

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Updated boilerplate. Added device type 03. Moved endurance and data retention testing requirements from Section 4 of drawing to Section 3 of drawing. Converted case outline "Y" to standard package. Editorial changes throughout.	94-03-31	M. A. Frye

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

REV																			
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REV STATUS OF SHEETS				REV			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	
PMIC N/A				PREPARED BY Kenneth Rice				DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444											
<b>STANDARDIZED MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A				CHECKED BY Ray Monnin				MICROCIRCUITS, MEMORY, DIGITAL, CMOS, 16K X 8 UV EPROM, MONOLITHIC SILICON											
				APPROVED BY D. R. Cool															
				DRAWING APPROVAL DATE 89-01-26				SIZE A			CAGE CODE 67268			5962-89537					
				REVISION LEVEL A				SHEET			1			OF			12		

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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

5962-E189-94

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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 type	Generic number	Circuit	Access time
01	(see 6.6)	16K x 8-bit UV EPROM	65 ns
02	(see 6.6)	16K x 8-bit UV EPROM	55 ns
03	(see 6.6)	16K x 8-bit UV EPROM	45 ns

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style 1/
Y	CDIP3-T28 or GDIP4-T28	28	Dual-in-line
Z	GDFP2-F28	28	Flat package
U	CQCC1-N32	32	Rectangular leadless chip carrier

1.2.3 Lead finish. The lead finish shall be as specified in MIL-STD-883 (see 3.1 herein). Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

## 1.3 Absolute maximum ratings.

Supply voltage range to ground potential ( $V_{CC}$ )	- - - - -	-0.5 V dc to +7.0 V dc
DC voltage range applied to the outputs in the high Z state	- - - - -	-0.5 V dc to +7.0 V dc
DC input voltage	- - - - -	-3.0 V dc to +7.0 V dc
Maximum power dissipation	- - - - -	1.0 W 2/
Lead temperature (soldering, 10 seconds)	- - - - -	+260°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ )	- - - - -	See MIL-STD-1835
Junction temperature ( $T_J$ )	- - - - -	+175°C
Storage temperature range ( $T_{STG}$ )	- - - - -	-65°C to +150°C
Temperature under bias	- - - - -	-55°C to +125°C
Data retention	- - - - -	10 years, minimum
Endurance	- - - - -	25 cycles/byte, minimum

## 1.4 Recommended operating conditions.

Case operating temperature ( $T_C$ )	- - - - -	-55°C to +125°C
Input high voltage range ( $V_{IH}$ )	- - - - -	+2.0 V dc
Input low voltage range ( $V_{IL}$ )	- - - - -	+0.8 V dc
Supply voltage ( $V_{CC}$ )	- - - - -	+4.5 V dc to +5.5 V dc

1/ Lid shall be transparent to permit ultraviolet light erasure.

2/ Must withstand the added  $P_D$  due to short circuit test; e.g.,  $I_{OS}$ .

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## 2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and bulletin. Unless otherwise specified, the following specification, standards, 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-I-38535 - Microcircuits, General Specification for.

### STANDARDS

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.  
MIL-STD-1835 - Microcircuit Case Outlines.

### BULLETIN

#### MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMD's).

(Copies of the specification, standards, 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. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-I-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-I-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-I-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-STD-883 (see 3.1 herein) and herein.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Truth table. The truth table shall be as specified on figure 2.

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, B, C, or D (see 4.3), the devices shall be programmed by the manufacturer prior to test with a checkerboard pattern or equivalent (a minimum of 50 percent of the total number of bits programmed) or to any altered item drawing pattern which includes at least 25 percent of the total number of bits programmed.

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, the electrical performance characteristics are as specified in table I and shall apply over the full case operating temperature range.

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3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical test 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 Processing EPROMS. All testing requirements and quality assurance provisions herein shall be satisfied by the manufacturer prior to delivery.

3.6.1 Erase of EPROMS. When specified, devices shall be erased in accordance with the procedures and characteristics specified in 4.4.

3.6.2 Programmability of EPROMS. When specified, devices shall be programmed to the specified pattern using the procedures and characteristics specified in 4.5.

3.6.3 Verification of state of EPROMS. When specified, devices shall be verified as either programmed to the specified pattern or erased. As a minimum, verification shall consist of performing a functional test (subgroup 7) to verify that all bits are in the proper state. Any bit that does not verify to be in the proper state shall constitute a device failure and shall be removed from the lot.

3.7 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-EC 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.

3.8 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.

3.9 Notification of change. Notification of change to DESC-EC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.10 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.

