MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL, COUNTERS, CASCADABLE, MONOLITHIC SILICON

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, low-power Schottky, TTL, binary and decade counters. Two 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, and as specified herein.

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

Device type	Circuit
01	Presettable decade counter, cascadable
02	Presettable 4-bit binary counter, cascadable
03	Decade counter
04	4-bit binary counter

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-lead, 1/4" x 1/4"), flat package
B	F-3 (14-lead, 3/16" x 1/4"), flat package
C	D-1 (14-lead, 1/4" x 3/4"), dual-in-line package
D	F-2 (14-lead, 1/4" x 3/8"), flat package
2	C-2 (20-terminal .350" x .350"), square chip carrier 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 -18 mA to +5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	
Device types 01 and 02	148.5 mW
Device types 03 and 04	82.5 mW
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC}):	
Cases A, B, C, and D	(see MIL-M-38510, Appendix C)
Case 2	60°C/W 2/
Junction temperature (T_J) 3/	+175°C

1/ Must withstand the added P_D due to short circuit test (e.g., I_{OS}).
2/ When a thermal resistance value is included in MIL-M-38510, Appendix C, it shall supersede the value stated herein.
3/ Maximum junction temperature shall not be exceeded except for short duration screening conditions per method 5004 of MIL-STD-883.

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
Minimum high-level input voltage (V_{IH})	2.0 V dc
Maximum low-level input voltage (V_{IL})	0.7 V dc
Normalized fanout (each output)	10 maximum
Width of input count pulse, $t_{p(IN)}$	
Types 01 and 02	
$\overline{CPO}$	20 ns minimum
$\overline{CPI}$	30 ns minimum
Types 03 and 04	
Input A	17 ns minimum
Input B	34 ns minimum
Width of reset pulse, $t_{p(reset)}$	
Types 01 and 02	20 ns minimum
Types 03 and 04	25 ns minimum
Input clock frequency, f_{clock}	
Types 01 and 02	
$\overline{CPO}$	0 to 30 MHz
$\overline{CPI}$	0 to 15 MHz
Types 03 and 04	
Input A	0 to 29 MHz
Input B	0 to 13 MHz
Width of parallel load pulse, $t_{W(\overline{PL})}$	
Types 01 and 02	20 ns minimum
Setup time, $t_{(SETUP)}$	
Types 01 and 02	
Data inputs high	10 ns minimum
Data inputs low	15 ns minimum
Enable time from load, reset to clock, t_{EN}	
Types 01 and 02	20 ns minimum
Hold time at data inputs, t_H	
Types 01 and 02	20 ns minimum
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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$	Device type	Limits Min	Limits Max	Unit
High-level output voltage	V_{OH}	V_{CC} = 4.5 V, V_{IL} = 0.7 V V_{IH} = 2.0 V I_{OH} = -400 µA	All	2.5		V
Low-level output voltage	V_{OL}	V_{CC} = 4.5 V, V_{IH} = 2.0 V 1/ V_{IL} = 0.7 V I_{OL} = 4 mA	All		0.4	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V I_{IN} = -18 mA, T_C = +25°C	All		-1.5	V
High-level input current at reset inputs	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	03,04 01,02		20 40	µA
High-level input current at reset inputs	I_{IH2}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	03,04 01,02		100 200	µA
High-level input current at input A	I_{IH3}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	03,04		80	µA
High-level input current at input A	I_{IH4}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	03,04		400	µA
High-level input current at input B	I_{IH5}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	03 04		160 80	µA
High-level input current at input B	I_{IH6}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	03 04		800 400	µA
High-level input current at load, data inputs	I_{IH7}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01,02		20	µA
High-level input current at load, data inputs	I_{IH8}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01,02		100	µA
High-level input current at $\overline{CP0}$	I_{IH9}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01,02		40	µA
High-level input current at $\overline{CP0}$	I_{IH10}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01,02		200	µA
High-level input current at $\overline{CP1}$	I_{IH11}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	01,02		80	µA
High-level input current at $\overline{CP1}$	I_{IH12}	V_{CC} = 5.5 V, V_{IN} = 5.5 V	01,02		400	µA
Low-level input current at reset inputs	I_{IL1}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	03,04 01,02	-30 -120	-400 -800	µA
Low-level input current at input A	I_{IL2}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	03,04	-0.5	-2.4	mA
Low-level input current at input B	I_{IL3}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	03,04	-0.4	-3.2	mA

See footnotes at end of table.

TABLE I. Electrical performance characteristics -Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$	Device type	Limits Min	Limits Max	Unit
Low-level input current at load, data inputs	I_{IL4}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01,02	-120	-400	µA
Low-level input current at $\overline{CP0}$	I_{IL5}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01,02	-0.6	-2.6	mA
Low-level input current at $\overline{CP1}$	I_{IL6}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	01	-0.4	-3.2	mA
			02		-1.6	
Short-circuit output current	I_{OS}	V_{CC} = 5.5 V 2/	01,02		-100	mA
			03,04	-15	-130	
Supply current	I_{CC}	V_{CC} = 5.5 V, V_{IN} = 0 V 3/	01,02		27	mA
			03,04		15	
Maximum count frequency at input CP0 $\overline{CP1}$	f_{MAX}	V_{CC} = 4.5 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01,02	30		MHz
				15		
Maximum input A count frequency	f_{MAX}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	03,04	29		MHz
Propagation delay time, low to high, A to Q_C	t_{PLH1} 4/	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	03,04	3	74	ns
Propagation delay time, high to low, A to Q_C	t_{PHL1} 4/	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	03,04	3	81	ns
Propagation delay time, low to high, B to Q_D	t_{PLH2}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	03		52	
			04	3	78	ns
Propagation delay time, high to low, B to Q_D	t_{PHL2}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	03		56	
			04	3	78	ns
Propagation delay time, low to high, CP0 to Q_2	t_{PLH3} 5/	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01,02	3	100	ns
Propagation delay time, high to low, CP0 to Q_2	t_{PHL3} 5/	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01,02	3	107	ns
Propagation delay time, low to high, CP1 to Q_3	t_{PLH4}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01		38	
			02	3	78	ns
Propagation delay time, high to low, CP1 to Q_3	t_{PHL4}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01		52	
			02	3	110	ns
Propagation delay time, low to high, load to Q	t_{PLH5}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01,02	3	46	ns
Propagation delay time, high to low, load to Q	t_{PHL5}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	01,02	3	65	ns
Propagation delay time, high to low reset to Q	t_{PHL6}	V_{CC} = 5.0 V, C_L = 50 pF ±10%, R_L = 2 kΩ	02	3	46	ns

1/ Input B ($\overline{CP1}$) is connected to Q_A (Q_0) during the V_{OL} test.
2/ Not more than one output should be shorted at a time.
3/ I_{CC} is measured with all outputs open, both Ro inputs grounded following momentary connection to 4.5 V and all other inputs grounded.
4/ When testing t_{PHL1} or t_{PLH1}, the Q_A pin shall be connected to the input B pin.
5/ When testing t_{PHL3} or t_{PLH3}, the Q_0 pin shall be connected to the $\overline{CP1}$ pin.

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 and logic diagrams. The terminal connections and logic diagrams shall be as specified on figures 1 and 2, respectively.

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

3.2.3 Schematic circuits. Schematic circuits shall be submitted to the preparing activity prior to inclusion of a manufacturer's device in the specification and shall be submitted to the qualifying activity and agent activity (DESC-ECS) as a prerequisite for qualification. All qualified manufacturers' schematics shall be maintained by the agent activity and will be available upon request.

3.2.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.3 Lead material and finish. The lead material and finish shall be in accordance with MIL-M-38510 and 6.4 herein.

3.4 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are specified in table I, and apply over the full recommended case operating temperature range.

3.5 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.

3.6 Marking. Marking shall be in accordance with MIL-M-38510.

3.7 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 12 (see MIL-M-38510, appendix E).

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters (pre burn-in) (method 5004)	1	1
Final electrical test parameters (method 5004)	1*,2,3,7,9, 10,11	1*,2,3,7,9
Group A test requirements (method 5005)	1,2,3,7,8, 9,10,11	1,2,3,7,8,9, 10,11
Group B test requirements (method 5005) subgroup 5	1,2,3,7,8, 9,10,11	N/A
Group C end-point electrical parameters (method 5005)	N/A	1,2,3
Additional electrical subgroups for group C periodic inspections	N/A	N/A
Group D end-point electrical parameters (method 5005)	1,2,3	1,2,3

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

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 qualification and 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°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) shall be as specified in MIL-M-38510.

4.3 Qualification inspection. Qualification 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).

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).

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. Electrical test requirements shall be as specified in table II herein.

b. Subgroups 4, 5, and 6 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. Electrical test requirements shall be as specified in table II herein.

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. 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°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

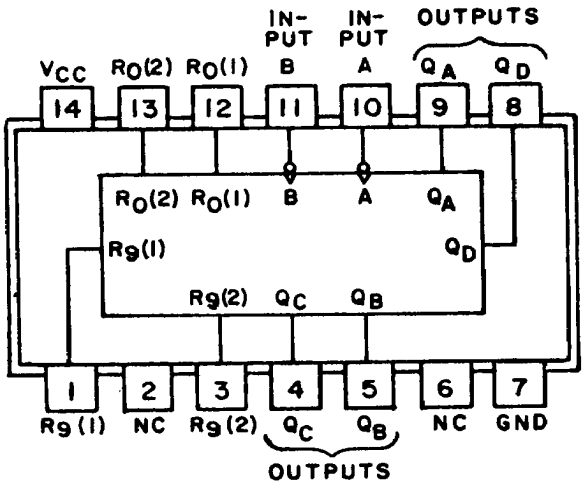
4.4.4 Group D inspection. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

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.

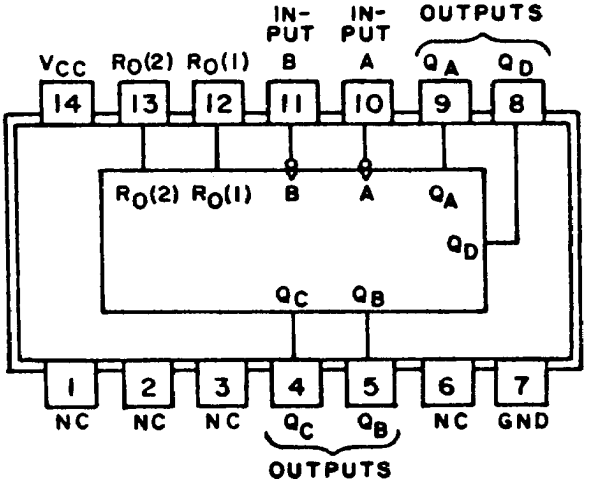
Device type 03

Cases A, B, C and D



Device type 04

Cases A, B, C and D



Device types 01 and 02

Cases A, B, C, and D

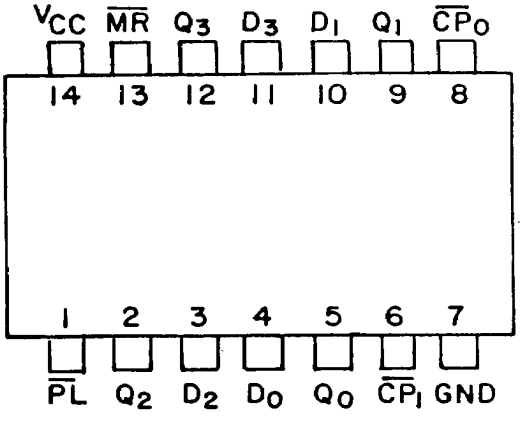


FIGURE 1. Terminal connections (top view).

