
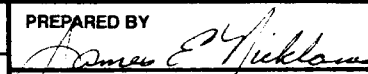
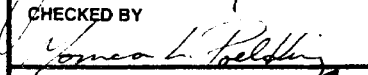



REVISIONS													
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED										
A	Add case outline "S" to device type "01". Add device type 02 to drawing for case outlines R, S, and 2. Add vendors CAGE 75569 and 27014 to device type 01. Add vendors CAGE 61772 and 75569 to device type 02. Editorial changes to table I and throughout drawing.	89 DEC 7											

REV																		
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REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A	A					
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12					

PMIC N/A STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	PREPARED BY  CHECKED BY  APPROVED BY  DRAWING APPROVAL DATE 16 NOVEMBER 1987 REVISION LEVEL A	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUIT, DIGITAL, FAST CMOS, OCTAL D-FLIP-FLOP TTL-COMPATIBLE, MONOLITHIC SILICON <table style="width:100%; border: none;"> <tr> <td style="border: none;">SIZE</td> <td style="border: none;">CAGE CODE</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;">A</td> <td style="border: none;">67268</td> <td style="border: none;">5962-87656</td> </tr> </table> SHEET 1 OF 1	SIZE	CAGE CODE		A	67268	5962-87656
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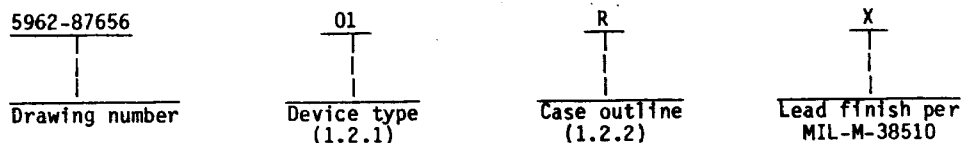
• U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911
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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	54FCT273	Octal D-type flip-flop with clear, TTL compatible
02	54FCT273A	Octal D-type flip-flop with clear, TTL compatible

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
R	D-8 (20-lead, 1.060" x .310" x .200") dual-in-line package
S	F-9 (20-lead, .540" x .300" x .100") flat package
2	C-2 (20-terminal, .358" x .358" x .100") square chip carrier package

1.3 Absolute maximum ratings. 1/

Supply voltage range (V_{CC})	- - - - -	-0.5 V dc to +6.0 V dc
Input voltage range	- - - - -	-0.5 V dc to $V_{CC} + 0.5$ V dc
Output voltage range	- - - - -	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC input diode current (I_{IK})	- - - - -	-20 mA
DC output diode current (I_{OK})	- - - - -	-50 mA
DC output current	- - - - -	± 100 mA
Maximum power dissipation (P_D)	- - - - -	500 mW
Thermal resistance (θ_{JC})	- - - - -	See MIL-M-38510, appendix C
Storage temperature range	- - - - -	-65°C to +150°C
Junction temperature (T_J)	- - - - -	+175°C
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C

1/ All voltages referenced to GND.

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1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	-----	+4.5 V dc to +5.5 V dc
Maximum low level input voltage (V_{IL})	-----	0.8 V dc
Minimum high level input voltage (V_{IH})	-----	2.0 V dc
Case operating temperature range (T_C)	-----	-55°C to +125°C
Minimum setup time, high to low (Data to CP) (t_s):		
Device type 01	-----	3.5 ns
Device type 02	-----	3.0 ns
Minimum hold time, high to low (Data to CP) (t_h):		
Device type 01	-----	2.5 ns
Device type 02	-----	2.0 ns
Minimum CP pulse width, high or low (t_{pw}):		
Device type 01	-----	7.0 ns
Device type 02	-----	6.0 ns
Minimum removal time, \overline{MR} to CP (t_{REM}):		
Device type 01	-----	5.0 ns
Device type 02	-----	3.0 ns
Minimum \overline{MR} pulse width, high or low (t_p):		
Device type 01	-----	7.0 ns
Device type 02	-----	6.0 ns

2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin 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 drawing 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.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standard, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

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3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

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

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

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

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full case operating temperature range.

