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PMIC N/A	PREPARED BY <i>Kenneth Rice</i>	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444																		
<b>STANDARDIZED MILITARY DRAWING</b>	CHECKED BY <i>Charles Reusing</i>																			
	APPROVED BY <i>[Signature]</i>																			
	DRAWING APPROVAL DATE 12 DECEMBER 1989																			
AMSC N/A	REVISION LEVEL	SIZE <b>A</b>	CAGE CODE <b>67268</b>	<b>5962-89692</b>																
		SHEET 1																		

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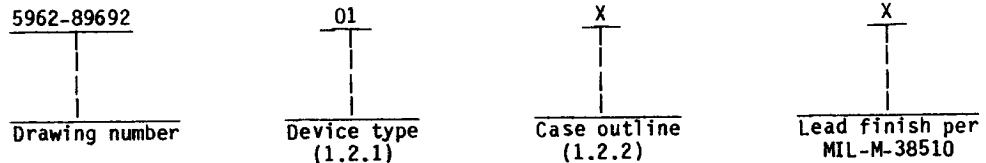
U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-129/60911  
5962-E1402

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

Device type	Generic number	Circuit function	Access time
01	See 6.6	16K x 4 static ram	25 ns (data retention)
02	"	"	25 ns
03	"	"	20 ns (data retention)
04	"	"	20 ns
05	"	"	15 ns (data retention)
06	"	"	15 ns

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
X	Figure 1 (22-lead, 1.260" X .310" X .150"), dual-in-line package
Y	Figure 1 (22-lead, 1.110" X .310" X .175"), dual-in-line package
Z	Figure 1 (22-terminal, .490" X .290" X .080"), leadless chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range ( $V_{CC}$ )	-0.5 V dc to +7.0 V dc <u>1/</u>
DC output current	20 mA
Ambient storage temperature	-65°C to +150°C
Temperature under bias	-55°C to +125°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ ):	
Case K	See MIL-M-38510, appendix C
Cases X and Y	28°C/W <u>2/</u>
Case Z	22°C/W <u>Z/</u>
Power dissipation ( $P_D$ )	1.0 W
Lead temperature (soldering, 10 seconds)	+260°C

1/ All voltages referenced to  $V_{SS}$ .

Z/ When a thermal resistance value is included in MIL-M-38510, appendix C, it shall supersede the value stated herein.

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1.4 Recommended operating conditions.

Supply voltage ( $V_{CC}$ )	- - - - -	+4.5 V dc to +5.5 V dc	<u>3/</u>
Ground voltage ( $V_{SS}$ )	- - - - -	0 V dc	
Input high voltage ( $V_{IH}$ )	- - - - -	+2.2 V dc to $V_{CC} + 0.5$ V dc	
Input low voltage ( $V_{IL}$ )	- - - - -	-0.5 V dc to .8 V dc	<u>4/</u>
Operating case 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 (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 2.

3.2.2 Truth table. The truth table shall be as specified on figure 3.

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

3/ All voltages referenced to  $V_{SS}$ .

4/  $V_{IL}$  negative undershoots to a minimum of -2.0 V dc are allowed with a maximum 20 ns pulse width.

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3.2.4 Die overcoat. Polyimide and silicone coatings are allowable as an overcoat on the die for alpha particle protection provided that each coated microcircuit inspection lot (reference MIL-M-38510, 3.1.3.8) shall be subjected to and pass the internal moisture content test (test method 1018 of MIL-STD-883). The frequency of the internal water vapor testing may not be decreased unless approved by the preparing activity.

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).

