REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																											
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	SHEET	1	2	3	4	5	6	7	8	9	10	11	12														

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: Kenneth Rice

CHECKED BY: Wm Johnson

APPROVED BY:

DRAWING APPROVAL DATE: 91-08-23

REVISION LEVEL:

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, MEMORY, BIPOLAR, ECL PROGRAMMABLE LOGIC DEVICE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-90573

SHEET 1 OF 12

DESC FORM 193
SEP 87

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

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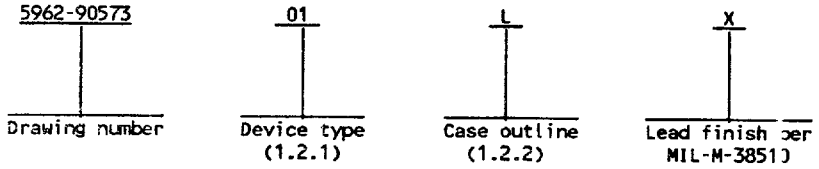
1. SCOPE

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 or Identifying number (PIN). The complete PIN shall be as shown in the following example:



1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

Device types	Generic number 1/	Circuit function	Propagation delay
01	10E301	16-input 8-output combinatorial PLD	5 ns
02	10E302	16-input 4-output combinatorial PLD	4 ns

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

Outline letter	Case outline
L	D-9 (24-lead, 1.280" x .310" x .200"), dual-in-line package
X	See figure 1, (28-lead, .458" x .458" x .180"), J-leaded chip carrier

1.3 Absolute maximum ratings.

Supply voltage range V_{EE} to V_{CC}	-7.0 V dc to +0.5 V dc
DC Input voltage range	V_{EE} to +0.5 V dc
Output current	-50 mA
Maximum power dissipation	1.31 W
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case outline L	See MIL-M-38510, appendix C
Case outline X	20°C/W 2/
Junction temperature (T_J)	+175°C
Storage temperature range	-65°C to +150°C
Temperature under bias	-55°C to +125°C

1/ Generic numbers are listed on the Standardized Military Drawing Source Approval Bulletin at the end of this document and will also be listed in MIL-BUL-103.
2/ When the thermal resistance for this case is specified in MIL-M-38510, appendix C, that value shall supersede the value indicated herein.

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1.4 Recommended operating conditions.

Supply voltage (V_{EE})	-5.46 V dc to -4.94 V dc
Minimum high level input voltage (V_{IH}):	
T_A = +25°C	-0.810 V
T_C = +125°C	-0.700 V
T_C = -55°C	-0.920 V
Maximum low-level input voltage (V_{IL}):	
T_A = +25°C	-1.950 V
T_C = +125°C	-1.950 V
T_C = -55°C	-1.950 V
Case operating temperature range (T_C)	-55°C to +125°C

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 (SMDs).

(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 Case outline(s). The case outline(s) shall be in accordance with figure 1 and 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Truth tables. The truth tables shall be as specified on figure 3.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions V_{CC} = 0.0 V, -55°C≤T_C≤+125°C, -5.46 V ≤ V_{EE} ≤ -4.94 V unless otherwise specified	V_{IH}	V_{IL}	Group A subgroups	Device type	Limits Min	Limits Max	Unit
Output high voltage 1/	V_{OH}	Outputs terminated through 50Ω to -2.0 V	-1.130	-1.480	1	All	-0.980	-0.810	V
			-1.050	-1.440	2		-0.900	-0.700	
			-1.270	-1.520	3		-1.140	-0.920	
Output low voltage 1/	V_{OL}	V_{CC} = 0.0 V, V_{EE} = -5.2 V	-1.130	-1.480	1	All	-1.950	-1.630	V
			-1.050	-1.440	2		-1.950	-1.590	
			-1.270	-1.520	3		-1.950	-1.650	
Input high voltage 1/	V_{IH}				1	All	-1.130	-0.810	V
					2		-1.050	-0.700	
					3		-1.270	-0.920	
Input low voltage 1/	V_{IL}				1	All	-1.950	-1.480	V
					2		-1.950	-1.440	
					3		-1.950	-1.520	
Input high current	I_{IH}	V_{IN} = V_{IH} Max.			1, 2, 3	All		220	uA
Input low current	I_{IL}	V_{IN} = V_{IL} Min. 2/			1, 2, 3	All	0.5		uA
Power supply current	I_{EE}	V_{EE} = -5.46 V, Inputs and outputs open			1, 2, 3	01		-240	mA
						02		-220	
Input capacitance	C_{IN} 3/	V_{EE} = -5.2 V, T_A = 25°C, f = 1MHz (See 4.3.1c)			4	All		10	pF
Output capacitance	C_{OUT} 3/	V_{EE} = -5.2 V, T_A = 25°C, f = 1MHz (See 4.3.1c)			4	All		10	pF
Functional tests		See 4.3.1d			7,8	All			
Input to output propagation delay	t_{PD}	See figures 4 and 5.			9, 10, 11	01		5.0	ns
						02		4.0	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions V_{CC} = 0.0 V, -55°C≤T_C≤+125°C -5.46 V ≤ V_{EE} ≤ -4.94 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output rise time	t_r	See figures 4 and 5.	9,10,11	All	0.35	1.5	ns
Output fall time	t_f		9, 10, 11	All	0.35	1.5	ns