3.11 Endurance. A reprogrammability test shall be completed as part of the vendor's reliability monitors. This reprogrammability test shall be done for initial characterization and after any design or process changes which may affect the reprogrammability of the device. The methods and procedures may be vendor specific, but shall guarantee the number of program/erase endurance cycles listed in section 1.3 herein over the full military temperature range. The vendor's procedure shall be kept under document control and shall be made available upon request of the acquiring or preparing activity, along with test data.

3.12 Data retention. A data retention stress test shall be completed as part of the vendor's reliability monitors. This test shall be done for initial characterization and after any design or process change which may affect data retention. The methods and procedures may be vendor specific, but shall guarantee the number of years listed in section 1.3 herein over the full military temperature range. The vendor's procedure shall be kept under document control and shall be made available upon request of the acquiring or preparing activity, along with test data.

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TABLE 1. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>C</sub> ≤ +125°C 4.5 V dc ≤ V <sub>CC</sub> ≤ 5.5 V dc unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Output low voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OL</sub> = 16 mA, V <sub>CC</sub> = 4.5 V	1, 2, 3	All		0.5	V
Output high voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> , I <sub>OH</sub> = -4.0 mA, V <sub>CC</sub> = 4.5 V	1, 2, 3	All	2.4		V
Input high voltage 2/	V <sub>IH</sub>		1, 2, 3	All	2.0		V
Input low voltage 2/	V <sub>IL</sub>		1, 2, 3	All		0.8	V
Input leakage current	I <sub>IX</sub>	V <sub>IN</sub> = GND to 5.5 V	1, 2, 3	All	-10	+10	μA
Output leakage current	I <sub>OZ</sub>	V <sub>CC</sub> = 5.5 V, I <sub>OUT</sub> = 0 mA V <sub>OUT</sub> = GND and 5.5 V	1, 2, 3	All	-40	+40	μA
Output short circuit current	I <sub>OS</sub> 3/ 4/	V <sub>CC</sub> = 5.5 V, V <sub>OUT</sub> = 0.0 V	1, 2, 3	All	-20	-90	mA
Power supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V, I <sub>OUT</sub> = 0 mA f = 16.7 MHz Inputs cycling from 0 to 3 V	1, 2, 3	All		120	mA
Standby supply current	I <sub>SB</sub>	V <sub>CC</sub> = 5.5 V, I <sub>OUT</sub> = 0 mA, V <sub>IN</sub> = 2.0 V	1, 2, 3	All		35	mA
Input capacitance	C <sub>IN</sub> 4/	V <sub>IN</sub> = 0 V, V <sub>CC</sub> = 5.0 V f = 1 MHz, T <sub>A</sub> = +25°C See 4.3.1c	4	All		10	pF
Output capacitance	C <sub>OUT</sub> 4/	V <sub>OUT</sub> = 0 V, V <sub>CC</sub> = 5.0 V f = 1 MHz, T <sub>A</sub> = +25°C See 4.3.1c	4	All		10	pF
Functional tests		See 4.3.1e	7, 8A, 8B	All			
Address to output valid	t <sub>AA</sub>	See figures 4 and 5 V <sub>CC</sub> = 4.5 V	9, 10, 11	01		65	ns
				02		55	
				03		45	
Chip select active to output valid 5/	t <sub>ACS1</sub>		9, 10, 11	01		35	ns
				02		30	
				03		25	
Chip select active to output valid 6/	t <sub>ACS2</sub>		9, 10, 11	01		70	ns
				02		60	
				03		50	

See footnotes at end of table.

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TABLE 1A. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>C</sub> ≤ +125°C 4.5V ≤ V <sub>CC</sub> ≤ 5.5 V unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Chip select active to power-up 4/ 6/ 7/	t <sub>PU</sub>	See figures 4 and 5 V <sub>CC</sub> = 4.5 V	9, 10, 11	All	0		ns
Chip select inactive to power-down 4/ 6/ 7/	t <sub>PD</sub>		9, 10, 11	01		70	ns
				02		60	
				03		50	
Chip select inactive to high-Z 4/ 5/ 7/	t <sub>HZCS1</sub>		9, 10, 11	01		35	ns
				02		30	
				03		25	
Chip select inactive to high-Z 4/ 6/ 7/	t <sub>HZCS2</sub>		9, 10, 11	01		70	ns
				02		60	
				03		50	

