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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 <i>Tim Id. Noh</i> CHECKED BY <i>Tim Id. Noh</i> APPROVED BY <i>William K. Beckman</i> DRAWING APPROVAL DATE 6 SEPTEMBER 1989 REVISION LEVEL	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUITS, DIGITAL, BIPOLAR, ADVANCED LOW POWER SCHOTTKY TTL, 8-BIT D-TYPE EDGE-TRIGGERED READ BACK LATCHES, MONOLITHIC SILICON <table style="width: 100%;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 35%;">CAGE CODE 67268</td> <td style="width: 50%;">5962-89945</td> </tr> </table>	SIZE A	CAGE CODE 67268	5962-89945
SIZE A	CAGE CODE 67268	5962-89945			
		SHEET 1 OF 14			

DESC FORM 193
SEP 87

• U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

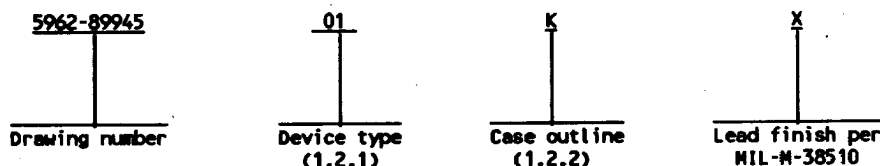
5962-E1506

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

Device type	Generic number	Circuit function
01	54ALS996	8-bit D-type edge-triggered read back latches

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
K	F-6 (24-lead, .640" x .420" x .090"), flat package
L	D-9 (24-lead, 1.280" x .310" x .200"), dual-in-line package
3	C-4 (28-terminal, .460" x .460" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
DC input voltage (G, RD, EN, CLK and T/C)	+7.0 V dc
Voltage applied to D and to disabled three-state outputs	+5.5 V dc
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C
Maximum power dissipation (P_D) 1/	467.5 mW
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	+4.5 V dc to +5.5 V dc
Minimum high level input voltage (V_{IH}):	
\bar{G} and \bar{RD}	+2.2 V dc
All others	+2.0 V dc
Maximum low level input voltage (V_{IL})	0.8 V
Case operating temperature range (T_C)	-55°C to +125°C

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

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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89945

REVISION LEVEL

SHEET 2

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.

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 Test circuit and switching waveforms. The test circuit and switching waveforms 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 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-BUL-103 (see 6.6 herein).

**STANDARDIZED
MILITARY DRAWING**
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89945

REVISION LEVEL

SHEET 3

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1965-550-547

TABLE 1. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _C ≤ +125°C unless otherwise specified		Group A Subgroup	Limits		Unit
					Min	Max	
High level output voltage	V _{OH}	V _{CC} = 4.5 V, I _{OH} = -0.4 mA	All outputs	1,2,3	2.5		V
		V _{CC} = 4.5 V, I _{OH} = -1.0 mA	Qn outputs		2.4		
Low level output voltage	V _{OL}	V _{CC} = 4.5 V	I _{OL} = 12 mA	1,2,3		0.4	V
			I _{OL} = 4.0 mA			0.4	
Input clamp voltage	V _{IC}	V _{CC} = 4.5 V, I _{IC} = -18 mA		1,2,3		-1.2	V
Output current	I _O	V _{CC} = 5.5 V, $\overline{\text{CLR}}$ = 2.5 V V _{OUT} = 2.25 V 1/		1,2,3	-30	-112	mA
Off-state output current	I _{OZH}	V _{CC} = 5.5 V, V _{OUT} = 2.7 V		1,2,3		20	μA
	I _{OZL}	V _{CC} = 5.5 V, V _{OUT} = 0.4 V		1,2,3		-20	μA
High level input current	I _{IH1}	V _{CC} = 5.5 V, V _{IN} = 5.5 V	Dn inputs	1,2,3		0.1	mA
		V _{CC} = 5.5 V, V _{IN} = 7.0 V	All other inputs			0.1	
	I _{IH2}	V _{CC} = 5.5 V V _{IN} = 2.7 V 2/	Dn inputs	1,2,3		20	μA
			All other inputs			20	
Low level input current	I _{IL}	V _{CC} = 5.5 V V _{IN} = 0.4 V 2/	Dn inputs	1,2,3		-0.1	mA
			All other inputs			-0.1	
Supply current	I _{CC}	V _{CC} = 5.5 V	Outputs high	1,2,3		55	mA
			Outputs low			85	
			Outputs disabled			65	

See footnotes at end of table.