1/ Subgroup 1 specified at T_A = +25°C.
2/ Input (I) pins only.
3/ Tested initially and after any design or process changes that affect that parameter, and therefore shall be guaranteed to the limits specified in table I.

3.2.3.1 Unprogrammed devices. The truth table for unprogrammed devices for contracts involving no altered item drawing shall be as specified on figure 2. When required in groups A, C, or D (see 4.3), the devices shall be programmed by the manufacturer prior to test. A minimum of 50 percent of the total number of fuses shall be programmed or at least 25 percent of the total number of cells to any altered item drawing.

3.2.3.2 Programmed devices. The truth table for programmed devices shall be as specified by an attached altered item drawing.

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 PIN listed in 1.2 herein. In addition, the manufacturer's PIN 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-ECS 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-ECS 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.

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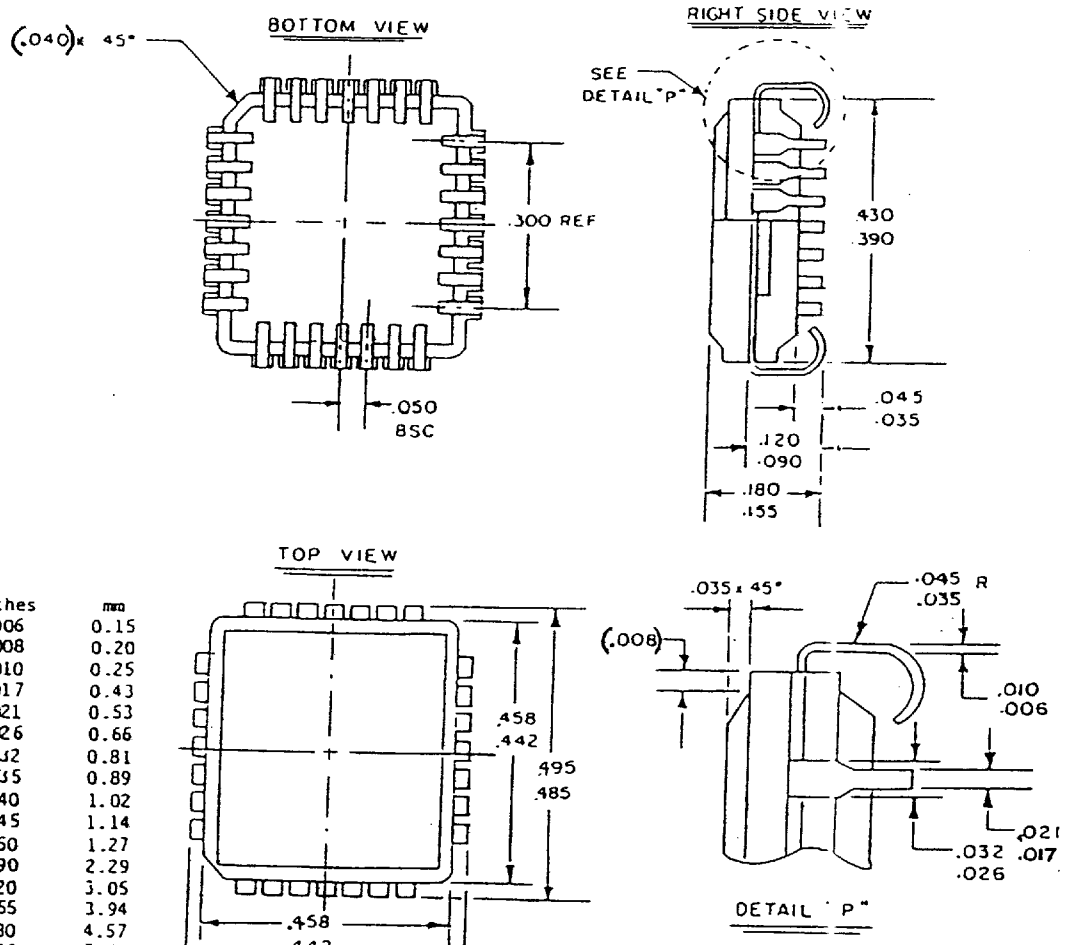

Inches	mm
.006	0.15
.008	0.20
.010	0.25
.017	0.43
.021	0.53
.026	0.66
.032	0.81
.035	0.89
.040	1.02
.045	1.14
.050	1.27
.090	2.29
.120	3.05
.155	3.94
.180	4.57
.300	7.62
.442	11.23
.485	12.32
.492	12.50

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 1. Case X (28-lead, .458" x .458" x .180"), J-leaded chip carrier package.

