

QUALIFICATION
REQUIREMENTS
REMOVED

MIL-M-38510/44B
28 February 1984
SUPERSEDING
MIL-M-38510/44A
24 May 1982

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, TTL, LOW POWER, COMPARATORS,
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, low power comparator microcircuits. One product assurance classes and a choice of case outlines and lead finishes are provided 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:

<u>Device type</u>	<u>Circuit</u>
01	5-bit comparator

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

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

<u>Letter</u>	<u>Case outlines, (see MIL-M-38510, appendix C)</u>
E	D-2 (16-lead, 1/4" x 7/8"), dual-in-line package
F	F-5 (16-lead, 1/4" x 3/8"), flat package

1.3 Absolute maximum ratings.

Supply voltage range - - - - -	-0.5 V to 7.0 V
Input voltage range - - - - -	-1.5 V at -10 mA to 5.5 V
Storage temperature range - - - - -	-65° to +150°C
Maximum power dissipation, (P _D) 1/- - - -	116 mW
Lead temperature (soldering 10 seconds) - -	300°C
Thermal resistance, junction to case (θ _{JC})	
Case F - - - - -	0.09°C/mW
Case E - - - - -	0.08°C/mW
Junction temperature (T _J) - - - - -	+175°C

1.4 Recommended operating conditions.

Supply voltage (V _{CC}) - - - - -	4.5 V minimum to 5.5 V maximum
Minimum high level input voltage (V _{IH}) - - -	2.0 V
Maximum low level input voltage (V _{IL}) - - -	0.7 V
Case operating temperature range (T _C) - - -	-55° to +125°C

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

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.

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 specifications. 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 Logic diagram and terminal connections. The logic diagram and terminal connections shall be as specified on figures 1 and 2.

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

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

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

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.

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. The "JAN" or "J" certification mark shall not be used.

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

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$	Limits		Unit
			Min	Max	
High level output voltage	V_{OH}	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$ $V_{IN} = 0.7\text{ V}$ and 2.0 V	2.4	---	V
Low level output voltage	V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 4.8\text{ mA}$ $V_{IN} = 0.7\text{ V}$ and 2.0 V	---	0.3	V
Input clamp voltage	V_{IC}	$V_{CC} = 4.5\text{ V}$, $I_{IN} = -10\text{ mA}$	---	-1.5	V
Low level input voltage	I_{IL}	$V_{CC} = 5.5\text{ V}$, $V_{IN} = 0.3\text{ V}$	-352	-800	μA
High level input voltage	I_{IH1}	$V_{CC} = 5.5\text{ V}$, $V_{IN} = 2.4\text{ V}$	---	40	μA
High level input current	I_{IH2}	$V_{CC} = 5.5\text{ V}$, $V_{IN} = 5.5\text{ V}$	---	200	μA
Short circuit output current	I_{OS}	$V_{CC} = 5.5\text{ V}$ 1/	-2.5	-25	mA
Supply current	I_{CC}	$V_{CC} = 5.5\text{ V}$, $V_{IN} = 0\text{ V}$	---	21	mA
Propagation delay time from E to A = B	t_{PLH1}	$V_{CC} = 5.0\text{ V}$ $R_L = 1.78\text{ K} \pm 5\%$ $C_L = 50\text{ pF}$ (min) (Figure 5)	8	63	ns
	t_{PHL1}		8	55	
Propagation delay time from E to A < B	t_{PLH2}		8	65	ns
	t_{PHL2}		8	50	
Propagation delay time from E to A > B	t_{PLH3}		10	65	ns
	t_{PHL3}		8	50	
Propagation delay time from A to A = B	t_{PLH4}		15	75	ns
	t_{PHL4}		20	90	
Propagation delay time from B to A = B	t_{PLH5}		15	75	ns
	t_{PHL5}		20	95	
Propagation delay time from A to A < B	t_{PLH6}		15	90	ns
	t_{PHL6}		15	90	
Propagation delay time from B to A < B	t_{PLH7}		18	90	ns
	t_{PHL7}		18	95	
Propagation delay time from A to A > B	t_{PLH8}		18	75	ns
	t_{PHL8}		15	95	
Propagation delay time from B to A > B	t_{PLH9}		15	75	ns
	t_{PHL9}		20	95	

