

REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
F	Table I, added footnotes and changed propagation delay times. Added figure 4, switching waveforms and test circuit. Editorial changes throughout. Added cage 18324. Table II, subgroups added. Device type 01, case 2, is inactive for new design.	1988 MAY 13																	

DEVICE TYPE 01, CASE R, IS INACTIVE FOR
 NEW DESIGN AS OF 24 FEB 1987. USE
 M38510/37101BRX.

CURRENT CAGE CODE 67268

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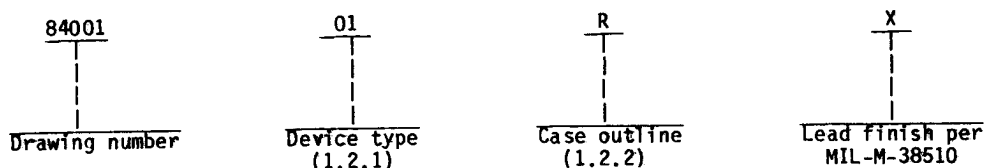
REV STATUS OF SHEETS	REV	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		

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 12 April 1984 REVISION LEVEL F	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUIT, DIGITAL, ADVANCED LOW-POWER SCHOTTKY TTL, FLIP-FLOP, MONOLITHIC SILICON <table style="width: 100%;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 35%;">CAGE CODE 14933</td> <td style="width: 50%; text-align: right;">84001</td> </tr> <tr> <td colspan="3">SHEET 1 OF 16</td> </tr> </table>	SIZE A	CAGE CODE 14933	84001	SHEET 1 OF 16		
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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	54ALS574	Octal D-type flip-flop with three state outputs
02	54ALS576	Octal D-type flip-flop with three state inverted outputs

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.

Supply voltage range - - - - -	-0.5 V dc minimum to +7.0 V dc maximum
Input voltage range- - - - -	-1.2 V at -18 mA to +7.0 V
Storage temperature- - - - -	-65°C to +150°C
Maximum power dissipation (P_D): 1/	
Device 01 - - - - -	154.0 mW
Device 02 - - - - -	165.0 mW
Lead temperature (soldering, 10 seconds) - - - - -	+300°C
Thermal resistance, junction-to-case (θ_{JC}) - - - - -	See MIL-M-38510, appendix C
Junction temperature (T_J) - - - - -	+175°C

1/ Maximum power dissipation is defined as $V_{CC} * I_{CC}$, and must withstand the added P_D due to short circuit test, e.g., I_Q .

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1.4 Recommended operating conditions.

Supply voltage range (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}):		
$T_C = +125^\circ\text{C}$	- - - - -	0.7 V dc
$T_C = -55^\circ\text{C}$	- - - - -	0.8 V dc
$T_C = +25^\circ\text{C}$	- - - - -	0.8 V dc
Case operating temperature range (T_C)	- - - - -	-55°C to $+125^\circ\text{C}$
Width of CLOCK pulse (t_w):		
Device type 01	- - - - -	16.5 ns minimum
Device type 02	- - - - -	25 ns minimum
Data setup time (t_{SU})	- - - - -	15 ns minimum
Data hold time (t_h)	- - - - -	4 ns minimum

2. APPLICABLE DOCUMENTS

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

(Copies of the specification and standard 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.

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.

