

INCH-POUND

MIL-M-38510/652B
4 November 2005

SUPERSEDING
MIL-M-38510/652A
15 May 1987

MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, HIGH-SPEED CMOS,
AND GATES, OR GATES, MONOLITHIC SILICON, POSITIVE LOGIC

Reactivated after 4 Nov. 2005 and may be used for new and existing designs and acquisitions.

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, high speed CMOS, logic microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete Part or Identifying Number (PIN). For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535 (see 6.3).

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

1.2.1 Device types. The device types are as follows:

<u>Device type</u>	<u>Circuit</u>
01	Quad 2 - input OR gate
02	Quad 2 - input exclusive OR gate
03	Quad 2 - input AND gate
04	Triple 3 - input AND gate

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

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or email CMOS@dscclia.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 (V_{CC})	-0.5 V dc to +7.0 V dc
DC input voltage range (V_{IN})	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC output voltage range (V_{OUT})	-0.5 V dc to $V_{CC} + 0.5$ V dc
Clamp diode current (I_{IK}, I_{OK})	± 20 mA
DC output current per pin (I_{OUT})	± 25 mA
DC V_{CC} or GND current per pin (I_{CC}, I_{GND})	± 50 mA
Storage temperature range (T_{STG})	-65°C to +150°C
Maximum power dissipation (P_D)	300 mW
Lead temperature (soldering, 10 seconds)	300°C
Thermal resistance, junction to case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	175°C

1.4 Recommended operating conditions.Device types 01, 02, 03, 04:

Maximum input low voltage (V_{IL})	0.3 V at $V_{CC} = 2.0$ V
	0.9 V at $V_{CC} = 4.5$ V
	1.2 V at $V_{CC} = 6.0$ V
Minimum input high voltage (V_{IH})	1.5 V at $V_{CC} = 2.0$ V
	3.15 V at $V_{CC} = 4.5$ V
	4.2 V at $V_{CC} = 6.0$ V
Supply voltage range (V_{CC})	2.0 V dc to 6.0 V dc
Output voltage range (V_{OUT})	0.0 V to V_{CC}
Operating temperature range (T_A)	-55°C to +125°C
Input rise and fall times (t_r, t_f) maximum:	
$V_{CC} = 2.0$ V	1000 ns
$V_{CC} = 4.5$ V	500 ns
$V_{CC} = 6.0$ V	400 ns

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

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
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 document 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.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Logic diagrams and terminal connections. The logic diagrams 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 Switching time test circuit and waveforms. The switching time test circuit and waveforms shall be as specified on figure 3.

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

3.3.5 Case outlines. The case outlines shall be as specified in 1.2.3 and MIL-STD-1835.

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 ambient 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.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 36 (see MIL-PRF-38535, appendix A).

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535 and shall be conducted on all devices prior to qualification and 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 method 1015 of MIL-STD-883.
- b. Delete the sequence specified as interim (pre-burn-in) electrical parameters through interim (post-burn-in) electrical parameters of table IA of MIL-PRF-38535 and substitute lines 1 through 7 of table II herein.

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

- (1) Unless otherwise specified in the manufacturers QM plan for static tests (test condition A), ambient temperature (T_A) shall be +125°C minimum. Test duration for each static test shall be 24 hours minimum for class S devices and in accordance with table I of method 1015 for class B devices.
 - i. For static burn-in I, all inputs shall be connected to GND. Outputs shall be open or connected to $V_{CC}/2$. Resistors are optional on outputs if open. Resistors are required on inputs and on outputs connected to $V_{CC}/2$. $R = 470\Omega$ to 47 k Ω .
 - ii. For static burn-in II, all inputs shall be connected through a resistor to V_{CC} . Outputs shall be open or connected to $V_{CC}/2$. Resistors are optional on outputs if open. Resistors are required on inputs and on outputs connected to $V_{CC}/2$. $R = 470\Omega$ to 47 k Ω .
- (2) Unless otherwise specified in the manufacturers QM plan for dynamic test (test condition D), ambient temperature shall be +125°C minimum. Test duration shall be in accordance with table I of method 1015.
 - i. For dynamic burn-in, all inputs shall be connected through the resistors in parallel to a common CP. Outputs shall be connected to $V_{CC}/2 \pm 0.5$ V through the resistors. $R = 1$ k $\Omega \pm 5\%$ for outputs, 470 Ω to 47 k Ω for inputs. For device type 02, one input for each gate shall be connected to V_{CC} or GND.
 - ii. CP = 25 kHz to 1 MHz square wave; duty cycle = 50% $\pm 15\%$; $V_{IH} = 4.5$ V to V_{CC} ; $V_{IL} = 0.0$ V ± 0.5 V; transition time ≤ 0.5 μ s.
 - iii. $V_{CC} = 6.0$ V ± 0.5 V.

d. Interim and final electrical test parameters shall be as specified in table II.

e. For class S devices, post dynamic burn-in, or class B devices, post static burn-in, electrical parameter measurements may, at the manufacturer's option, be performed separately or included in the final electrical parameter requirements.

4.2.1 Percent defective allowable (PDA).

- a. The PDA for class S devices shall be 5 percent for static burn-in and 5 percent for dynamic burn-in, based on the exact number of devices submitted to each separate burn-in.
- b. Static burn-in I and II failure shall be cumulative for determining the PDA.
- c. The PDA for class B devices shall be in accordance with MIL-PRF-38535 for static burn-in. Dynamic burn-in is not required.
- d. Those devices whose measured characteristics, after burn-in, exceed the specified delta (Δ) limits or electrical parameter limits specified in table III, subgroup 1, are defective and shall be removed from the lot. The verified failures divided by the total number of devices in the lot initially submitted to burn-in shall be used to determine the percent defective for the lot and the lot shall be accepted or rejected based on the specified PDA.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

- a. Tests shall be performed in accordance with table II herein.
- b. Subgroups 5, 6, 7, and 8 shall be omitted.
- c. Subgroup 4 (C_{IN} measurement) shall be measured only for initial qualification and after process or design changes that may affect input capacitance. Capacitance shall be measured between the designated terminal and V_{SS} at a frequency of 1 MHz.
- d. Subgroups 9 and 11 shall be measured only for initial qualification and after process or design changes which may affect dynamic performance.

