REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changes in accordance with NOR 5962-R026-94.	93-11-05	M. A. Frye
B	Updated boilerplate. Added device types 02 and 03. Removed programming requirements from drawing. TABLE I. changes. Editorial changes throughout.	94-08-19	M. A. Frye

REV																			
SHEET																			
REV																			
SHEET																			

REV STATUS OF SHEETS	REV	B	B	B	B	B	B	B	B	B	B				
	SHEET	1	2	3	4	5	6	7	8	9	10				

PMIC N/A

STANDARD MICROCIRCUIT 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
D. H. Johnson

APPROVED BY
Michael A. Frye

DRAWING APPROVAL DATE
88-05-23

REVISION LEVEL
B

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, MEMORY, DIGITAL, CMOS 1K X 8 PROM, MONOLITHIC SILICON

SIZE	CAGE CODE	5962-87651
A	67268	

SHEET 1 OF 10

DESC FORM 193
JUL 94

5962-E348-94

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

9004708 0003543 183

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 1/	Circuit function	Access time
01		1K X 8-bit PROM	45
02		1K X 8-bit PROM	45
03		1K X 8-bit PROM	30

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
J	CDIP2-T24 or GDIP1-T24	24	Dual-in-line
K	CDFP3-F24 or GDFP2-F24	24	flat package
L	CDIP4-T24 or GDIP3-T24	24	Dual-in-line
3	CQCC1-N28	28	Square 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. 2/

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 3/
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	+150°C 4/
Storage temperature range (T_{STG})	-65°C to +150°C
Temperature under bias	-55°C to +125°C
Data retention	10 years, minimum

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	+4.5 V dc minimum to +5.5 V dc maximum
Ground voltage (GND)	0 V dc
Input high voltage range (V_{IH})	+2.0 V dc to V_{CC}
Input low voltage range (V_{IL})	-0.5 V dc to +0.8 V dc
Case operating temperature range (T_C)	-55°C to +125°C

1/ Generic numbers are listed on the Standardized Military Drawing Source Approval Bulletin and in MIL-BUL-103.
2/ Unless otherwise specified, all voltages are referenced to ground.
3/ Must withstand the added P_D due to short circuit test; e.g., I_{OS}.
4/ Maximum junction temperature may be inceased to +175°C during burn-in and steady state life tests.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, bulletin, and handbook. Unless otherwise specified, the following specification, standards, bulletin, and handbook 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

MICROCIRCUIT

MIL-I-38535 - Integrated Circuits, Manufacturing, General Specification for.

STANDARDS

MICROCIRCUIT

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

BULLETIN

MICROCIRCUIT

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

(Copies of the specification, standards, bulletin, and handbook 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 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.

3.2.2.1 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.

3.2.2.2 Programmed devices. The requirements for supplying programmed devices are not part of this drawing.

3.2.3 Case outline(s). The case outline(s) 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 defined 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-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.

3.7 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-EC 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.

3.10 Data retention. A data retention stress test shall be completed as part of the vendor's reliability monitors. This test shall be done initially and after any design or process change which may affect data retention. The methods and procedures may be vendor specific, but will 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.

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°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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V\ dc \le V_{CC} \le 5.5\ V\ dc$ unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Output low voltage	V_{OL}	V_{IH} = 2.0 V, V_{IL} = 0.8 V I_{OL} = 16 mA, V_{CC} = Min	1, 2, 3	All		0.4	V
Output high voltage	V_{OH}	V_{IH} = 2.0 V, V_{IL} = 0.8 V I_{OH} = -4.0 mA, V_{CC} = Min	1, 2, 3	All	2.4		V
Input high voltage 1/	V_{IH}		1, 2, 3	All	2.0		V
Input low voltage 1/	V_{IL}		1, 2, 3	All		0.8	V
Input leakage current	I_{IX}	V_{CC} = Max V_{IN} = GND to 5.5 V	1, 2, 3	All	-10	+10	µA
Output leakage current	I_{OZ}	V_{CC} = Max V_{OUT} = V_{OH} and V_{OL} Output disabled	1, 2, 3	All	-10	+10	µA
Output short circuit current	I_{OS} 2/ 3/	V_{CC} = Max, V_{OUT} = GND	1, 2, 3	All	-20	-90	mA
Power supply current	I_{CC}	V_{CC} = Max, I_{OUT} = 0 mA	1, 2, 3	All		120	mA
Input capacitance	C_{IN} 2/	V_{IN} = 0 V, V_{CC} = 5.0 V f = 1 MHz, T_A = +25°C See 4.3.1c	4	All		10	pF
Output capacitance	C_{OUT} 2/	V_{OUT} = 0 V, V_{CC} = 5.0 V f = 1 MHz, T_A = +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_{AA}	See figure 4 4/	9, 10, 11	01,02 03		45 30	ns
Chip select active to output valid	t_{ACS}		9, 10, 11	01,02 03		25 20	ns
Chip select inactive to high-Z	t_{HZCS}	See figure 4 2/ 4/ 5/	9, 10, 11	01,02 03		25 20	ns

1/ These are absolute values with respect to device ground and all overshoots due to system or tester noise are included.
2/ 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 I.
3/ For test purposes, not more than one output at a time may be shorted. Short circuit test duration should not exceed thirty seconds.
4/ AC tests are performed with input rise and fall times of 5 ns or less, timing reference levels of 1.5 V, output loading of the specified I_{OL}/I_{OH}, and loads shown in figure 3.
5/ 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 3.