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TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified			Device	Group A sub- groups	Limits		Unit
							Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V V _{IH} = 2.0 V 2/	V _{IL} = 0.7 V	I _{OH} = -0.4 mA	A11	2	2.5	V	
				I _{OH} = -1 mA			2.4		
			V _{IL} = 0.8 V	I _{OH} = -0.4 mA		1,3	2.5		
				I _{OH} = -1 mA			2.4		
Low level output voltage	V _{OL}	I _{OL} = 12 mA V _{CC} = 4.5 V V _{IH} = 2.0 V 2/	V _{IL} = 0.7 V	A11	1,2,3		0.4	V	
			V _{IL} = 0.8 V						
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V I _{IN} = -18 mA		A11	1,2,3		-1.2	V	
Low level input current	I _{IL}	V _{CC} = 5.5 V V _{IN} = 0.4 V All other inputs = 4.5 V		A11	1,2,3		-200	μA	
High level input current	I _{IH1}	V _{CC} = 5.5 V V _{IN} = 2.7 V All other inputs = 0.0 V		A11	1,2,3		20	μA	
	I _{IH2}	V _{CC} = 5.5 V V _{IN} = 7.0 V All other inputs = 0.0 V					100	μA	
Off-state output current	I _{OZH}	V _{CC} = 5.5 V V _{OUT} = 2.7 V		A11	1,2,3		20	μA	
	I _{OZL}	V _{CC} = 5.5 V V _{OUT} = 0.4 V		A11	1,2,3		-20	μA	
Output current	I _O	V _{CC} = 5.5 V V _{OUT} = 2.25 V 3/		01	1,2,3	-30	-112	mA	
				02		-15	-112		
Supply current	I _{CCH}	V _{CC} = 5.5 V V _{IN} ≥ 4.5 V		01	1,2,3		18	mA	
		V _{CC} = 5.5 V; V _{IN} ≤ 0.4 V		02					
	I _{CCL}	V _{CC} = 5.5 V; V _{IN} ≤ 0.4 V		01	1,2,3		27	mA	
		V _{CC} = 5.5 V; V _{IN} ≥ 4.5 V		02			24		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Supply current outputs disabled	I _{CCZ}	V _{CC} = 5.5 V V _{IH} ≥ 4.5 V	01 02	1,2,3		28 30	mA
Functional tests		See 4.3.1c 4/	A11	7,8			
Maximum clock frequency	f _{MAX}	V _{CC} = 4.5 V to 5.5 V C _L = 50 pF ± 10% 5/ R _L = 500Ω ± 5% See figure 4	01 02	9,10,11	30 22		MHz
Propagation delay time CLK to any Q or Q̄	t _{PLH1}		01	9,10,11	4	16	ns
			02		4	24	
	t _{PHL1}		01	9,10,11	4	14	ns
			02		4	20	
Output enable $\overline{OC}$ to any Q or Q̄	t _{PZL}		01	9,10,11	4	20	ns
			02		3	23	
	t _{PZH}		01	9,10,11	4	18.5	ns
			02		4	24	
Output disable $\overline{OC}$ to any Q or Q̄	t _{PLZ}		01	9,10,11	2	15	ns
			02		3	29	
	t _{PHZ}		01	9,10,11	2	10	ns
			02		2	14	

1/ Unused inputs that do not directly control the pin under test must be > 2.5 V or < 0.4 V. Unused inputs shall not exceed 5.5 V or go less than 0.0 V. No inputs shall be floated.

2/ All outputs must be tested. In the case where only one input at V_{IL} maximum or V_{IH} minimum produces the proper output state, the test must be performed with each input being selected as the V_{IL} maximum or V_{IH} minimum input.

3/ The output conditions have been chosen to produce a current that closely approximates one-half of the true short circuit output current, I_{OS}. Not more than one output will be tested at a time and the duration of the test condition shall not exceed 1 second.

4/ Functional tests shall be conducted at input test conditions of GND ≤ V_{IL} ≤ V_{OL} and V_{OH} ≤ V_{IH} ≤ V_{CC}.

5/ The propagation delay limits are based on single output switching. Unused inputs = 3.5 V or = 0.3 V.

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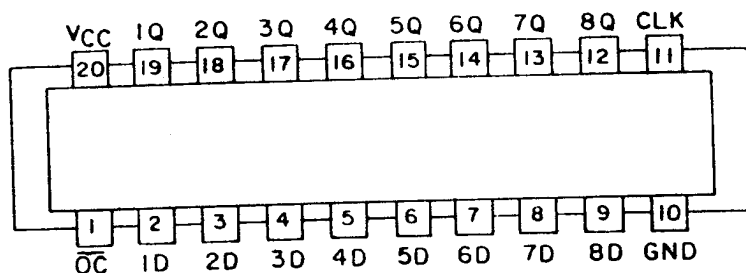
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Device type 01

Cases R and S



Device type 01

Case 2

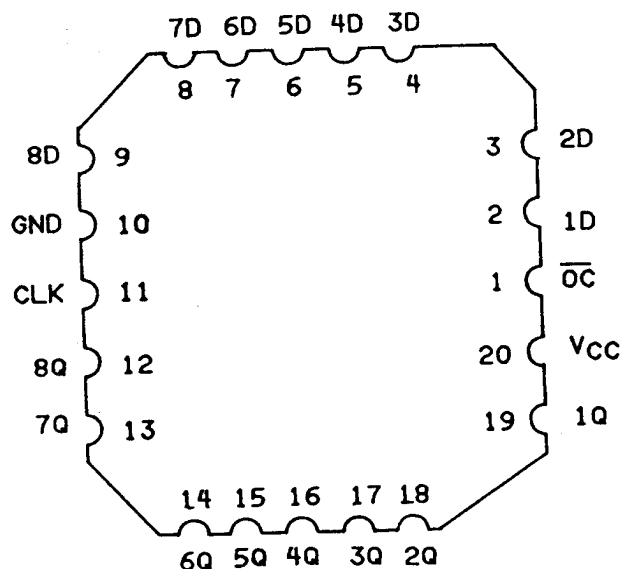


FIGURE 1. Terminal connections (top view).

