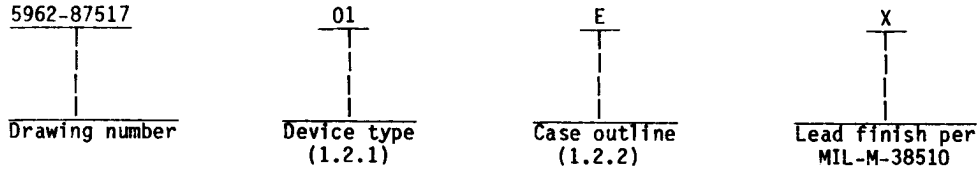


1. SCOPE

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	54LS590	8-bit binary counter with three-state output registers

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>
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
F	F-5 (16-lead, .440" x .285" 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 - - - - -	-0.5 V to +7.0 V
Storage temperature range - - - - -	-65°C to +150°C
Maximum power dissipation (P_D) ^{1/} - - - - -	357 mW
Lead temperature (soldering, 10 ¹ seconds) - - - - -	+300°C
Junction temperature (T_J) - - - - -	+175°C
Thermal resistance, junction to case (θ_{JC}) - - - - -	See MIL-M-38510, appendix C
Input voltage - - - - -	-1.5 V at -18 mA to +7.0 V
Off-state output voltage, maximum - - - - -	5.5 V

^{1/} Must withstand the added P_D , due to short-circuit test, e.g., I_{OS} .

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1.4 Recommended operating conditions.

Supply voltage range (V_{CC}) - - - - -	4.5 V to 5.5 V
Minimum high level input voltage (V_{IH}) - - - - -	2.0 V dc
Maximum low level input voltage (V_{IL}) - - - - -	0.7 V dc
Maximum high level output current:	
RCO - - - - -	-1 mA
Q - - - - -	-1 mA
Maximum low level output current:	
RCO - - - - -	8 mA
Q - - - - -	12 mA
Counter clock frequency (f_{CCK}) - - - - -	0 MHz to 20 MHz
Register clock frequency (f_{RCK}) - - - - -	0 MHz to 25 MHz
Minimum counter clock pulse width (t_{WCCK}) - - -	25 ns
Minimum counter clear pulse width (t_{WCCLR}) - - -	20 ns
Minimum register clock pulse width (t_{WRCK}) - - -	20 ns
Minimum setup time (t_{su}):	
CCKEN low before CCK \uparrow - - - - -	20 ns
CCLR inactive before CCK \uparrow - - - - -	20 ns
CCK before RCK \uparrow 2/ - - - - -	40 ns
Minimum hold time (t_h) - - - - -	0 ns
Case operating temperature range (T_c) - - - - -	-55°C to +125°C

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.

2/ This setup time ensures the register will see stable data from the counter outputs. The clocks may be tied together in which case the register state will be one clock pulse behind the counter.

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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, 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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TABLE 1. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _C < +125°C unless otherwise specified	Group A subgroups	Limits		Unit	
				Min	Max		
High level output voltage	V _{OH}	V _{CC} = 4.5 V; I _{OH} = -1 mA V _{IN} = 0.7 V or 2.0 V	1,2,3	2.4		V	
Low level output voltage	V _{OL}	V _{CC} = 4.5 V; V _{IN} = 0.7 V or 2.0 V	I _{OL} = 8 mA RCO output	1,2,3	0.4	V	
			I _{OL} = 12 mA Q output	1,2,3	0.4	V	
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V; I _{IN} = -18 mA	1,2,3	-1.5		V	
High level input current	I _{IH1}	V _{CC} = 5.5 V; V _{IN} = 7.0 V	1,2,3	0.1		mA	
	I _{IH2}	V _{CC} = 5.5 V; V _{IN} = 2.7 V	1,2,3	20		μA	
Low level input current	I _{IL}	V _{CC} = 5.5 V; V _{IN} = 0.4 V	CCK input	1,2,3	-0.8	mA	
			All other inputs	1,2,3	-0.2	mA	
Short-circuit output current	I _{OS}	V _{CC} = 5.5 V; V _{OUT} = 0.0 V 1/	RCO output	1,2,3	-20	-100	mA
			Q output	1,2,3	-30	-130	mA
Off-state output current, high level voltage applied	I _{OZH}	V _{CC} = 5.5 V; V _{OUT} = 2.7 V V _{IN} = 0.7 V or 2.0 V	1,2,3	20		μA	
Off-state output current, low level voltage applied	I _{OZL}	V _{CC} = 5.5 V; V _{OUT} = 0.4 V V _{IN} = 0.7 V or 2.0 V	1,2,3	-20		μA	