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 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-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)  $T_A = +125^{\circ}\text{C}$ , 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C V <sub>SS</sub> = 0 V, 4.5 V ≤ V <sub>CC</sub> ≤ 5.5 V unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Input leakage current	I <sub>LI</sub>	V <sub>CC</sub> = max, V <sub>IN</sub> = GND to V <sub>CC</sub>	1,2,3	A11		10	μA
Output leakage current	I <sub>LO</sub>	V <sub>CC</sub> = max, V <sub>OUT</sub> = GND to V <sub>CC</sub> , CE ≥ V <sub>IH</sub> , WE ≤ V <sub>IL</sub>	1,2,3	A11		10	μA
Output low voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 8 mA, V <sub>IL</sub> = 0.8 V, V <sub>IH</sub> = 2.2 V	1,2,3	A11		0.4	V
Output high voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -4 mA, V <sub>IL</sub> = 0.8 V, V <sub>IH</sub> = 2.2 V	1,2,3	A11	2.4		V
Operating supply current	I <sub>CC1</sub>	CE = V <sub>IL</sub> , outputs open, V <sub>CC</sub> = max, f = 1/t <sub>AVAX</sub>	1,2,3	01,03		120	mA
				02,04		130	
				05,06		150	
Standby power supply current (TTL)	I <sub>CC2</sub>	CE ≥ V <sub>IH</sub> , outputs open, V <sub>CC</sub> = max, f = 0 MHz	1,2,3	01,03,05		20	mA
				02,04,06		50	
Standby power supply current (CMOS)	I <sub>CC3</sub>	V <sub>CC</sub> + 0.2 V > CE ≥ V <sub>CC</sub> - 0.2 V, outputs open, V <sub>CC</sub> + 0.2 V > V <sub>IN</sub> ≥ V <sub>CC</sub> - 0.2 V or +0.2 V > V <sub>IN</sub> ≥ -0.2 V, f = 0 MHz	1,2,3	01,03,05		5	mA
				02,04,06		20	
Data retention current	I <sub>CC4</sub>	V <sub>CC</sub> = V <sub>DR</sub> = 2.0 V	1,2,3	01,03,05,		600	μA
Input capacitance	C <sub>IN</sub> 1/	V <sub>I</sub> = 0 V f = 1 MHz, T <sub>A</sub> = +25°C, see 4.3.1c	4	A11		10	pF
Output capacitance	C <sub>OUT</sub> 1/	V <sub>O</sub> = 0 V f = 1 MHz, T <sub>A</sub> = +25°C, see 4.3.1c	4	A11		10	pF

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C V <sub>SS</sub> = 0 V, 4.5 V < V <sub>CC</sub> < 5.5 V unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Read cycle time	t <sub>AVAX</sub>	See figure 4	9,10,11	01,02	25		ns
				03,04	20		
				05,06	15		
Address cycle time	t <sub>AVQV</sub>		9,10,11	01,02		25	
				03,04		20	
				05,06		15	
Chip enable access time	t <sub>ELQV</sub>		9,10,11	01,02		25	
				03,04		20	
				05,06		15	
Output hold from address change	t <sub>AVQX</sub>		9,10,11	01-04	3		
				05,06	2		
Chip select to output in low Z	t <sub>ELQX</sub> 1/ 3/		9,10,11	01-04	3		
				05,06	2		
Chip select to output in high Z	t <sub>EHQZ</sub> 1/ 3/		9,10,11	A11		15	
Write enable to output in high Z	t <sub>WLQZ</sub> 1/ 3/		9,10,11	01,02		15	
				03,04		12	
				05,06		10	
Data valid to end of write	t <sub>DVWH</sub>		9,10,11	01,02	15		
				03,04	12		
				05,06	10		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <sup>2/</sup> -55°C < T <sub>C</sub> < +125°C V <sub>SS</sub> = 0 V, 4.5 V < V <sub>CC</sub> < 5.5 V unless otherwise specified	Group A subgroups	Device types	Limits		Unit	
					Min	Max		
Data hold time	t <sub>WHDX</sub>	See figure 4	9,10,11	A11	0		ns	
Output active from end of write	t <sub>WHQV</sub> <sup>1/</sup> <sup>3/</sup>				3			
Write cycle time	t <sub>AVAV</sub>		9,10,11	01,02	25			
					03,04	20		
					05,06	15		
Chip select to end of write	t <sub>ELWH</sub>		9,10,11	01,02	20			
					03,04	17		
		05,06			14			
Address valid to end of write	t <sub>AVWH</sub>	9,10,11	01,02	20				
				03,04	17			
				05,06	14			
Address setup time	t <sub>AVWL</sub>	9,10,11	A11	0				
Write pulse width	t <sub>WLWH</sub>	9,10,11	01,02	20				
				03,04	17			
				05,06	14			

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C 2/ V <sub>SS</sub> = 0 V, 4.5 V ≤ V <sub>CC</sub> ≤ 5.5 V unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Write recovery time	t <sub>EHAX</sub>	See figure 4	9,10,11	01-04	5		ns
				05-06	3		

1/ This parameter tested initially and after any design or process change which could affect this parameter, and is therefore guaranteed to the limits specified in table I.