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. Delta limits shall apply only to subgroup 1 of group C inspection and shall consist of tests specified in table IV 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 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T _C ≤ +125°C unless otherwise specified	Device type	V _{CC}	Limits		Unit
					Min	Max	
High level output voltage	V _{OH1} <u>2/</u>	V _{IH} = 1.5 V V _{IL} = 0.3 V I _{OH} = -20 μA	All	2.0 V	1.95		V
	V _{OH2} <u>2/</u>	V _{IH} = 3.15 V V _{IL} = 0.9 V I _{OH} = -20 μA	All	4.5 V	4.45		V
	V _{OH3}	V _{IH} = 4.2 V V _{IL} = 1.2 V I _{OH} = -20 μA	All	6.0 V	5.95		V
	V _{OH4} <u>2/</u>	V _{IH} = 3.15 V V _{IL} = 0.9 V I _{OH} = -4.0 mA	All	4.5 V	3.7		V
	V _{OH5}	V _{IH} = 4.2 V V _{IL} = 1.2 V I _{OH} = -5.2 mA	All	6.0 V	5.2		V
Low level output voltage	V _{OL1} <u>2/</u>	V _{IL} = 0.3 V V _{IH} = 1.5 V I _{OL} = 20 μA	All	2.0 V		0.05	V
	V _{OL2} <u>2/</u>	V _{IL} = 0.9 V V _{IH} = 3.15 V I _{OL} = 20 μA	All	4.5 V		0.05	V
	V _{OL3}	V _{IL} = 1.2 V V _{IH} = 4.2 V I _{OL} = 20 μA	All	6.0 V		0.05	V
	V _{OL4} <u>2/</u>	V _{IL} = 0.9 V V _{IH} = 3.15 V I _{OL} = 4.0 mA	All	4.5 V		0.4	V
	V _{OL5}	V _{IL} = 1.2 V V _{IH} = 4.2 V I _{OL} = 5.2 mA	All	6.0 V		0.4	V
Positive input clamp voltage	V _{IC(pos)}	I _{IN} = 1 mA T _C = 25°C	All	GND		1.5	V
Negative input clamp voltage	V _{IC(neg)}	I _{IN} = -1 mA T _C = 25°C	All	OPEN		-1.5	V
Input current low	I _{IL}	V _{IN} = GND	All	6.0 V		-0.1	μA
Input current high	I _{IH}	V _{IN} = V _{CC}	All	6.0 V		0.1	μA
Short circuit output current	I _{OS1} <u>2/</u>	T _C = -55°C to +125°C V _{OUT} = GND V _{IN} = GND or V _{CC}	All	2.0 V	-2	-50	mA
	I _{OS2} <u>2/</u>			4.5 V	-15	-150	
	I _{OS3} <u>2/</u>			6.0 V	-25	-180	
	I _{OS4}			4.0 V	-10	-120	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions ^{1/} -55°C ≤ T _C ≤ +125°C unless otherwise specified	Device type	V _{CC}	Limits		Unit
					Min	Max	
Quiescent supply current	I _{CCL}	V _{IN} = 0.0 V	All	6.0 V		10.0	μA
	I _{CCH}	V _{IN} = 6.0 V	All	6.0 V		10.0	μA
Input capacitance	C _{IN}	T _C = +25°C	All			10	pF
Power dissipation capacitance	C _{PD} ^{2/} ^{3/}	T _C = +25°C	01			50	pF
			02			35	
			03			38	
			04			35	
Propagation delay times	t _{PHL1} , t _{PLH1} ^{4/} ^{5/}	C _L = 50 pF ± 10%	01	4.5 V	3	23	ns
			03	4.5 V	4	28	ns
			04	4.5 V	5	29	ns
Propagation delay time, high-to-low level (other input low)	t _{PHL1} ^{4/} ^{5/}		02	4.5 V	3	28	ns
Propagation delay time, high-to-low level (other input high)	t _{PHL2} ^{4/} ^{5/}		02	4.5 V	3	28	ns
Propagation delay time, low-to-high level (other input low)	t _{PLH1} ^{4/} ^{5/}		02	4.5 V	3	28	ns
Propagation delay time, low-to-high level (other input high)	t _{PLH2} ^{4/} ^{5/}		02	4.5 V	3	28	ns
Transition times	t _{THL} , t _{TLH} ^{4/} ^{5/}		01	4.5 V	3	20	ns
			02	4.5 V	3	20	ns
			03	4.5 V	3	20	ns
			04	4.5 V	3	20	ns

^{1/} Complete terminal conditions shall be as specified in table III.

^{2/} Guaranteed but not tested.

^{3/} Power dissipation capacitance (C_{PD}) per gate.

^{4/} Tested at V_{CC} = 4.5 V at 125°C for sample testing and V_{CC} = 4.5 V at 25°C for screening. Guaranteed at other V_{CC} voltages and temperatures. See table IA and exception in 4.4.1d.

^{5/} For propagation and transition delay times at V_{CC} = 2.0 V, increase limit by a factor of 5.0. For propagation and transition delay times at V_{CC} = 6.0 V, decrease limit by a factor of 0.85.

TABLE IA. Calculated dynamic figures at T_C = -55°C/+25°C.

V _{CC}	T _C	
	+125°C	-55°C or +25°C
2.0V	5	5 x 0.75
4.5V	↑	↑
	1 →	→ 0.75
6.0V	↓	↓
	0.85	0.85 x 0.75

Normalized numbers
(125°C equals 1)

NOTE: The 2.0 V and 6.0 V numbers are derived from their 4.5 V integer value.
Rounding off according 5/4.

TABLE II. Burn-in and electrical test requirements.