- 1/ AC tests are performed with input rise and fall times of 5 ns or less, timing reference levels of 1.5 V, input pulse levels of 0 V to 3.0 V, and the output load in figure 4, circuit A.
- 2/ These are absolute values with respect to device ground and all overshoots due to system or tester noise are included.
- 3/ For test purposes, not more than one output at a time may be shorted. Short circuit test duration should not exceed one second.
- 4/ Tested initially and after any design or process change which may affect that parameter, and therefore shall be guaranteed to the limits specified in table 1.
- 5/ Parameter applies to CS<sub>2</sub>, CS<sub>3</sub>, and CS<sub>4</sub>.
- 6/ Parameter applies only to CS<sub>1</sub>.
- 7/ Transition is measured at steady-state high level -500 mV or steady-state low level +500 mV on the output from 1.5 V level on the input and the output load in figure 4, circuit B.

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Device types	01-03	
Case outlines	Y, Z	U
Terminal number	Terminal symbol	
1	A <sub>9</sub>	A <sub>9</sub>
2	A <sub>8</sub>	A <sub>8</sub>
3	A <sub>7</sub>	A <sub>7</sub>
4	A <sub>6</sub>	A <sub>6</sub>
5	A <sub>5</sub>	A <sub>5</sub>
6	A <sub>4</sub>	A <sub>4</sub>
7	A <sub>3</sub>	A <sub>3</sub>
8	A <sub>2</sub>	A <sub>2</sub>
9	A <sub>1</sub>	A <sub>1</sub>
10	A <sub>0</sub>	A <sub>0</sub>
11	O <sub>0</sub>	NC
12	O <sub>1</sub>	O <sub>0</sub>
13	O <sub>2</sub>	O <sub>1</sub>
14	GND	O <sub>2</sub>
15	O <sub>3</sub>	NC
16	O <sub>4</sub>	GND
17	O <sub>5</sub>	O <sub>3</sub>
18	O <sub>6</sub>	NC
19	O <sub>7</sub>	O <sub>4</sub>
20	CS <sub>4</sub>	O <sub>5</sub>
21	CS <sub>3</sub>	O <sub>6</sub>
22	CS <sub>2</sub>	O <sub>7</sub>
23	CS <sub>1</sub>	NC
24	A <sub>13</sub>	CS <sub>4</sub>
25	A <sub>12</sub>	CS <sub>3</sub>
26	A <sub>11</sub>	CS <sub>2</sub>
27	A <sub>10</sub>	CS <sub>1</sub>
28	V <sub>CC</sub>	A <sub>13</sub>
29	---	A <sub>12</sub>
30	---	A <sub>11</sub>
31	---	A <sub>10</sub>
32	---	V <sub>CC</sub>

NC = no connection

FIGURE 1. Terminal connections.

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Mode	$\overline{CS}_4$	$CS_3$	$\overline{CS}_2$	$\overline{CS}_1$	$A_{13} - A_0$	Power	Outputs
Read	$V_{IL}$	$V_{IH}$	$V_{IL}$	$V_{IL}$	X	$I_{CC}$	$D_{OUT}$
Output disable	X	X	X	$V_{IH}$	X	$I_{SB}$	High Z
Output disable	X	X	$V_{IH}$	X	X	$I_{CC}$	High Z
Output disable	X	$V_{IL}$	X	X	X	$I_{CC}$	High Z
Output disable	$V_{IH}$	X	X	X	X	$I_{CC}$	High Z

1/ X can be either  $V_{IL}$  or  $V_{IH}$ .

2/ For  $V_{pp}$  see 4.5.

FIGURE 2. Truth table.