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

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in MIL-BIL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Device type	Conditions -55°C < T _C < +125°C V _{CC} = 5.0 V dc ±10% unless otherwise specified	Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V _{OH}	A11	V _{CC} = 4.5 V V _{IL} = 0.8 V V _{IH} = 2.0 V	I _O = -300 μA	1, 2, 3	4.3	V
				I _O = -12 mA	1, 2, 3	2.4	V
Low level output voltage	V _{OL}	A11	V _{CC} = 4.5 V V _{IL} = 0.8 V V _{IH} = 2.0 V	I _O = 300 μA	1, 2, 3	0.2	V
				I _O = 32 mA	1, 2, 3	0.5	V
Input clamp voltage	V _{IK}	A11	V _{CC} = 4.5 V, I _{IN} = -18 mA	1		-1.2	V
High level input current	I _{IH}	A11	V _{CC} = 5.5 V, V _{IN} = 5.5 V	1, 2, 3		5	μA
Low level input current	I _{IL}	A11	V _{CC} = 5.5 V, V _{IN} = GND	1, 2, 3		-5	μA
Short circuit output current	I _{OS}	A11	V _{CC} = 5.5 V <u>1/</u> V _{OUT} = GND	1, 2, 3	-60		mA
Quiescent power supply current (CMOS inputs)	I _{CCQ}	A11	V _{IN} ≤ 0.2 V or V _{IN} ≥ 5.3 V V _{CC} = 5.5 V, f _I = f _{CP} = 0 MHz	1, 2, 3		1.5	mA
Quiescent power supply current (TTL inputs high)	ΔI _{CC}	A11	V _{CC} = 5.5 V, V _{IN} = 3.4 V <u>2/</u>	1, 2, 3		2.0	mA
Dynamic power supply current	I _{CCD}	A11	V _{CC} = 5.5 V, Outputs open, IMR = V _{CC} One bit toggling - 50% duty cycle V _{IN} ≥ 5.3 V or V _{IN} ≤ 0.2 V	<u>3/</u>		0.25	mA/MHz

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Device type	Conditions -55°C ≤ T _C ≤ +125°C V _{CC} = 5.0 V dc ±10% unless otherwise specified	Group A subgroups	Limits		Unit
					Min	Max	
Total power supply current 4/	I _{CC}	A11	V _{IN} ≥ 5.3 V or V _{IN} < 0.2 V, V _{CC} = 5.5 V, f _{cp} = 10 MHz, Outputs open One bit toggling at f _I = 5 MHz I _{MR} = V _{CC} 50% duty cycle	1, 2, 3		4.0	mA
			V _{IN} = 3.4 V or V _{IN} = GND, V _{CC} = 5.5 V, f _{cp} = 10 MHz, Outputs open One bit toggling at f _I = 5 MHz I _{MR} = V _{CC} 50% duty cycle			6.0	
Functional tests		A11	See 4.3.1d	7, 8			
Input capacitance	C _{IN}	A11	See 4.3.1c	4		10	pF
Output capacitance	C _{OUT}	A11	See 4.3.1c	4		12	pF
Propagation delay time, CP to outputs	t _{PLH} , t _{PHL}	01	C _L = 50 pF ±10% R _L = 500Ω ±5% R _T = 50Ω See figure 4 5/	9,10,11	2.0	15.0	ns
		02			2.0	8.3	
Propagation delay time, MR to outputs	t _{PLH} , t _{PHL}	01		9,10,11	2.0	15.0	
		02			2.0	8.3	

- 1/ Not more than one output should be shorted at one time, and the duration of the short circuit condition should not exceed 1 second.
- 2/ In accordance with TTL driven input (V_{IN} = 3.4 V); all other inputs at V_{CC} or GND.
- 3/ This parameter is not directly testable, but is derived for use in total power supply calculations.
- 4/ $I_{CC} = I_{CCQ} + (\Delta I_{CC} \times D_H \times N_T) + (f_{cp}/2 + f_I \times N_I)$
 where D_H = Duty cycle for TTL inputs high.
 N_T = Number of TTL inputs at D_H.
 f_I = Input frequency in MHz.
 N_I = Number of inputs at f_I.
 f_{cp} = Clock frequency in MHz.
- 5/ The minimum limits of the propagation delay times are guaranteed, if not tested, to the limits specified herein.