See footnote at end of table.

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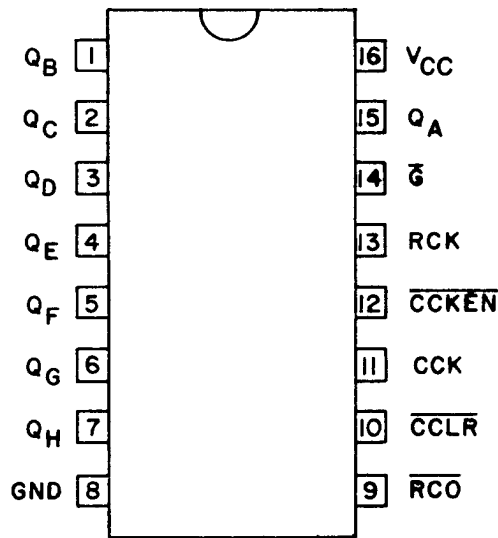
TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _C < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Supply current	I _{CC} H	V _{CC} = 5.5 V; All possible inputs grounded, all outputs open	1,2,3		55	mA
	I _{CC} L		1,2,3		65	mA
	I _{CC} Z		1,2,3		65	mA
Functional tests		See 4.3.1c	7			
Maximum count frequency	f _{MAX}	V _{CC} = 5.0 V R _L = 666Ω C _L = 45 pF	9	20		MHz
			10,11	12		MHz
Propagation delay time, CCK to RCO	t _{PLH1}	V _{CC} = 5.0 V R _L = 1 kΩ C _L = 30 pF See figure 4	9		22	ns
			10,11		31	ns
	t _{PHL1}		9		30	ns
			10,11		43	ns
Propagation delay time, CCLR to RCO	t _{PLH2}	9		45	ns	
		10,11		64	ns	
Propagation delay time, RCK to Q	t _{PLH3}	V _{CC} = 5.0 V R _L = 667Ω C _L = 45 pF See figure 4	9		18	ns
			10,11		26	ns
	t _{PHL3}		9		33	ns
			10,11		47	ns
Propagation delay time, G to Q	t _{PZH}	See figure 4	9		38	ns
			10,11		54	ns
	t _{PZL}		9		45	ns
			10,11		64	ns
Propagation delay time, G to Q	t _{PHZ}	V _{CC} = 5.0 V R _L = 667Ω C _L = 5 pF See figure 4	9		30	ns
			10,11		43	ns
	t _{PLZ}		9		38	ns
			10,11		54	ns

1/ Not more than one output should be shorted at a time and the duration of the short-circuit condition should not exceed one second.