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

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III)
Interim electrical test parameters (pre burn-in) (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,7, 9
Group A test requirements (method 5005)	1,2,3,7, 9,10,11
Group C end-point electrical test parameters (method 5005)	1,2,3
Group D end-point electrical test parameters (method 5005)	1,2,3
Additional electrical test parameters for group C inspection	None

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

3.9 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 test (method 1015 of MIL-STD-883).
 - (1) Test condition D or E, using the circuit shown on figure 4, or equivalent.
 - (2) $T_A = +125^{\circ}\text{C}$ minimum.
- b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameter tests prior to burn-in are 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 tests 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 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. 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 shall be as specified in table II.
- 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 test parameters shall be as specified in table II herein.
- b. Subgroups 3 and 4 shall be added to the group C inspection requirements for class B devices and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A inspection.
- c. Steady state life test (method 1005 of MIL-STD-883) conditions:
 - (1) Test condition D or E, using the circuit shown on figure 4, or equivalent.
 - (2) $T_A = +125^{\circ}\text{C}$ 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 test parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be 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 logistic support of existing equipment.

Device type 01

Cases E and F

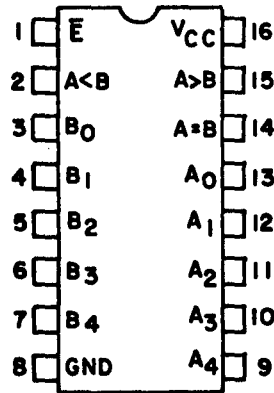


FIGURE 1. Terminal connections.

Device type 01

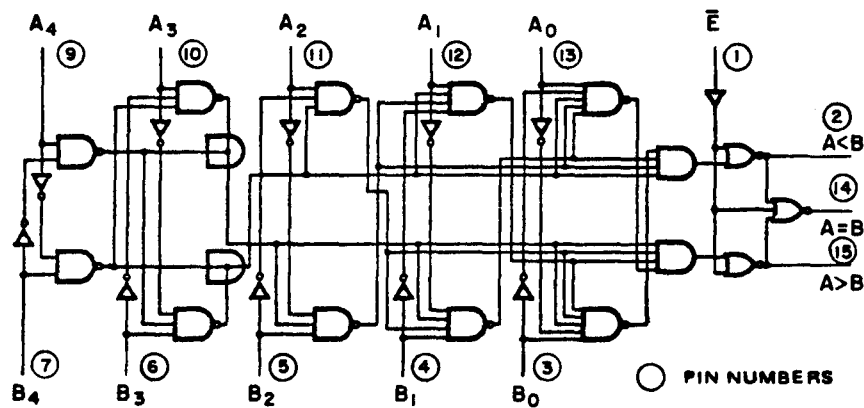


FIGURE 2. Logic diagram.

Device type 01

$\bar{E}$	A	B	$A < B$	$A > B$	$A = B$
H	X	X	L	L	L
L	Word A = Word B		L	L	H
L	Word A > Word B		L	H	L
L	Word A < Word B		H	L	L

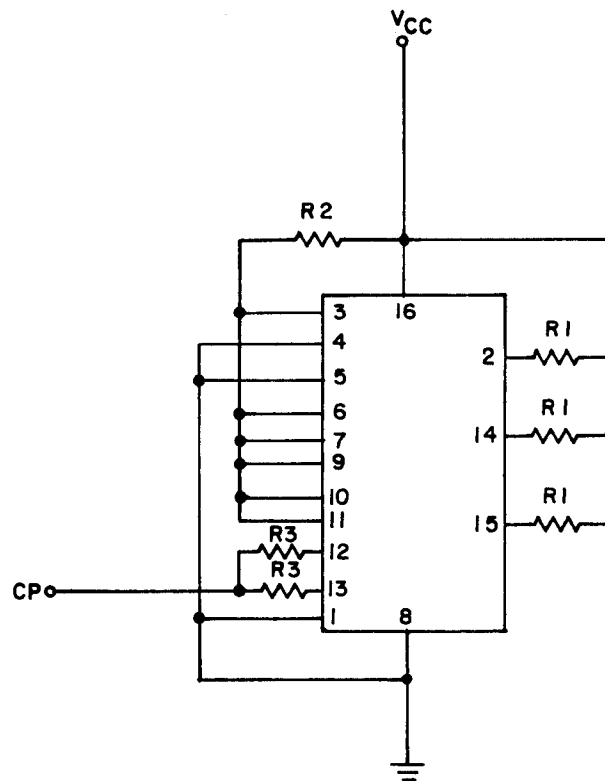
L = LOW voltage level

H = HIGH voltage level

X = Either HIGH or LOW voltage level

FIGURE 3. Truth table.

