REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Technical changes in table I. Editorial changes throughout.	1989 SEP 12	Wackman

REV																									
SHEET																									
REV																									
SHEET																									
REV STATUS OF SHEETS	REV	A	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	13											

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: Larry T. Gauder

CHECKED BY: Tim M. Noh

APPROVED BY: William K. Heckman

DRAWING APPROVAL DATE: 27 JULY 1987

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, DIGITAL, BIPOLAR, ADVANCED SCHOTTKY TTL, BUS TRANSCEIVER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-87595

SHEET 1 OF 13

DESC FORM 193
SEP 87

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

5962-E1473

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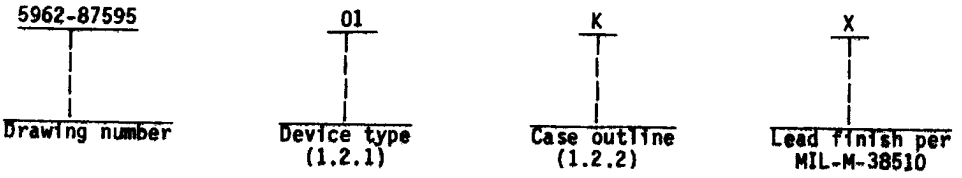
1. SCOPE

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

Device type	Generic number	Circuit function
01	54AS646	Octal bus transceiver and register with three-state 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
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 (V_{CC})	-0.5 V dc to +7.0 V dc
Input voltage:	
Control inputs	-1.2 V at -18 mA to +7.0 V dc
I/O ports	-1.2 V at -18 mA to +5.5 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	1.16 W
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

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	4.5 V dc to 5.5 V dc
Minimum high level input voltage (V_{IH})	2.0 V
Maximum low level input voltage (V_{IL})	0.8 V
Case operating temperature range (T_C)	-55°C to +125°C
Width of clock pulse (t_w)	7 ns minimum
Setup time before clock (t_s)	7 ns minimum
Hold time after clock (t_h)	0 ns minimum
Maximum clock frequency (f_{MAX})	75 MHz

1/ Must withstand the added P_D due to short-circuit test (e.g., I_O).

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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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA		1		-1.2	V
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 32 mA		1, 2, 3		0.5	V
High level output voltage	V_{OH}	V_{CC} = 4.5 V to 5.5 V, I_{OH} = -2 mA		1, 2, 3	2.5		V
		V_{CC} = 4.5 V	I_{OH} = -3 mA	1, 2, 3	2.4		V
			I_{OH} = -12 mA	1, 2, 3	2.0		V
Low level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V	Control inputs	1, 2, 3		-0.5	mA
			A or B ports 1/	1, 2, 3		-0.75	mA
High level input current	I_{IH1}	V_{CC} = 5.5 V, V_{IN} = 2.7 V	Control inputs	1, 2, 3		20	µA
			A or B ports 1/	1, 2, 3		70	µA
	I_{IH2}	V_{CC} = 5.5 V	Control inputs	1, 2, 3		0.1	mA
			A or B ports	1, 2, 3		0.1	mA
Output current	I_O	V_{CC} = 5.5 V, V_O = 2.25 V 2/		1, 2, 3	-30	-112	mA
Supply current	I_{CCH}	V_{CC} = 5.5 V, outputs high		1, 2, 3		195	mA
	I_{CCL}	V_{CC} = 5.5 V, outputs low		1, 2, 3		211	mA
	I_{CCZ}	V_{CC} = 5.5 V, outputs disabled		1, 2, 3		211	mA
Functional tests		See 4.3.1c		7, 8			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Propagation delay time, CBA or CAB to A or B	t_{PLH1}	V_{CC} = 4.5 V to 5.5 V C_L = 50 pF ±10% R_1 = 500Ω ±5% R_2 = 500Ω ±5% (See figure 4)	9, 10, 11	2	9.5	ns
	t_{PHL1}		9, 10, 11	2	10	ns
Propagation delay time, A or B to B or A	t_{PLH2}		9, 10, 11	2	11.5	ns
	t_{PHL2}		9, 10, 11	1	8	ns
Propagation delay time, SBA or SAB to A or B 3/	t_{PLH3}		9, 10, 11	2	13.5	ns
	t_{PHL3}		9, 10, 11	2	11	ns
Propagation delay time, enable time, $\overline{G}$ to A or B	t_{PZH1}		9, 10, 11	2	11	ns
	t_{PZL1}		9, 10, 11	3	15	ns
Propagation delay time, disable time, $\overline{G}$ to A or B	t_{PHZ1}		9, 10, 11	2	11	ns
	t_{PLZ1}		9, 10, 11	2	11	ns
Propagation delay time, enable time, DIR to A or B	t_{PZH2}		9, 10, 11	3	21	ns
	t_{PZL2}		9, 10, 11	3	24	ns
Propagation delay time, disable time, DIR to A or B	t_{PHZ2}		9, 10, 11	2	12	ns
	t_{PLZ2}		9, 10, 11	2	12	ns