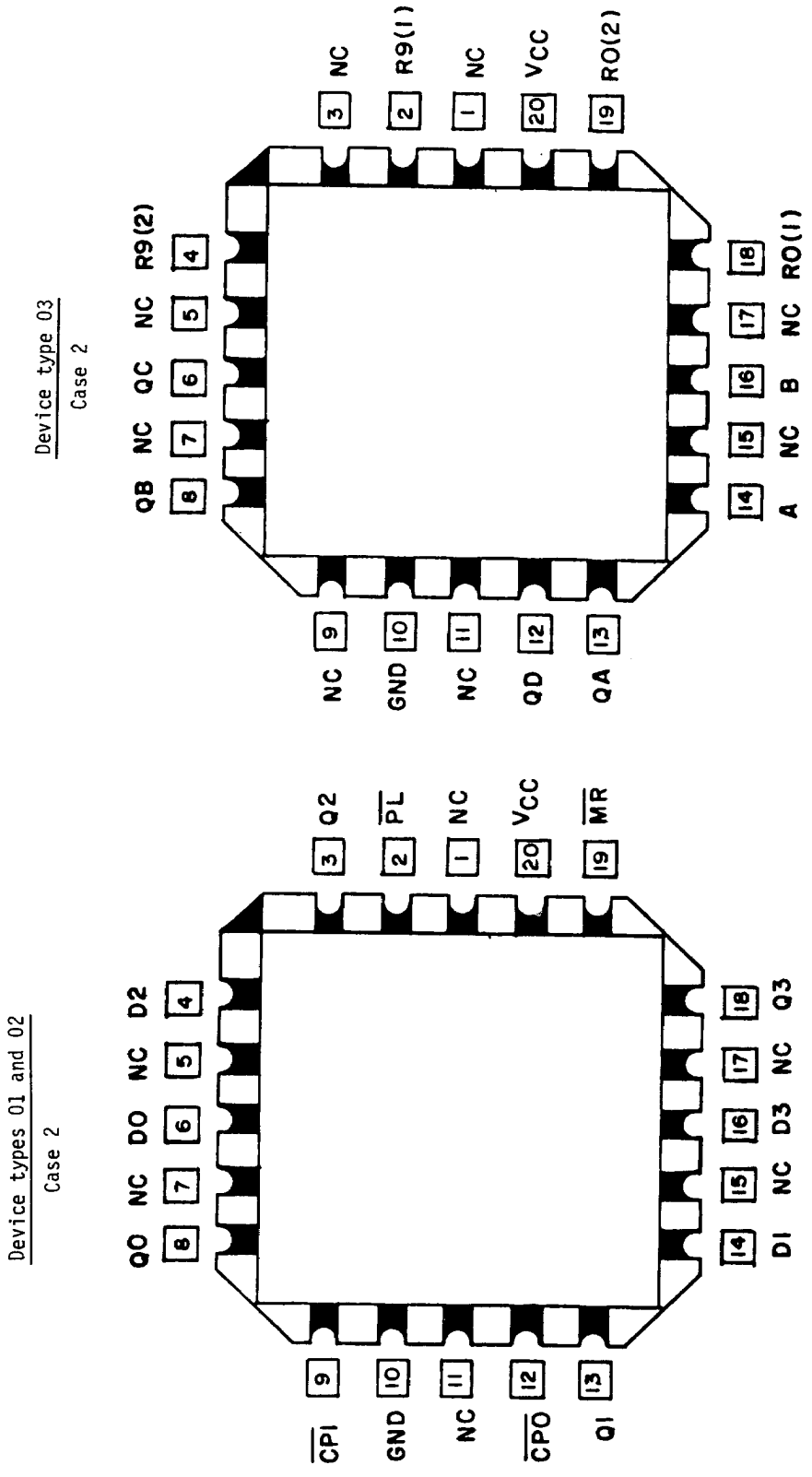


FIGURE 1. Terminal connections (top view) - Continued.

Device type 04

(Case 2)

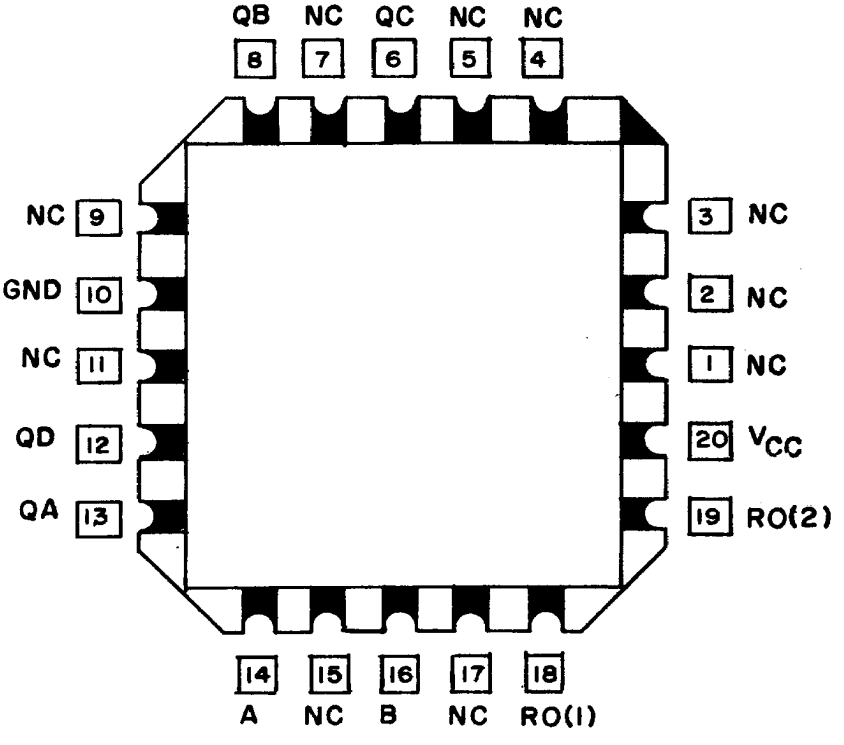
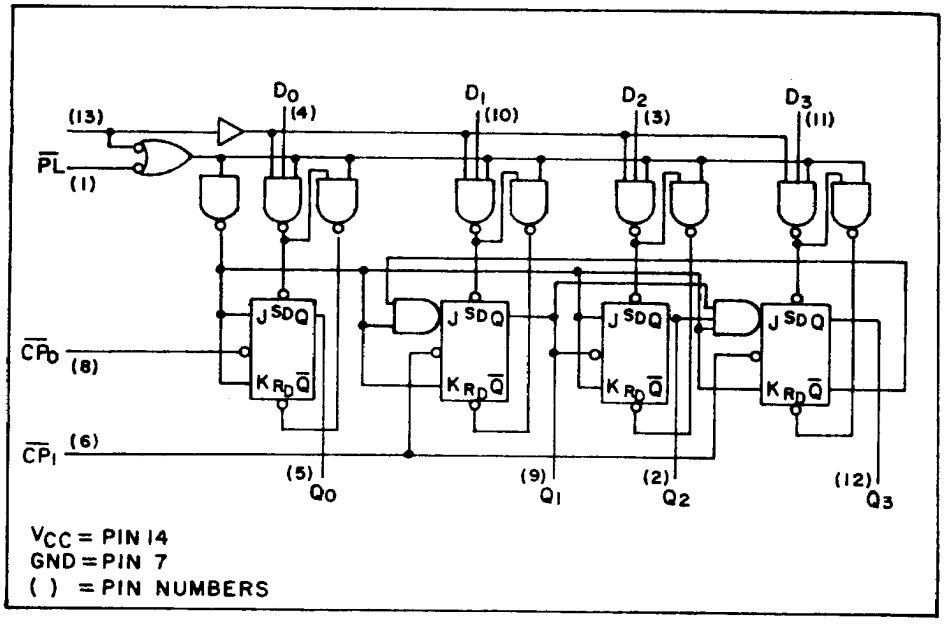


FIGURE 1. Terminal connections (top view) - Continued.

Device type 01



Device type 02

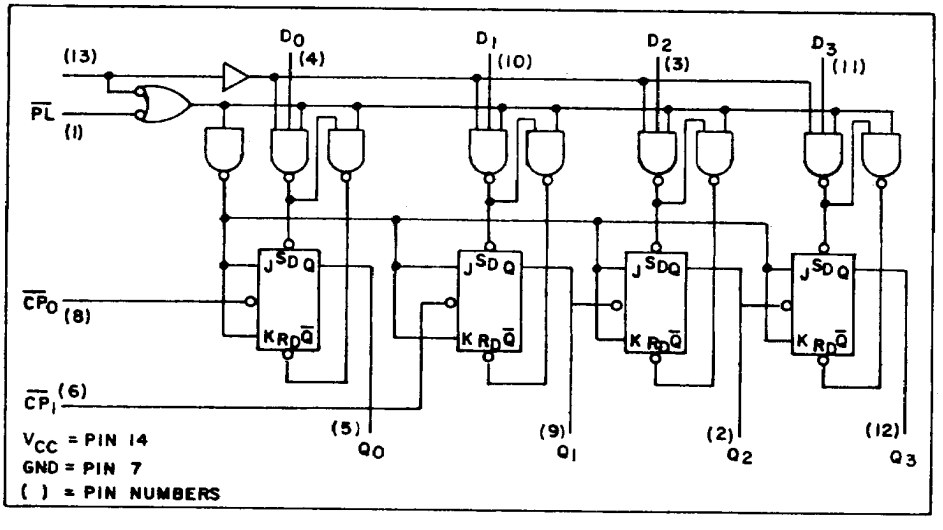
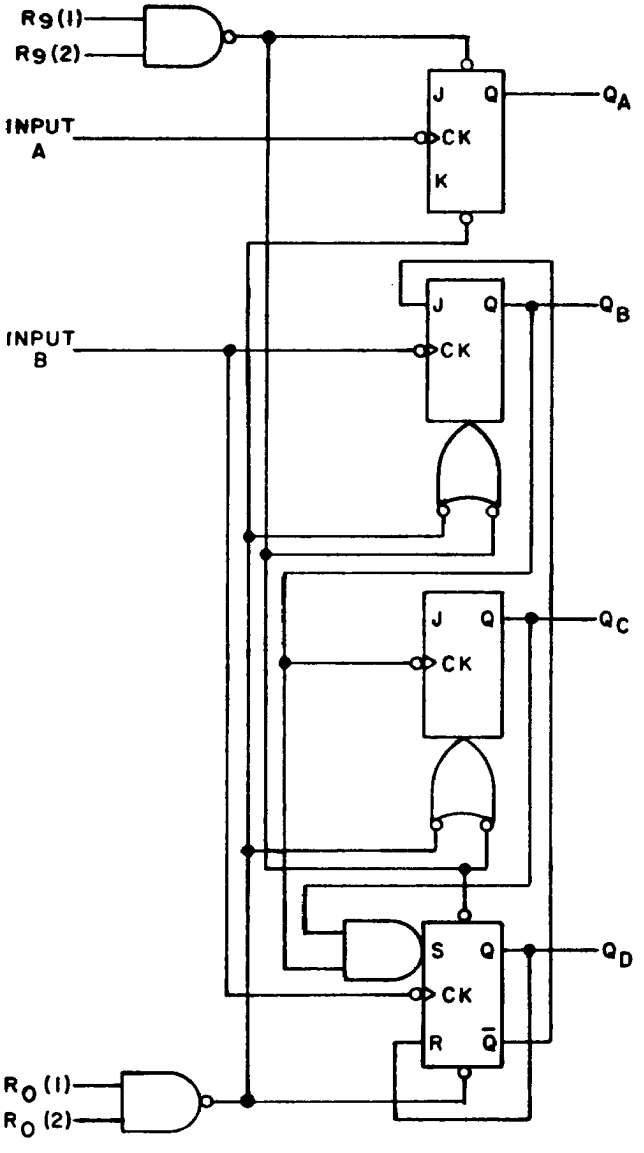


FIGURE 2. Logic diagrams.

DEVICE TYPE 03



DEVICE TYPE 04

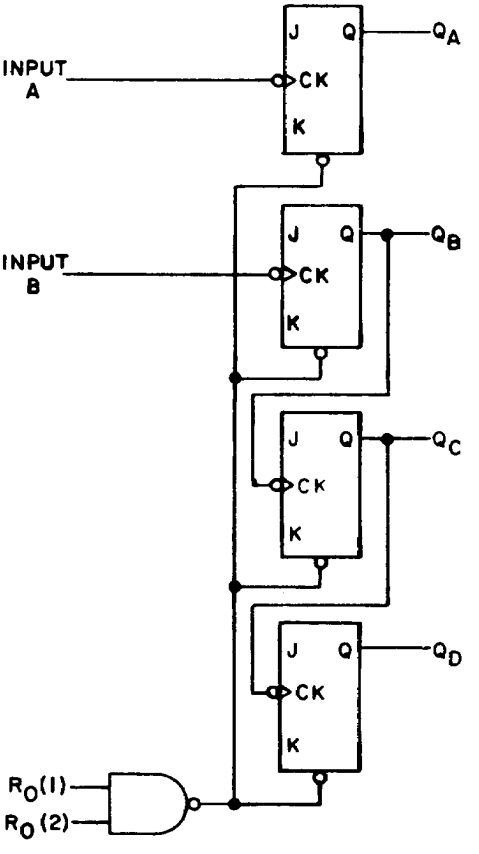


FIGURE 2. Logic diagrams - Continued.

Device type 01

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H

H = high level, L = low level
NOTE A: Output Q_0 connected to clock-2 input.

Device type 02

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

H = high level, L = low level
NOTE A: Output Q_0 connected to clock-2 input.

FIGURE 3. Truth tables.