**STANDARDIZED
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 DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

 SIZE
A

5962-89945

REVISION LEVEL

SHEET 4

 DESC FORM 193A
SEP 87

* U. S. GOVERNMENT PRINTING OFFICE: 1968-580-547

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	
Maximum operating frequency	f _{max}	V _{CC} = 4.5 V to 5.5 V C _L = 50 pF R _L = 500Ω see figure 4	9,10,11	35		MHz
Setup time	t _s		9,10,11	15		ns
				10		
				15		
				10		
Hold time	t _h		9,10,11	0		ns
				5		
				5		
Pulse duration	t _w		9,10,11	10		ns
				14.5		
				14.5		
Propagation delay time, CLK to any Qn	t _{PLH1}		9,10,11	5	30	ns
	t _{PHL1}			5	24	
Propagation delay time, CLR to any Qn	t _{PLH2}		9,10,11	5	27	ns
	t _{PHL2}			5	23	
Propagation delay time, T/C to any Qn	t _{PLH3}		9,10,11	5	23	ns
	t _{PHL3}			5	23	
Propagation delay time, CLR to any Dn	t _{PHL4}		9,10,11	5	30	ns
Output enable time, RD to any Dn	t _{PZH1}		9,10,11	2	17	ns
	t _{PZL1}			2	17	

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89945	
		REVISION LEVEL	SHEET 5

DESC FORM 193A
SEP 87

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _a ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Output disable time, RD to any Dn	t _{PHZ1}	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500Ω, see figure 4	9,10,11	2	19	ns
	t _{PLZ1}			2	19	
Output enable time, EN to any Dn	t _{PZH2}		9,10,11	2	16	ns
	t _{PZL2}			2	16	
Output disable time, EN to any Dn	t _{PHZ2}		9,10,11	2	19	ns
	t _{PLZ2}			2	19	
Output enable time, G to Qn	t _{PZH3}		9,10,11	2	15	ns
	t _{PZL3}			2	15	
Output disable time, G to Qn	t _{PHZ3}		9,10,11	1	11	ns
	t _{PLZ3}			1	11	

1/ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

2/ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

**STANDARDIZED
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89945

REVISION LEVEL

SHEET 6

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1985-550-547

Device type	01	
Case outlines	L and K	3
Terminal number	Terminal symbol	
1	D1	NC
2	D2	D1
3	D3	D2
4	D4	D3
5	D5	D4
6	D6	D5
7	D7	D6
8	D8	NC
9	EN	D7
10	RD	D8
11	CLK	EN
12	GND	RD
13	CLR	CLK
14	T/C	GND
15	G	NC
16	Q8	CLR
17	Q7	T/C
18	Q6	G
19	Q5	Q8
20	Q4	Q7
21	Q3	Q6
22	Q2	NC
23	Q1	Q5
24	V _{CC}	Q4
25	---	Q3
26	---	Q2
27	---	Q1
28	---	V _{CC}

NC = No internal connection

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89945
		REVISION LEVEL	SHEET 7

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1988-650-547

Inputs							Output
\overline{G}	T/\overline{C}	\overline{CLR}	\overline{RD}	\overline{EN}	CLK	D_n	Q_n
H	X	X	X	X	X	X	Z
L	H	H	H	L	↑	X	D
L	X	H	L	L	X	Readback	D
L	X	L	X	X	X	X	L
L	X	H	L	H	H	Disable	Q_0
L	L	H	H	L	↑	X	\overline{D}

H = High voltage level

L = Low voltage level

X = Irrelevant

↑ = Transition from low to high

Q_0 = Q level before steady-state input conditions were established

NOTE: Transitions on \overline{EN} should only be made with CLK high in order to prevent false clocking.