Line no.	MIL-PRF-38535 test requirements	Class S devices ^{1/}			Class B devices ^{1/}		
		Ref. par.	Table III Subgroups ^{2/}	Table IV delta limits ^{3/}	Ref. par.	Table III subgroups ^{2/}	Table IV delta ^{3/}
1	Interim electrical parameters		1			1	
2	Static burn-in I (method 1015)	4.2c 4.5.2	Req'd			Not req'd	
3	Same as line 1		1*	Δ			
4	Static burn-in II (method 1015)	4.2c 4.5.2	Req'd		4.2c 4.5.2	^{4/} req'd	
5	Same as line 1	4.2e	1*	Δ	4.2e	1*	Δ
6	Dynamic burn-in (method 1015)	4.2c 4.5.2	Req'd			Not req'd	
7	Same as line 1	4.2e	1	Δ			
8	Final electrical parameters		1*, 2, 3, 9			1*, 2, 9 ^{4/}	
9	Group A test requirements	4.4.1	1, 2, 3, 4, 9, 10, 11		4.4.1	1, 2, 3, 4, 9, 10, 11	
10	Group B test when using method 5005 QCI option	4.4.2	1, 2, 3, 9, 10, 11	Δ			
11	Group C end-point electrical parameters	4.4.2	1, 2, 3, 9, 10, 11	Δ	4.4.3	1, 2	Δ
12	Group D end-point electrical parameters	4.4.4	1, 2, 3		4.4.4	1, 2	

^{1/} Blank spaces indicate tests are not applicable.

^{2/} * indicates PDA applies to subgroup 1 (see 4.2.1).

^{3/} Δ indicates delta limits shall be required only on table III, subgroup 1, where specified, and the delta values shall be computed with reference to the previous interim electrical parameters.

^{4/} The device manufacturer may, at his option, either complete subgroup 1 electrical parameter measurements, including delta measurements, within 96 hours after burn-in completion (removal of bias); or may complete subgroup 1 electrical measurements without delta measurements within 24 hours after burn-in completion (removal of bias).

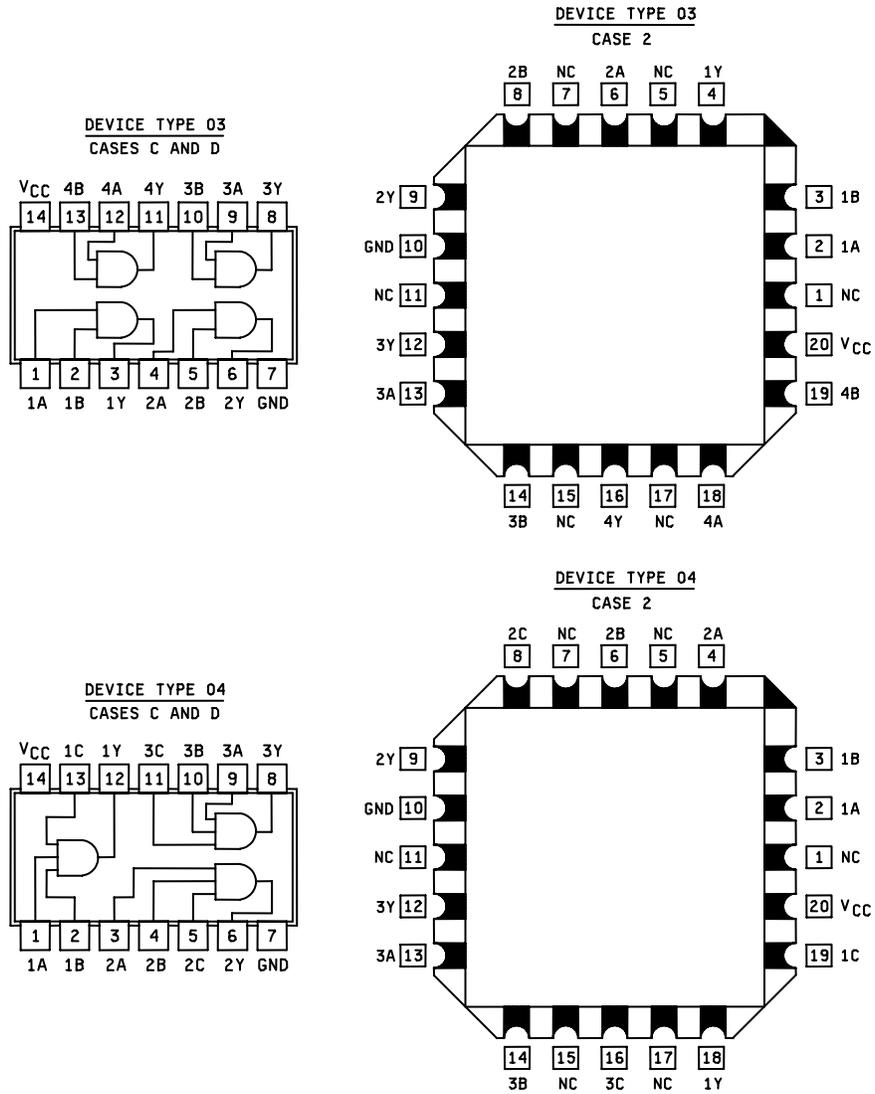


FIGURE 1. Logic diagrams and terminal connections (top views) – Continued.

Device type 01

Truth table, each gate		
Inputs		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

Positive logic: $Y = A + B$

Device type 02

Truth table, each gate		
Inputs		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