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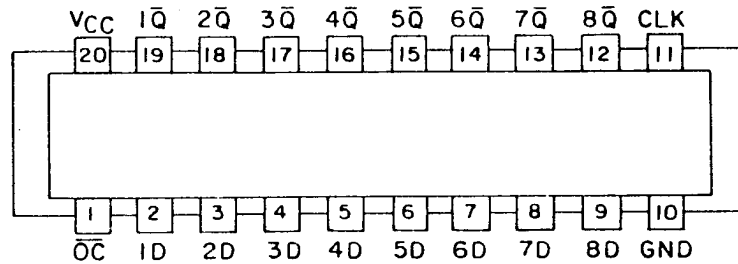
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Device type 02

Cases R and S



Device type 02

Case 2

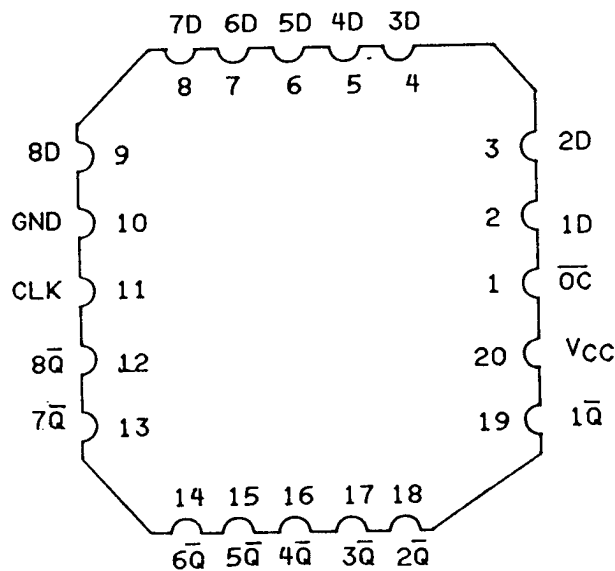


FIGURE 1. Terminal connections (top view) - Continued.