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Device types	01		02	
Case outlines	L	X	L	X
Terminal number	Terminal symbol			
1	I	NC	I	NC
2	I	I	I	I
3	I	I	I	I
4	I/O	I	I	I
5	O	I/O	O	I
6	V_{CC1}	O	V_{CC1}	O
7	O	V_{CC1}	O	V_{CC1}
8	I/O	NC	I	NC
9	I	O	I	O
10	I	I/O	I	I
11	I	I	I	I
12	V_{EE}	I	V_{EE}	I
13	I	I	I	I
14	I	V_{EE}	I	V_{EE}
15	I	NC	I	NC
16	I	I	I	I
17	I/O	I	I	I
18	O	I	O	I
19	V_{CC2}	I	V_{CC2}	I
20	O	I/O	O	I
21	I/O	O	I	O
22	I	NC	I	NC
23	I	V_{CC2}	I	V_{CC2}
24	V_{CC}	O	V_{CC}	O
25	---	I/O	---	I
26	---	I	---	I
27	---	I	---	I
28	---	V_{CC}	---	V_{CC}

FIGURE 2. Terminal connections.

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Truth table	
Input pins I	Output pins O
X	L

NOTE:
X = Don't care

FIGURE 3. Truth table (unprogrammed).

Switching test loads

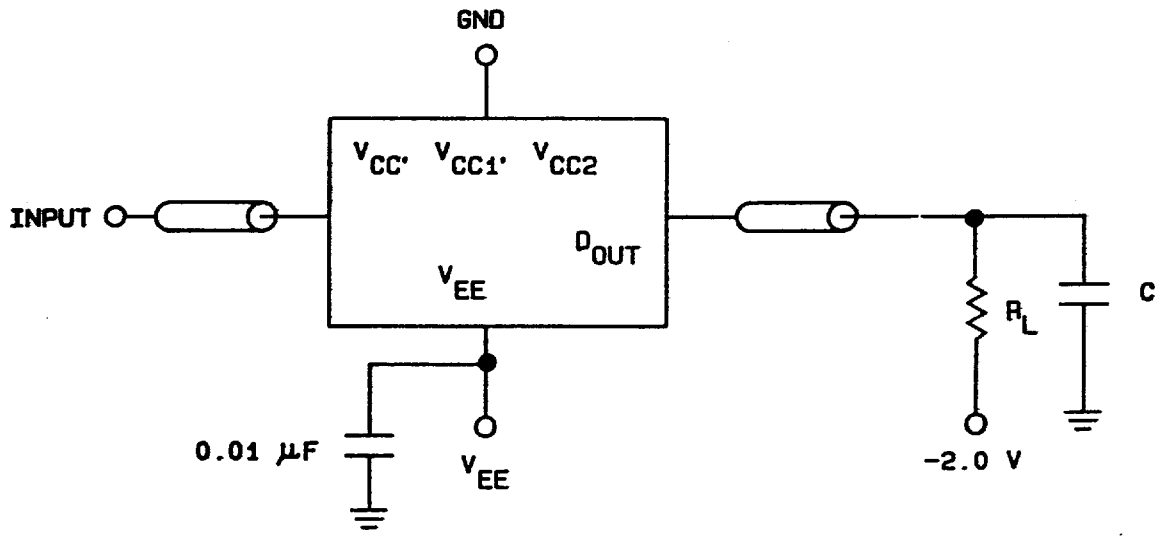

FIGURE 4. Test circuit and test conditions.