Device type 03

BCD COUNT SEQUENCE
(See note A)

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H

BI-QUINARY (5-2)
(See note B)

COUNT	OUTPUT			
	Q_A	Q_D	Q_C	Q_B
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	H	L	L	L
6	H	L	L	H
7	H	L	H	L
8	H	L	H	H
9	H	H	L	L

RESET/COUNT FUNCTION TABLE

RESET INPUTS				OUTPUT			
$R_{0(1)}$	$R_{0(2)}$	$R_{9(1)}$	$R_{9(2)}$	Q_D	Q_C	Q_B	Q_A
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
X	L	X	L	COUNT			
L	X	L	X	COUNT			
L	X	X	L	COUNT			
X	L	L	X	COUNT			

Device type 04

COUNT SEQUENCE
(See note)

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

RESET/COUNT FUNCTION TABLE

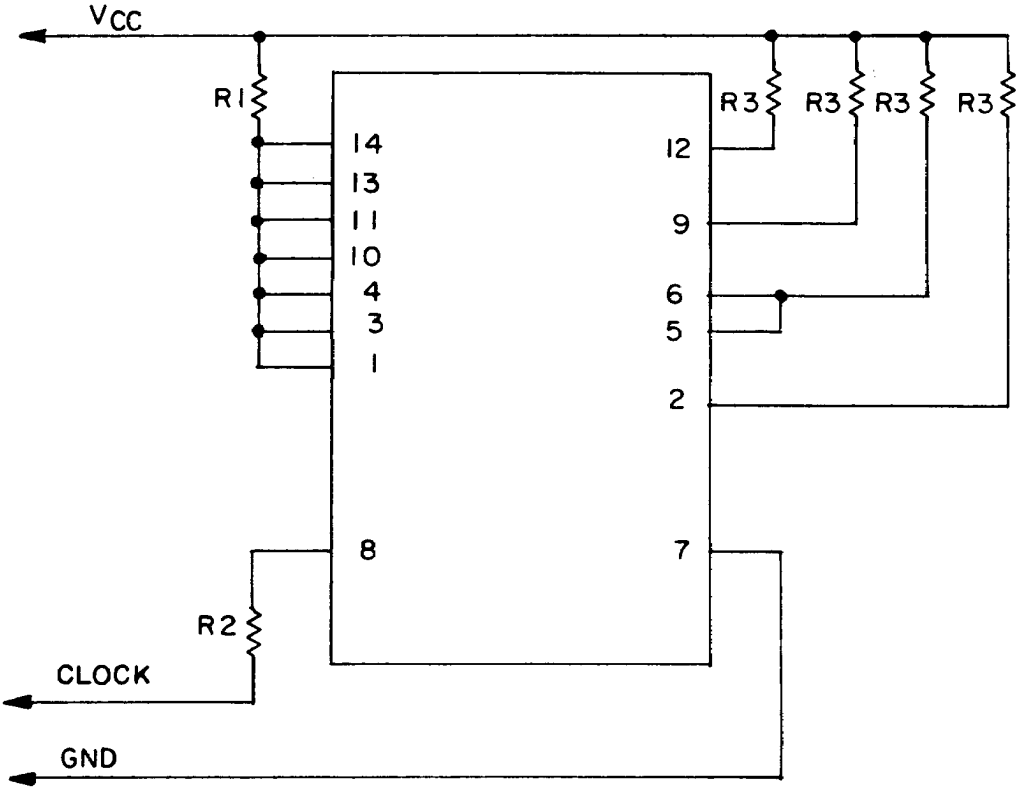
RESET INPUTS		OUTPUT			
$R_{0(1)}$	$R_{0(2)}$	Q_D	Q_C	Q_B	Q_A
H	H	L	L	L	L
L	X	COUNT			
X	L	COUNT			

NOTE: Output Q_A is connected to input B.

NOTES:
A. Output Q_A is connected to input B for BCD count.
B. Output Q_D is connected to input A for bi-quinary count.

FIGURE 3. Truth tables - Continued.

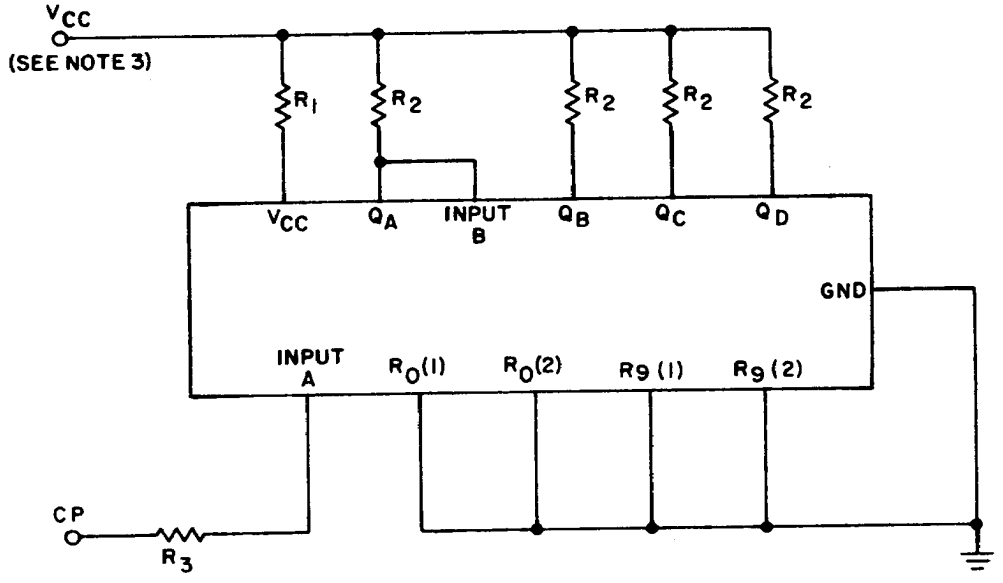
Device types 01 and 02



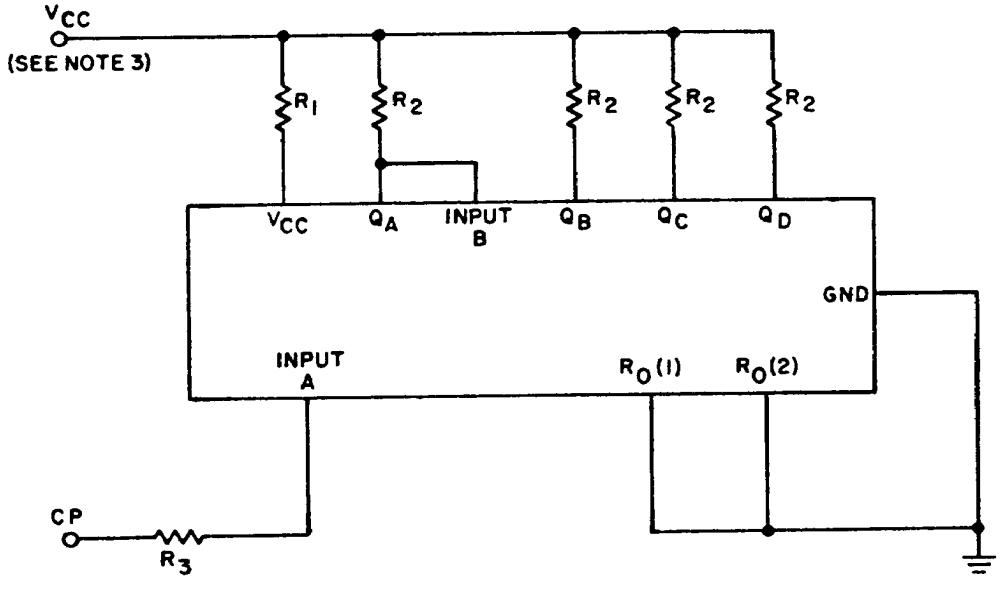
NOTES:
1. R_1 = 4.7Ω.
2. R_2 = 27Ω.
3. R_3 = 1 kΩ.
4. CLK = 100 kHz.
5. V_{CC} = 5.0 V minimum
6. 50% duty cycle

FIGURE 4. Burn-in and life test circuit.

DEVICE TYPE 03

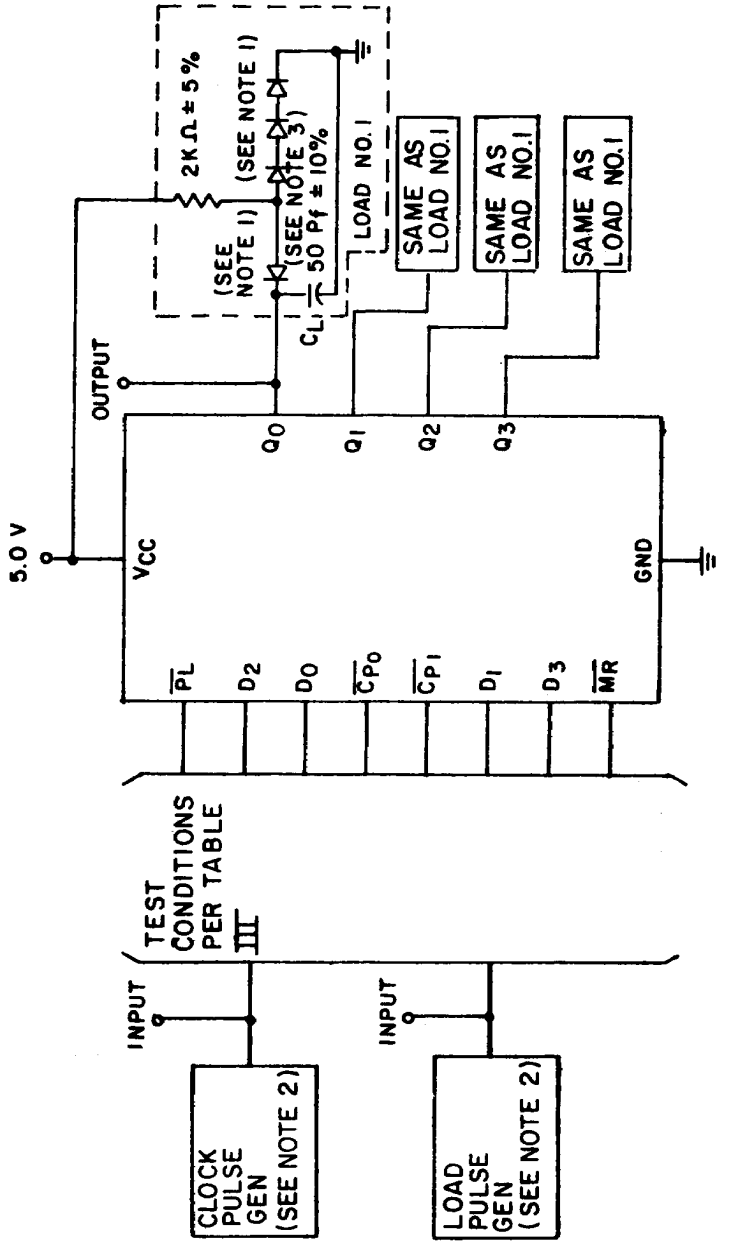


DEVICE TYPE 04



NOTES:
1. CP = 100 kHz ±50% square wave; duty cycle = 50 ±15%; V_{IL} = -0.5 V minimum to +0.7 V maximum; V_{IH} = 2.0 V minimum to 5.5 V maximum.
2. R_1 = 20Ω (maximum), R_2 = 1.0 kΩ ±10%, R_3 = 27Ω ±10%.
3. V_{CC} shall be high enough to insure that 5.0 V minimum is present at V_{CC} device terminal.

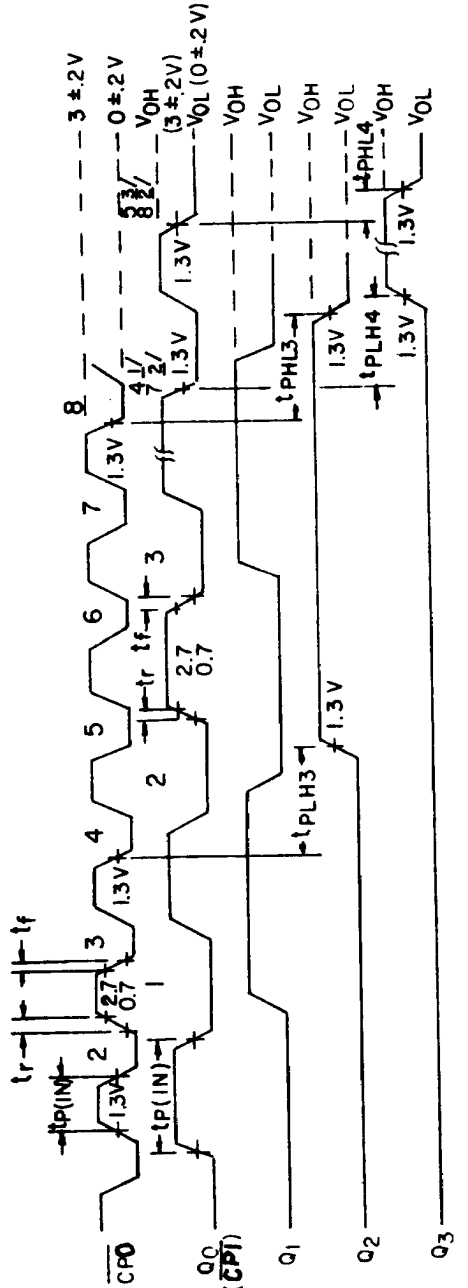
FIGURE 4. Burn-in and life test circuit - Continued.



NOTES:
1. All diodes are 1N3064 or equivalent.
2. The pulse generator has the following characteristics: V_{gen} = 3 ±.2 V, $t_r \leq 15$ ns, $t_f \leq 6$ ns; $t_{p(IN)}$ = 500 ns; PRR ≤ 1 MHz, $Z_{OUT} \approx 50\Omega$. F_{max}: $t_r = t_f \leq 6$ ns.
3. C_L includes probe and jig capacitance.

FIGURE 5. Switching time test circuit and waveforms for device types 01 and 02.

Serial setup and test



NOTES:
1/ Applies to device types 01 and 02 on t_{PLH4} test; device type 01 on t_{PHL4} test.
2/ Applies to device type 02 on t_{PHL4} test.
3/ Applies to device type 01 on t_{PHL4} test.

FIGURE 5. Switching time test circuit and waveforms for device types 01 and 02 - Continued.

