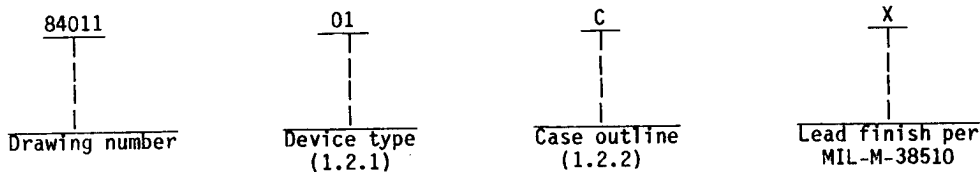




## 1. SCOPE

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 type. The device type shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	54ALS74	Dual D-type positive-edge-triggered flip-flops

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

<u>Outline letter</u>	<u>Case outline</u>
C	D-1 (14-lead, .785" x .310" x .200"), dual-in-line package
D	F-2 (14-lead, .390" x .260" x .085"), 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 to +7.0 V dc
Input voltage range	- - - - -	-1.5 V at -18 mA to +7.0 V
Storage temperature	- - - - -	-65°C to +150°C
Maximum power dissipation (P <sub>D</sub> ) <u>1/</u>	- - - - -	22.0 mW
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C
Thermal resistance, junction-to-case (θ <sub>JC</sub> )	- - - - -	See MIL-M-38510, appendix C
Junction temperature (T <sub>J</sub> )	- - - - -	+175°C

#### 1.4 Recommended operating conditions.

Supply voltage range ( $V_{CC}$ )	- - - - -	+4.5 V minimum to +5.5 V maximum
Minimum high level input voltage ( $V_{IH}$ )	- - - - -	2.0 V
Maximum low level input voltage ( $V_{IL}$ ):		
$T_C = +125^\circ\text{C}$	- - - - -	0.7 V dc
$T_C = -55^\circ\text{C}$	- - - - -	0.8 V dc
$T_C = +25^\circ\text{C}$	- - - - -	0.8 V dc
Setup time before CLK, data ( $t_{su}$ )	- - - - -	15 ns
Setup time before CLK, PRE or CLR inactive ( $t_{su}$ )	- - - - -	10 ns
Hold time, data after CLK ( $t_H$ )	- - - - -	0 ns
Pulse duration, PRE or CLR low ( $t_W$ )	- - - - -	15 ns
Pulse duration, CLK high or low ( $t_W$ )	- - - - -	16.5 ns
Clock frequency ( $f_{CLOCK}$ )	- - - - -	30 MHz
Case operating temperature range ( $T_C$ )	- - - - -	-55°C to +125°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.,  $I_0$ .

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## 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.

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 diagrams. The logic diagrams 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C 1/ 2/ unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
High level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V 3/ I <sub>OH</sub> = -0.4 mA V <sub>IH</sub> = 2.0 V	V <sub>IL</sub> = 0.7 V V <sub>IL</sub> = 0.8 V	2 1,3	2.5		V
Low level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V 3/ I <sub>OL</sub> = 4.0 mA V <sub>IH</sub> = 2.0 V	V <sub>IL</sub> = 0.7 V V <sub>IL</sub> = 0.8 V	2 1,3		0.4	V
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V I <sub>IN</sub> = -18 mA		1,2,3		-1.5	V
Low level input current	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 0.4 V All other inputs = 4.5 V	CLK or D PRE or CLR	1,2,3		-0.2	mA
						-0.4	
High level input current	I <sub>IH1</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 2.7 V All other inputs = 0.0 V	CLK or D PRE or CLR	1,2,3		20	μA
						40	
	I <sub>IH2</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 7.0 V All other inputs = 0.0 V	CLK or D PRE or CLR	1,2,3		0.1	mA
						0.2	
Output current	I <sub>O</sub>	V <sub>CC</sub> = 5.5 V V <sub>OUT</sub> = 2.25 V 4/		1,2,3	-30	-112	mA
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V 5/		1,2,3		4.0	mA
Functional tests		See 4.3.1c 6/		7,8			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_C \leq +125^{\circ}\text{C}$ 1/ 2/ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Propagation delay time PRE or CLR to Q or $\bar{Q}$	tPLH1	VCC = 4.5 V to 5.5 V 7/ CL = 50 pF RL = 500 $\Omega$ See figure 3	9,10,11	3	13.5	ns
	tPHL1		9,10,11	5	17	
Propagation delay time CLK to Q or $\bar{Q}$	tPLH2		9,10,11	5	17	
	tPHL2		9,10,11	5	18	