Device type 01

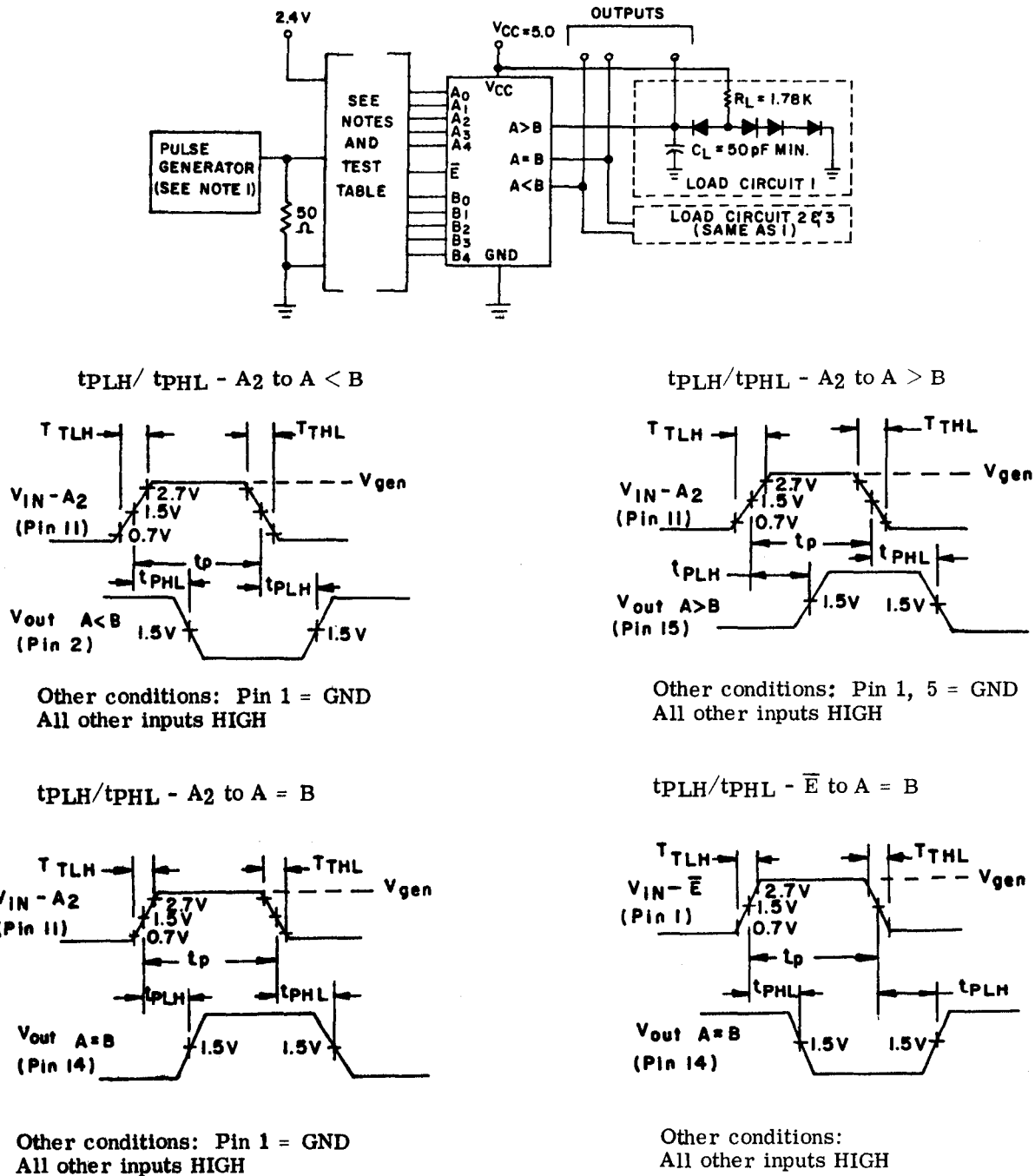


NOTES:

1. CP = 1 MHz $\pm 50\%$ square wave; duty cycle = 50 $\pm 15\%$; V_{IH} = 2.0 V to 5.5 V;
 V_{IL} = -0.5 V to 0.7 V.
2. V_{CC} shall provide 5 V minimum at device terminal.
3. R_1 = 1.2 k Ω $\pm 5\%$, R_2 = 13.2 k Ω $\pm 5\%$, R_3 = 10 Ω $\pm 5\%$.