2/ AC parameters are tested using input rise and fall times of 5 ns and input pulse levels of GND to 3.0 V. Both input and output timing reference levels are 1.5 V, and the output load is shown on figure 5.

3/ Transition is measured ±500 mV from steady state.

4.3.1 Group A inspection.

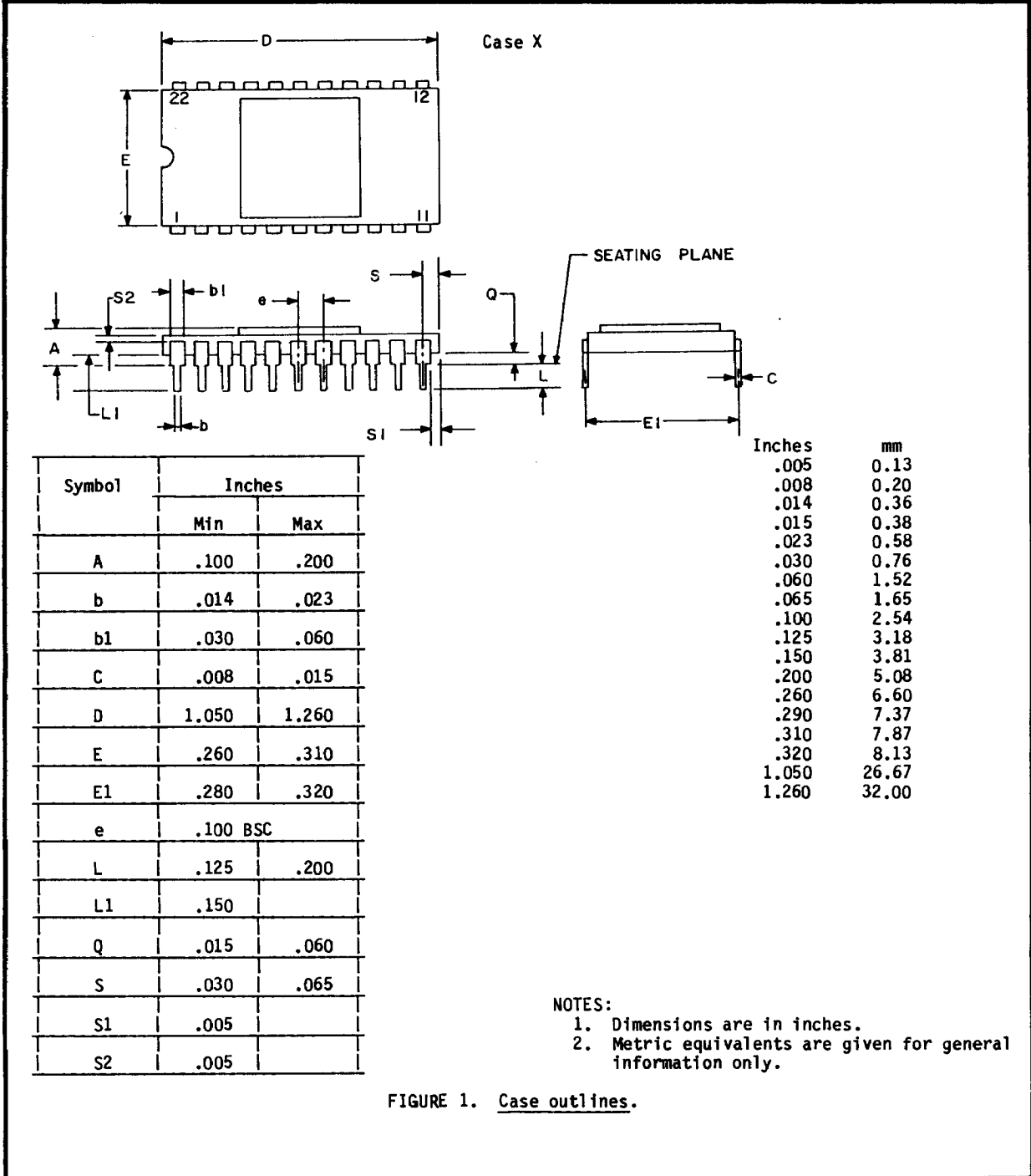
- a. Tests shall be as specified in table II herein.
- b. Subgroups 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C<sub>IN</sub> and C<sub>OUT</sub> measurements) shall be measured for the initial characterization and after any process or design changes which may affect capacitance. Sample size is 15 devices with no failures, and all input and output terminals tested.
- d. Subgroups 7 and 8 tests sufficient to verify the truth tables.