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Device type 01

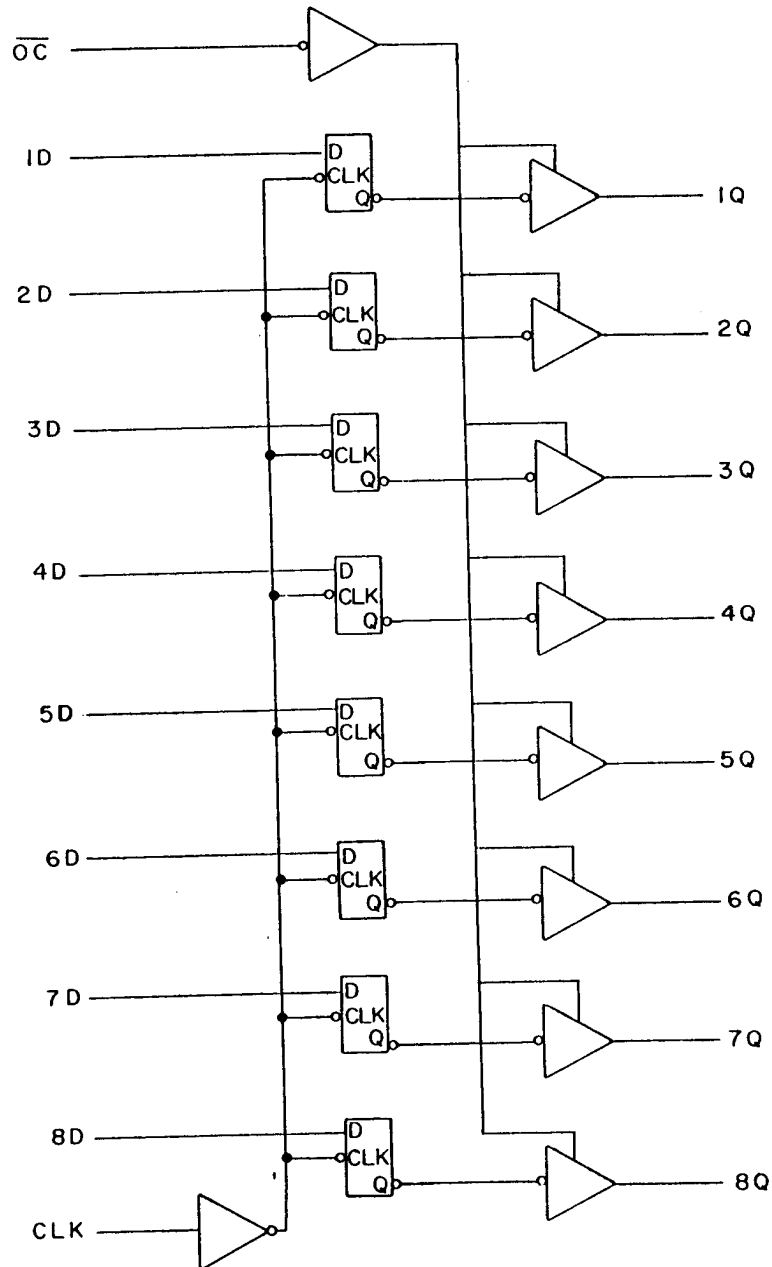


FIGURE 2. Logic diagrams.

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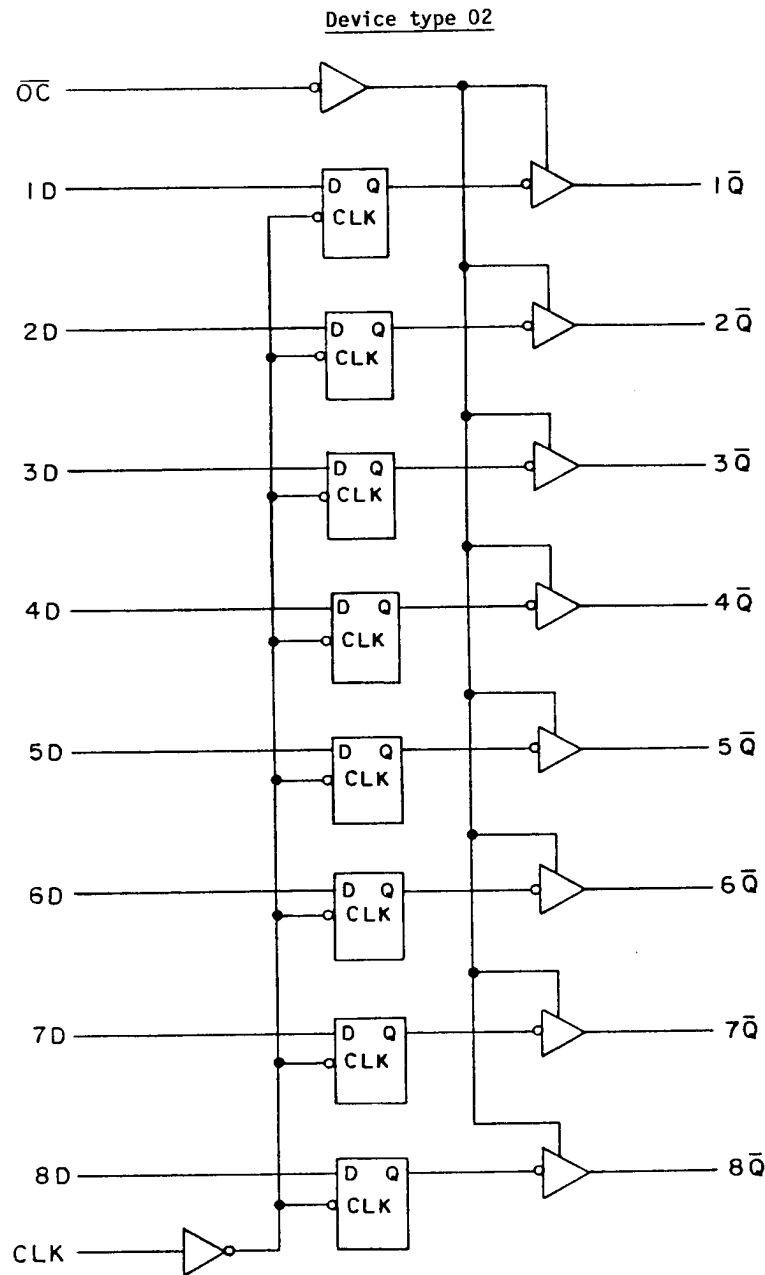


FIGURE 2. Logic diagrams - Continued.