1/ For I/O ports, the low level input current, I_{IL}, and high level input current, I_{IH}, include the off-state output current.
2/ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit output current, I_{OS}.
3/ These tests are performed with the internal output state of the storage register opposite to that of the bus input.

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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).

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. Off-shore documentation shall be made available on-shore 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 3.6 herein).

(2) T_A = +125°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.

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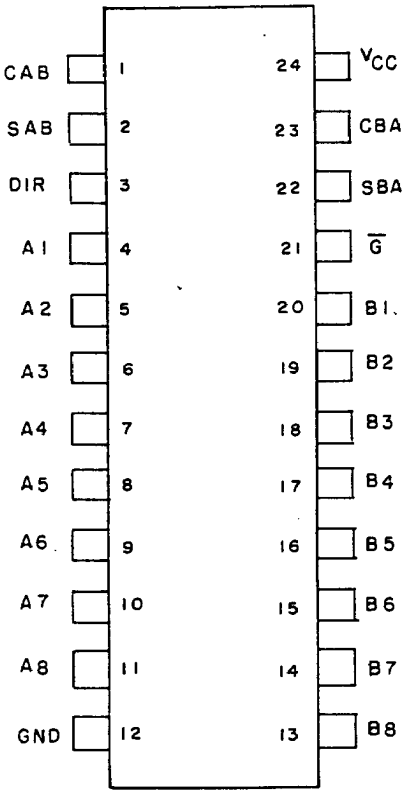
Cases L and K



Case 3

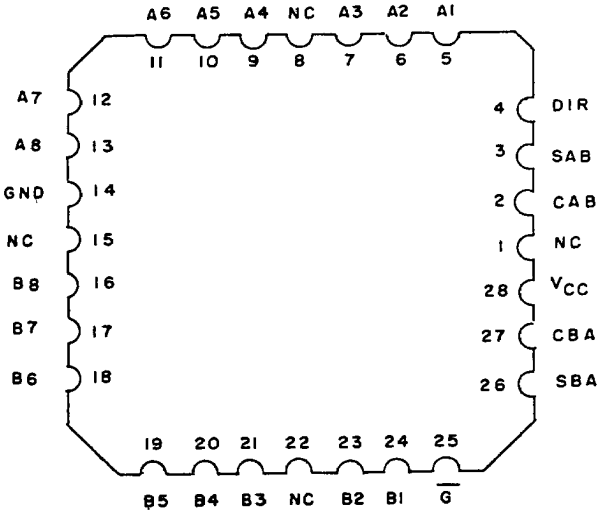


FIGURE 1. Terminal connections (top view).

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Inputs						Data I/O		Operation or function
$\overline{G}$	DIR	CAB	CBA	SAB	SBA	A1 through A8	B1 through B8	
X	X	↑	X	X	X	Input	Unspecified†	Store A, B unspecified†
X	X	X	↑	X	X	Unspecified†	Input	Store B, A unspecified†
H	X	↑	↑	X	X	Input	Input	Store A, B data
H	X	H/L	H/L	X	X			Isolation, hold storage
L	L	X	X	X	L	Output	Input	Real-time B data to A bus
L	L	X	H/L	X	H			Stored B data to A bus
L	H	X	X	L	X	Input	Output	Real-time A data to B bus
L	H	H/L	X	H	X			Stored A data to B bus

† The data output functions may be enabled or disabled by various signals at the $\overline{G}$ and DIR inputs. Data input functions are always enabled, i.e., data at the bus pins will be stored on every low-to-high transition on the clock inputs.