FIGURE 2. Truth table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89945
		REVISION LEVEL	SHEET 8

DESC FORM 193A
SEP 87

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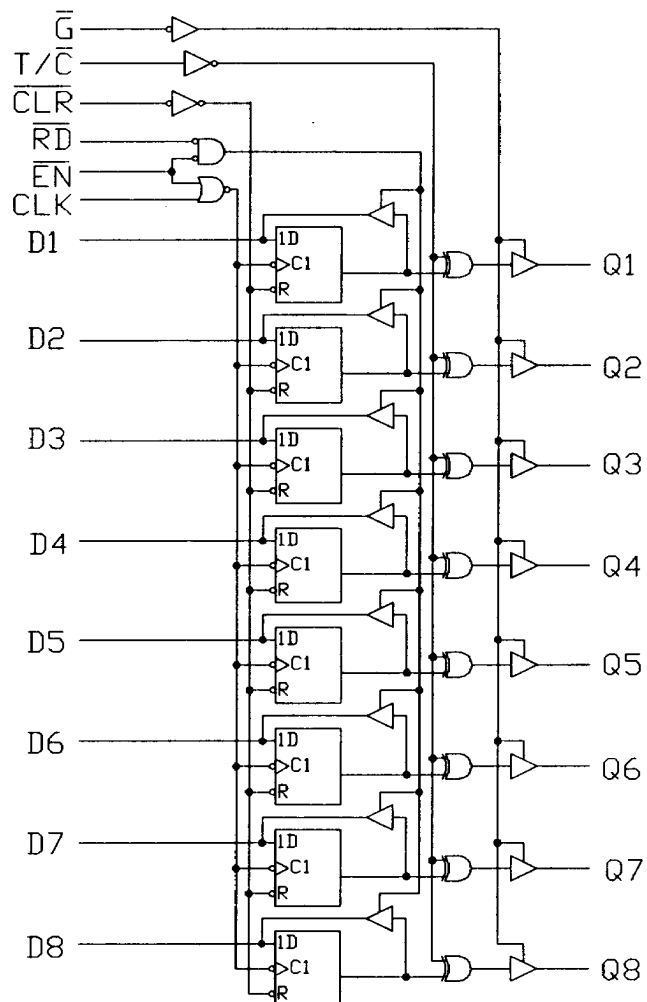


FIGURE 3. Logic diagram.

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		REVISION LEVEL	SHEET 9

DESC FORM 193A
SEP 87

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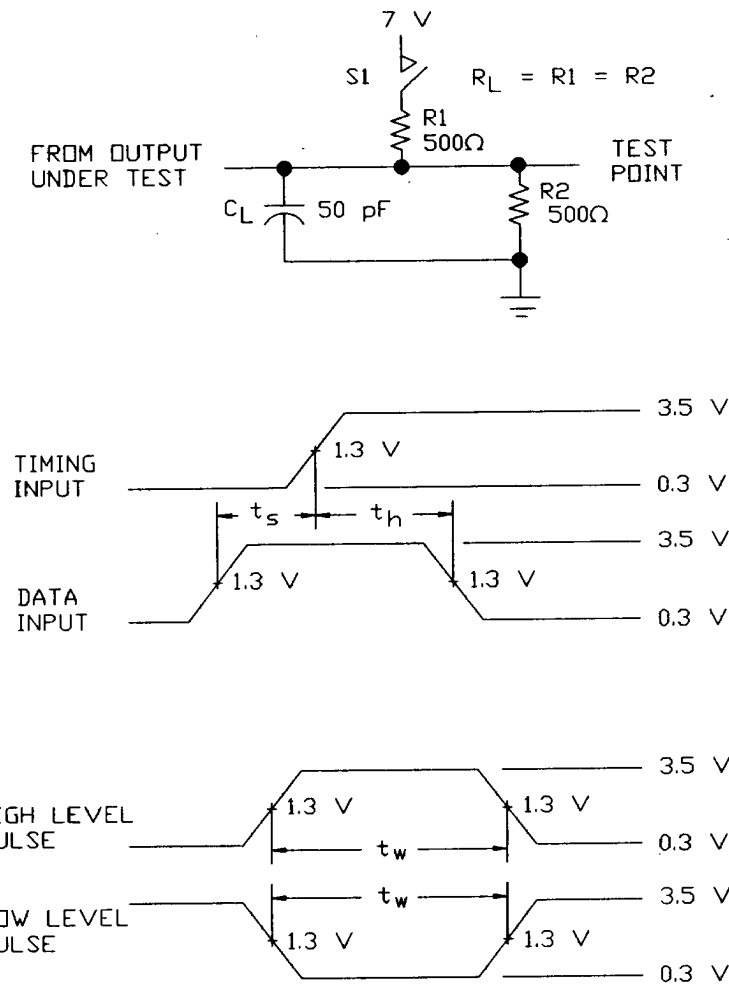