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Device type 01 and 02

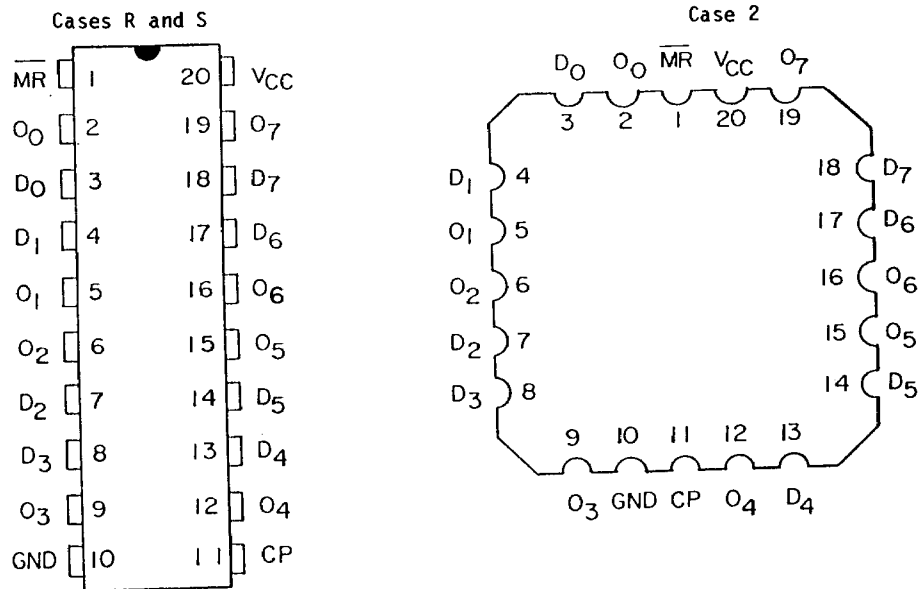




FIGURE 1. Terminal connections.

Operating mode	Inputs			Output
	\overline{MR}	CP	D_N	O_N
Reset (clear)	L	X	X	L
Load "1"	H		h	H
Load "0"	H		l	L


H = High voltage level steady state.
 h = High voltage level one setup time prior to the low to high clock transition.
 L = Low voltage level steady state.
 l = Low voltage level one setup time prior to the low to high clock transition.
 X = Don't care.
 = Low to high clock transition.

FIGURE 2. Truth table.