Positive logic: $Y = A \oplus B = \bar{A}B + A\bar{B}$

Device types 03

Truth table, each gate		
Inputs		Output
A	B	Y
L	L	L
H	L	L
L	H	L
H	H	H

Positive logic: $Y = AB$

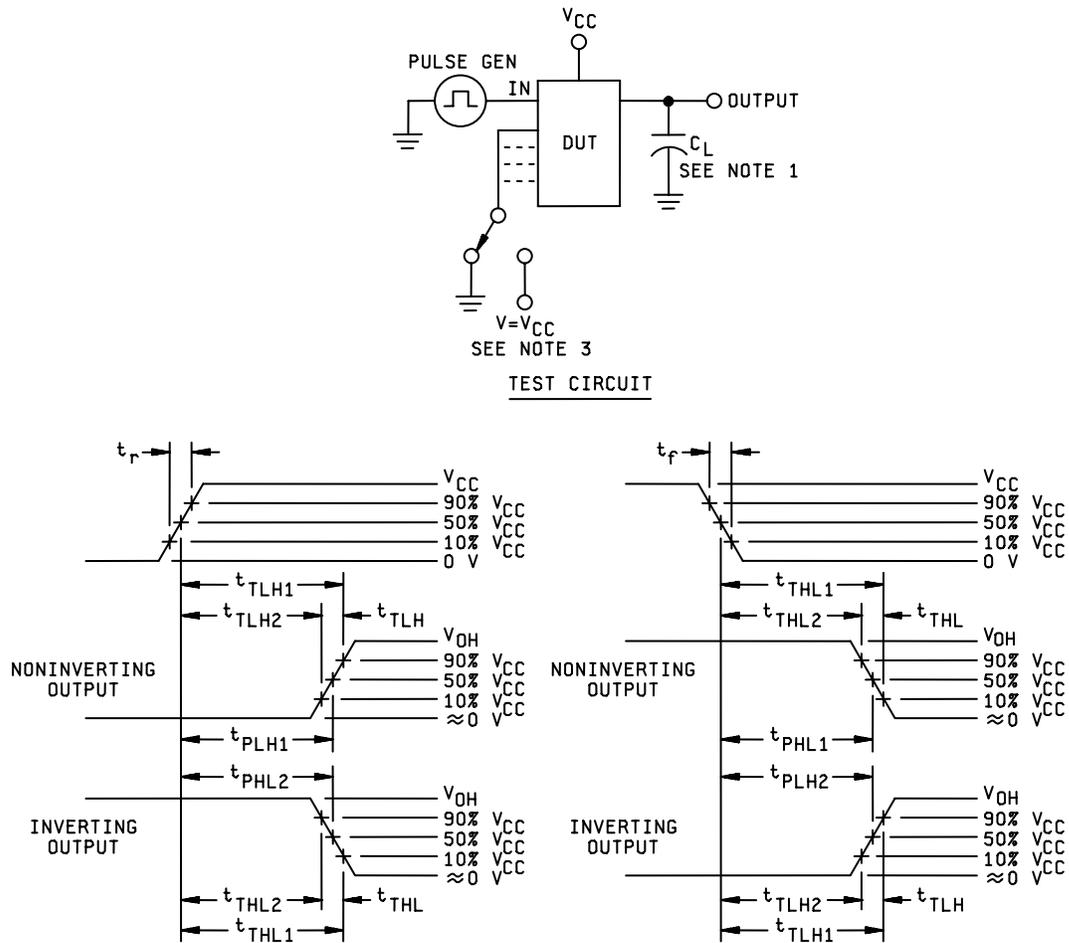
Device type 04

Truth table, each gate			
Inputs			Output
A	B	C	Y
L	L	L	L
H	L	L	L
L	H	L	L
H	H	L	L
L	L	H	L
H	L	H	L
L	H	H	L
H	H	H	H

Positive logic: $Y = ABC$

H = High voltage level
L = Low voltage level

FIGURE 2. Truth tables and logic equations.



NOTES:

1. $C_L = 50 \text{ pF} \pm 10\%$, includes probe and jig capacitance.
2. Input pulse shall have the following characteristics: $t_r = t_f \leq 6 \text{ ns}$; $\text{PRR} \leq 1 \text{ MHz}$; duty cycle = 50%.
3. All unused inputs are tied to V_{CC} for device types 02, 03, and 04, and to GND for device type 01.
4. $t_{TLH} = t_{TLH1} - t_{TLH2}$; $t_{THL} = t_{THL1} - t_{THL2}$.

FIGURE 3. Switching time test circuit and waveforms.

TABLE III. Group A inspection for device type 01.

Symbol	MIL-STD-883 method	Case 2		Terminal conditions 1/																Measured terminal	Test limits						Unit
		Cases C,D		2	3	4	6	8	9	10	12	13	14	16	18	19	20	Subgroup 1 T _C = +25°C			Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Min	Max	Min	Max		Min	Max					
		Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}											
V _{IC} (pos)		1	1mA						1/							GND	1A	1/	1.5					V			
		2		1mA														1B							"		
		3						1mA										2A							"		
		4																2B							"		
		5																3A							"		
		6																3B							"		
		7																4A							"		
		8																4B							"		
V _{IC} (neg)		9	-1mA	-1mA					GND								1/	1A		-1.5				"			
		10																1B						"			
		11																2A						"			
		12																2B						"			
		13																3A						"			
		14																3B						"			
		15																4A						"			
		16																4B						"			
I _{CCH}	3005	17															V _{CC}		0.1		10			μA			
		18	6V GND	GND 6V				6V GND	GND 6V								6V GND	GND 6V							"		
I _{CCL}	3005	19	GND	GND			GND	GND								GND	GND							"			
V _{OH3}	3006	20	4.2V	1.2V	-20μA													1Y	5.95		5.95		5.95	V			
		21	1.2V	4.2V	-20μA													1Y							"		
		22																2Y							"		
		23																2Y							"		
		24																3Y							"		
		25																3Y							"		
		26																4Y							"		
		27																4Y							"		
V _{OH5}	3006	28	4.2V	1.2V	-5.2mA													1Y	5.48		5.2		5.48	"			
		29	1.2V	4.2V	-5.2mA													1Y							"		
		30																2Y							"		
		31																2Y							"		
		32																3Y							"		
		33																3Y							"		
		34																4Y							"		
		35																4Y							"		
V _{OL3}	3007	36	1.2V	1.2V	20μA													1Y		0.05		0.05		0.05	"		
		37																2Y							"		
		38																3Y							"		
		39																4Y							"		
V _{OL5}	3007	40	1.2V	1.2V	5.2mA													1Y		.26		.4		.26	"		
		41																2Y							"		
		42																3Y							"		
		43																4Y							"		
I _{OS4}	3011	44	4V	4V	GND												4V	-10	-120	-10	-120	-10	-120	mA			
		45															2Y							"			
		46															3Y							"			
		47															4Y							"			
I _{IH}	3010	48	6V	GND													6V		.05		.1			μA			
		49	GND	6V														1B						"			
		50																2A						"			
		51																2B						"			
		52																3A						"			
		53																3B						"			
		54																4A						"			
		55																4B						"			

See footnotes at end of device type 04.