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<sub>A</sub> = +125°C, minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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Symbol	Inches	
	Min	Max
A	.100	.200
b	.014	.023
b1	.030	.060
C	.008	.015
D	1.050	1.260
E	.260	.310
E1	.280	.320
e	.100 BSC	
L	.125	.200
L1	.150	
Q	.015	.060
S	.030	.065
S1	.005	
S2	.005	

Inches	mm
.005	0.13
.008	0.20
.014	0.36
.015	0.38
.023	0.58
.030	0.76
.060	1.52
.065	1.65
.100	2.54
.125	3.18
.150	3.81
.200	5.08
.260	6.60
.290	7.37
.310	7.87
.320	8.13
1.050	26.67
1.260	32.00

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

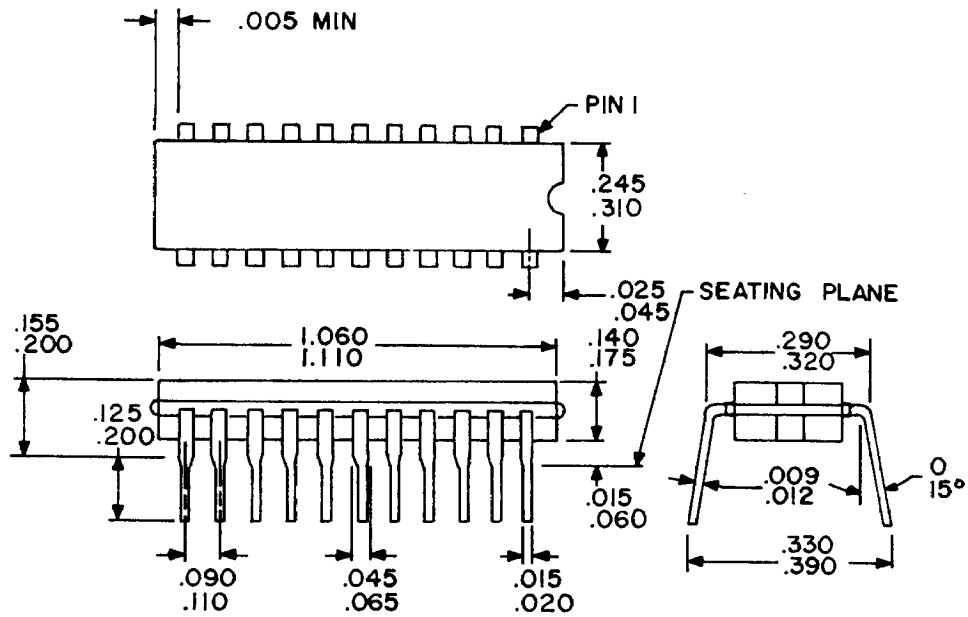
FIGURE 1. Case outlines.

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Case Y



Inches	mm
.005	0.13
.009	0.22
.012	0.30
.015	0.38
.020	0.51
.025	0.64
.045	1.14
.060	1.52
.065	1.65
.090	2.29
.110	2.79
.125	3.18
.140	3.56
.155	3.94
.175	4.44
.200	5.08
.245	6.22
.290	7.37
.310	7.87
.320	8.13
.330	8.38
.390	9.91
1.060	26.92
1.110	28.19

FIGURE 1. Case outlines - Continued.