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Device type 01

$\overline{OC}$	CLK	D	Output Q
L	↑	H	H
L	↑	L	L
L	L	X	Q ₀
H	X	X	Z

H = High level (steady-state)
 L = Low level (steady-state)
 X = Irrelevant
 ↑ = Transition from low to high level
 Q₀ = The level of Q before the indicated
 steady-state input conditions were
 established.
 Z = High impedance state

Device type 02

$\overline{OC}$	CLK	D	Output Q
L	↑	H	L
L	↑	L	H
L	L	X	Q ₀
H	X	X	Z

H = High level (steady-state)
 L = Low level (steady-state)
 X = Irrelevant
 ↑ = Transition from low to high level
 Q₀ = The level of Q before the indicated
 steady-state input conditions were
 established.
 Z = High impedance state

FIGURE 3. Truth table.

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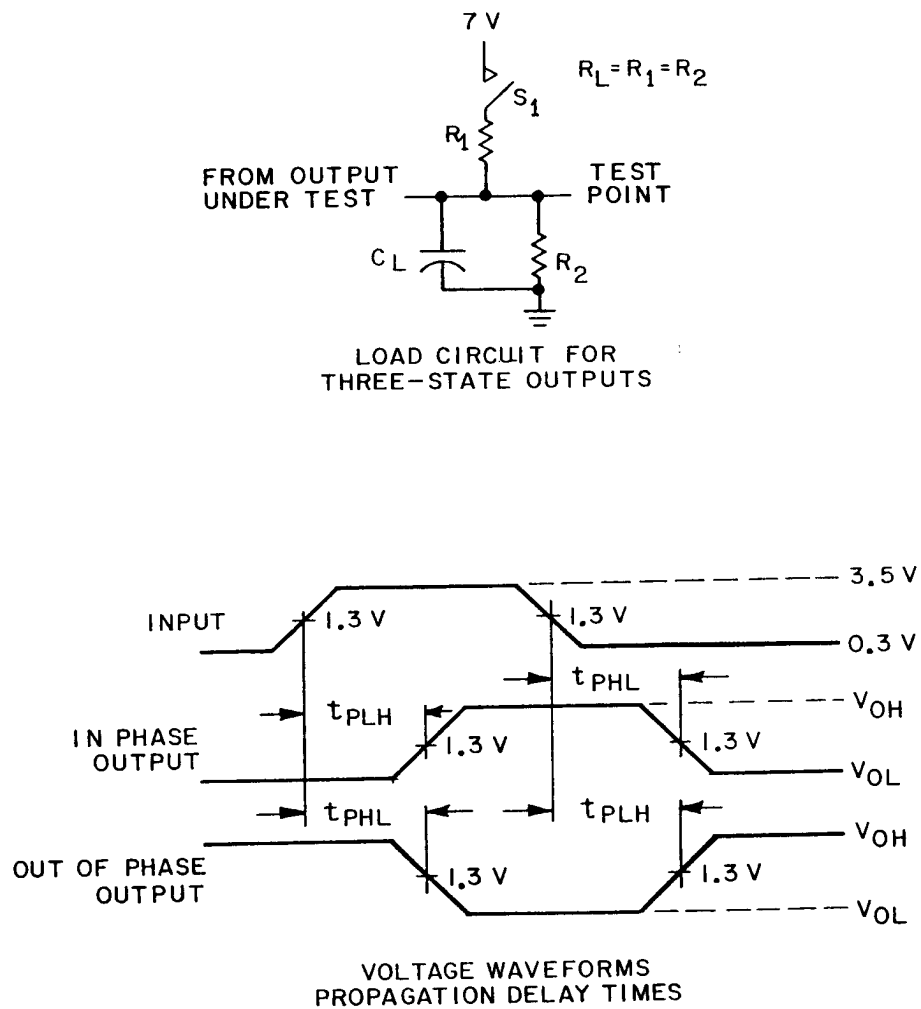
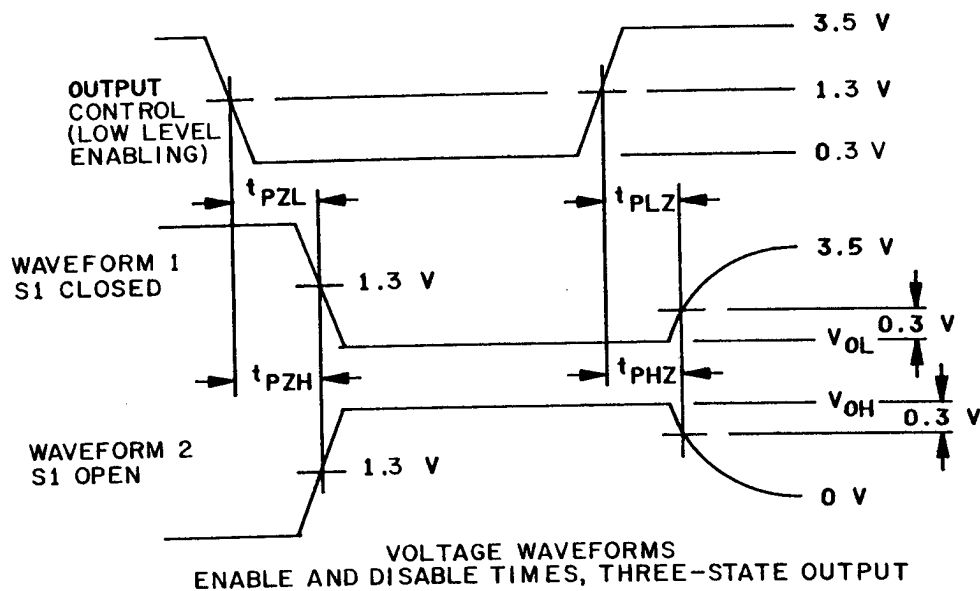