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Cases E and F



Case 2

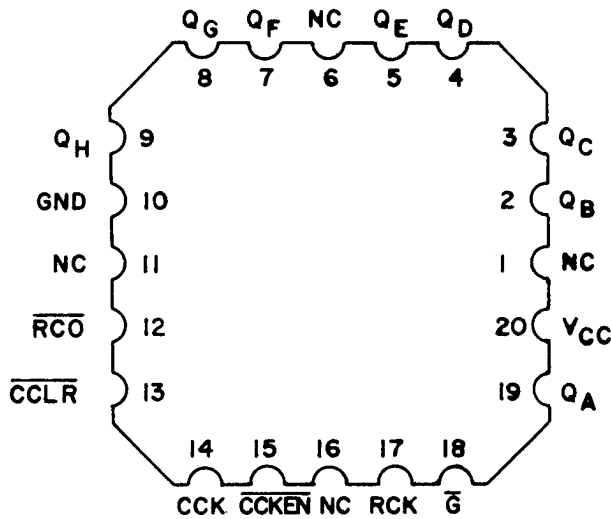


FIGURE 1. Terminal connections (top view).

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Inputs					Device state
\overline{G}	\overline{CCLR}	\overline{CCKEN}	CCK	RCK	
H	X	X	X	X	Disabled
L	L	X	X	↑	Clear
L	H	H	X	X	No change
L	H	L	↑	X	Internal count
L	H	L	↑	↑	External count

L = Low level voltage
 H = High level voltage
 X = Irrelevant
 ↑ = Low to high clock transition.

FIGURE 2. Truth table.