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

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit	
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C			
			1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}		Min	Max	Min	Max	Min	Max		
I _{IL}	3009	56	GND	6V					GND							6V	1A		-05		-0.1			μA	
		57	GND	6V														1B							
		58		6V	GND													2A							
		59				GND	6V											2B							
		60																3A							
		61												GND	6V	6V		3B							
		62																4A							
63																4B									
																	Subgroup 4 T _C = +25°C								
																	Min	Max							
C _i	3012	64	2/						GND							GND	1A							pF	
		65		2/														1B		10					
		66					2/											2A							
		67						2/										2B							
		68																3A							
		69																3B							
		70																4A							
71																4B									
																	Subgroup 9 T _C = +25°C 3/		Subgroup 10 T _C = +125°C		Subgroup 11 T _C = -55°C 3/				
																	Min	Max	Min	Max	Min	Max			
t _{PHL}	3003 (Fig. 3)	72	IN	GND	OUT				GND							4.5V	1A to 1Y	3	18	3	23	3	18	ns	
		73	GND	IN														1B to 1Y							
		74																2A to 2Y							
		75				IN	GND	OUT										2B to 2Y							
		76									OUT	IN	GND					3A to 3Y							
		77																3B to 3Y							
		78																4A to 4Y							
79																4B to 4Y									
t _{PLH}	3003 (Fig. 3)	80 to 87	Same terminal conditions and limits as specified above for t _{PHL} .																						
t _{TLH}	3004 (Fig. 3)	88	IN	GND	OUT				GND							4.5V	1Y	3	15	3	20	3	15	ns	
		89	GND	IN														1Y							
		90																2Y							
		91				IN	GND	OUT										2Y							
		92																3Y							
		93									OUT	IN	GND					3Y							
		94																4Y							
95																4Y									
t _{THL}	3004 (Fig. 3)	96 to 103	Same terminal conditions and limits as specified above for t _{TLH} .																						

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 02.

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit	
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max		
			1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}									
V _{IC} (pos) 1/		1	1mA	1mA		1mA	1mA									GND	1A	1/	1.5				V		
		2															1B	"	"				"		
		3															2A	"	"				"		
		4															2B	"	"				"		
		5															3A	"	"				"		
		6															3B	"	"				"		
		7															4A	"	"				"		
		8															4B	"	"				"		
V _{IC} (neg) 1/		9	-1mA	-1mA		-1mA	-1mA		GND								1A		-1.5				"		
		10							"							"	1B	"	"				"		
		11							"							"	2A	"	"				"		
		12							"							"	2B	"	"				"		
		13							"							"	3A	"	"				"		
		14							"							"	3B	"	"				"		
		15							"							"	4A	"	"				"		
		16							"							"	4B	"	"				"		
I _{CCH}	3005	17	6V	GND		6V	GND		"							6V	V _{CC}		0.1		10		μA		
		18	GND	6V		GND	6V		"							GND	V _{CC}		"		"		"		
I _{CCL}	3005	19	6V	6V		6V	6V		"							6V	V _{CC}		"		"		"		
		20	GND	GND		GND	GND		"							GND	V _{CC}		"		"		"		
V _{OH3}	3006	21	4.2V	1.2V	-20μA				"							"	1Y	5.95		5.95		5.95		V	
		22	1.2V	4.2V	-20μA				"							"	1Y	"		"		"		"	
		23				4.2V	1.2V	-20μA		"						"	2Y	"		"		"		"	
		24							"							"	2Y	"		"		"		"	
		25							"							"	3Y	"		"		"		"	
		26							"							"	3Y	"		"		"		"	
		27							"							"	4Y	"		"		"		"	
		28							"							"	4Y	"		"		"		"	
V _{OH5}	3006	29	4.2V	1.2V	-5.2mA				"							"	1Y	5.48		5.2		5.48		"	
		30	1.2V	4.2V	-5.2mA				"							"	1Y	"		"		"		"	
		31				4.2V	1.2V	-5.2mA		"						"	2Y	"		"		"		"	
		32							"							"	2Y	"		"		"		"	
		33							"							"	3Y	"		"		"		"	
		34							"							"	3Y	"		"		"		"	
		35							"							"	4Y	"		"		"		"	
		36							"							"	4Y	"		"		"		"	
V _{OL3}	3007	37	4.2V	4.2V	20μA				"							"	1Y		.05		.05		.05		"
		38	1.2V	1.2V	20μA				"							"	1Y		"		"		"		"
		39				4.2V	4.2V	20μA		"						"	2Y		"		"		"		"
		40							"							"	2Y		"		"		"		"
		41							"							"	3Y		"		"		"		"
		42							"							"	3Y		"		"		"		"
		43							"							"	4Y		"		"		"		"
		44							"							"	4Y		"		"		"		"
V _{OL5}	3007	45	4.2V	4.2V	5.2mA				"							"	1Y		.26		.4		.26		"
		46	1.2V	1.2V	5.2mA				"							"	1Y		"		"		"		"
		47				4.2V	4.2V	5.2mA		"						"	2Y		"		"		"		"
		48							"							"	2Y		"		"		"		"
		49							"							"	3Y		"		"		"		"
		50							"							"	3Y		"		"		"		"
		51							"							"	4Y		"		"		"		"
		52							"							"	4Y		"		"		"		"

See footnotes at end of device type 04.