FIGURE 4. Test circuit and switching waveforms.

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SIZE
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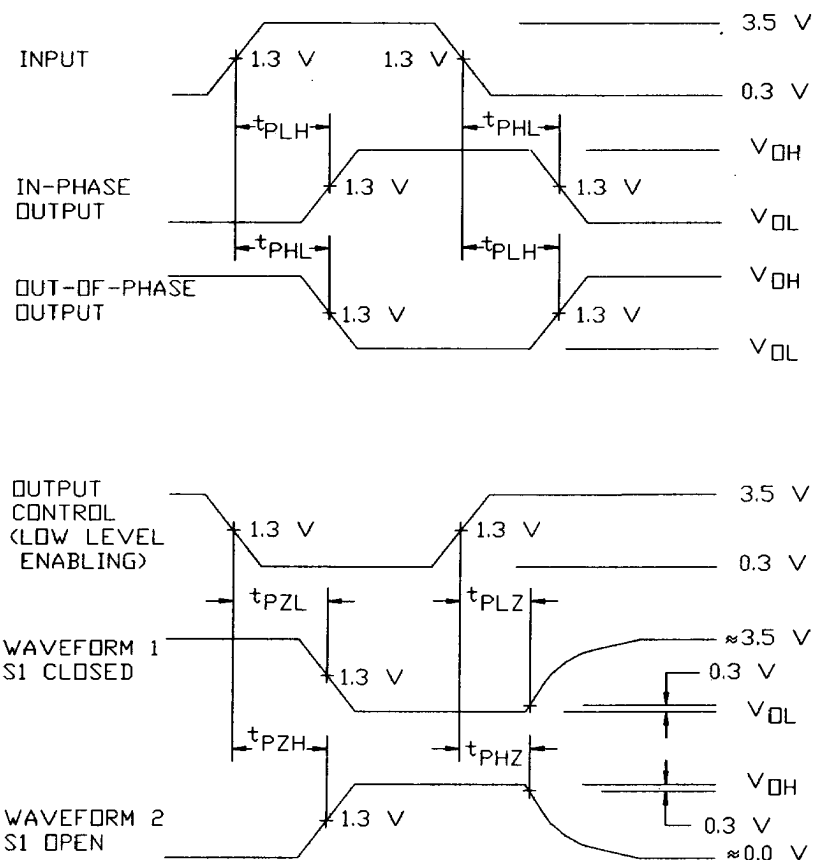
5962-89945

REVISION LEVEL

SHEET 10

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1988-580-547



NOTES:

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

FIGURE 4. Test circuit and switching waveforms - Continued.

**STANDARDIZED
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89945

REVISION LEVEL

SHEET 11

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1988-550-547

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-ECC 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-ECC 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-H-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 3.6 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 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 2.

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.

STANDARDIZED MILITARY DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5942-89945

REVISION LEVEL

SHEET 12

DESC FORM 193A
SEP 87

U. S. GOVERNMENT PRINTING OFFICE: 1985-550-547

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. 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-ECC, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone 513-296-8525.

**STANDARDIZED
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89945

REVISION LEVEL

SHEET 13

DESC FORM 193A
SEP 87

• U. S. GOVERNMENT PRINTING OFFICE: 1968-850-547

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

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8994501KX	01295	SNJ54ALS996W
5962-8994501LX	01295	SNJ54ALS996J
5962-89945013X	01295	SNJ54ALS996FK

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 60448
Midland, TX 79711-0448

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89945	
		REVISION LEVEL	SHEET 14

DESC FORM 193A
SEP 87

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