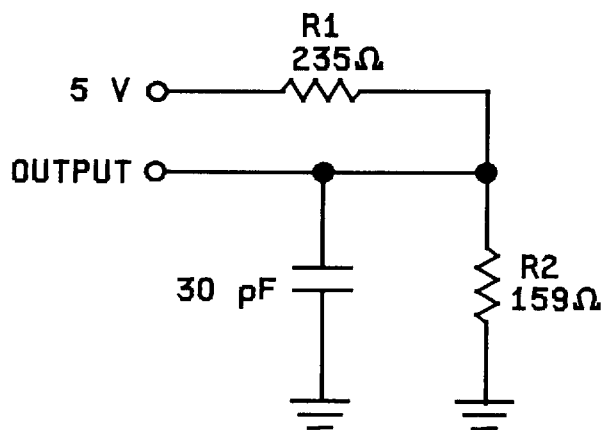
<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	<b>SIZE A</b>		<b>5962-89537</b>
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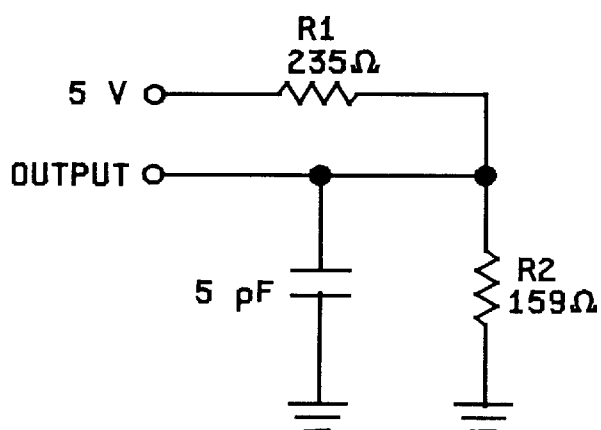
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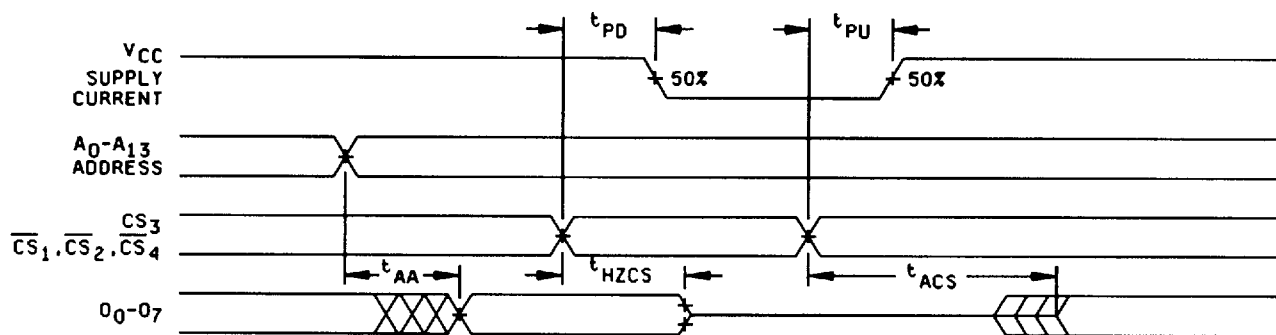
CIRCUIT A



CIRCUIT B

NOTE: Including scope and jig capacitance.

FIGURE 3. Output load circuits.



NOTES:

1. Power down controlled by  $\overline{CS}_1$  only.

FIGURE 4. Switching waveforms.

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#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with 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 C or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(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.

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

MIL-STD-883 test requirements	Subgroups (in accordance with method 5005, table I)
Interim electrical parameters (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/ As a minimum, subgroups 7 and 8 shall consist of verifying the data pattern.

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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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 ( $C_{IN}$  and  $C_{OUT}$  measurement) shall be measured only for the initial test and after process or design changes which may affect capacitance. Sample size is 15 devices with no failures, and all input and output terminals tested.
- d. 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:
  - (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 in accordance with 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 3.2.3.1). If more than two devices fail to program, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 24 total devices with no more than 4 total device failures allowable. Ten devices from the programmability sample shall be submitted to the requirements of group A, subgroups 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 4 total device failures allowable.
- e. Subgroups 7 and 8 shall include verification of the pattern specified in 4.3.1d.

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 C or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.
- c. All devices selected for testing shall be programmed with a checkerboard pattern or equivalent. After completion of all testing, the devices shall be erased and verified.

4.4 Erasing procedure. The recommended erasure procedure for the device is exposure to shortwave ultraviolet light which has a wavelength of 2537 Angstroms ( $\text{\AA}$ ). The integrated dose (i.e., UV intensity x exposure time) for erasure should be a minimum of  $25 \text{ Ws/cm}^2$ . The erasure time with this dosage is approximately 35 minutes using an ultraviolet lamp with a  $12000 \mu\text{W/cm}^2$  power rating. The device should be placed within 1 inch of the lamp tubes during erasure. The maximum integrated dose the device can be exposed to without damage is  $7258 \text{ Ws/cm}^2$  (1 week at  $12000 \mu\text{W/cm}^2$ ). Exposure of EPROMS to high intensity UV light for long periods may cause permanent damage.

4.5 Programming procedures. The programming procedures shall be as specified by the device manufacturer.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-STD-883 (see 3.1 herein).

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6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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-973 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-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, 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 3.7 herein) has been submitted to and accepted by DESC-EC.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89537
		REVISION LEVEL A	SHEET 12

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