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

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit	
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max		
I _{OS4}	3011	53	4V	GND	GND				GND								4V	1Y	-10	-120	-10	-120	-10	-120	mA
		54	GND	4V	GND				"								"	1Y	"	"	"	"	"	"	"
		55				4V	GND	GND	"								"	2Y	"	"	"	"	"	"	"
		56				GND	4V	GND	"								"	3Y	"	"	"	"	"	"	"
		57							"		GND	4V	GND				"	3Y	"	"	"	"	"	"	"
		58							"						GND	4V	GND	4Y	"	"	"	"	"	"	"
I _{IH}	3010	61	6V	GND												6V	1A							μA	
		62	GND	6V												"	1B		.05						
		63				6V	GND									"	2A		"						
		64				GND	6V									"	2B		"						
		65										6V	GND			"	3A		"						
		66														"	3B		"						
I _{IL}	3009	69	GND	6V													1A								
		70				6V	GND									"	1B		-.05						
		71														"	2A		"						
		72				GND	6V									"	2B		"						
		73														"	3A		"						
		74										GND	6V			"	3B		"						
C _i	3012	77	2/	2/					GND							GND	1A							pF	
		78							"							"	1B		10						
		79							"							"	2A		"						
		80					2/									"	2B		"						
		81						2/								"	3A		"						
		82											2/	2/			"	3B		"					
t _{PHL1}	3003 (Fig. 3)	85	IN	GND	OUT				GND							4.5V	1A to 1Y	3	21	3	28	3	21	ns	
		86	GND	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"	
		87							"							"	2A to 2Y	"	"	"	"	"	"	"	
		88					IN	GND	OUT	"						"	2B to 2Y	"	"	"	"	"	"	"	
		89					GND	IN	OUT	"	OUT	IN	GND			"	3A to 3Y	"	"	"	"	"	"	"	
		90								"						"	3B to 3Y	"	"	"	"	"	"	"	
t _{PLH1}	3003 (Fig. 3)	92	Same terminal conditions and limits as specified above for t _{PHL1} .																						
		93																							
		94																							
		95																							
		96																							
		97																							
t _{PHL2}	3003 (Fig. 3)	101	IN	4.5V	OUT				GND							4.5V	1A to 1Y	3	21	3	28	3	21	ns	
		102	4.5V	IN	OUT				"							"	1B to 1Y	"	"	"	"	"	"	"	
		103							"							"	2A to 2Y	"	"	"	"	"	"	"	
		104					IN	4.5V	OUT	"						"	2B to 2Y	"	"	"	"	"	"	"	
		105								"						"	3A to 3Y	"	"	"	"	"	"	"	
		106								"	OUT	IN	4.5V	IN			"	3B to 3Y	"	"	"	"	"	"	
t _{PLH2}	3003 (Fig. 3)	109	Same terminal conditions and limits as specified above for t _{PHL2} .																						
		110																							
		111																							
		112																							
		113																							
		114																							

See footnotes at end of device type 04.

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

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 9 T _C = +25°C 3/		Subgroup 10 T _C = +125°C		Subgroup 11 T _C = -55°C 3/		
			1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}		Min	Max	Min	Max	Min	Max	
t _{THL}	3004 (Fig. 3)	117 118 119 120 121 122 123 124	IN GND	GND IN	OUT OUT				GND "							4.5V "	1Y 1Y 2Y 2Y 3Y 3Y 4Y 4Y	3 " " " " " "	15 " " " " " "	3 " " " " " "	20 " " " " " "	3 " " " " " "	15 " " " " " "	ns " " " " " "
t _{TLH}	3004 (Fig. 3)	125 to 132	Same terminal conditions and limits as specified above for t _{THL} .																					

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 03.

Symbol	MIL-STD-883 method	Case 2		Terminal conditions 1/														Measured terminal	Test limits						Unit
		Cases C,D		2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Min	Max		Min	Max	Min	Max			
		Test no.	1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}									
V _{IC} (pos)		1	1mA	1mA					1/							GND	1A	1/	1.5					V	
		2					1mA										1B								
		3															2A								
		4															2B								
		5						1mA									3A								
		6												1mA			3B								
		7													1mA		4A								
		8														1mA	4B								
V _{IC} (neg)		9	-1mA	-1mA					GND							1/	1A		-1.5						
		10															1B								
		11															2A								
		12															2B								
		13															3A								
		14															3B								
		15															4A								
		16															4B								
I _{CCH}	3005	17	6V	6V		6V	6V					6V	6V		6V	6V	6V		.1		10		μA		
I _{CCL}	3005	18	6V	GND		6V	GND					6V	GND		6V	GND									
		19	GND	6V		GND	6V					GND	6V		GND	6V									
V _{OH3}	3006	20	4.2V	4.2V	-20μA												1Y	5.95		5.95		5.95		V	
		21				4.2V	4.2V	-20μA									2Y								
		22															3Y								
		23															4Y								
V _{OH5}	3006	24	4.2V	4.2V	-5.2mA												1Y	5.48		5.2		5.48		V	
		25				4.2V	4.2V	-5.2mA									2Y								
		26															3Y								
		27															4Y								
V _{OL3}	3007	28	4.2V	1.2V	20μA												1Y		.05		.05		.05	V	
		29	1.2V	4.2V	20μA												1Y								
		30				4.2V	1.2V	20μA									2Y								
		31															2Y								
		32															3Y								
		33															3Y								
		34															4Y								
		35															4Y								
V _{OL5}	3007	36	4.2V	1.2V	5.2mA												1Y		.26		.4		.26	V	
		37	1.2V	4.2V	5.2mA												1Y								
		38				4.2V	1.2V	5.2mA									2Y								
		39															2Y								
		40															3Y								
		41															3Y								
		42															4Y								
		43															4Y								
I _{OS4}	3011	44	4V	4V	GND											4V	1Y	-10	-120	-10	-120	-10	-120	mA	
		45				4V	4V	GND									2Y								
		46															3Y								
		47															4Y								
I _{IH}	3010	48	6V	GND													1A		.05		.1			μA	
		49	GND	6V													1B								
		50															2A								
		51															2B								
		52															3A								
		53															3B								
		54															4A								
		55															4B								

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 03 – Continued.

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C		
			1A	1B	1Y	2A	2B	2Y	GND	3Y	3A	3B	4Y	4A	4B	V _{CC}		Min	Max	Min	Max	Min	Max	
I _{IL}	3009	56	GND	6V					GND							6V	1A		-05		-0.1			μA
		57	GND	6V														1B						
		58																2A						
		59																2B						
		60																3A						
		61																3B						
		62																4A						
63																4B								
																	Subgroup 4 T _C = +25°C							
																	Min	Max						
C _i	3012	64	2/						GND							GND	1A							pF
		65		2/														1B						
		66																2A						
		67																2B						
		68																3A						
		69																3B						
		70																4A						
71																4B								
																	Subgroup 9 T _C = +25°C 3/		Subgroup 10 T _C = +125°C		Subgroup 11 T _C = -55°C 3/			
																	Min	Max	Min	Max	Min	Max		
t _{PHL}	3003 (Fig. 3)	72	IN	4.5V	OUT				GND							4.5V	1A to 1Y	4	21	4	28	4	21	ns
		73	4.5V	IN	OUT													1B to 1Y						
		74																2A to 2Y						
		75																2B to 2Y						
		76																3A to 3Y						
		77																3B to 3Y						
		78																4A to 4Y						
79																4B to 4Y								
t _{PLH}	3003 (Fig. 3)	80 to 87	Same terminal conditions and limits as specified above for t _{PHL} .																					
t _{THL}	3004 (Fig. 3)	88	IN	4.5V	OUT				GND							4.5V	1Y	3	15	3	20	3	15	ns
		89	4.5V	IN	OUT													1Y						
		90																2Y						
		91																2Y						
		92																3Y						
		93																3Y						
		94																4Y						
95																4Y								
t _{TLH}	3004 (Fig. 3)	96 to 103	Same terminal conditions and limits as specified above for t _{THL} .																					