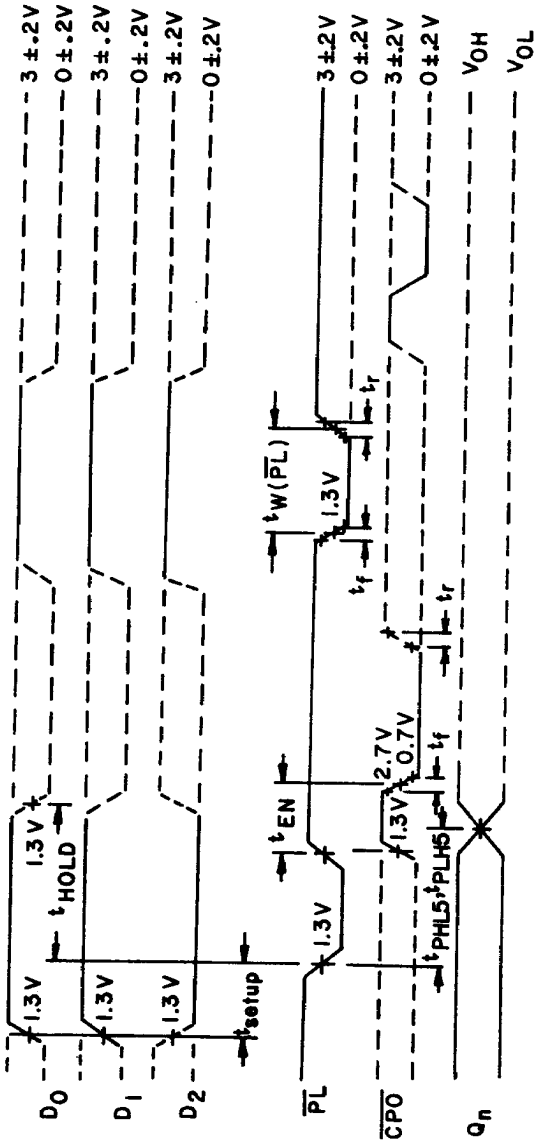
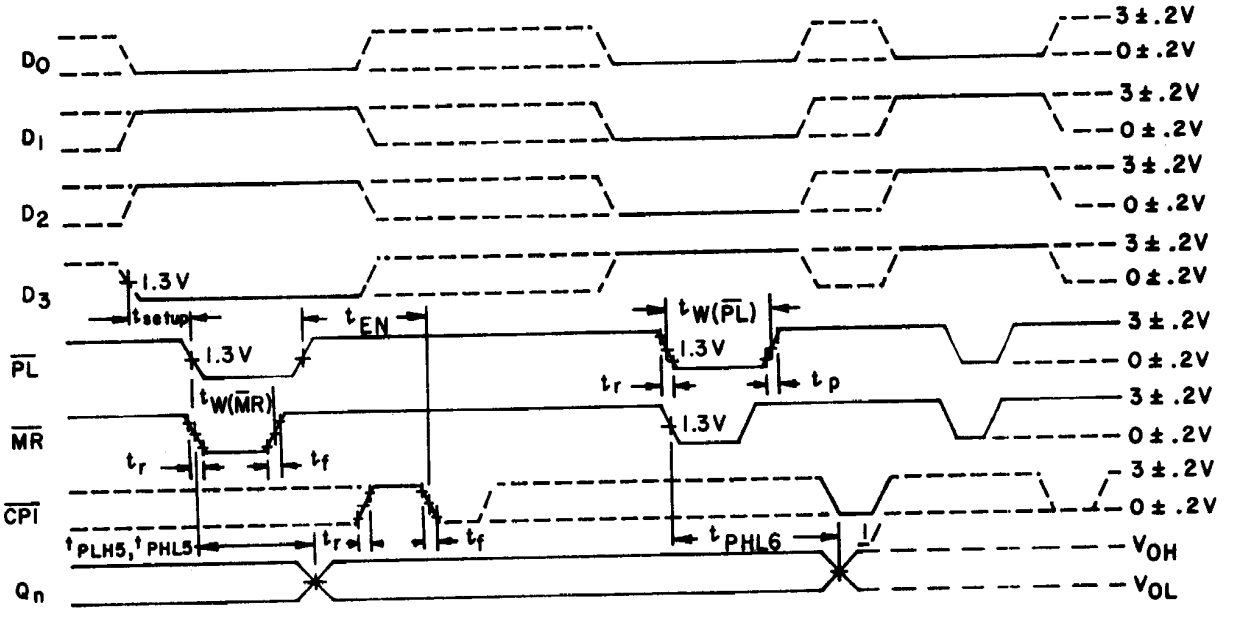


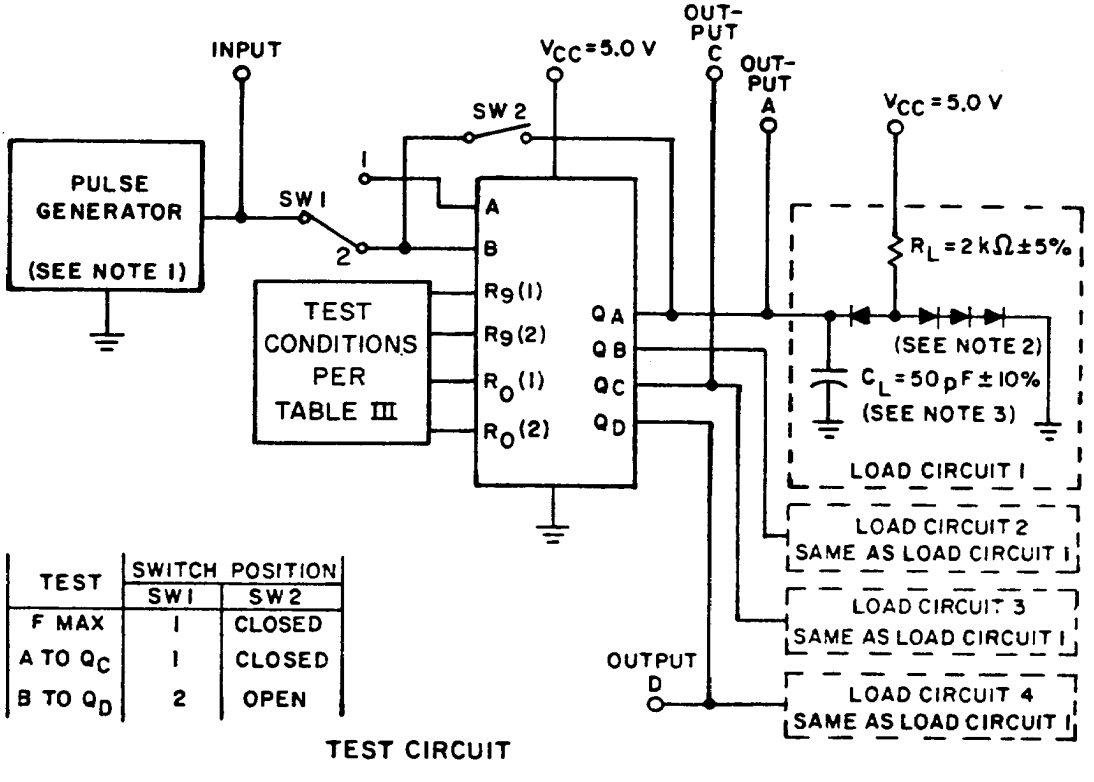
FIGURE 5. Switching time test circuit and waveforms for device types 01 and 02 - Continued.

Parallel load setup and test - Continued.



1/ For device type 02 only.

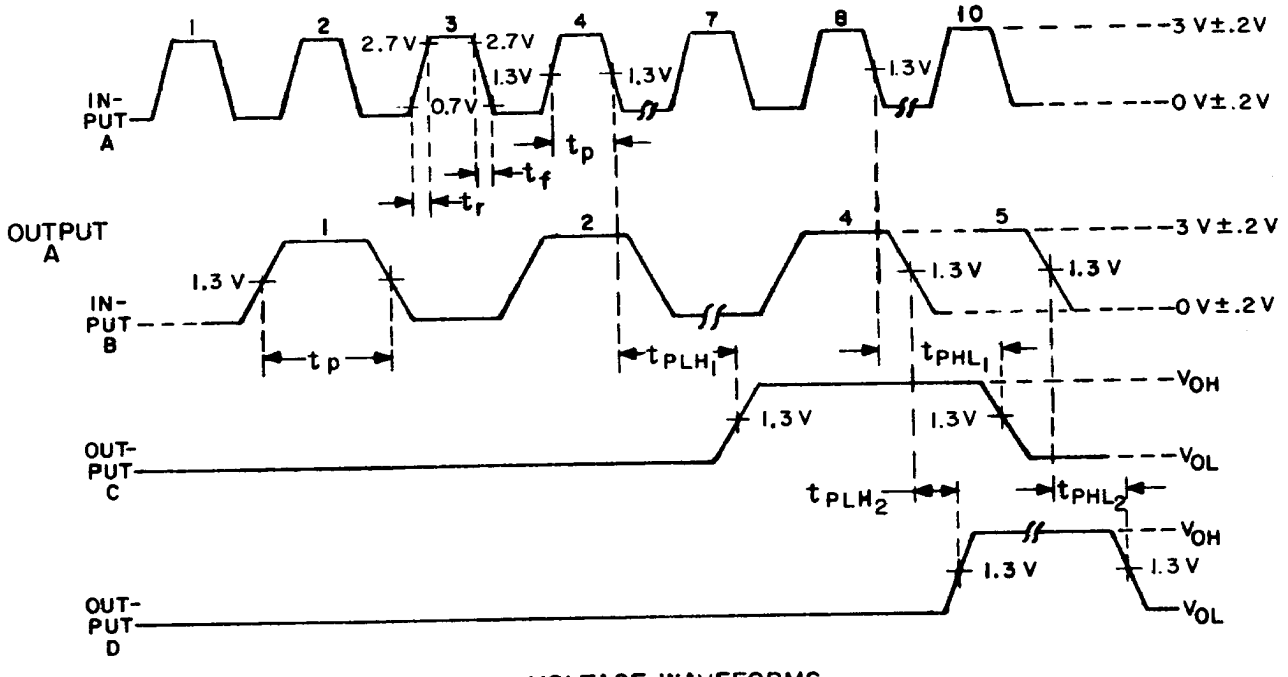
FIGURE 5. Switching time test circuit and waveforms for device types 01 and 02 - Continued.



TEST	SWITCH POSITION	
	SW1	SW2
F MAX	1	CLOSED
A TO Q_C	1	CLOSED
B TO Q_D	2	OPEN

TEST CIRCUIT

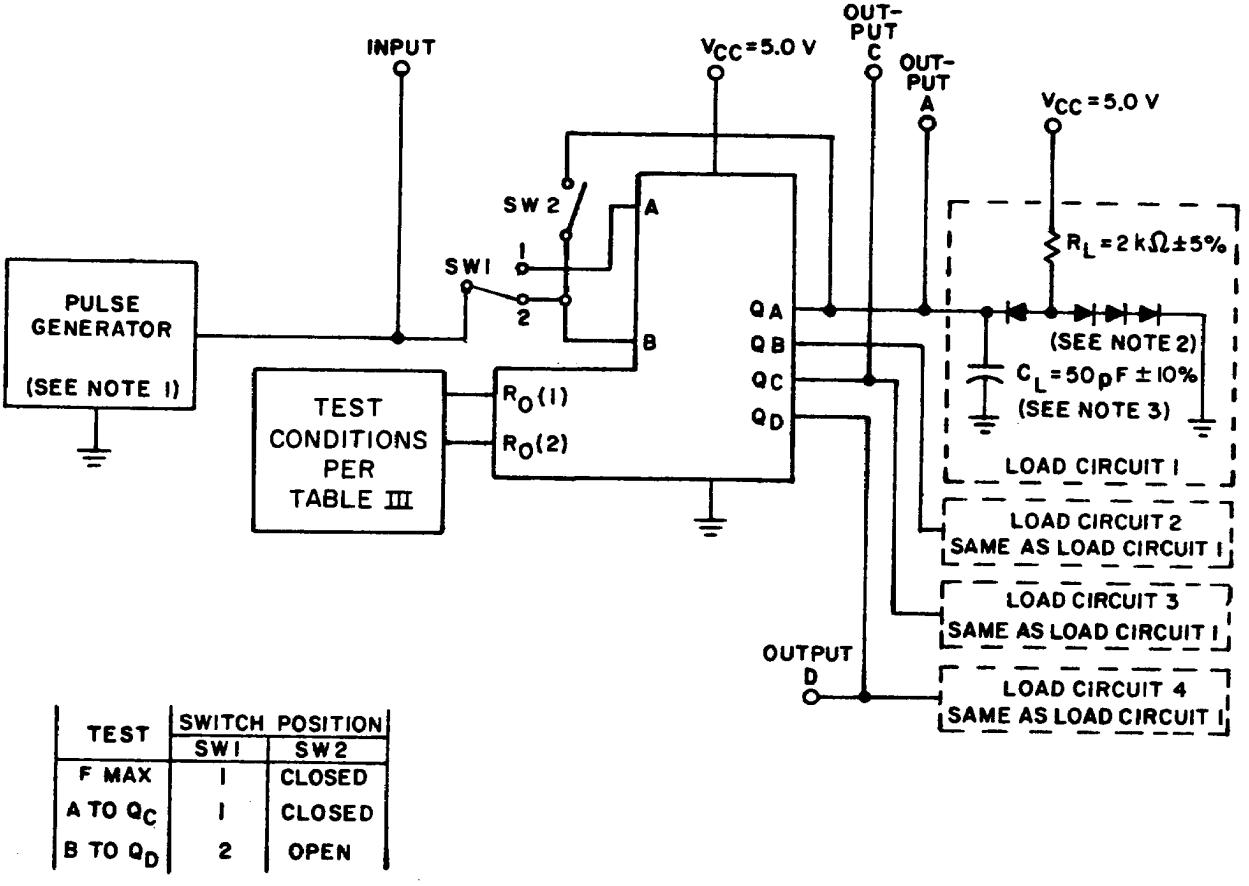
FIGURE 5. Switching time test circuit and waveforms for device type 03 - Continued.