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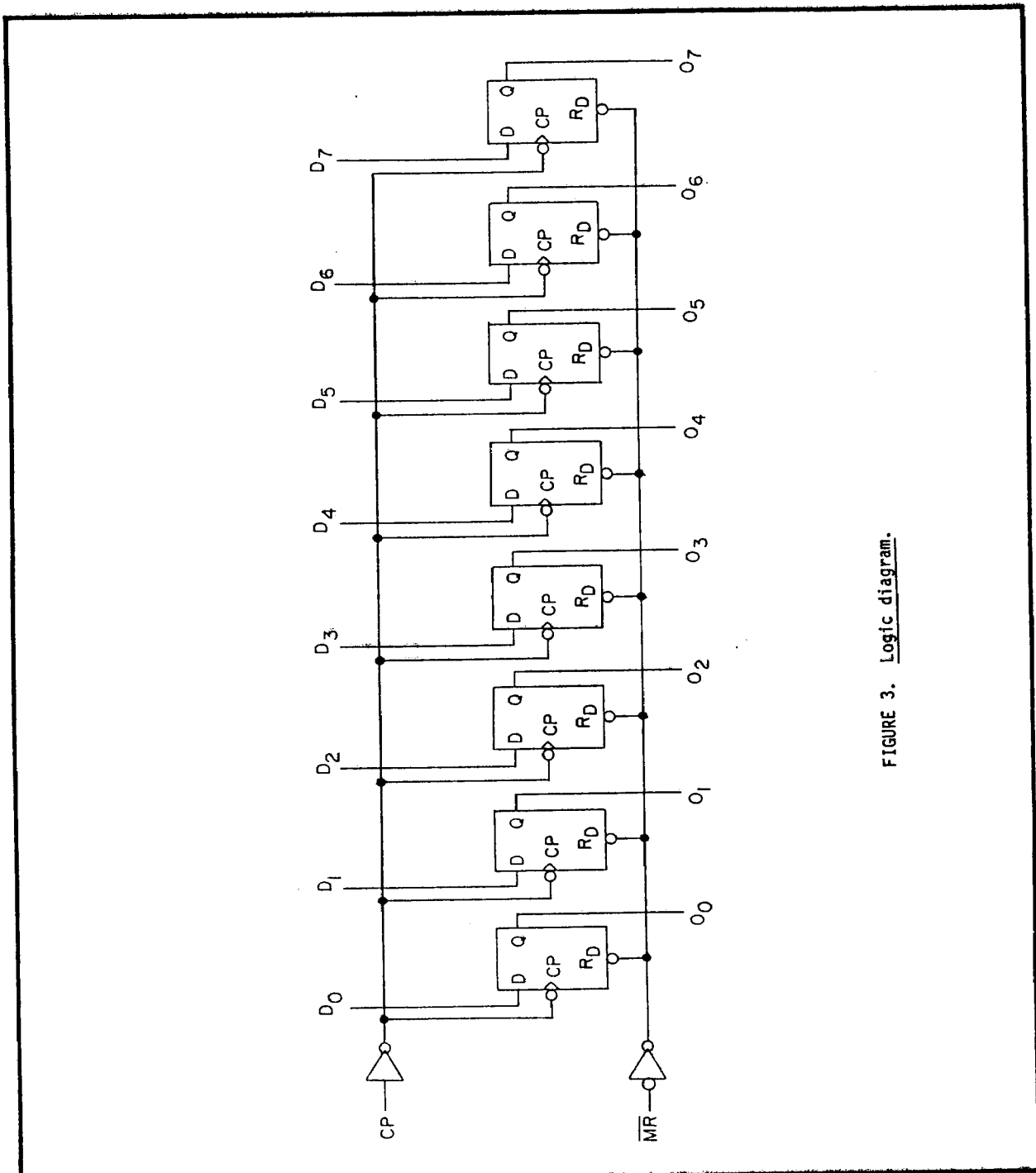


FIGURE 3. Logic diagram.