H = High voltage level
L = Low voltage level
↑ = Low-to-high transition
X = Irrelevant
H/L = High or low voltage level

FIGURE 2. Truth table.

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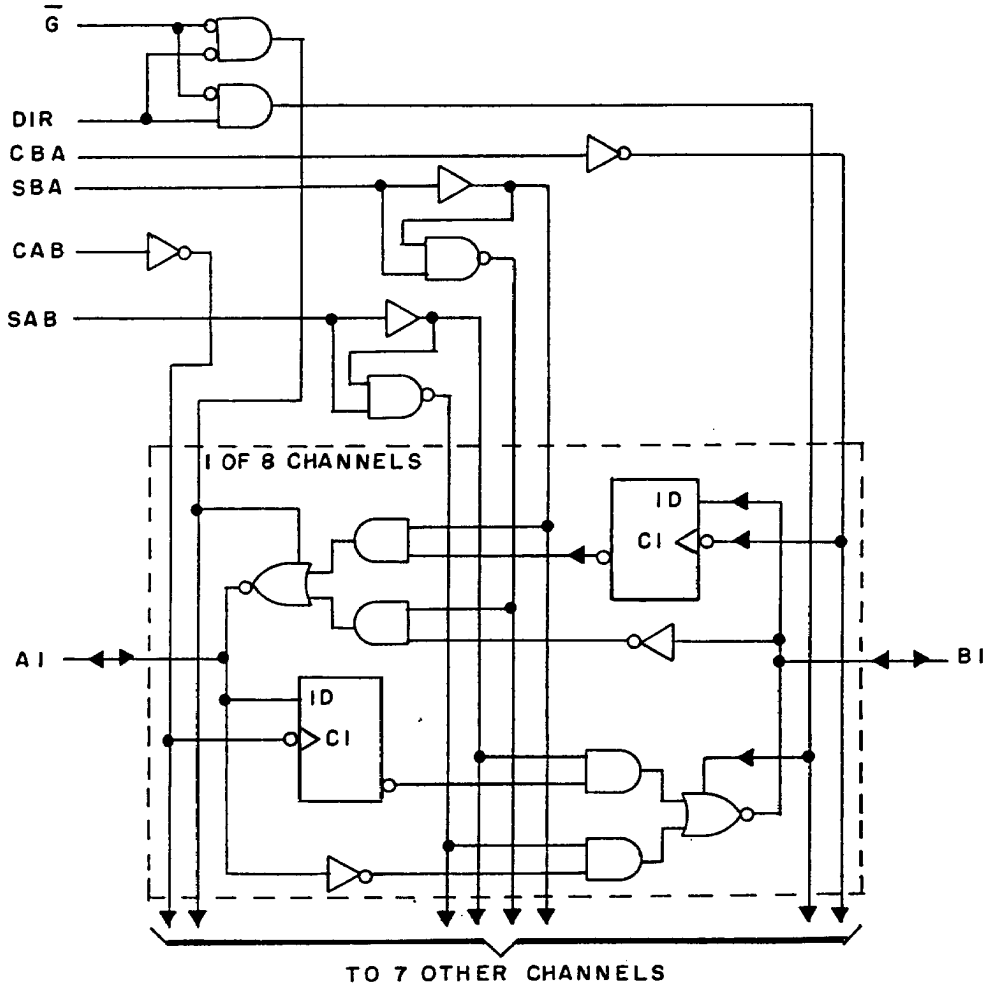

FIGURE 3. Logic diagram.