VOLTAGE WAVEFORMS

NOTES:
1. The pulse generator has the following characteristics: V_{gen} = 3 V, $t_r \leq 15$ ns, $t_f \leq 6$ ns, t_p = .5 µs, PRR ≤ 1 MHz, $Z_{out} \approx 50\Omega$.
2. All diodes are 1N3064 or equivalent.
3. C_L includes probe and jig capacitance.
4. Voltage values are with respect to ground terminal.
5. F maximum: $t_r = t_f \leq 6$ ns.

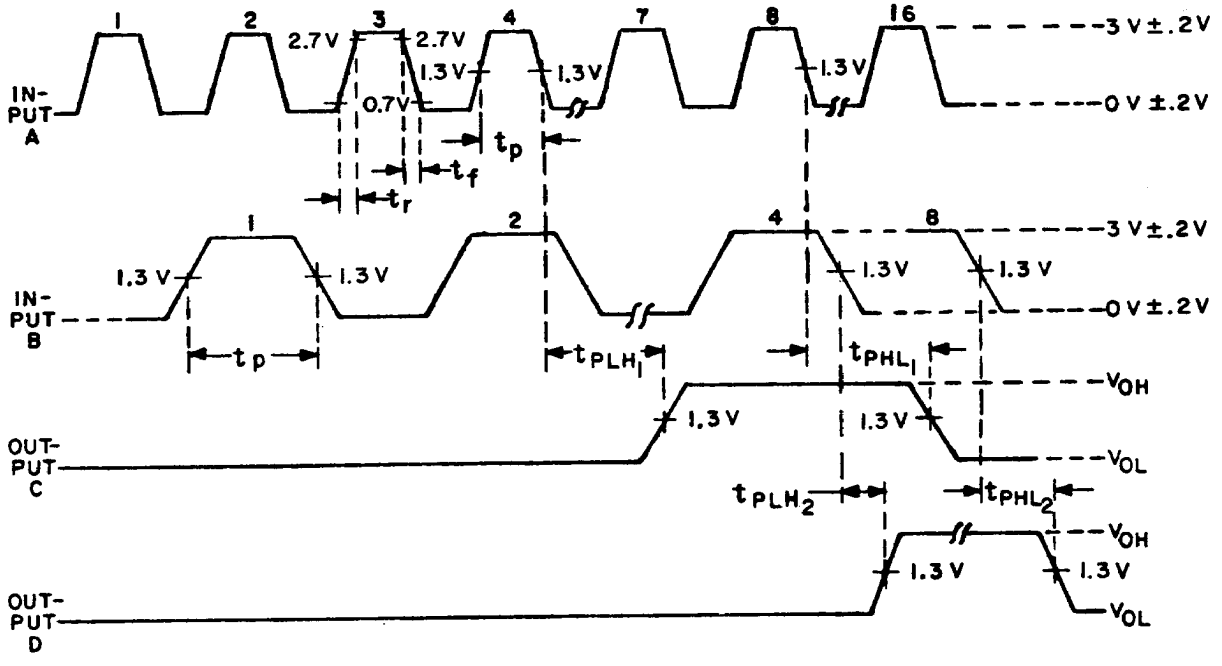
FIGURE 5. Switching time test circuit and waveforms for device type 03 - Continued.



TEST	SWITCH POSITION	
	SW1	SW2
F MAX	1	CLOSED
A TO Q_C	1	CLOSED
B TO Q_D	2	OPEN

TEST CIRCUIT

FIGURE 5. Switching time test circuit and waveforms for device type 04 - Continued.



VOLTAGE WAVEFORMS

NOTES:
1. The pulse generator has the following characteristics: V_{gen} = 3 V, $t_r \leq 15$ ns, $t_f \leq 6$ ns, t_p = .5 µs, PRR ≤ 1 MHz, $Z_{out} \approx 50\Omega$.
2. All diodes are 1N3064 or equivalent.
3. C_L includes probe and jig capacitance.
4. Voltage values are with respect to ground terminal.
5. F maximum: $t_r = t_f \leq 6$ ns.

FIGURE 5. Switching time test circuit and waveforms for device type 04 - 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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$\overline{PL}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
1 T_C = +25°C	V_{OL}	3007	1					4 mA 2/	2/	GND						0.7 V	4.5 V	Q_0		0.4	V
		"	2		4 mA			2/	"	"		4 mA				"	"	Q_1		"	"
		"	3					2/	"	"						"	"	Q_2		"	"
		"	4					2/	"	"					4 mA	"	"	Q_3		"	"
	V_{OH}	3006	5	0.7 V			2.0 V	-.4 mA		"						2.0 V	"	Q_0	2.5		"
		"	6	"						"						"	"	Q_1	"		"
		"	7	"	-.4 mA	2.0 V				"		-.4 mA	2.0 V			"	"	Q_2	"		"
		"	8	"						"				2.0 V	-.4 mA	"	"	Q_3	"		"
	V_{IC}		9				-18 mA			"							"	D_0		-1.5	"
			10			-18 mA				"			-18 mA				"	D_1		"	"
			11							"				-18 mA			"	D_2		"	"
			12							"							"	D_3		"	"
			13							"	-18 mA						"	$\overline{CPO}$		"	"
			14						-18 mA	"							"	$\overline{CPI}$		"	"
			15							"							"	$\overline{MR}$		"	"
			16	-18 mA						"						-18 mA	"	$\overline{PL}$		"	"
	I_{IH1}	3010	17							"						2.7 V	5.5 V	$\overline{MR}$		40	µA
	I_{IH2}	"	18							"						5.5 V	"	$\overline{MR}$		200	"
	I_{IH7}	"	19	2.7 V						"							"	$\overline{PL}$		20	"
		"	20			2.7 V				"							"	D_2		"	"
		"	21				2.7 V			"							"	D_0		"	"
		"	22							"			2.7 V				"	D_1		"	"
		"	23							"				2.7 V			"	D_3		"	"
	I_{IH8}	"	24	5.5 V						"							"	$\overline{PL}$		100	"
		"	25			5.5 V				"							"	D_2		"	"
		"	26				5.5 V			"							"	D_0		"	"
		"	27							"			5.5 V				"	D_1		"	"
		"	28							"				5.5 V			"	D_3		"	"
	I_{IH9}	"	29							"	2.7 V						"	$\overline{CPO}$		40	"
	I_{IH10}	"	30							"	5.5 V						"	$\overline{CPO}$		200	"
	I_{IH11}	"	31						2.7 V	"							"	$\overline{CPI}$		80	"
	I_{IH12}	"	32						5.5 V	"							"	$\overline{CPI}$		400	"
	I_{IL1}	3009	33							"						0.4 V	"	$\overline{MR}$	3/	3/	"
	I_{IL4}	"	34	0.4 V						"							"	$\overline{PL}$	"	"	"
		"	35			0.4 V				"							"	D_2	"	"	"
		"	36				0.4 V			"							"	D_0	"	"	"
		"	37							"			0.4 V				"	D_1	"	"	"
		"	38							"				0.4 V			"	D_3	"	"	"
	I_{IL5}	"	39							"	0.4 V						"	$\overline{CPO}$	"	"	mA

See footnotes at end of device type 02.

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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$\overline{PL}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
1 T_C = +25°C	I_{IL6}	3009	40						0.4 V	GND							5.5 V	$\overline{CPI}$	3/	3/	mA
	I_{OS}	3011	41	GND			5.5 V	GND		"		GND	5.5 V				"	Q_0	-15	-100	"
		"	42							"							"	Q_1	"	"	"
		"	43		GND	5.5 V				"				5.5 V	GND		"	Q_2	"	"	"
		"	44							"							"	Q_3			
	I_{CC}		45	GND		GND	GND		GND	"	GND		GND	GND		GND	"	V_{CC}		27	"
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 5/	3014	46	4/ A	L	A	A	L	A	GND	A	L	A	A	L	B 4/	4.5 V	6/			
		"	47	"	L	B	B	H	B	"	B	H	B	B	"	A	"				
		"	48	"	L	"	B	H	A	"	A	H	B	A	"	"	"				
		"	49	"	H	"	A	L	B	"	B	L	A	A	"	"	"				
		"	50	"	"	"	A	L	A	"	A	L	A	A	"	"	"				
		"	51	"	"	"	B	H	B	"	B	H	B	A	"	"	"				
		"	52	"	"	"	"	H	A	"	A	H	B	A	"	"	"				
		"	53	"	L	"	A	L	B	"	B	L	A	A	H	"	"				
		"	54	"	"	"	"	L	B	"	B	"	"	B	H	"	"				
		"	55	"	"	"	A	H	A	"	A	"	"	A	L	"	"				
		"	56	"	"	"	"	"	A	"	A	"	B	A	L	"	"				
		"	57	B	"	B	"	"	A	"	A	"	B	A	H	"	"				
		"	58	"	"	"	"	"	A	"	A	"	"	A	H	"	"				
		"	59	"	"	"	B	L	B	"	B	H	A	B	L	"	"				
		"	60	"	"	"	B	L	A	"	A	H	A	B	"	"	"				
		"	61	"	H	"	A	H	B	"	B	L	B	B	"	"	"				
		"	62	"	"	"	A	H	A	"	A	L	B	B	"	"	"				
		"	63	"	"	"	B	L	B	"	B	H	A	B	"	"	"				
		"	64	"	"	"	"	L	A	"	A	H	A	B	"	"	"				
		"	65	"	L	B	"	"	B	"	B	L	B	B	"	"	"				
		"	66	"	L	B	"	"	A	"	A	L	B	B	"	"	"				
8	Repeat subgroup 7 at T_C = +125°C and T_C = -55°C.																				
9 T_C = +25°C	f_{MAX}	(Fig. 5)	67	5.0 V		5.0 V	5.0 V	OUT	IN	GND	IN		5.0 V	5.0 V	OUT	5.0 V	5.0 V	$\overline{CPO}$ > Q_0 8/ $\overline{CPI}$ > Q_3 8/	30 15		MHz MHz
			68	5.0 V		5.0 V	5.0 V			"			5.0 V	5.0 V		"	"				
	t_{PLH3}	3003 (Fig. 5) 7/	69	9/	OUT	9/	9/			"	IN 9/		9/	9/		"	"	$\overline{CPO}$ > Q_2	3	77	ns
	t_{PHL3}	"	70	10/	OUT	10/	10/			"	IN 10/		10/	10/		"	"	$\overline{CPO}$ > Q_2	"	82	"
	t_{PLH4}	"	71	11/		11/	11/		IN 11/	"			11/	11/	OUT	"	"	$\overline{CPI}$ > Q_3	"	13/	"
	t_{PHL4}	"	72	12/		12/	12/		IN 12/	"			12/	12/	OUT	"	"	$\overline{CPI}$ > Q_3	"	14/	"
	t_{PLH5}	"	73	IN 15/			15/	OUT		"						15/	"	$\overline{PL}$ > Q_0	"	35	"
		"	74	IN						"							"	$\overline{PL}$ > Q_1	"	"	"
		"	75	IN	OUT	15/				"		OUT	15/	15/	OUT		"	$\overline{PL}$ > Q_2	"	"	"
		"	76	IN						"							"	$\overline{PL}$ > Q_3			

See footnotes at end of device type 02.

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 A,B,C,D Case 1/ 2	1 2	2 3	3 4	4 6	5 8	6 9	7 10	8 12	9 13	10 14	11 16	12 18	13 19	14 20	Measured terminal	Limits Min	Limits Max	Unit
			Test no.	$\overline{PL}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
9 T_C = +25°C	t_{PHL5}	3003 7/ " "	77	IN 16/			16/	OUT		GND						5.0 V	5.0 V	$\overline{PL}$ > Q_0	3	50	ns
			78	IN						"								$\overline{PL}$ > Q_1	"	"	"
			79	IN	OUT	16/						OUT	16/					$\overline{PL}$ > Q_2	"	"	"
			80	IN										16/	OUT			$\overline{PL}$ > Q_3	"	"	"
10 T_C = +125°C	f_{MAX}	(Fig. 5) "	81	Same terminal conditions as for subgroup 9.														$\overline{CPO}$ > Q_0 8/	30		MHz
			82															$\overline{CPI}$ > Q_3 8/	15		MHz
	t_{PLH3}	3003 7/	83															$\overline{CPO}$ > Q_2	3	100	ns
	t_{PHL3}	"	84															$\overline{CPO}$ > Q_2	"	107	"
	t_{PLH4}	"	85															$\overline{CPI}$ > Q_3	"	17/	"
	t_{PHL4}	"	86															$\overline{CPI}$ > Q_3	"	18/	"
	t_{PLH5}	"	87															$\overline{PL}$ > Q_0	"	46	"
		"	88															$\overline{PL}$ > Q_1	"	"	"
		"	89															$\overline{PL}$ > Q_2	"	"	"
		"	90															$\overline{PL}$ > Q_3	"	"	"
	t_{PHL5}	"	91															$\overline{PL}$ > Q_0	"	65	"
		"	92															$\overline{PL}$ > Q_1	"	"	"
		"	93															$\overline{PL}$ > Q_2	"	"	"
		"	94															$\overline{PL}$ > Q_3	"	"	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C and V_{CC} = 4.5 volts for the f_{MAX} tests.																				