FIGURE 4. Burn-in circuit for device type 01.

Device type 01



NOTES:

- Input pulse generator characteristics: $V_{gen} = 3.0V$, $T_{TLH} = T_{THL} < 10ns$, $T_p = 200ns$, $PRR = 1MHz$, $Z_{out} = 50\Omega$.
- C_L includes stray wiring and probe capacitance.
- All diodes 1N3064 or equivalent.

FIGURE 5. Switching circuit and waveforms for device type 01.

DEVICE TYPE 01

TEST TABLE

PARAMETER	APPLY PULSE	2.4 V	GND	OUTPUT	WAVEFORM
t_{PLH1}	$\bar{E}$	Ax, Bx		A = B	INV
t_{PHL1}	$\bar{E}$	Ax, Bx		A = B	INV
t_{PLH2}	$\bar{E}$	Bx	Ax	A < B	INV
t_{PHL2}	$\bar{E}$	Bx	Ax	A < B	INV
t_{PLH3}	$\bar{E}$	A	Bx	A > B	INV
t_{PHL3}	$\bar{E}$	Ax	Bx	A > B	INV
t_{PLH4}	An	Bn, Ax, Bx	$\bar{E}$	A = B	Non INV
t_{PHL4}	An	Bn, Ax, Bx	$\bar{E}$	A = B	Non INV
t_{PLH5}	Bn	An, Ax, Bx	$\bar{E}$	A = B	Non INV
t_{PHL5}	Bn	An, Ax, Bx	$\bar{E}$	A = B	Non INV
t_{PLH6}	An	Bn, Ax, Bx	$\bar{E}$	A < B	INV
t_{PHL6}	An	Bn, Ax, Bx	$\bar{E}$	A < B	INV
t_{PLH7}	Bn		$\bar{E}$, An, Ax, Bx	A < B	Non INV
t_{PHL7}	Bn		$\bar{E}$, An, Ax, Bx	A < B	Non INV
t_{PLH8}	An		$\bar{E}$, Bn, Ax, Bx	A > B	Non INV
t_{PHL8}	An		$\bar{E}$, Bn, Ax, Bx	A > B	Non INV
t_{PLH9}	Bn	An, Ax, Bx	$\bar{E}$	A > B	INV
t_{PHL9}	Bn	An, Ax, Bx	$\bar{E}$	A > B	INV

Switching conditions for device type 01.

FIGURE 5. Switching circuit and waveforms for device type 01 - Continued.

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

Subgroup	Symbol	MIL-STD-883 method	Cases E, F Test No.	1 $\bar{E}$	2 A < B	3 B ₀	4 B ₁	5 B ₂	6 B ₃	7 B ₄	8 GND	9 A ₄	10 A ₃	11 A ₂	12 A ₁	13 A ₀	14 A = B	15 A > B	16 V _{CC}	Meas. terminal	Test Limits		
																					Min	Max	Unit
1 T = 25° C	V _{OL}	3007	1	GND	4.8 mA	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V	GND	0.7 V	0.7 V	0.7 V	0.7 V	0.7 V			4.5 V	A < B		0.3	V
			2	GND																A > B			
			3	2.0 V													4.8 mA	4.8 mA		A = B			
			4	2.0 V																A > B			
			5	GND													4.8 mA			A = B			
			6	GND																A = B			
			7	2.0 V	4.8 mA	2.0 V										0.7 V	4.8 mA			A < B			
	V _{OH}	3006	8	0.7 V	-0.4 mA															A < B	2.4		
			9			0.7 V	2.0 V													A < B			
			10				0.7 V	2.0 V												A < B			
			11					0.7 V	2.0 V											A < B			
			12						0.7 V	2.0 V										A < B			
			13							2.0 V										A < B			
			14							2.0 V										A < B			
			15																	A < B			
			16																	A < B			
			17																	A < B			
			18																	A < B			
	I _{IL}	3009	19	0.3 V		0.3 V													5.5 V	$\bar{E}$	-352	-800	μA
			20				0.3 V													B ₀			
			21					0.3 V												B ₁			
			22						0.3 V											B ₂			
			23							0.3 V										B ₃			
			24								0.3 V									B ₄			
			25			GND	GND	GND	GND	0.3 V		0.3 V								A ₄			
			26										0.3 V							A ₃			
			27											0.3 V						A ₂			
			28			4.5 V									0.3 V					A ₁			
			29			GND										0.3 V				A ₀			
	I _{IH1}	3010	30			2.4 V						5.5 V	5.5 V	5.5 V	5.5 V	GND				B ₀		40	
			31				2.4 V									5.5 V				B ₁			
			32					2.4 V												B ₂			
			33						2.4 V											B ₃			
			34							2.4 V										B ₄			
			35			5.5 V	5.5 V	5.5 V	5.5 V	5.5 V		2.4 V								A ₄			
			36										2.4 V							A ₃			
			37											2.4 V						A ₂			
			38												2.4 V					A ₁			
			39			GND										2.4 V				A ₀			
			40	2.4 V																E			
	I _{IH2}		41			5.5 V						5.5 V	5.5 V	5.5 V	5.5 V	GND				B ₀		200	
			42				5.5 V									5.5 V				B ₁			
			43					5.5 V												B ₂			
			44						5.5 V											B ₃			