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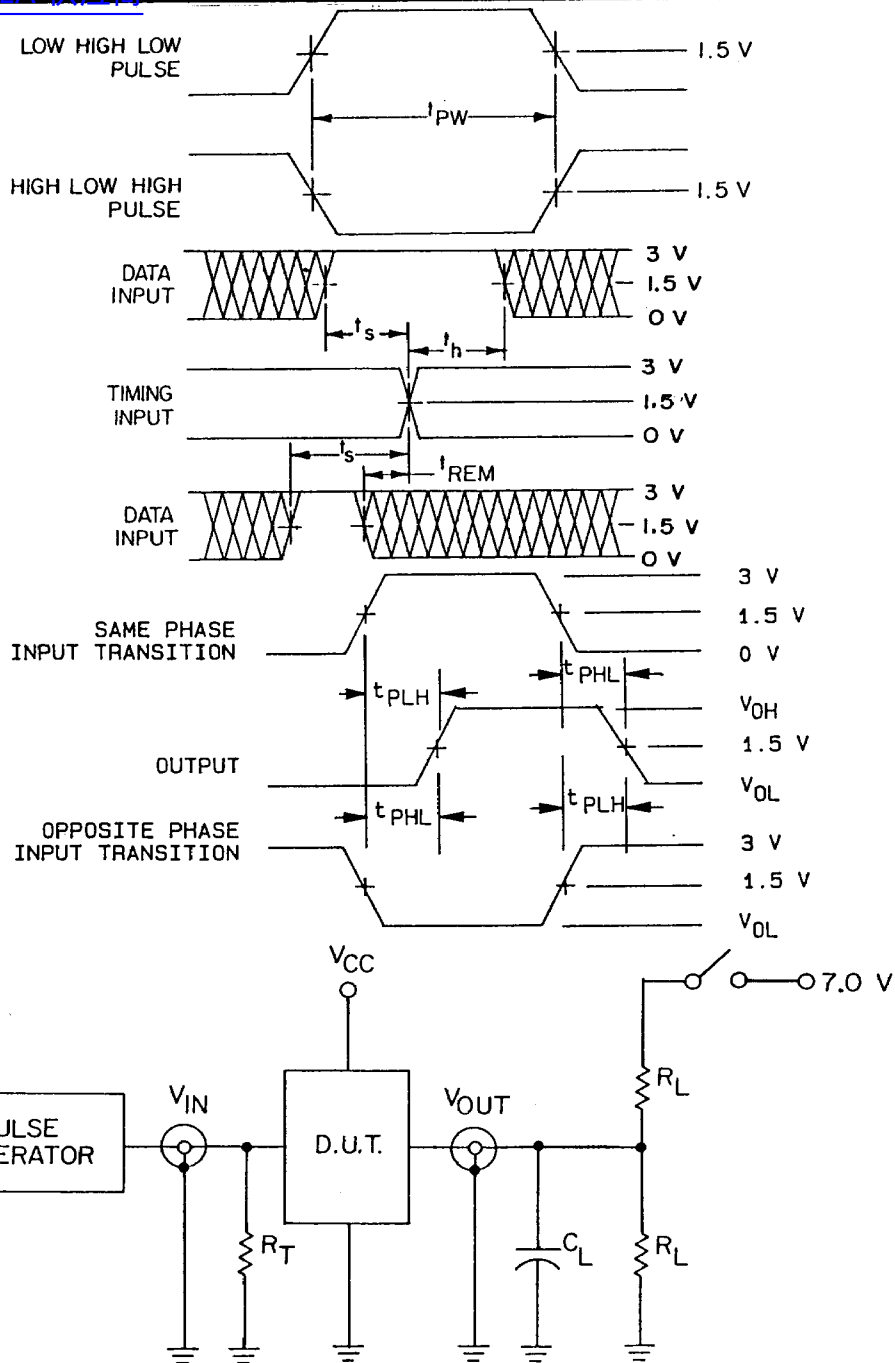


FIGURE 4. Switching waveforms and test circuit.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 4, 7, 8, 9, 10, 11
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroup 1.

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

- a. Burn-in test, method 1015 of MIL-STD-883.
 - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C_{IN} and C_{OUT} measurements) shall be measured only initially and after process or design changes which may affect capacitance. Test all applicable pins on five devices with zero failures.
- d. Subgroups 7 and 8 tests shall verify the truth table on figure 2.

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4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions method 1005 of MIL-STD-883.
 - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).
 - (2) $T_A = +125^{\circ}\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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 drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-5375.

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6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS. The approved sources of supply listed below are for information purposes only and are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
5962-8765601RX	27014 61772 75569	54FCT273DMQB IDT54FCT273DB P54PCT273DMB
5962-8765601SX	27014 61772 75569	54FCT273FMQB IDT54FCT273EB P54PCT273FMB
5962-87656012X	27014 61772 75569	54FCT273LMQB IDT54FCT273LB P54PCT273LMB
5962-8765602RX	61772 75569	IDT54FCT273ADB P54PCT273ADMB
5962-8765602SX	61772 75569	IDT54FCT273AEB P54PCT273AFMB
5962-87656022X	61772 75569	IDT54FCT273ALB P54PCT273ALMB

1/ **Caution.** Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
27014	National Semiconductor 2900 Semiconductor Dr. P.O. Box 58090 Santa Clara, CA 95052-8090 Point of contact: 333 Western Avenue South Portland, ME 04106
61772	Integrated Devices Technology, Incorporated 1566 Moffett Boulevard Salinas, CA 93905 Point of contact: 3236 Scott Boulevard Santa Clara, CA 95052
75569	Performance Semiconductor 610 East Weddell Drive Sunnyvale, CA 94089

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