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02.
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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$\overline{PL}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
1 T_C = +25°C	V_{OL}	3007	1					4 mA 2/	2/	GND		4 mA				0.7 V	4.5 V	Q_0		0.4	V
		"	2		4 mA			2/	"	"						"	"	Q_1		"	"
		"	3					2/	"	"						"	"	Q_2		"	"
		"	4					2/	"	"					4 mA	"	"	Q_3		"	"
	V_{OH}	3006	5	0.7 V			2.0 V	-.4 mA		"		-.4 mA	2.0 V			2.0 V	"	Q_0	2.5		"
		"	6	"						"				2.0 V			"	Q_1	"		"
		"	7	"	-.4 mA	2.0 V				"					-.4 mA		"	Q_2	"		"
		"	8	"						"							"	Q_3	"		"
	V_{IC}		9				-18 mA			"							"	D_0		-1.5	"
			10			-18 mA				"			-18 mA				"	D_1		"	"
			11							"				-18 mA			"	D_2		"	"
			12							"							"	D_3		"	"
			13							"	-18 mA						"	$\overline{CPO}$		"	"
			14						-18 mA	"							"	$\overline{CPI}$		"	"
			15							"						-18 mA	"	$\overline{MR}$		"	"
			16	-18 mA						"							"	$\overline{PL}$		"	"
	I_{IH1}	3010	17							"						2.7 V	5.5 V	$\overline{MR}$		40	µA
	I_{IH2}	"	18							"						5.5 V	"	$\overline{MR}$		200	"
	I_{IH7}	"	19	2.7 V		2.7 V				"							"	$\overline{PL}$		20	"
		"	20				2.7 V			"							"	D_2		"	"
		"	21							"							"	D_0		"	"
		"	22							"			2.7 V				"	D_1		"	"
		"	23							"				2.7 V			"	D_3		"	"
	I_{IH8}	"	24	5.5 V		5.5 V				"							"	$\overline{PL}$		100	"
		"	25				5.5 V			"							"	D_2		"	"
		"	26							"							"	D_0		"	"
		"	27							"			5.5 V				"	D_1		"	"
		"	28							"				5.5 V			"	D_3		"	"
	I_{IH9}	"	29							"	2.7 V						"	$\overline{CPO}$		40	"
	I_{IH10}	"	30							"	5.5 V						"	$\overline{CPO}$		200	"
	I_{IH11}	"	31						2.7 V	"							"	$\overline{CPI}$		80	"
	I_{IH12}	"	32						5.5 V	"							"	$\overline{CPI}$		400	"
	I_{IL1}	3009	33							"						0.4 V	"	$\overline{MR}$	3/	3/	"
	I_{IL4}	"	34	0.4 V		0.4 V				"							"	$\overline{PL}$	"	"	"
		"	35				0.4 V			"							"	D_2	"	"	"
		"	36							"			0.4 V				"	D_0	"	"	"
		"	37							"				0.4 V			"	D_1	"	"	"
		"	38							"							"	D_3	"	"	"
	I_{IL5}	"	39							"	0.4 V							$\overline{CPO}$	"	"	mA

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - 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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$\overline{PE}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
1 T_C = +25°C	I_{IL6}	3009	40						0.4 V	GND							5.5 V	$\overline{CPI}$	3/	3/	mA
	I_{OS}	3011	41	GND			5.5 V	GND		"							"	Q_0	-15	-100	"
		"	42							"							"	Q_1	"	"	"
		"	43		GND	5.5 V				"		GND	5.5 V				"	Q_2	"	"	"
		"	44							"				5.5 V	GND		"	Q_3	"	"	"
	I_{CC}	3005	45	GND		GND	GND		GND	"	GND		GND	GND		GND	"	V_{CC}		27	"
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 5/	3014	46	4/ A	L	A	A	L	A	GND	A	L	A	A	L	B 4/	4.5 V	6/			
		"	47	"	L	A	B	H	B	"	B	H	B	B	"	A	"				
		"	48	"	L	A	B	H	A	"	A	H	B	B	"	"	"				
		"	49	"	H	B	A	L	B	"	B	L	A	A	"	"	"				
		"	50	"	H	B	A	L	A	"	A	L	A	A	"	"	"				
		"	51	"	H	B	B	H	B	"	A	H	B	A	"	"	"				
		"	52	"	H	B	B	H	A	"	B	H	B	A	"	"	"				
		"	53	"	L	A	A	L	B	"	A	L	A	B	"	"	"				
		"	54	"	L	A	A	L	A	"	B	L	A	B	H	"	"				
		"	55	"	L	A	B	H	B	"	A	H	B	B	"	"	"				
		"	56	"	L	A	B	H	A	"	B	H	B	B	"	"	"				
		"	57	"	H	B	A	L	B	"	A	L	A	B	"	"	"				
		"	58	"	H	B	A	L	A	"	B	L	A	B	"	"	"				
		"	59	"	H	B	B	H	B	"	A	H	B	B	"	"	"				
		"	60	"	H	B	B	H	A	"	B	H	B	B	"	"	"				
		"	61	"	L	A	A	L	B	"	A	L	A	A	L	"	"				
		"	62	"	L	A	A	L	A	"	B	L	A	A	"	"	"				
		"	63	B	"	A	B	L	B	"	A	L	B	B	"	"	"				
		"	64	"	"	A	B	L	A	"	B	L	B	B	"	"	"				
		"	65	"	"	B	B	H	B	"	A	H	A	B	"	"	"				
		"	66	"	"	B	A	H	A	"	B	H	A	B	"	"	"				
		"	67	"	H	A	B	L	B	"	A	L	B	B	"	"	"				
		"	68	"	H	A	B	L	A	"	B	L	B	B	"	"	"				
		"	69	"	H	A	A	H	B	"	A	H	A	B	"	"	"				
		"	70	"	H	A	A	H	A	"	B	H	A	B	"	"	"				
		"	71	"	L	B	A	L	B	"	A	L	B	A	H	"	"				
		"	72	"	L	B	B	L	A	"	B	L	B	A	"	"	"				
		"	73	"	H	A	B	H	B	"	A	H	A	A	"	"	"				
		"	74	"	H	A	A	H	A	"	B	H	A	A	"	"	"				
8	Repeat subgroup 7 at T_C = +125°C and T_C = -55°C.																				
9 T_C = +25°C	f_{MAX}	(Fig. 5)	75	5.0 V		5.0 V	5.0 V	OUT	IN	GND	IN		5.0 V	5.0 V	OUT	5.0 V	5.0 V	$\overline{CPO}$ → Q_0 8/ $\overline{CPI}$ → Q_3 8/	30 15		MHz MHz
		"	76	5.0 V		5.0 V	5.0 V			"			5.0 V	5.0 V		5.0 V	5.0 V				
	t_{PLH3}	3003 7/	77	9/	OUT	9/	9/			"	IN 9/		9/	9/		"	"	$\overline{CPO}$ → Q_2	3	77	ns
	t_{PHL3}	"	78	10/	OUT	10/	10/			"	IN 10/		10/	10/		"	"	$\overline{CPO}$ → Q_2	"	82	"
	t_{PLH4}	"	79	11/		11/	11/		IN 11/	"			11/	11/	OUT	"	"	$\overline{CPI}$ → Q_3	"	13/	"

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - 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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$\overline{PL}$	Q_2	D_2	D_0	Q_0	$\overline{CPI}$	GND	$\overline{CPO}$	Q_1	D_1	D_3	Q_3	$\overline{MR}$	V_{CC}				
9 T_C = +25°C	t_{PHL4}	3003 7/	80	12/		12/	12/		IN 12/	GND			12/	12/	OUT	5.0 V	5.0 V	$\overline{CPI}$ → Q_3	3	14/	ns
	t_{PLH5}	"	81	IN 15/			15/	OUT		"						15/	"	$\overline{PL}$ → Q_0	"	35	"
		"	82	"						"		OUT	15/			"	"	$\overline{PL}$ → Q_1	"	"	"
		"	83	"	OUT	15/				"						"	"	$\overline{PL}$ → Q_2	"	"	"
		"	84	"						"				15/	OUT	"	"	$\overline{PL}$ → Q_3	"	"	"
	t_{PHL5}	"	85	IN 16/			16/	OUT		"						5.0 V	"	$\overline{PL}$ → Q_0	"	50	"
		"	86	"						"		OUT	16/				"	$\overline{PL}$ → Q_1	"	"	"
		"	87	"	OUT	16/				"							"	$\overline{PL}$ → Q_2	"	"	"
		"	88	"						"				16/	OUT		"	$\overline{PL}$ → Q_3	"	"	"
	t_{PHL6}	"	89	IN	OUT	3.0 V	3.0 V		GND	"	GND		3.0 V	3.0 V		IN	"	$\overline{MR}$ → Q_2	"	35	"
		"	90	"		"	"	OUT	"	"	"		"	"		"	"	$\overline{MR}$ → Q_0	"	"	"
		"	91	"		"	"		"	"	"	OUT	"	"		"	"	$\overline{MR}$ → Q_1	"	"	"
		"	92	"		"	"		"	"	"		"	"	OUT	"	"	$\overline{MR}$ → Q_3	"	"	"
10 T_C = +125°C	f_{MAX}	(Fig. 5)	93	Same terminal conditions as for subgroup 9.														$\overline{CPO}$ → Q_0 8/	30		MHz
		"	94															$\overline{CPI}$ → Q_3 8/	15		MHz
	t_{PLH3}	3003 7/	95															$\overline{CPO}$ → Q_2	3	100	ns
	t_{PHL3}	"	96															$\overline{CPO}$ → Q_2	"	107	"
	t_{PLH4}	"	97															$\overline{CPI}$ → Q_3	"	17/	"
	t_{PHL4}	"	98															$\overline{CPI}$ → Q_3	"	18/	"
	t_{PLH5}	"	99															$\overline{PL}$ → Q_0	"	46	"
		"	100															$\overline{PL}$ → Q_1	"	"	"
		"	101															$\overline{PL}$ → Q_2	"	"	"
		"	102															$\overline{PL}$ → Q_3	"	"	"
	t_{PHL5}	"	103															$\overline{PL}$ → Q_0	"	65	"
		"	104															$\overline{PL}$ → Q_1	"	"	"
		"	105															$\overline{PL}$ → Q_2	"	"	"
		"	106															$\overline{PL}$ → Q_3	"	"	"
	t_{PHL6}	"	107															$\overline{MR}$ → Q_2	"	46	"
		"	108															$\overline{MR}$ → Q_0	"	"	"
		"	109															$\overline{MR}$ → Q_1	"	"	"
		"	110															$\overline{MR}$ → Q_3	"	"	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C and V_{CC} = 4.5 volts for the f_{MAX} tests.																				

1/ Case 2 pins not referenced are NC.
2/ Input $\overline{CPI}$ shall be connected to Q_0 during the V_{OL} test.
3/ I_{IL} limits are as follows:

Test	Min/Max limits for circuits			
	B	C	E	F
I_{IL1}	-320/-800 µA	-180/-410 µA	-280/-760 µA	-120/-360 µA
I_{IL4}	-160/-400 µA	-150/-380 µA	-160/-400 µA	-120/-360 µA
I_{IL5}	-1.0/-2.4 mA	-1.2/-2.6 mA	-0.6/-1.6 mA	-1.0/-2.4 mA
I_{IL6}	-0.4/-1.4 mA	-1.2/-2.6 mA (Device 01)	-0.8/-2.8 mA (Device 01 only)	-1.3/-3.2 mA (Device 01 only)
		-.62/-1.35 mA (Device 02)	-0.4/-1.4 mA (Device 02 only)	-.65/-1.6 mA (Device 02 only)

4/ A = 3.0 V min.
B = 0.0 V or GND.

5/ Only a summary of attributes data is required.

6/ Output voltages shall be either:
a. H > 1.5 V
b. L < 1.5 V

7/ If proper setup is achieved from previous test and conditions, no additional setup is required. (See figure 5). When testing t_{PHL3} or t_{PLH3}, the Q_0 pin shall be connected to the $\overline{CPI}$ pin.

8/ The f_{MAX} minimum limit is the frequency of the input pulse. Outputs shall be monitored and shall be observed to toggle per the truth table for that device type. Recommended operating conditions (particularly for $t_{p(IN)}$) shall be observed.

9/ Setup to count 3 (Q_0 = 1, Q_1 = 1, Q_2 = 0, Q_3 = 0) by either:

a. Serial up-count (3 clock pulses; $\overline{PL}$ high).
b. Parallel load to count 3 (D_0=1, D_1=1, D_2=0, D_3=0; following data setup as shown, make $\overline{PL}$ low, then high).

Following the above setup, apply clock pulse to $\overline{CPO}$ ($\overline{PL}$ high) for test. (See figure 5, connect Q_0 to $\overline{CPI}$.)

10/ Setup to count 7 (Q_0=1, Q_1=1, Q_2=1, Q_3=0) by either:

a. Serial up-count (7 clock pulses; $\overline{PL}$ high).
b. Parallel load to count 7 (D_0=1, D_1=1, D_2=1, D_3=0; following data setup as shown, make $\overline{PL}$ low, then high).

Following the above setup, apply clock pulse to $\overline{CPO}$ ($\overline{PL}$ high) for test. (See figure 5, connect Q_0 to $\overline{CPI}$.)

11/ Setup to count 6 (Q_0=0, Q_1=1, Q_2=1, Q_3=0) by either:

a. Serial up-count (3 clock pulses at $\overline{CPI}$, $\overline{PL}$ high).
b. Parallel load to count 6 (D_0=0, D_1=1, D_2=1, D_3=0; following data setup as shown, make $\overline{PL}$ low, then high).