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04.

Symbol	MIL-STD-883 method	Case 2 Cases C,D Test no.	Terminal conditions 1/														Measured terminal	Test limits						Unit	
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max		
			1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V _{CC}									
V _{IC} (pos)		1	1mA	1mA					1/							GND	1A	1/	1.5					V	
		2							"							"	1B	"	"					"	
		3							"							"	1C	"	"					"	
		4			1mA				"							"	2A	"	"					"	
		5				1mA			"							"	2B	"	"					"	
		6					1mA		"							"	2C	"	"					"	
		7							"		1mA					"	3A	"	"					"	
		8							"			1mA				"	3B	"	"					"	
		9							"				1mA			"	3C	"	"					"	
V _{IC} (neg)		10	-1mA	-1mA					GND							1/	1A		-1.5					"	
		11							"							"	1B	"	"					"	
		12							"							"	1C	"	"					"	
		13			-1mA				"							"	2A	"	"					"	
		14				-1mA			"							"	2B	"	"					"	
		15					-1mA		"							"	2C	"	"					"	
		16							"		-1mA					"	3A	"	"					"	
		17							"			-1mA				"	3B	"	"					"	
		18							"				-1mA			"	3C	"	"					"	
I _{CGH}	3005	19	6V	6V	6V	6V	6V		"		6V	6V	6V		6V	6V	V _{CC}		.1		10			μA	
I _{CCL}	3005	20	6V	GND	6V	6V	GND		"		6V	GND	GND		GND	GND	V _{CC}		"		"			"	
		21	GND	6V	GND	6V	GND		"		GND	6V	GND		GND	GND	V _{CC}		"		"			"	
		22	GND	GND	GND	GND	6V		"		GND	GND	6V		GND	6V	V _{CC}		"		"			"	
V _{OH3}	3006	23	4.2V	4.2V					"							1Y		5.95		5.95		5.95		V	
		24			4.2V	4.2V	4.2V	-20μA		"						2Y		"		"		"		"	
		25								"	-20μA	4.2V	4.2V	4.2V		3Y		"		"		"		"	
V _{OH5}	3006	26	4.2V	4.2V					"							1Y		5.48		5.2		5.48		"	
		27			4.2V	4.2V	4.2V	-5.2mA		"						2Y		"		"		"		"	
		28								"	-5.2mA	4.2V	4.2V	4.2V		3Y		"		"		"		"	
V _{OL3}	3007	29	4.2V	1.2V					"							20μA	1Y		.05		.05		.05		"
		30	1.2V	4.2V					"							"	1Y		"		"		"		"
		31	1.2V	1.2V					"							"	1Y		"		"		"		"
		32			4.2V	1.2V	1.2V	20μA		"						"	2Y		"		"		"		"
		33			1.2V	4.2V	1.2V		"							"	2Y		"		"		"		"
		34			1.2V	1.2V	1.2V		"							"	2Y		"		"		"		"
		35							"		20μA	4.2V	1.2V	1.2V		"	3Y		"		"		"		"
		36							"			1.2V	4.2V	1.2V		"	3Y		"		"		"		"
		37							"			1.2V	4.2V	4.2V		"	3Y		"		"		"		"
V _{OL5}	3007	38	4.2V	1.2V					"							5.2mA	1Y		.26		.4		.26		"
		39	1.2V	4.2V					"							"	1Y		"		"		"		"
		40	1.2V	1.2V					"							"	1Y		"		"		"		"
		41			4.2V	1.2V	1.2V	5.2mA		"						"	2Y		"		"		"		"
		42			1.2V	4.2V	1.2V		"							"	2Y		"		"		"		"
		43			1.2V	1.2V	1.2V		"							"	2Y		"		"		"		"
		44							"		5.2mA	4.2V	1.2V	1.2V		"	3Y		"		"		"		"
		45							"			1.2V	4.2V	1.2V		"	3Y		"		"		"		"
		46							"			1.2V	4.2V	4.2V		"	3Y		"		"		"		"
I _{OS4}	3011	47	4V	4V					"							GND	4V	4V	-10	-120	-10	-120	-10	-120	mA
		48			4V	4V	4V	GND		"						"	2Y		"	"	"	"	"	"	"
		49							"		GND	4V	4V	4V		"	3Y		"	"	"	"	"	"	"
I _{IH}	3010	50	6V	GND					"							GND	6V	1A		.05		.1			μA
		51	GND	6V					"							"	1B		"	"	"	"	"	"	"
		52	GND	GND					"							"	1C		"	"	"	"	"	"	"
		53			6V	GND	GND		"							"	2A		"	"	"	"	"	"	"
		54			GND	6V	GND		"							"	2B		"	"	"	"	"	"	"
		55			GND	GND	GND		"							"	2C		"	"	"	"	"	"	"
		56							"			6V	GND	GND		"	3A		"	"	"	"	"	"	"
		57							"			GND	6V	GND		"	3B		"	"	"	"	"	"	"
		58							"			GND	GND	6V		"	3C		"	"	"	"	"	"	"

See footnotes at end of device type 04.

