minimum duty cycle of 50%.

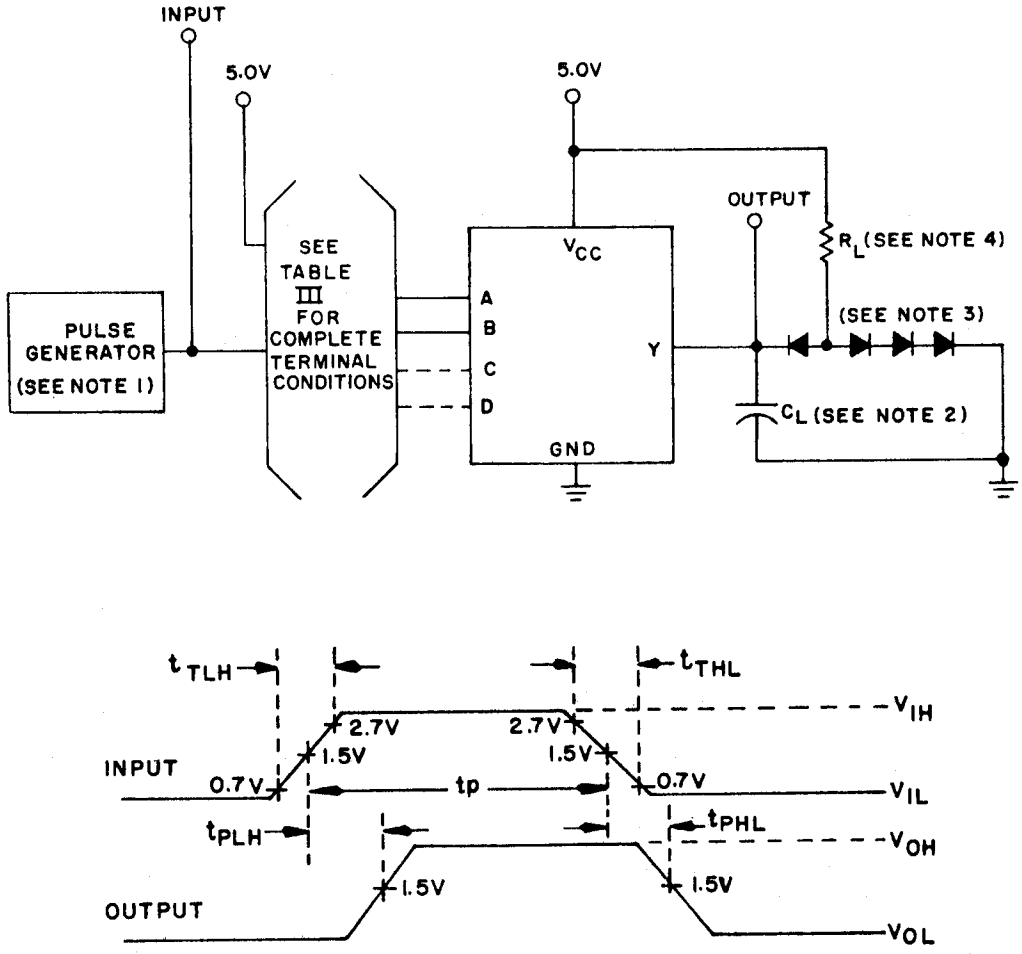
FIGURE 3. Burn-in and life test circuit - Continued.

Device type 03



NOTES:
1. R_1 and R_2 = 220Ω ±5%.
2. The clock frequency shall be 100 kHz with V_{IN} = 3 V minimum and minimum duty cycle of 50%.

FIGURE 3. Burn-in and life test circuit - Continued.



NOTES:
1. The pulse generator shall have the following characteristics: PRR = 1 MHz, t_p = 0.5 µs, $Z_{out} \approx 50\Omega$, $t_{TLH} = t_{THL} \leq 10$ ns, V_{IH} = 3.0 V, V_{IL} = 0 V.
2. C_L = 50 pF minimum including probe and jig capacitance.
3. All diodes are 1N3064 or equivalent.
4. $R_L = 280\Omega \pm 5\%$.

FIGURE 4. Switching time test circuit.

parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for that lot, and the lot shall be accepted or rejected based on the PDA for the applicable device class.

4.3 Qualification inspection. Qualification inspection is not required.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510, and as specified herein. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4). Generic test data (see 6.6) may be used to satisfy the requirements for groups C and D inspections. Quality conformance inspection shall be completed on the specific devices covered by this specification before they are shipped.

4.4.1 Group A inspection. Group A inspection shall be in accordance with table I of method 5005 of MIL-STD-883 and as follows:

a. Tests requirements shall be as specified in table II herein.

b. Subgroups 4, 5, 6, and 8 of table I of method 5005 of MIL-STD-883 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table III of method 5005 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Subgroups 3 and 4 shall be added to group C inspection parameters for class B devices and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.

c. Steady-state life test (method 1005 of MIL-STD-883) conditions:

(1) Test condition D or E, using the circuit shown on figure 3, or equivalent.

(2) T_A = +125°C minimum.

(3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified 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.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging of microcircuits shall be as specified in MIL-M-38510.

6. NOTES

6.1 Notes. The notes specified in MIL-M-38510 are applicable to this specification.

6.2 Intended use. Microcircuits conforming to this specification are intended for logisitic support of existing equipment.

6.3 Ordering data. The acquisition document should specify the following:

a. Complete part number (see 1.2).

b. 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.

c. Requirements for certificate of compliance, if applicable.

d. Requirements for notification of change of product or process to the contracting activity, if applicable.

e. Requirements for packaging and packing.

f. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements shall not apply to direct purchase by or direct shipment to the Government.

6.4 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

GND	Electrical ground (common terminal).
I_{IN}	Current flowing into an input terminal.
T_C	Case temperature.
V_{IN}	Voltage level at an input terminal.

6.5 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 C (see 3.3). Longer length leads and lead forming shall not affect the part number.

6.6 Generic test data. Generic test data may be used to satisfy the requirements of 4.4.3. Group C generic test data shall be on date codes no more than one year old and on a die in the same microcircuit group (see appendix E of MIL-M-38510) with the same material, design and process and from the same plant as the die represented. Group D (see 4.4.4) generic data shall be on date codes no more than one year old and on the same package type (see terms, definitions, and symbols of MIL-M-38510) and from the same plant as the package represented. The vendor is required to retain the generic data for a period of not less than 36 months from the date of shipment.

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 shall 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-M-38510.

Military device type	Generic-industry type
01	54H08
02	54H11
03	54H21
04	(see note)

NOTE: Device type 04 is electrically similar to device type 01 but is not interchangeable due to different pin-out terminations (see figure 1).

6.8 Ordering guidance. Since the qualification and certification requirements have been removed from the specification, orders may be placed immediately.

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 - ER
Navy - EC
Air Force - 17

Review activities:
Army - AR, MI
Navy - OS, SH
Air Force - 11, 19, 85, 99
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC

Agent:
DLA - ES

Preparing activity:
Air Force - 17

(Project 5962-0673)