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Case Z

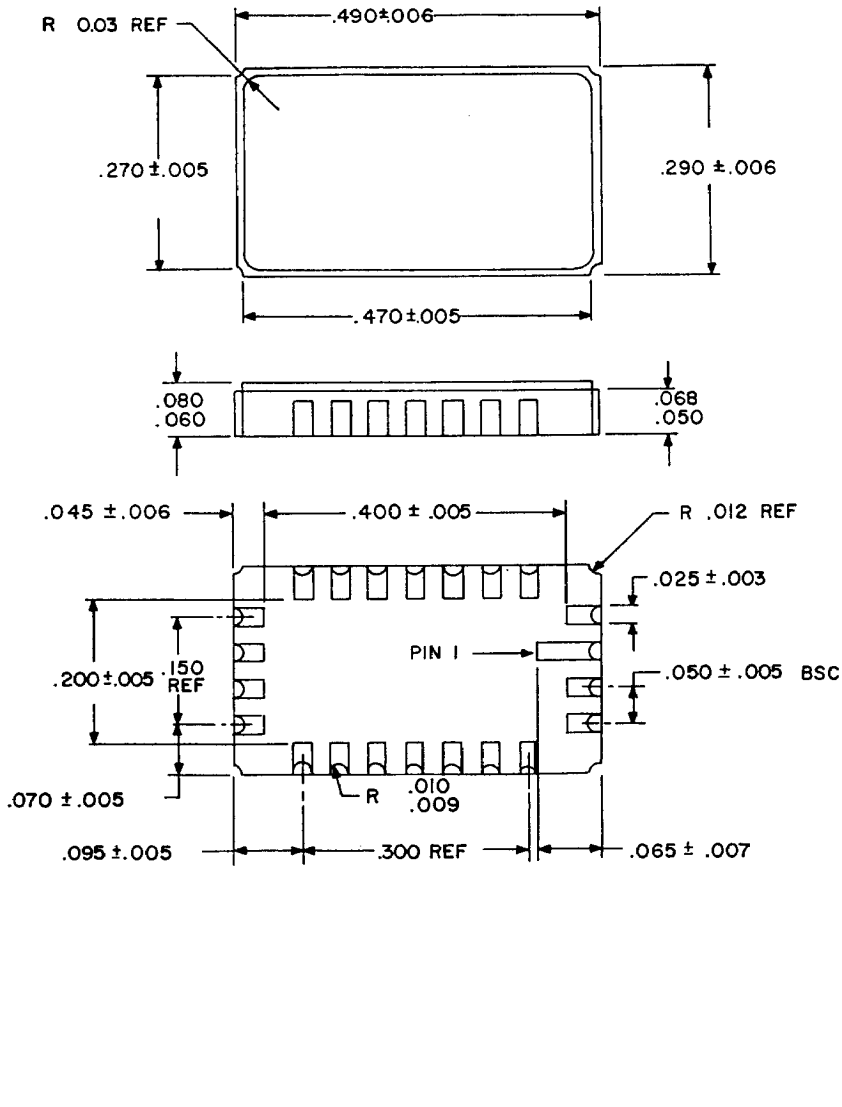


FIGURE 1. Case outlines - Continued.

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Device types	01 through 06	
Case outlines	X, Y, and Z	K
Terminal number	Terminal symbol	
1	A5	A0
2	A6	A1
3	A7	A2
4	A8	A3
5	A9	A4
6	A10	A5
7	A11	A6
8	A12	A7
9	A13	A8
10	CE	CE
11	GND	NC
12	WE	GND
13	I/O <sub>0</sub>	WE
14	I/O <sub>1</sub>	I/O <sub>1</sub>
15	I/O <sub>2</sub>	I/O <sub>2</sub>
16	I/O <sub>3</sub>	I/O <sub>3</sub>
17	A0	I/O <sub>4</sub>
18	A1	NC
19	A2	A9
20	A3	A10
21	A4	A11
22	VCC	A12
23	---	A13
24	---	VCC

NC = no connection

FIGURE 1. Terminal connections.

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Device types 01 through 06

CE	WE	Mode	I/O	Power
H	X	Not selected	High Z	Standby
L	L	Write	DIN	Active
L	H	Read	DOUT	Active

H = Logic "1" state  
 L = Logic "0" state  
 X = Don't care

FIGURE 3. Truth table.