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

Symbol	MIL-STD-883 method	Case 2	Terminal conditions 1/														Measured terminal	Test limits						Unit					
			2	3	4	6	8	9	10	12	13	14	16	18	19	20		Subgroup 1 T _C = +25°C		Subgroup 2 T _C = +125°C		Subgroup 3 T _C = -55°C							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14		Min	Max	Min	Max	Min	Max						
I _{IL}	3009	Test no.	1A	1B	2A	2B	2C	2Y	GND	3Y	3A	3B	3C	1Y	1C	V _{CC}													
		59	GND	6V						GND						6V	6V	1A											μA
		60	6V	GND						"						"	"	1B											"
		61	6V	6V						"						"	"	1C											"
		62								"						"	"	2A											"
		63			GND					"						"	"	2B											"
		64			6V	6V				"						"	"	2C											"
65					6V	6V			"					"	"	3A											"		
66									"		GND	6V				3B											"		
67									"		6V	6V	6V			3C											"		
																	Subgroup 4 T _C = +25°C												
																	Min	Max											
C _i	3012	68	2/	2/					GND							GND	1A										pF		
		69							"							"	1B		10								"		
		70							"						2/	"	1C		"								"		
		71			2/				"							"	2A		"								"		
		72				2/				"						"	2B		"								"		
		73					2/			"						"	2C		"								"		
		74						2/		"			2/			"	3A		"								"		
75								"				2/		"	3B		"								"				
76								"					2/	"	3C		"								"				
																	Subgroup 9 T _C = +25°C		Subgroup 10 T _C = +125°C		Subgroup 11 T _C = -55°C								
																	3/	3/			3/								
																	Min	Max	Min	Max	Min	Max							
t _{PHL}	3003 (Fig. 3)	77	IN	4.5V					GND								1A to 1Y	5	22	5	29	5	22	ns					
		78	4.5V	IN					"								1B to 1Y	"	"	"	"	"	"	"					
		79	4.5V	4.5V					"								1C to 1Y	"	"	"	"	"	"	"					
		80			IN	4.5V	4.5V	4.5V	OUT	"							2A to 2Y	"	"	"	"	"	"	"					
		81			4.5V	4.5V	4.5V	IN	"		OUT	IN	4.5V	4.5V			2B to 2Y	"	"	"	"	"	"	"					
		82							"		"						2C to 2Y	"	"	"	"	"	"	"					
		83							"		"						3A to 3Y	"	"	"	"	"	"	"					
84							"		"						3B to 3Y	"	"	"	"	"	"	"							
85							"		"						3C to 3Y	"	"	"	"	"	"	"							
t _{PLH}	3003 (Fig. 3)	86 to 94	Same terminal conditions and limits as specified above for t _{PHL} .																										
t _{THL}	3004 (Fig. 3)	95	IN	4.5V					GND								1Y	3	15	3	20	3	15	ns					
		96	4.5V	IN					"								1Y	"	"	"	"	"	"	"					
		97	4.5V	4.5V					"								1Y	"	"	"	"	"	"	"					
		98			IN	4.5V	4.5V	4.5V	OUT	"							2Y	"	"	"	"	"	"	"					
		99			4.5V	4.5V	4.5V	IN	"								2Y	"	"	"	"	"	"	"					
		100							"		OUT	IN	4.5V	4.5V			2Y	"	"	"	"	"	"	"					
		101							"		"						3Y	"	"	"	"	"	"	"					
102							"		"						3Y	"	"	"	"	"	"	"							
103							"		"						3Y	"	"	"	"	"	"	"							
t _{TLH}	3004 (Fig. 3)	104 to 112	Same terminal conditions and limits as specified above for t _{THL} .																										

See footnotes on next page.

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

- 1/ Input pins not designated shall be high level logic, low level logic, or may be left open provided they do not influence the outcome of the measurement. Output pins not designated shall be tied to the loads or left open provided they do not influence the outcome of the measurement. Exceptions are as follows:
- a. $V_{IC}(\text{pos})$ tests: The GND terminal shall be open. Minimum limit of 0.4 V applies to tests being performed on equipment not capable of opening GND pin during test.
 - b. $V_{IC}(\text{neg})$ tests: The V_{CC} terminal shall be open.
 - c. I_{CC} tests: The output terminal shall be open.
- 2/ See 4.4.1c. For all type input terminals (e.g. clock, clear, data, etc.) a minimum of 3 inputs of each per device shall be tested.
- 3/ See 4.4.1d.

4.5 Methods of inspection. Methods of inspection shall be specified and as follows:

4.5.1 Voltage and current. Unless otherwise specified, all voltages given are referenced to the microcircuit GND terminal. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cool down procedures. When the burn-in and life tests are completed and prior to removal of bias voltages, the devices under test (DUT) shall be cooled to within 10°C of their power stable condition at room temperature; then, electrical parameter end-point measurements shall be performed.

TABLE IV. Delta limits at 25°C.

Parameter 1/	Device types	
	All	
I_{CC}		± 30 nA

1/ The above parameters shall be recorded before and after the required burn-in and life tests to determine deltas (Δ).

4.5.3 Quiescent supply current (I_{CC} test). When performing quiescent supply current measurements (I_{CC}), the meter shall be placed so that all currents flow through the meter.

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 commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES:

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. PIN and compliance identifier, if applicable (see 1.2).
- c. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- d. Requirements for certificate of compliance, if applicable.
- e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.
- f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.
- g. Requirements for product assurance options.
- h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.
- i. Requirements for "JAN" marking.
- j. Packaging requirements (see 5.1).

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractors parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, P.O. Box 3990, Columbus, Ohio 43218-3990.

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

T _C	Case temperature.
C _{IN}	Input terminal-to-GND capacitance.
GND	Ground zero voltage potential
I _{CC}	Quiescent supply current.
T _A	Free air temperature.
V _{CC}	Positive supply voltage.
C _{PD}	Power dissipation capacitance.

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 S for National Aeronautics and Space Administration or class B for Department of Defense (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Data reporting. When specified in the purchase order or contract, a copy of the following data, as applicable, will be supplied.

- a. Attributes data for all screening tests (see 4.2) and variables data for all static burn-in, dynamic burn-in, and steady-state life tests (see 3.6).
- b. A copy of each radiograph.
- c. The technology conformance inspection (TCI) data (see 4.4).
- d. Parameter distribution data on parameters evaluated during burn-in (see 3.6).
- e. Final electrical parameters data (see 4.2d).

6.8 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.

Military device type	Generic-industry type
01	54HC32
02	54HC86
03	54HC08
04	54HC11

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
 (Project 5962-2005-019)

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

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