See footnotes at end of table.

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

Subgroup	Symbol	MIL-STD-883 method	Cases E, F			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Meas. terminal	Test limits																					
			Test No.	$\bar{E}$	A<B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A=B	A>B	V _{CC}	Min	Max		Unit																					
1 T _C = 25 °C	I _{IH2} ↓	3010 ↓	45	5.5 V		5.5 V	5.5 V	5.5 V	5.5 V	5.5 V	GND	5.5 V	5.5 V	5.5 V	5.5 V	5.5 V	5.5 V				5.5 V	B ₄		200	μA																			
			46			↓																																						
			47																																									
			48																																									
			49																																									
			50																																									
			51																																									
	I _{OS} ↓	3011 ↓	52	GND	GND	4.5 V	4.5 V	4.5 V	4.5 V	4.5 V		4.5 V	4.5 V	4.5 V	4.5 V	GND	GND				A< B	-2.5	-25	mA																				
			53	↓			4.5 V	↓	↓	↓	↓		↓	↓	↓	4.5 V				4.5 V																								
			54																								GND													A = B				
	I _{CC}	3005	55	GND		GND	GND	GND	GND	GND		GND	GND	GND	GND	GND	GND					V _{CC}		21	mA																			
			V _{IC} ↓		56	-10 mA		-10 mA	-10 mA	-10 mA	-10 mA	-10 mA		-10 mA	-10 mA	-10 mA	-10 mA	-10 mA				4.5 V	$\bar{E}$		-1.5	V																		
	57	↓																																										
	58																																											
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61																																												
62																																												
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2	Same tests, terminal conditions and limits as for subgroup 1, except T _C = 125 °C and V _{IC} tests are omitted.																																											
3	Same tests, terminal conditions and limits as for subgroup 1, except T _C = -55 °C and V _{IC} tests are omitted.																																											
7 T _C = 25 °C	Functional tests ↓	3014 ↓	67	L ^{1/}	H	H ^{1/}	H	H	H	L	GND	L	L	L	L	L	L	L	5.0 V	See 2/																								
			68	↓		L	↓																																					
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See footnotes at end of table.