FIGURE 4. Switching waveforms and test circuit.

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NOTES:

1. C_L includes probe and jig capacitance.
2. When measuring propagation delay times of three-state outputs, switch S1 is open.
3. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
4. All input pulses have the following characteristics: $PRR \leq 10$ MHz, duty cycle = 50 percent, $t_r = t_f = 3$ ns ± 1 ns.
5. The outputs are measured one at a time with one input transition per measurement.

FIGURE 4. Switching waveforms and test circuit - Continued.

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- 3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.
- 3.2.2 Logic diagrams. The logic diagrams shall be as specified on figure 2.
- 3.2.3 Truth tables. The truth tables shall be as specified on figure 3.
- 3.2.4 Switching waveforms and test circuit. The switching waveforms and test circuit shall be as specified on figure 4.
- 3.2.5 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.
- 3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full case operating temperature range.
- 3.4 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 6.4 herein.
- 3.5 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 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.
- 3.6 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.
- 3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).
- 3.8 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).
- 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 3.5 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.

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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 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 7 and 8 tests shall verify the truth table as specified on figure 3 herein.

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 3.5 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.

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, 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.

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.

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6.2 Replaceability. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- b. When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/37104B-- or M38510/37105B--.

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

6.4 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor 1/ similar part number	Replacement military specification
8400101RX 2/	01295 04713 18324 27014	SNJ54ALS574AJ 54ALS574A/BRAJC 54ALS574A/BRA 54ALS574AJ/883	M38510/37104BRX
8400101SX	01295 04713 18324	SNJ54ALS574AW 54ALS574A/BSAJC 54ALS574A/BSA	M38510/37104BSX
84001012X 2/	01295 04713 18324 27014	SNJ54ALS574AFK 54ALS574AM/B2AJC 54ALS574A/B2A 54ALS574AE/883	M38510/37104B2X
8400102RX	01295 27014	SNJ54ALS576AJ 54ALS576AJ/883	M38510/37105BRX
8400102SX	01295	SNJ54ALS576AW	M38510/37105BSX
84001022X	01295	SNJ54ALS576AFK	M38510/37105B2X

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

2/ Inactive for new design. Use QPL-38510 product.

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Vendor CAGE
number

01295

04713

18324

27014

Vendor name
and address

Texas Instruments Incorporated
P.O. Box 6448
Midland, TX 79701

Motorola, Inc.
7402 S. Price Road
Tempe, AZ 85283

Signetics Corporation
4130 South Market Court
Sacramento, CA 95834

National Semiconductor
2900 Semiconductor Drive
Santa Clara, CA 95052-8090

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