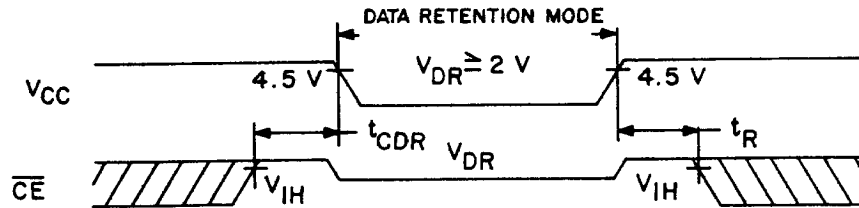
<b>STANDARDIZED                  MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		5962-89692
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Low V<sub>CC</sub> data retention waveform

(Device types 01, 03, and 05)



NOTE:  $t_{CDR} = 0$  ns (minimum); may not be tested, but is guaranteed.  
 $t_r = t_{AVAX}$

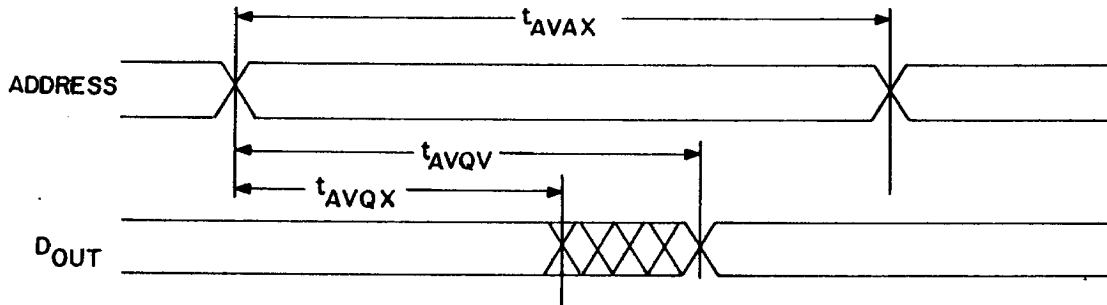
FIGURE 4. Switching time waveforms.

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Timing waveform of read cycle number 1



Timing waveform of read cycle number 2

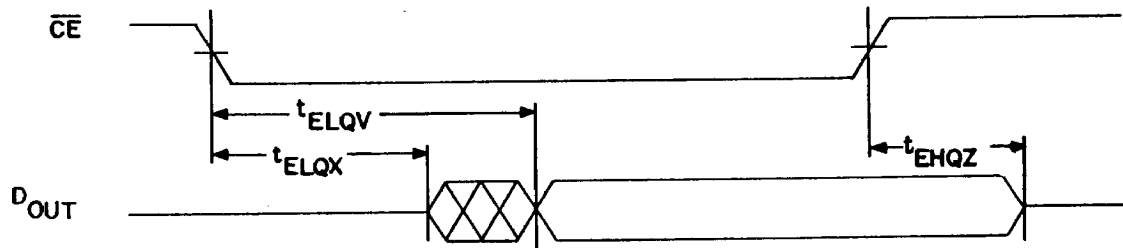


FIGURE 4. Switching time waveforms - Continued.

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Timing waveform of write cycle number 1