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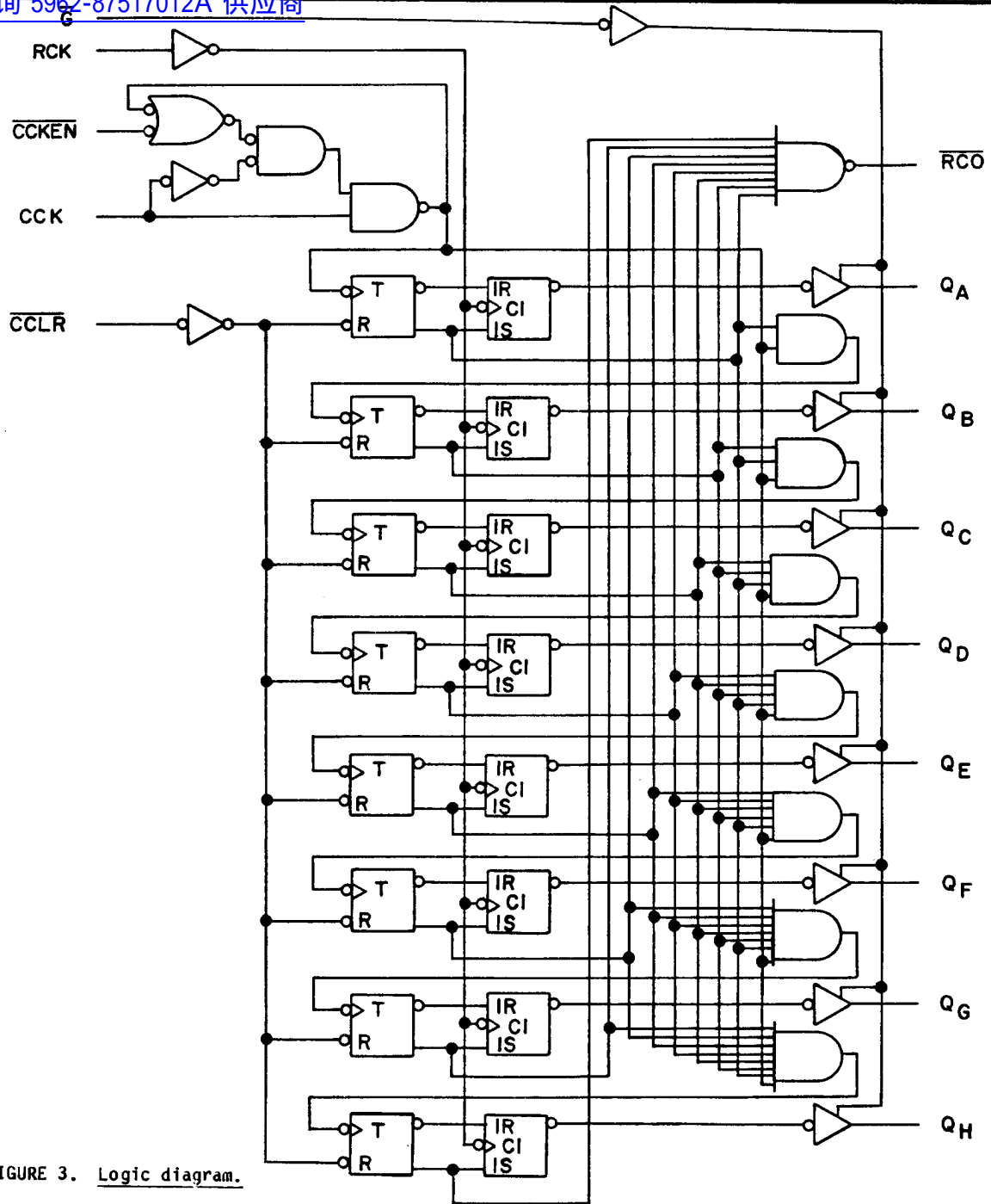
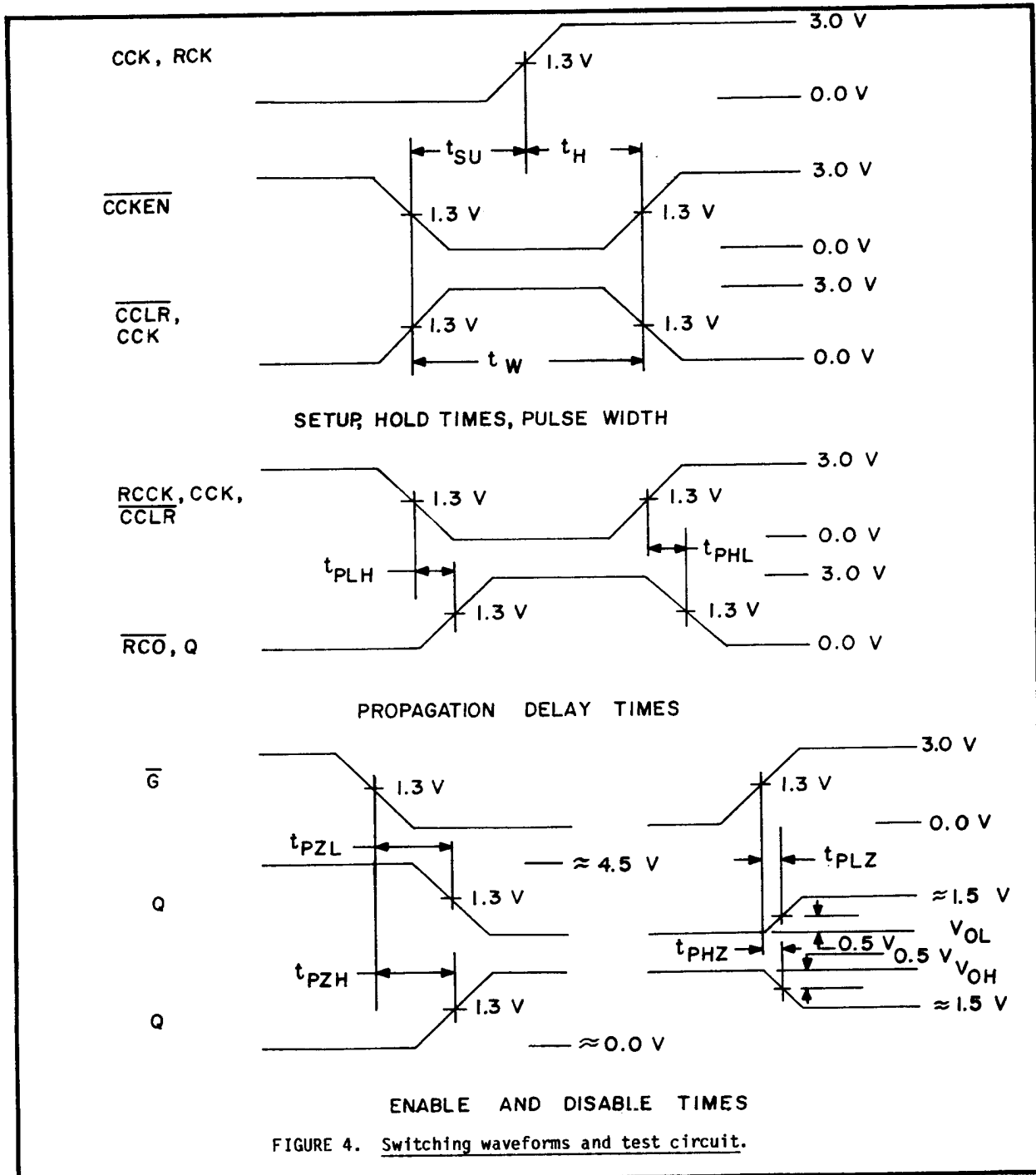