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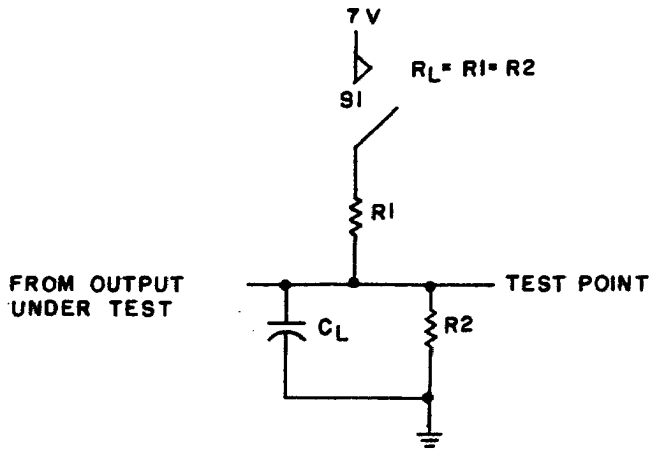
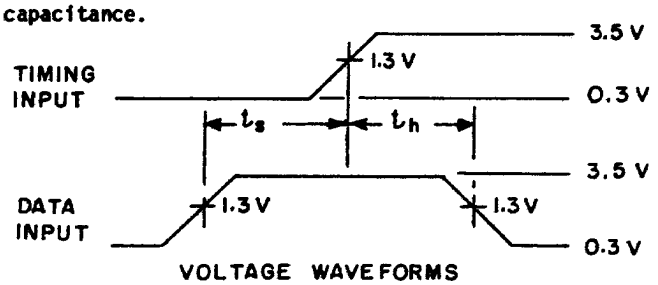


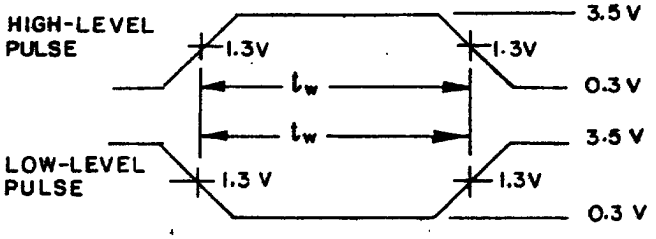
TEST CIRCUIT

NOTE: C_L includes probe and jig capacitance.



VOLTAGE WAVEFORMS

SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS

PULSE DURATIONS

FIGURE 4. Test circuit and switching waveforms.

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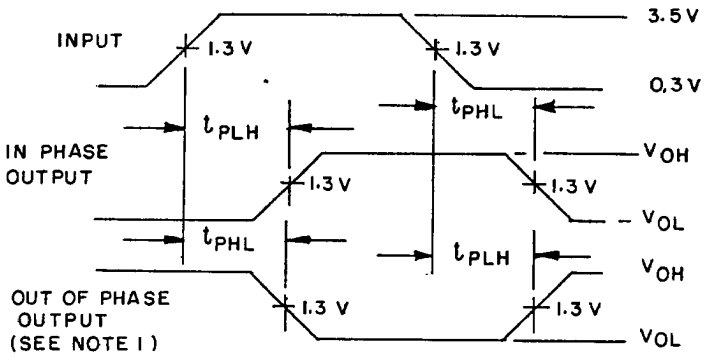
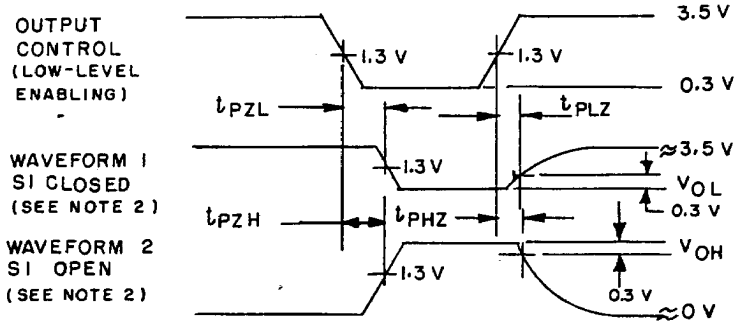


VOLTAGE WAVEFORMS

PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS

ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS

NOTES:

1. When measuring propagation delay items of three-state outputs, switch S1 is open.
2. 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.
3. All input pulses have the following characteristics: PRR $\leq$ 1 MHz, $t_r = t_f = 2$ ns, duty cycle = 50 percent.
4. The outputs are measured one at a time with one input transition per measurement.

FIGURE 4. Test circuit and switching waveforms - Continued.

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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
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.

4.3.2 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°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.

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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 513-296-5375.

6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added 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/
5962-8759501KX	01295	SNJ54AS646W
5962-8759501LX	01295	SNJ54AS646JT
5962-87595013X	01295	SNJ54AS646FK

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	Vendor name and address
01295	Texas Instruments, Incorporated PO Box 60448 Midland, TX 79711-0448

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