Following the above setup, apply clock pulse to $\overline{CPI}$ ($\overline{PL}$ high) for test. (See figure 5).

12/ Setup to count 8 (for device type 01) (Q_0=0, Q_1=0, Q_2=0, Q_3=0) or count 14 (for device type 02) (Q_0=1, Q_1=1, Q_2=0, Q_3=1) by either:

a. Serial up-count (4 clock pulses at $\overline{CPI}$ for device type 01; 7 clock pulses at $\overline{CPI}$ for device type 02; $\overline{PL}$ high).
b. Parallel load to count 8 (D_0=0, D_1=0, D_2=0, D_3=1) for device type 01 or count 14 (D_0=0, D_1=1, D_2=1, D_3=1) for device type 02; following data setup as shown, make $\overline{PL}$ low, then high).

Following the above setup, apply clock pulse to $\overline{CPI}$ ($\overline{PL}$ high) for test. (See figure 5).

13/ The maximum limit for device type 01 is 29 ns, 02 is 60 ns.

14/ The maximum limit for device type 01 is 40 ns, 02 is 85 ns.

15/ The output under test must be set to logical 0 previous to test. This may be done by setting $\overline{MR}$ low, then high, or as follows: D_n = low followed by pulse on $\overline{PL}$. Set D_n = high, pulse on $\overline{PL}$ to run test. (See figure 5).

16/ The output under test must be set to logical 1 previous to test. This may be done by setting D_n = high followed by pulse on $\overline{PL}$. Set D_n = low, pulse on $\overline{PL}$ to run test. (See figure 5).

17/ The maximum limit for device type 01 is 38 ns, 02 is 78 ns.

18/ The maximum limit for device type 01 is 52 ns, 02 is 110 ns.

TABLE III. Group A inspection for device type 03.
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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	Rg(1)	NC	Rg(2)	Q_C	Q_B	NC	GND	Q_D	Q_A	A	B	$R_O(1)$	$R_O(2)$	V_{CC}				
1 T_C = +25°C	V_{OL}	3007	1	GND		GND	4 mA	4 mA		GND	4 mA		GND	2.0 V	2.0 V	2.0 V	4.5 V	Q_C		0.4	V
		"	2	"		"				"			"	"	"	"	"	Q_B		"	"
		"	3	2.0 V		0.7 V				"			"	"	"	"	"	Q_D		"	"
		"	4	0.7 V		2.0 V				"		4 mA + I_{IL3} (max)	2.0 V	GND	"	"	"	Q_A		"	"
		"	5	2.0 V		"	4 mA			"			GND	2.0 V		0.7 V	"	Q_C		"	"
		"	6	"		"		4 mA		"			"	"	0.7 V	2.0 V	"	Q_B		"	"
	V_{OH}	3006	7	"		"				"	-0.4 mA		GND	2.0 V	2.0 V	0.7 V	"	Q_D	2.5		"
		"	8	"		"				"		-0.4 mA	2.0 V	GND	0.7 V	2.0 V	"	Q_A	"		"
		"	9	"		"				"	-0.4 mA		GND	2.0 V	"	0.7 V	"	Q_D	"		"
		"	10	"		"				"		-0.4 mA	2.0 V	GND	"	"	"	Q_A	"		"
		"	11	0.7 V		0.7 V	-0.4 mA			"			GND	2/ 3/	2/	2/	"	Q_C	"		"
		"	12	"		"		-0.4 mA		"			"	2/ 4/	2/	2/	"	Q_B	"		"
	I_{IL1}	3009	13							"					0.4 V	5.5 V	5.5 V	$R_O(1)$	5/	5/	µA
		"	14							"					5.5 V	0.4 V	"	$R_O(2)$	"	"	"
		"	15	0.4 V		5.5 V				"							"	$R_g(1)$	"	"	"
		"	16	5.5 V		0.4 V				"							"	$R_g(2)$	"	"	"
	I_{IL2}	"	17	2/		2/				"			0.4 V		GND	GND	"	A	"	"	mA
	I_{IL3}	"	18	"		"				"				0.4 V	GND	GND	"	B	"	"	"
	V_{IC}	"	19	-18 mA						"							4.5 V	$R_g(1)$		-1.5	V
		"	20			-18 mA				"							"	$R_g(2)$		"	"
		"	21							"							"	A		"	"
		"	22							"			-18 mA				"	B		"	"
		"	23							"				-18 mA			"	$R_O(1)$		"	"
		"	24							"					-18 mA		"	$R_O(2)$		"	"
	I_{IH1}	3010	25	2.7 V						"							5.5 V	$R_g(1)$		20	µA
		"	26			2.7 V				"							"	$R_g(2)$		"	"
		"	27							"					2.7 V		"	$R_O(1)$		"	"
		"	28							"						2.7 V	"	$R_O(2)$		"	"
	I_{IH2}	"	29	5.5 V						"							"	$R_g(1)$		100	"
		"	30			5.5 V				"							"	$R_g(2)$		"	"
		"	31							"					5.5 V		"	$R_O(1)$		"	"
		"	32							"						5.5 V	"	$R_O(2)$		"	"
	I_{IH3}	"	33							"			2.7 V				"	A		80	"
	I_{IH4}	"	34							"			5.5 V				"	A		400	"
	I_{IH5}	"	35							"				2.7 V			"	B		160	"
	I_{IH6}	"	36							"				5.5 V			"	B		800	"
	I_{OS} 6/	3011	37	5.5 V		5.5 V				"	GND	GND			GND	GND	"	Q_D	-15	-100	mA
		"	38	"		"				"					"	"	"	Q_A	"	"	"
		"	39	GND		GND	GND	GND		"			GND	2/ 4/	2/	2/	"	Q_B	"	"	"
		"	40	"		"				"			"	2/ 3/	"	"	"	Q_C	"	"	"
	I_{CC}		41	"		"				"			"	GND	"	"	"	V_{CC}		15	"

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 - 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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	$R_G(1)$	NC	$R_G(2)$	Q_C	Q_B	NC	GND	Q_D	Q_A	A	B	$R_O(1)$	$R_O(2)$	V_{CC}				
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 7/	3014	42	A 8/		A	L	L		GND	H	H	B 8/	A	A	A	4.5 V		9/		
		"	43	A		A	"	"		"	H	H	"	B	A	A	"				
		"	44	B		B	"	"		"	L	L	"	B	A	A	"				
		"	45	A		A	"	"		"	H	H	"	A	B	B	"				
		"	46	A		A	"	"		"	H	H	"	B	B	B	"				
		"	47	B		B	"	"		"	L	L	"	B	A	A	"				
		"	48	"		B	"	"		"	"	"	"	A	"	A	"				
		"	49	"		A	"	"		"	"	"	"	B	"	A	"				
		"	50	"		"	"	"		"	"	"	"	A	"	A	"				
		"	51	"		"	"	"		"	"	"	"	B	"	B	"				
		"	52	"		"	"	"		"	"	"	"	A	"	"	"				
		"	53	"		"	"	H		"	"	"	"	B	"	"	"				
		"	54	B		A	L	H		"	"	"	"	A	"	"	"				
		"	55	"		"	H	L		"	"	"	"	B	"	"	"				
		"	56	"		"	"	L		"	"	"	"	A	"	"	"				
		"	57	"		"	"	H		"	"	"	"	B	"	"	"				
		"	58	"		"	"	H		"	"	"	"	A	"	"	"				
		"	59	"		"	L	L		"	H	H	"	B	"	"	"				
		"	60	"		"	"	"		"	H	H	"	A	"	"	"				
		"	61	"		"	"	"		"	L	L	"	B	"	"	"				
		"	62	"		B	"	"		"	"	"	"	B	"	"	"				
		"	63	A		"	"	"		"	"	"	"	A	A	"	"				
		"	64	"		"	"	H		"	"	"	"	B	"	"	"				
		"	65	"		"	"	H		"	"	"	"	A	"	"	"				
		"	66	"		"	H	L		"	"	"	"	B	"	"	"				
		"	67	"		"	"	L		"	"	"	"	A	"	"	"				
		"	68	"		"	"	H		"	"	"	"	B	"	"	"				
		"	69	"		"	"	H		"	"	"	"	A	"	"	"				
		"	70	"		"	L	L		"	H	H	"	B	"	"	"				
		"	71	"		"	"	"		"	H	H	"	A	"	"	"				
		"	72	"		"	"	"		"	L	L	"	B	"	"	"				
		"	73	B		"	"	"		"	"	"	"	B	"	"	"				
		"	74	"		"	"	H		"	"	"	"	A	"	"	"				
		"	75	"		A	"	H		"	"	"	"	B	"	"	"				
		"	76	"		"	"	H		"	"	"	"	A	"	"	"				
		"	77	"		"	H	L		"	"	"	"	B	"	"	"				
		"	78	"		"	H	L		"	"	"	"	A	"	"	"				
		"	79	"		"	H	H		"	"	"	"	B	"	"	"				
		"	80	"		B	L	L		"	"	"	"	A	"	"	"				
		"	81	A		"	"	L		"	"	"	"	B	"	"	"				
		"	82	"		"	"	L		"	"	"	"	A	"	"	"				
		"	83	"		"	"	H		"	"	"	"	B	"	"	"				
		"	84	"		"	"	H		"	"	"	"	A	"	"	"				
		"	85	"		"	H	L		"	"	"	"	B	"	"	"				
		"	86	"		"	H	L		"	"	"	"	A	"	"	"				
		"	87	"		"	H	H		"	"	"	"	B	"	"	"				
		"	88	"		A	L	L		"	H	H	"	A	"	"	"				
		"	89	"		B	"	L		"	H	H	"	B	"	"	"				
		"	90	B		"	"	L		"	L	L	"	A	A	"	"				
		"	91	"		"	"	L		"	"	"	"	B	A	"	"				
		"	92	"		"	"	H		"	"	"	"	A	B	"	"				
		"	93	"		"	"	H		"	"	"	"	B	"	"	"				
		"	94	"		"	"	H		"	"	"	"	A	"	"	"				
		"	95	"		"	H	L		"	"	"	"	B	"	"	"				
		"	96	"		"	"	L		"	"	"	"	A	"	"	"				
		"	97	"		"	"	H		"	"	"	"	B	"	"	"				
		"	98	"		"	"	H		"	"	"	"	A	"	A	"				
		"	99	"		"	"	L		"	"	"	"	B	"	B	"				
		"	100	"		"	"	L		"	"	"	"	A	"	"	"				
		"	101	"		"	L	L		"	"	"	"	B	"	"	"				

See footnotes at the end of device type 03.

TABLE III. Group A inspection for device type 03 - 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 A,B,C,D Case 1/ 2 Test no.	1 2 Rg(1)	2 3 NC	3 4 Rg(2)	4 6 Q_C	5 8 Q_B	6 9 NC	7 10 GND	8 12 Q_D	9 13 Q_A	10 14 A	11 16 B	12 18 $R_O(1)$	13 19 $R_O(2)$	14 20 V_{CC}	Measured terminal	Limits Min	Limits Max	Unit
7 T_C = +25°C	Functional tests 7/	3014	102	B		B	L	H		GND	L	L	B	B	B	B	4.5 V	9/			
	"	"	103	"		"	L	H		"	"	"	"	A	"	"	"				
	"	"	104	"		"	H	L		"	"	"	"	B	"	"	"				
	"	"	105	"		"	L	L		"	"	"	"	A	"	"	"				
	"	"	106	"		"	"	H		"	"	"	"	B	"	"	"				
	"	"	107	"		"	"	H		"	"	"	"	A	"	"	"				
	"	"	108	A		A	L	L		"	H	H	"	A	"	"	"				
	"	"	109	A		A	"	"		"	"	"	"	B	"	"	"				
	"	"	110	B		B	"	"		"	"	"	"	B	"	"	"				
	"	"	111	"		"	"	"		"	"	"	"	A	"	"	"				
	"	"	112	"		"	"	"		"	L	L	"	A	A	A	"				
	"	"	113	"		"	"	"		"	"	L	"	B	A	A	"				
	"	"	114	"		"	"	"		"	"	L	A	"	B	B	"				
	"	"	115	"		"	"	"		"	"	H	B	"	"	"	"				
	"	"	116	"		"	"	"		"	"	H	A	"	"	"	"				
	"	"	117	"		"	"	"		"	"	L	B	"	"	"	"				
	"	"	118	"		"	"	"		"	"	"	A	"	"	A	"				
	"	"	119	"		"	"	"		"	"	"	B	"	"	A	"				
	"	"	120	"		"	"	"		"	"	"	A	"	A	B	"				
	"	"	121	"		A	"	"		"	"	H	B	"	A	B	"				
	"	"	122	"		A	"	"		"	"	"	B	"	B	"	"				
	"	"	123	A		A	"	"		"	H	"	A	"	B	"	"				
	"	"	124	A		B	"	"		"	H	"	B	"	A	"	"				
	"	"	125	A		A	"	"		"	H	"	B	"	A	A	"				
8	Same tests, terminal conditions, and limits as for subgroup 7, except T_C = +125°C, and -55°C.																				
9 T_C = +25°C	f_{MAX}	(Fig. 5)	126	GND						GND		OUT	IN 10/		GND		5.0 V	A to Q_A	29		MHz
	t_{PLH1} 11/	3003 (Fig. 5)	127	"			OUT			"			IN		12/	A 8/	"	A to Q_C	3	53	ns
	t_{PHL1} 11/	"	128	"			OUT			"			IN		GND		"	A to Q_C	"	58	"
	t_{PLH2}	"	129	"						"	OUT			IN	12/	A 8/	"	B to Q_D	"	37	"
	t_{PHL2}	"	130	"						"	OUT			IN	GND		"	B to Q_D	"	40	"
10 T_C = +125°C	f_{MAX}	(Fig. 5)	131	"						"		OUT	IN 10/		GND		"	A to Q_A	29		MHz
	t_{PLH1} 11/	3003 (Fig. 5)	132	"			OUT			"			IN		12/	A 8/	"	A to Q_C	3	74	ns
	t_{PHL1} 11/	"	133	"			OUT			"			IN		GND		"	A to Q_C	"	81	"
	t_{PLH2}	"	134	"						"	OUT			IN	12/	A 8/	"	B to Q_D	"	52	"
	t_{PHL2}	"	135	"						"	OUT			IN	GND		"	B to Q_D	"	56	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C.																				