- 1/ Unused inputs that do not directly control the pin under test must be  $\geq 2.5$  V or  $\leq 0.4$  V.
- 2/ Unused inputs shall not exceed 5.5 V or go less than 0.0 V. No inputs shall be floated.
- 3/ 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.
- 4/ 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 duration of the short circuit condition shall not exceed one second.
- 5/  $I_{CC}$  is measured with D, CLK, and  $\overline{PRE}$  grounded, then with D, CLK, and  $\overline{CLR}$  grounded.
- 6/ Functional tests shall be conducted at input test conditions of  $0.0 \text{ V} \leq V_{IL} \leq V_{OL}$  and  $V_{OH} \leq V_{IH} \leq V_{CC}$ .
- 7/ The propagation delay limits are based on single output switching. Unused outputs = 3.5 V or  $\leq 0.3$  V.

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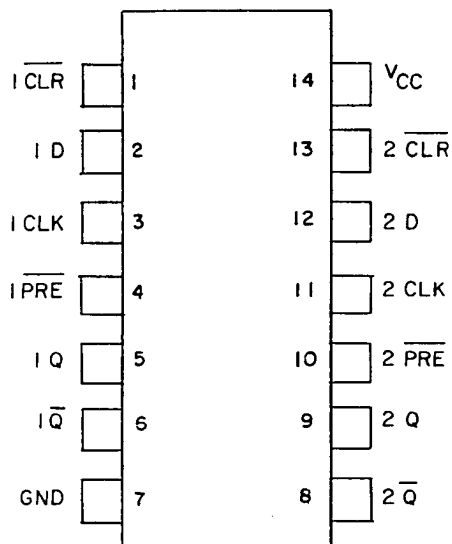
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Case C and D



Case 2

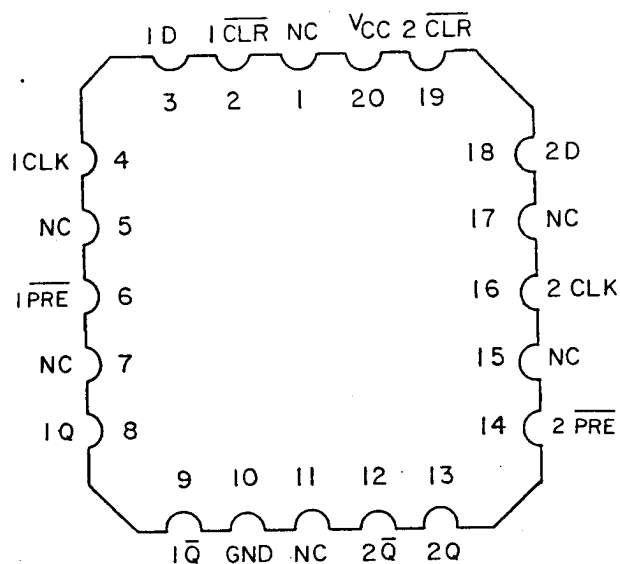


FIGURE 1. Terminal connections.

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Inputs				Outputs	
PRE	CLR	CLK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q <sub>0</sub>	$\bar{Q}_0$

H = High level (steady state).  
 L = Low level (steady state).  
 X = Irrelevant.  
 ↑ = Transition from low to high level.  
 Q<sub>0</sub> = The level of Q before the indicated steady state input conditions were established.  
 \* = This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

FIGURE 2. Truth table.

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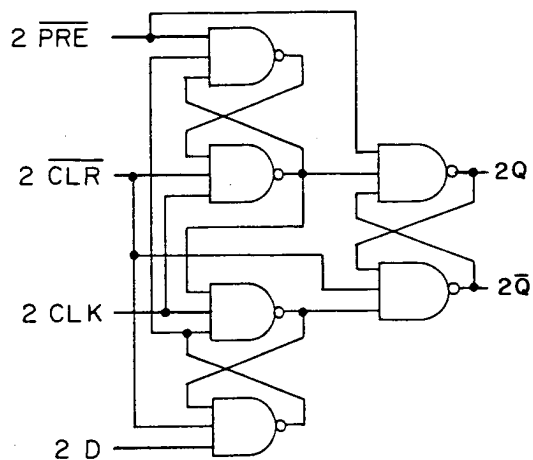
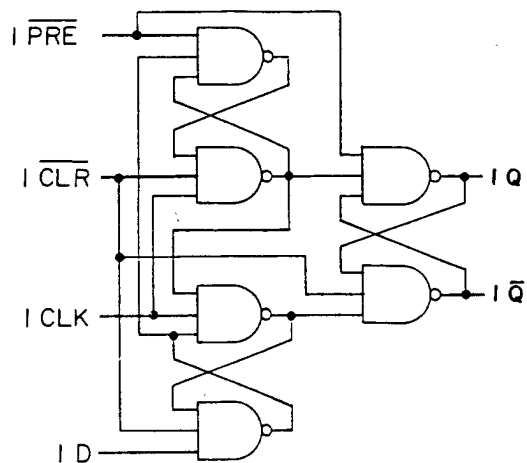


FIGURE 3. Logic diagrams.