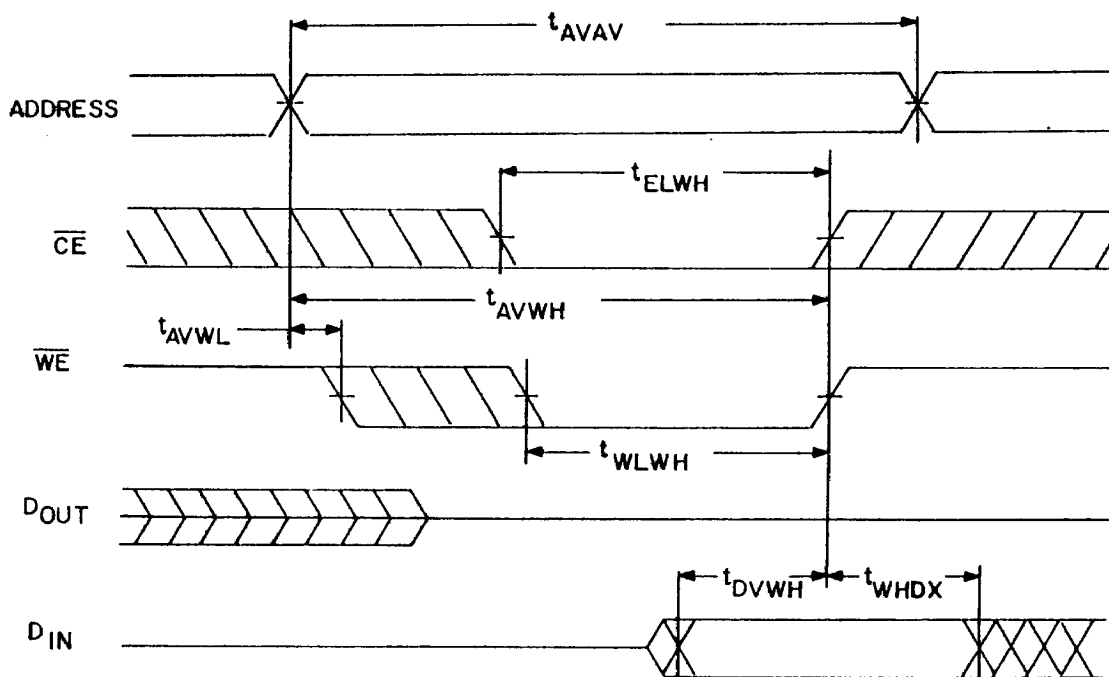


FIGURE 4. Switching time waveforms - Continued.

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Timing waveform of write cycle number 2

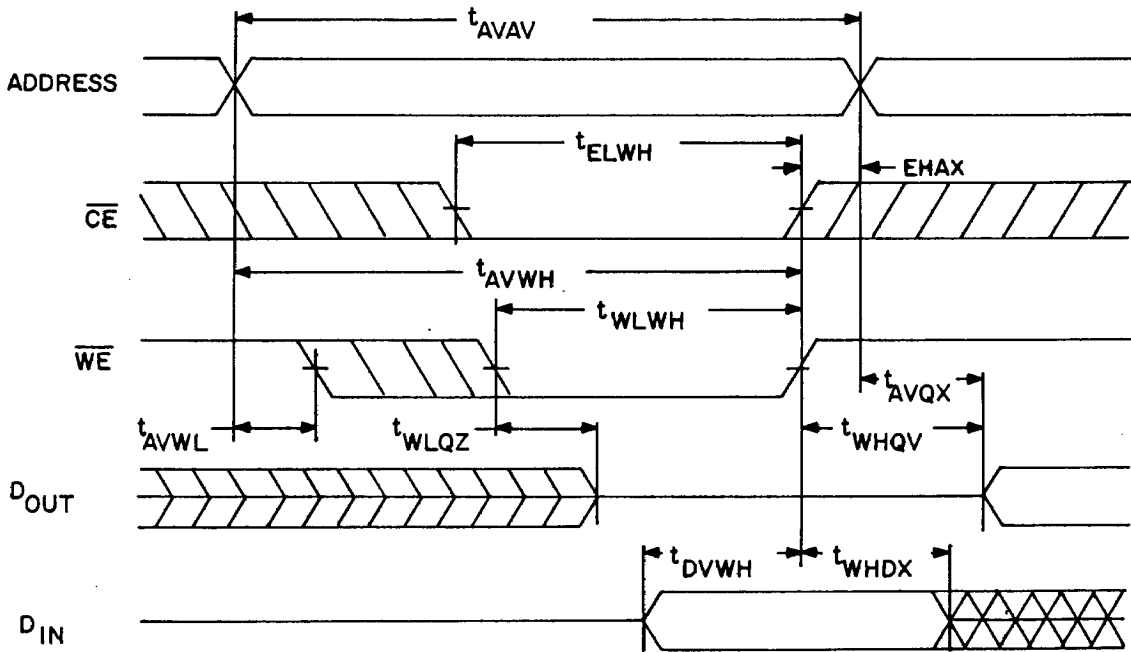
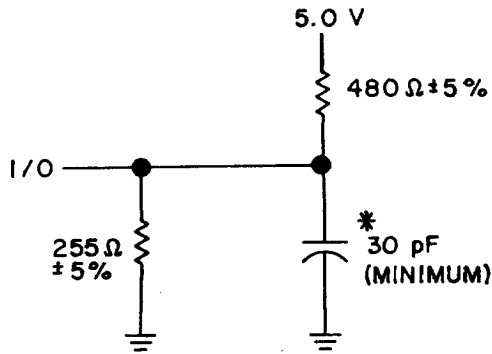