1/ Case 2 pins not referenced are NC.

2/ Apply 4.5 V pulse, then ground prior to taking measurements to set device in the desired state.

3/ Apply two pulses after Ro (reset) pulse.

4/ Apply one pulse after Ro (reset) pulse.

5/ I_{IL} limits are as follows:

Test	Min/Max limits for circuits				
	A	B	C	E	F
I_{IL1}	-120/-360 µA	-30/-400 µA	-30/-400 µA	-120/-360 µA	-120/-360 µA
I_{IL2}	-0.5/-2.0 mA	-1.0/-2.4 mA	-1.0/-2.4 mA	-0.5/-2.0 mA	-1.0/-2.4 mA
I_{IL3}	-0.4/-1.6 mA	-1.4/-3.2 mA	-1.4/-3.2 mA	-0.8/-3.2 mA	-0.8/-3.2 mA

6/ I_{os} limits for circuit C are -30/-130 mA.

7/ Only a summary of attributes data is required.

8/ A = 3.0 V minimum, B = 0 V or GND.

9/ Output voltages shall be either:
a. H > 1.5 V.
b. L < 1.5 V.

10/ f_{MAX} minimum limit specified is the frequency of the input pulse. The output frequency shall be one-half of the input frequency.

11/ When testing t_{PHL1} or t_{PLH1}, the Q_A pin shall be connected to the input B pin.

12/ Momentary 3.0 V (min), then ground. Maintain ground for measurement.

TABLE III. Group A inspection for device type 04.
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 A,B,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
			Case 1/ 2	2	3	4	6	8	9	10	12	13	14	16	18	19	20		Min	Max	
			Test no.	NC	NC	NC	Q_C	Q_B	NC	GND	Q_D	Q_A	A	B	$R_O(1)$	$R_O(2)$	V_{CC}				
1 T_C = +25°C	V_{OL}	3007	1					4 mA		GND		4 mA + I_{IL3} (max)	2.0 V	GND	2.0 V	2.0 V	4.5 V	Q_A		0.4	V
		"	2				4 mA			"			GND	2.0 V	"	"	"	Q_B		"	"
		"	3							"	4 mA		2.0 V	"	"	"	"	Q_C		"	"
		"	4							"			"	"	"	"	"	Q_D		"	"
	V_{OH}	3006	5					-0.4 mA		"		-0.4 mA	2/ 3/ GND	GND	2/	2/	"	Q_A	2.5		"
		"	6							"			"	2/ 3/	"	"	"	Q_B	"		"
		"	7				-0.4 mA			"			"	2/ 4/	"	"	"	Q_C	"		"
		"	8							"	-0.4 mA		"	2/ 5/	"	"	"	Q_D	"		"
	V_{IC}		9							"			-18 mA				"	A		-1.5	"
			10							"				-18 mA			"	B		"	"
			11							"					-18 mA		"	$R_O(1)$		"	"
			12							"						-18 mA	"	$R_O(2)$		"	"
	I_{IL1}	3009	13							"					0.4 V	5.5 V	5.5 V	$R_O(1)$	6/	6/	µA
		"	14							"					5.5 V	0.4 V	"	$R_O(2)$	"	"	"
	I_{IL2}	"	15							"			0.4 V		2/	2/	"	A	"	"	mA
	I_{IL3}	"	16							"				0.4 V	"	"	"	B	"	"	"
	I_{IH1}	3010	17							"					2.7 V	GND	"	$R_O(1)$		20	µA
		"	18							"					GND	2.7 V	"	$R_O(2)$		"	"
	I_{IH2}	"	19							"					5.5 V	GND	"	$R_O(1)$		100	"
		"	20							"					GND	5.5 V	"	$R_O(2)$		"	"
	I_{IH3}	"	21							"			2.7 V		5.5 V	5.5 V	"	A		80	"
	I_{IH4}	"	22							"			5.5 V		"	"	"	A		400	"
	I_{IH5}	"	23							"				2.7 V	"	"	"	B		80	"
	I_{IH6}	"	24							"				5.5 V	"	"	"	B		400	"
	V_{OS} 7/	3011	25							"		GND	2/ 3/ GND	GND	2/	2/	"	Q_A	-15	-100	mA
		"	26							"				2/ 3/	"	"	"	Q_B	"	"	"
		"	27				GND	GND		"				2/ 4/	"	"	"	Q_C	"	"	"
		"	28							"	GND			2/ 5/	"	"	"	Q_D	"	"	"
	I_{CC}	3005	29							"				GND			"	V_{CC}		15	"
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 8/	3014	30				L	L		GND	L	L	B 8/	B	A 8/	A	4.5 V	9/			
		"	31				"	"		"	"	"	"	A	"	A	"				
		"	32				"	"		"	"	"	"	B	"	A	"				
		"	33				"	"		"	"	"	"	B	"	B	"				

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04 - 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 A,B,C,D Case 1/ 2 Test no.	1 2 NC	2 3 NC	3 4 NC	4 6 Q_C	5 8 Q_B	6 9 NC	7 10 GND	8 12 Q_D	9 13 Q_A	10 14 A	11 16 B	12 18 $R_0(1)$	13 19 $R_0(2)$	14 20 V_{CC}	Measured terminal	Limits Min	Limits Max	Unit
7 T_C = +25°C	Functional tests 8/	3014	34				L	L		GND	L	L	B 8/	A	A 8/	B	4.5 V				
	"	"	35				"	H		"	"	"	"	B	"	B	"				
	"	"	36				"	L		"	"	"	"	B	"	A	"				
	"	"	37				"	"		"	"	"	"	B	B	A	"				
	"	"	38				"	"		"	"	"	"	A	"	A	"				
	"	"	39				"	"		"	"	"	"	A	"	B	"				
	"	"	40				"	H		"	"	"	"	B	"	"	"				
	"	"	41				"	H		"	"	"	"	A	"	"	"				
	"	"	42				H	L		"	"	"	"	B	"	"	"				
	"	"	43				"	L		"	"	"	"	A	"	"	"				
	"	"	44				"	H		"	"	"	"	B	"	"	"				
	"	"	45				"	H		"	"	"	"	A	"	"	"				
	"	"	46				L	L		"	H	"	"	B	"	"	"		9/		
	"	"	47				"	L		"	"	"	"	A	"	"	"				
	"	"	48				"	H		"	"	"	"	B	"	"	"				
	"	"	49				"	H		"	"	"	"	A	"	"	"				
	"	"	50				H	L		"	"	"	"	B	"	"	"				
	"	"	51				"	L		"	"	"	"	A	"	"	"				
	"	"	52				"	H		"	"	"	"	B	"	"	"				
	"	"	53				"	H		"	"	"	"	A	"	"	"				
	"	"	54				L	L		"	L	"	"	B	"	"	"				
	"	"	55				"	L		"	"	"	"	A	"	"	"				
	"	"	56				"	H		"	"	"	"	B	"	"	"				
	"	"	57				"	H		"	"	"	"	A	"	"	"				
	"	"	58				H	L		"	"	"	"	B	"	"	"				
	"	"	59				H	L		"	"	"	"	A	"	"	"				
	"	"	60				H	H		"	"	"	"	B	"	"	"				
	"	"	61				H	H		"	"	"	"	A	"	"	"				
	"	"	62				L	L		"	H	"	"	B	"	"	"				
	"	"	63				"	L		"	"	"	"	A	"	"	"				
	"	"	64				"	H		"	"	"	"	B	"	"	"				
	"	"	65				"	H		"	"	"	"	B	A	"	"				
	"	"	66				"	H		"	"	"	"	A	"	"	"				
	"	"	67				H	L		"	"	"	"	B	"	"	"				
	"	"	68				"	L		"	"	"	"	A	"	"	"				
	"	"	69				"	H		"	"	"	"	B	"	"	"				
	"	"	70				"	H		"	"	"	"	A	"	"	"				
	"	"	71				L	L		"	L	"	"	A	"	A	"				
	"	"	72				"	"		"	"	"	"	B	"	A	"				
	"	"	73				"	"		"	"	"	A	"	B	B	"				
	"	"	74				"	"		"	"	H	B	"	"	"	"				
	"	"	75				"	"		"	"	H	A	"	"	"	"				
	"	"	76				"	"		"	"	L	B	"	"	"	"				
8	Same tests, terminal conditions, and limits as for subgroup 7, except T_C = +125°C, and -55°C.																				
9 T_C = +25°C	f_{MAX}	(Fig. 5)	77							GND		OUT	IN 10/		GND		5.0 V	A to Q_A	29		MHz
	t_{PLH1} 11/	3003 (Fig. 5)	78				OUT			"			IN		12/	A 8/	"	A to Q_C	3	53	ns
	t_{PHL1} 11/	"	79				OUT			"			IN		GND		"	A to Q_C	"	58	"
	t_{PLH2}	"	80							"	OUT			IN	12/	A 8/	"	B to Q_D	"	56	"
	t_{PHL2}	"	81							"	OUT			IN	GND		"	B to Q_D	"	"	"
10 T_C = +25°C	f_{MAX}	(Fig. 5)	82							"		OUT	IN 10/		GND		"	A to Q_A	29		MHz

See footnotes at end of device type 04.

TABLE III. Group A inspection for device type 04 - 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 A,B,C,D Case 1/ 2 Test no.	1 2 NC	2 3 NC	3 4 NC	4 6 Q_C	5 8 Q_B	6 9 NC	7 10 GND	8 12 Q_D	9 13 Q_A	10 14 A	11 16 B	12 18 $R_0(1)$	13 19 $R_0(2)$	14 20 V_{CC}	Measured terminal	Limits Min	Limits Max	Unit
10 T_C = +125°C	t_{PLH1} 11/	3003 (Fig. 5)	83				OUT			GND			IN		12/	A 8/	5.0 V	A to Q_C	3	74	ns
	t_{PHL1} 11/	"	84				OUT			"			IN		GND		"	A to Q_C	"	81	"
	t_{PLH2}	"	85							"	OUT			IN	12/	A 8/	"	B to Q_D	"	78	"
	t_{PHL2}	"	86							"	OUT			IN	GND		"	B to Q_D	"	78	"
11	Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C.																				

1/ Case 2 pins not referenced are NC.

2/ Apply 4.5 V pulse, then ground prior to taking measurements to set device in the desired state. Maintain ground measurement.

3/ Input pulse must be applied one time after R_0 pulse.

4/ Input pulse must be applied twice after R_0 pulse.

5/ Input pulse must be applied four times after R_0 pulse.

6/ I_{IL} limits shall be as follows:

Test	Min/Max limits for circuits A	B	C	E	F
I_{IL1}	-120/-360 µA	-30/-400 µA	-30/-400 µA	-120/-360 µA	-120/-400 µA
I_{IL2}	-0.5/-2.0 mA	-1.0/-2.4 mA	-1.0/-2.4 mA	-0.5/-2.0 mA	-1.0/-2.4 mA
I_{IL3}	-0.4/-1.6 mA	-0.4/-1.6 mA	-0.7/-3.2 mA	-0.4/-1.6 mA	-.65/-1.6 mA

7/ I_{OS} limits for circuit C shall be -30/-130 mA.

8/ A = 3.0 V minimum, B = 0.0 V or GND.

9/ Output voltages shall be either:
a. H > 1.5 V.
b. L < 1.5 V.

10/ f_{MAX} minimum limit specified is the frequency of the input pulse. The output frequency shall be one-half of the input frequency.

11/ When testing t_{PHL1} or t_{PLH1}, the Q_A pin shall be connected to the input B pin.

12/ Momentary 3.0 V (min), then ground. Maintain ground for measurement.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

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

6.2 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 contracting activity in addition to notification to the qualifying activity, if applicable.

e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

f. Requirements for product assurance options.

g. 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.

h. Requirements for "JAN" marking.

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

GND- - - - - - - - - - - - - Ground zero voltage potential.
I_{IN}- - - - - - - - - - - - - Current flowing into an input terminal.
V_{IN}- - - - - - - - - - - - - Voltage level at an input terminal.

6.4 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.

6.5 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	54LS196
02	54LS197
03	54LS290
04	54LS293

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

TABLE IV. Manufacturers' designations.

Device type	Circuit				
	A	B	C	E	F
	Texas Instrument	Signetics Corp.	National Semi-conductor Corp.	Motorola Inc.	Fairchild Semiconductor
01		X	X		X
02		X	X	X	X
03	X	X	X	X	X
04	X	X	X	X	X

6.7 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

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