FIGURE 3. Logic diagram.

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DESC FORM 193A
SEP 87

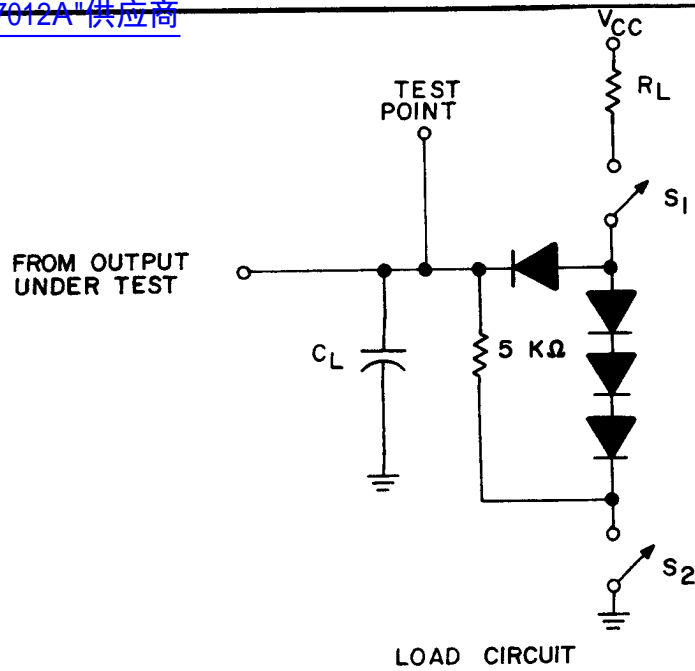
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SEP 87

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NOTES:

1. The pulse generator shall have the following characteristics: $PRR \leq 1 \text{ MHz}$; $t_p \leq 15 \text{ ns}$; $t_r \leq 6 \text{ ns}$.
2. C_L includes scope probe, wiring, and stray capacitance without the package in the test fixture.
3. All diodes are 1N3064, 1N916, or equivalent.
4. Switches S_1 and S_2 shall be set for enable and disable time tests as follows:
 - t_{PZL} : S_1 closed, S_2 open
 - t_{PZH} : S_1 open, S_2 closed
 - t_{PLZ} and t_{PHZ} : S_1 and S_2 closed

FIGURE 4. Switching times and test circuit - Continued.

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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, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 7 tests shall verify the truth table 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, 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 appendix B of MIL-M-38510 and 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)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 9, 10, 11**
Groups C and D end-point electrical parameters (method 5005)	1

*PDA applies to subgroup 1.

**Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

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

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has 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 similar part number ^{1/}
5962-8751701EX	01295	SNJ54LS590J
5962-8751701FX	01295	SNJ54LS590W
5962-87517012X	01295	SNJ54LS590FK

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

Vendor CAGE number

01295

Vendor name and address

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

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