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

Terminal conditions (pins not designated may be high ≥ 2.0 V or low ≤ 0.7 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	Meas. terminal	Test limits		
				$\bar{E}$	A < B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A = B	A > B	V _{CC}		Min	Max	Unit
7 T _C = 25 °C	Functional test	3014	84	L	H	L	H	L	L	L	GND	L	L	L	L	H	L	L	5.0 V	See 2/			
			85	L	H	L	L	L	L	L		L	L	L	L	H	L	L					
			86	H	L	H	L	L	L	L		H	H	H	H	L	H	H					
			87	H	L	H	L	L	L	L		L	L	L	L	L	H	L					
			88	H	L	H	L	L	L	L		L	L	L	L	L	H	L					
			89	H	L	H	L	L	L	L		L	L	L	L	L	H	L					
			90	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			91	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			92	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			93	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			94	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			95	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			96	L	H	L	H	L	L	L		L	L	L	L	L	H	L					
			97	L	H	L	L	L	L	L		L	L	L	L	L	H	L					
9 T _C = 25 °C	t _{PLH1}	3003 (Fig. 5)	98	IN		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	OUT			$\bar{E}$ to A = B	10	58	ns
	t _{PLH2}		99		OUT	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		GND	GND	GND	GND	GND				$\bar{E}$ to A < B	10	60	
	t _{PLH3}		100			GND	GND	GND	GND	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		OUT		$\bar{E}$ to A > B	10	60	
	t _{PLH4}		101	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V					2.4 V	IN	OUT			A ₀ to A = B	20	70	
			102													IN				A ₁ to A = B			
			103											IN	2.4 V					A ₂ to A = B			
			104										IN	2.4 V						A ₃ to A = B			
			105									IN	2.4 V							A ₄ to A = B			
	t _{PLH5}		106			IN						2.4 V								B ₀ to A = B			
			107			2.4 V	IN													B ₁ to A = B			
			108				2.4 V	IN												B ₂ to A = B			
			109					2.4 V	IN											B ₃ to A = B			
			110						2.4 V	IN										B ₄ to A = B			
	t _{PLH6}		111		OUT					2.4 V						IN				A ₀ to A < B		85	
			112		OUT					2.4 V						IN	2.4 V			A ₁ to A < B		85	

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 -Continued
Terminal conditions (pins not designated may be high ≥ 2.0 V or low ≤ 0.7 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	Meas. terminal	Test limits		
				$\bar{E}$	A<B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A=B	A>B	V _{CC}		Min	Max	Unit
9 T _C =25 °C	t _{PLH6}	3003 (Fig. 5)	113	GND	OUT	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	GND	2.4 V	2.4 V	IN	2.4 V	2.4 V			5.0 V	A ₂ to A<B	20	85	ns
	t _{PLH6}		114			2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	IN	2.4 V	2.4 V	2.4 V				A ₃ to A<B			
	t _{PLH6}		115			2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		IN	2.4 V	2.4 V	2.4 V	2.4 V				A ₄ to A<B			
	t _{PLH7}		116			IN	GND	GND	GND	GND		GND	GND	GND	GND	GND				B ₀ to A<B			
			117			GND	IN	GND												B ₁ to A<B			
			118				GND	IN												B ₂ to A<B			
			119					GND	IN											B ₃ to A<B			
			120						GND	IN										B ₄ to A<B			
	t _{PLH8}		121							GND						IN		OUT		A ₀ to A>B		70	
			122												IN	GND				A ₁ to A>B			
			123											IN	GND					A ₂ to A>B			
			124									IN	IN	GND						A ₃ to A>B			
			125									IN	GND	GND						A ₄ to A>B			
	t _{PLH9}		126			IN	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V				B ₀ to A>B			
			127			2.4 V	IN													B ₁ to A>B			
			128				2.4 V	IN												B ₂ to A>B			
			129					2.4 V	IN											B ₃ to A>B			
			130					2.4 V	2.4 V	IN										B ₄ to A>B			
	t _{PHL1}		131	IN				2.4 V	2.4 V	2.4 V							OUT			$\bar{E}$ to A = B	10	50	
	t _{PHL2}		132		OUT			2.4 V	2.4 V	2.4 V		GND	GND	GND	GND	GND				$\bar{E}$ to A < B	10	45	
	t _{PHL3}		133			GND	GND	GND	GND	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		OUT		$\bar{E}$ to A > B	10	45	
	t _{PHL4}		134	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	IN	OUT			A ₀ to A = B	25	90	

See footnotes at end of table.