FIGURE 4. Switching time waveforms - Continued.

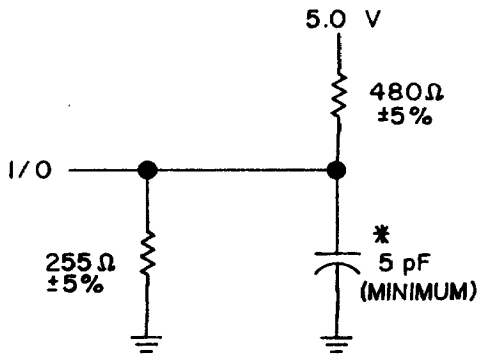
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Circuit A or equivalent



Circuit B or equivalent

for  $t_{ELQX}$ ,  $t_{EHQZ}$ ,  $t_{WLQZ}$ , and  $t_{WHQV}$

\* Including scope and jig

FIGURE 5. Output loads circuits.

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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*,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 (method 5005)	2,3,7,8A,8B

- \* PDA applies to subgroups 1 and 7
- \*\* See 4.3.lc.
- \*\*\* See 4.3.ld.

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-ECS, telephone 513-296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. 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. The approved sources of supply listed below are for information purposes only and are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/	Replacement military specification part number
5962-8969201KX ✓	61772	IDT7188L25EB	
5962-8969201XX	75569	P4C188L-25CMB	
5962-8969201YX	61772	IDT7188L-25DB	
5962-8969201ZX ✓	75569	P4C188L-25LMB	
5962-8969202KX ✓	65786 61772	CY7C164A-25KMB IDT7188S25EB	
5962-8969202XX ✓	6Y440 75569	MT5C6404C-25883C P4C188-25CMB	
5962-8969202YX ✓	61772 65786	IDT7188S25DB CY7C164A-25DMB	
5962-8969202ZX ✓	75569 6Y440 65786	P4C188-25LMB MT5C6404EC-25883C CY7C164A-25LMB	
5962-8969203KX ✓	61772	IDT7188L20EB	
5962-8969203YX ✓	61772	IDT7188L20DB	
5962-8969204KX	65786 61772	CY7C164A-20KMB IDT7188S20EB	
5962-8969204XX	6Y440 75569	MT5C6404C-20883C P4C188-20CMB	

See footnote at end of table.

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Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>	Replacement military specification part number
5962-8969204YX ✓	61772 65786	IDT7188S20DB CY7C164A-20DMB	
5962-8969204ZX ✓	75569 6Y440 65786	P4C188-20LMB MT5C6404EC-20883C CY7C164A-20LMB	
5962-8969205KX ✓	61772	IDT7188L15EB	
5962-8969205YX ✓	61772	IDT7188L15DB	
5962-8969206KX ✓	61772	IDT7188-20EB	
5962-8969206XX ✓	6Y440 75569	MT5C6404C-15883C P4C188-15CMB	
5962-8969206ZX ✓	6Y440 75569	MT5C6404EC-15883C P4C188-15LMB	

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

6Y440

Micron Technology  
2805 E. Columbia Road  
Boise, ID 83706

61772

Integrated Device Technology, Incorporated  
1566 Moffett Boulevard  
Salinas, CA 93905  
Point of contact: 3236 Scott Boulevard  
Santa Clara, CA 95054

65786

Cypress Semiconductor  
3901 N. First Street  
San Jose, CA 95134

75569

Performance Semiconductor Corporation  
610 East Weddell Drive  
Sunnyvale, CA 94089

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