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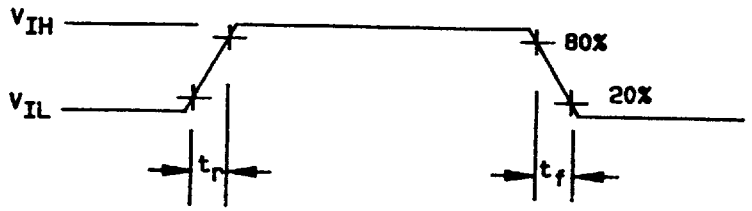
All input pulses



NOTES:
1. $V_{IL} = V_{IL}$ minimum, $V_{IH} = V_{IH}$ maximum.
2. $R_l = 50\Omega$, C < 5pF (includes fixture and stray capacitance).
3. All coaxial cables should be 50Ω with equal lengths. The delay of the coaxial cables should be nulled out of the measurement.
4. $t_r = t_f = 0.7$ ns for input pulses.
5. Propagation delay timing measurements are made from the 50% point of the input to 50% point of the output waveform.
6. Output t_r and t_f are measured at the 20% and 80% points of the output waveform.

FIGURE 4. Test circuit and test conditions - Continued.

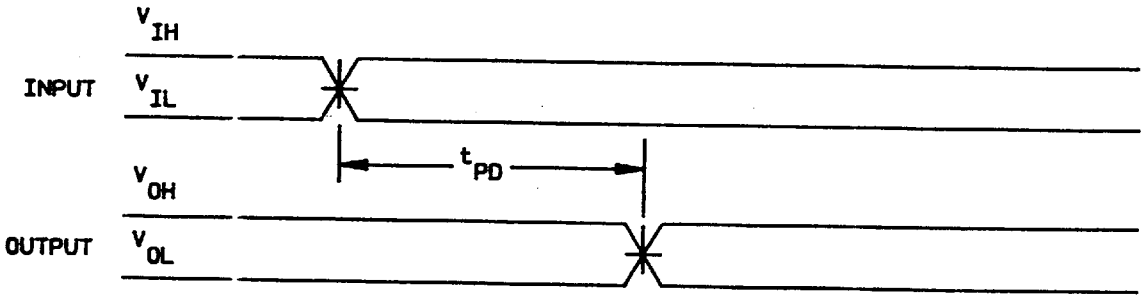


FIGURE 5. Switching waveforms.

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3.10 Processing options. Since the device is capable of being programmed by either the manufacturer or the user to result in a wide variety of configurations; two processing options are provided for selection in the contract, using an altered item drawing.

3.10.1 Unprogrammed device delivered to the user. All testing shall be verified through group A testing as defined in 3.2.3.1 and table II. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.10.2 Manufacturer-programmed device delivered to the user. All testing requirements and quality assurance provisions herein, including the requirements of the altered item drawing, shall be satisfied by the manufacturer prior to delivery.

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 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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} and C_{OUT} measurements) shall be measured only for the initial characterization and after any process or design changes which may affect input or output capacitance. Sample size is 15 devices with no failures, and all input and output terminals tested.

d. Subgroups 7, 8A, and 8B tests shall be sufficient to verify the truth table.

e. Unprogrammed devices shall be tested for programmability and ac performance compliance to the requirements of Group A, subgroups 9, 10, and 11. Either of two techniques is acceptable:

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TABLE II. Electrical test requirements. 1/ 2/ 3/ 4/

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (pre burn-in) (method 5004)	1
Final electrical test parameters (method 5004) for unprogrammed devices	1*,2,3,7*,8A, 8B
Final electrical test parameters (method 5004) for programmed devices	1*,2,3,7*,8A, 8B,9
Group A test requirements (method 5005)	1,2,3,4**,7, 8A,8B,9,10,11
Groups C and D end-point electrical parameters (method 5005)	2,3,7,8A,8B

1/ * indicates PDA applies to subgroups 1 and 7.
2/ Any or all subgroups may be combined when using high-speed testers.
3/ ** see 4.3.1c.
4/ Subgroups 7 and 8 functional tests shall also verify that no fuses are blown for unprogrammed devices or that the altered item drawing pattern exists for programmed devices (see table II).

(1) Testing the entire lot using additional built-in test circuitry which allows the manufacturer to verify programmability and ac performance without programming the user array. If this is done, the resulting test patterns shall be verified on all devices during subgroups 9, 10, and 11, group A testing per the sampling plan specified in MIL-STD-883, method 5005.

(2) If such compliance cannot be tested on an unprogrammed device, a sample shall be selected to satisfy programmability requirements prior to performing subgroups 9, 10, and 11. Twelve devices shall be submitted to programming (see 3.2.2.1). If more than two devices fail to program, the lot shall be rejected. At the manufacturers option, the sample may be increased to 24 total devices with no more than four total device failures allowable. Ten devices from the programmability sample shall be submitted to the requirements of group A, subgroup 9, 10, and 11. If more than two devices fail, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 20 total devices with no more than four total device failures allowable.

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 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.

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(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4 Programming procedures. The programming procedures shall be as specified by the device manufacturer and shall be made available upon request.

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 which SMD's are applicable to that system. 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 microelectronic devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6021.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.

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