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

Terminal conditions (pins not designated may be high > 2.0 V or low < 0.7 V or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Meas. terminal	Test limits		
																					Min	Max	Unit
TC = 25°C	t _{PHL4}	3003 (Fig. 5)	135	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	GND	2.4 V	2.4 V	2.4 V	IN	2.4 V	OUT		5.0 V	A ₁ to A = B	25	90	ns
			136										2.4 V	IN	2.4 V					A ₂ to A = B			
			137										IN	2.4 V						A ₃ to A = B			
			138									IN	2.4 V							A ₄ to A = B			
	t _{PHL5}		139			IN						2.4 V								B ₀ to A = B			
			140			2.4 V	IN													B ₁ to A = B			
			141				2.4 V	IN												B ₂ to A = B			
			142					2.4 V	IN											B ₃ to A = B			
			143						2.4 V	IN										B ₄ to A = B			
	t _{PHL6}		144		OUT					2.4 V						IN				A ₀ to A < B	20		
			145													2.4 V				A ₁ to A < B			
			146											IN	2.4 V					A ₂ to A < B			
			147									IN	2.4 V							A ₃ to A < B			
			148									IN	2.4 V	2.4 V						A ₄ to A < B			
	t _{PHL7}		149			IN	GND	GND	GND	GND		GND	GND	GND	GND	GND				B ₀ to A < B			
			150			GND	IN	GND												B ₁ to A < B			
			151				GND	IN												B ₂ to A < B			
			152					GND	IN											B ₃ to A < B			
			153						GND	IN										B ₄ to A < B			
	t _{PHL8}		154							GND						IN		OUT		A ₀ to A > B			
			155													GND				A ₁ to A > B			
			156											IN	GND					A ₂ to A > B			
			157										IN	GND						A ₃ to A > B			
			158									IN	GND	GND						A ₄ to A > B			

See footnotes at end of table.

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

Terminal conditions (pins not designated may be high > 2.0 V or low < 0.7 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	Meas. terminal	Test limits		
				$\bar{E}$	A<B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A=B	A>B	V _{CC}		Min	Max	Unit
9 T _C =25 °C	t _{PHL9}	3003 (Fig. 5)	159	GND		IN	2.4 V	2.4 V	2.4 V	2.4 V	GND	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		OUT	5.0 V	B ₀ to A > B	20	90	ns
			160			2.4 V	IN													B ₁ to A > B			
			161				2.4 V	IN												B ₂ to A > B			
			162					2.4 V	IN											B ₃ to A > B			
			163					2.4 V	2.4 V	IN										B ₄ to A > B			
10 T _C =125 °C	t _{PLH1}		164	IN		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	OUT			$\bar{E}$ to A = B	8	63	
	t _{PLH2}		165		OUT	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		GND	GND	GND	GND	GND				$\bar{E}$ to A < B	8	65	
	t _{PLH3}		166			GND	GND	GND	GND	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		OUT		$\bar{E}$ to A > B	10	65	
	t _{PLH4}		167	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V					2.4 V	IN	OUT			A ₀ to A = B	15	75	
			168												IN	2.4 V				A ₁ to A = B			
			169											IN	2.4 V					A ₂ to A = B			
			170										IN	2.4 V						A ₃ to A = B			
			171									IN	2.4 V							A ₄ to A = B			
	t _{PLH5}		172			IN						2.4 V								B ₀ to A = B			
			173			2.4 V	IN													B ₁ to A = B			
			174				2.4 V	IN												B ₂ to A = B			
			175					2.4 V	IN											B ₃ to A = B			
			176						2.4 V	IN										B ₄ to A = B			
	t _{PLH6}		177		OUT					2.4 V						IN				A ₀ to A < B		90	
			178												IN	2.4 V				A ₁ to A < B			
			179											IN	2.4 V					A ₂ to A < B			
			180										IN	2.4 V						A ₃ to A < B			
			181									IN	2.4 V	2.4 V						A ₄ to A < B			

See footnotes at end of table.