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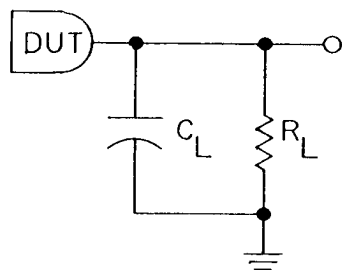
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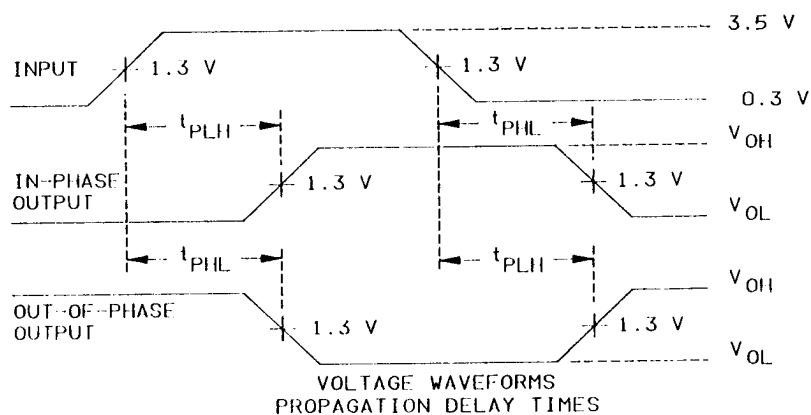
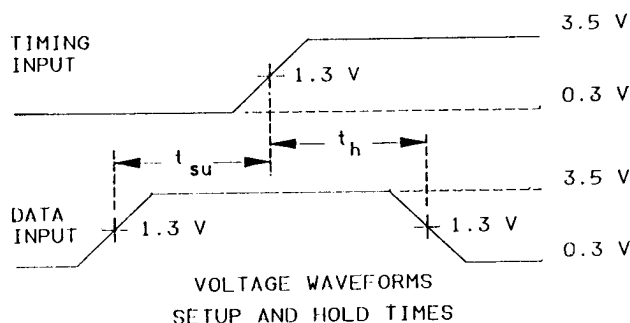
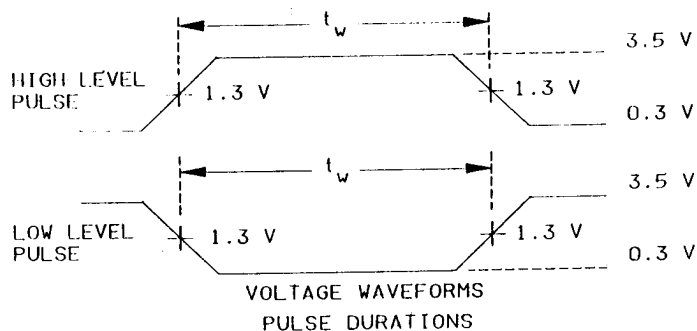
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LOAD CIRCUIT FOR  
BI-STATE  
TOTEM POLE OUTPUTS



NOTES:

1.  $C_L$  includes probe and jig capacitance.
2. All input pulses have the following characteristics:  $PRR \leq 10$  MHz, duty cycle = 50 percent,  $t_r = t_f = 3$  ns  $\pm 1$  ns.
3. The outputs are measured one at a time with one input transition per measurement.

FIGURE 4. Waveforms and test circuit.

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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 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.

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. Subgroups 7 and 8 tests shall verify the truth table as specified on figure 2 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 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.

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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, 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.

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 M38510/37101B--.

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

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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 part number
8401101AX	<u>2/</u>	---	M38510/37101BAX
8401101BX	<u>2/</u>	---	M38510/37101BBX
8401101CX <u>3/</u>	01295 18324	SNJ54ALS74AJ 54ALS74A/BCA	M38510/37101BCX
8401101DX	01295 18324	SNJ54ALS74AW 54ALS74A/BDA	M38510/37101BDX
84011012X <u>3/</u>	01295 18324	SNJ54ALS74AFK 54ALS74A/B2A	M38510/37101B2X

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/ Not available from an approved source of supply.

3/ This device is inactive for new design. Use QPL device.

Vendor CAGE  
number

01295

18324

Vendor name  
and address

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

Signetics Corporation  
4130 South Market Court  
Sacramento, CA 95834

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