Device types	ALL	
Case outlines	J, K, L	3
Terminal number	Terminal symbol	
1	A_7	NC
2	A_6	A_7
3	A_5	A_6
4	A_4	A_5
5	A_3	A_4
6	A_2	A_3
7	A_1	A_2
8	A_0	A_1
9	O_0	A_0
10	O_1	NC
11	O_2	O_0
12	GND	O_1
13	O_3	O_2
14	O_4	GND
15	O_5	NC
16	O_6	O_3
17	O_7	O_4
18	CS_4	O_5
19	CS_3	O_6
20	$\overline{CS}_2$	O_7
21	$\overline{CS}_1$	NC
22	A_9	CS_4
23	A_8	CS_3
24	V_{CC}	$\overline{CS}_2$
25	---	$\overline{CS}_1$
26	---	A_9
27	---	A_8
28	---	V_{CC}

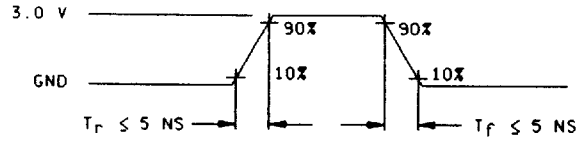
NC = no connection

FIGURE 1. Terminal connections.

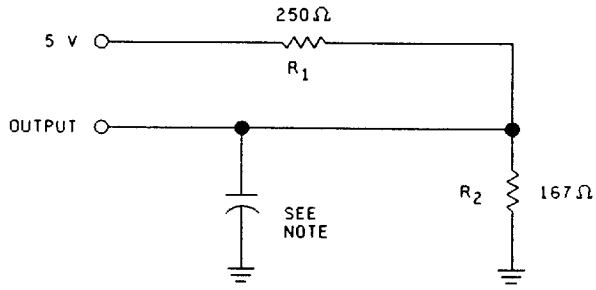
	Read or output disable	CS_4	CS_3	$\overline{CS}_2$	$\overline{CS}_1$	Outputs
Mode	Read	V_{IH}	V_{IH}	V_{IL}	V_{IL}	Data out
	Output disable	X	X	V_{IH}	X	High Z
	Output disable	X	V_{IL}	X	X	High Z
	Output disable	V_{IL}	X	X	X	High Z
	Output disable	X	X	X	V_{IH}	High Z

NOTE: X = don't care.

FIGURE 2. Truth table.



ALL INPUT PULSES



NOTES:
1. C_L includes probe and jig capacitance. C_L = 30 pF for all switching characteristics except t_{HZCS}, for which C_L = 5 pF.
2. Tests are performed with rise and fall times of 5 ns or less.

FIGURE 3. Output load circuit and test conditions.

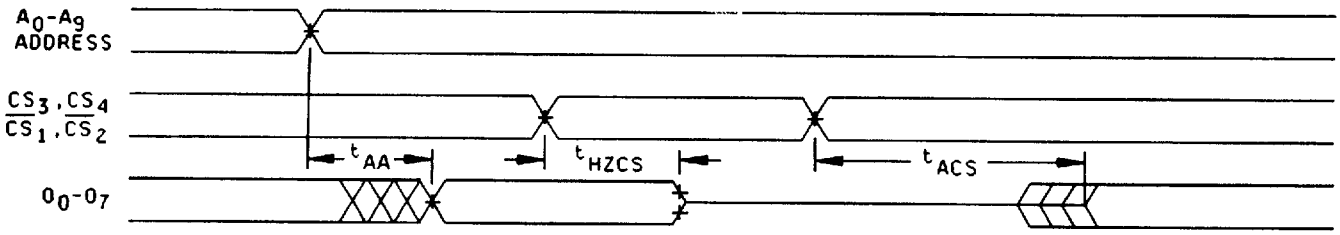


FIGURE 4. Switching waveforms.

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)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 7*, 8A, 8B, 9, 10, 11
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.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 5 and 6 of table I of 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. 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:

(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 3.2.2.2). 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 truth table.

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°C, minimum.

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

c. Group C, subgroup 1 sample shall include devices tested in accordance with 4.3.1d.

4.4 Programming procedure. 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-STD-883 (see 3.1 herein).

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 1692, Engineering Change Proposal.

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 45444-5270, 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-EC.