TABLE III. Group A inspection for device type 01 -Continued.
Terminal conditions (pins not designated may be ≥ 2.0 V or low ≤ 0.7 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	Meas. terminal	Test limits		
				$\bar{E}$	A<B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A=B	A>B	V _{CC}		Min	Max	Unit
10 T _C = 125 °C	t _{PLH7}	3003 (Fig. 5)	182	GND	OUT	IN	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND			5.0 V	B ₀ to A<B	18	90	ns
			183			GND	IN	GND												B ₁ to A<B			
			184				GND	IN												B ₂ to A<B			
			185					GND	IN											B ₃ to A<B			
			186						GND	IN										B ₄ to A<B			
	t _{PLH8}		187							GND						IN		OUT		A ₀ to A>B		75	
			188												IN	GND				A ₁ to A>B			
			189											IN	GND					A ₂ to A>B			
			190									IN	IN	GND						A ₃ to A>B			
			191									IN	GND	GND						A ₄ to A>B			
	t _{PLH9}		192			IN	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V				B ₀ to A>B	15		
			193			2.4 V	IN													B ₁ to A>B			
			194				2.4 V	IN												B ₂ to A>B			
			195					2.4 V	IN											B ₃ to A>B			
			196					2.4 V	2.4 V	IN										B ₄ to A>B			
	t _{PHL1}		197	IN		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	OUT			$\bar{E}$ to A = B	8	55	
	t _{PHL2}		198		OUT	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		GND	GND	GND	GND	GND				$\bar{E}$ to A < B	8	50	
	t _{PHL3}		199			GND	GND	GND	GND	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V		OUT		$\bar{E}$ to A > B	8	50	
	t _{PHL4}		200	GND		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V					2.4 V	IN	OUT			A ₀ to A = B	20	90	
			201												IN	2.4 V				A ₁ to A = B			
			202											IN	2.4 V					A ₂ to A = B			
			203									IN	2.4 V							A ₃ to A = B			
			204									IN	2.4 V							A ₄ to A = B			

See footnotes at end of table.

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

Terminal conditions (pins not designated may be high ≥ 2.0 V or low ≤ 0.7 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	Meas. terminal	Test limits			
				$\bar{E}$	A < B	B ₀	B ₁	B ₂	B ₃	B ₄	GND	A ₄	A ₃	A ₂	A ₁	A ₀	A = B	A > B	V _{CC}		Min	Max	Unit	
10 T = 125°C	t _{PHL5}	3003 (Fig. 5)	205	GND		IN	2.4 V	2.4 V	2.4 V	2.4 V	GND	2.4 V	2.4 V	2.4 V	2.4 V	2.4 V	OUT		5.0 V	B ₀ to A = B	20	95	ns	
			206			2.4 V	IN	2.4 V												A = B				
			207				2.4 V	IN													B ₁ to A = B			
			208					2.4 V	IN												B ₂ to A = B			
			209						2.4 V	IN											B ₃ to A > B			
	t _{PHL6}		210		OUT						2.4 V						IN				B ₄ to A = B			
			211														IN	2.4 V			A ₀ to A < B	15	90	
			212													IN	2.4 V			A ₁ to A < B				
			213											IN	2.4 V					A ₂ to A < B				
			214										IN	2.4 V	2.4 V					A ₃ to A < B				
	t _{PHL7}		215			IN	GND	GND	GND	GND		GND	GND	GND	GND	GND	GND				B ₀ to A < B	18	95	
			216			GND	IN	GND													B ₁ to A < B			
			217				GND	IN													B ₂ to A < B			
			218					GND	IN												B ₃ to A < B			
			219						GND	IN											B ₄ to A < B			
	t _{PHL8}		220							GND							IN		OUT		A ₀ to A > B	15		
			221													IN	GND				A ₁ to A > B			
			222													GND					A ₂ to A > B			
			223												IN	GND					A ₃ to A > B			
			224									IN	GND	GND							A ₄ to A > B			
	t _{PHL9}		225			IN	2.4 V	2.4 V	2.4 V	2.4 V		2.4 V	2.4 V	2.4 V	2.4 V	2.4 V					B ₀ to A > B	20		
			226			2.4 V	IN														B ₁ to A > B			
			227				2.4 V	IN													B ₂ to A > B			
			228					2.4 V	IN												B ₃ to A > B			
			229					2.4 V	2.4 V	IN											B ₄ to A > B			
11	Same tests, terminal conditions, and limits as for subgroup 10, except T _C = -55°C.																							

1/ Input voltages shall be H = 2.0 V, L = 0.7 V.

2/ Output voltages shall be either:

- a. H = 2.4 volts minimum and L = 0.3 volt maximum when using a high-speed checker double comparator, or
 b. H $\geq$ 1.5 volts and L < 1.5 volts when using a high-speed checker single comparator.

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6.3 Ordering data. The contract or purchase order 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 contracting activity in addition to notification to the qualifying 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 will 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
V _{IN} - - - - -	Voltage level at an input terminal
T _C - - - - -	Case temperature

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) and 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 4.4.3) 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.

<u>Military device type</u>	<u>Generic-industry type</u>
01	93L24

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
NASA - NA

Preparing activity:

Air Force - 17

(Project 5962-0657-3)

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