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LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																								
A	1.3, absolute maximum ratings, change input voltage range. Editorial changes throughout.	1990 AUG 14	<i>W. Heckman</i>																								

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REV STATUS OF SHEETS	REV	A	A	A																								
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13														

PMIC N/A  <b>STANDARDIZED MILITARY DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A	PREPARED BY <i>Greg A. Pitz</i> CHECKED BY <i>Ray Monrinn</i> APPROVED BY <i>Michael [Signature]</i> DRAWING APPROVAL DATE 8 MARCH 1988 REVISION LEVEL A	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444  MICROCIRCUITS, DIGITAL, BIPOLAR, BIDIRECTIONAL TRANSCEIVERS, MONOLITHIC SILICON  <table style="width: 100%;"> <tr> <td style="width: 15%;">SIZE <b>A</b></td> <td style="width: 25%;">CAGE CODE <b>67268</b></td> <td style="width: 60%;">5962-88604</td> </tr> <tr> <td colspan="2">SHEET</td> <td style="text-align: center;"><b>1</b></td> </tr> </table>	SIZE <b>A</b>	CAGE CODE <b>67268</b>	5962-88604	SHEET		<b>1</b>
SIZE <b>A</b>	CAGE CODE <b>67268</b>	5962-88604						
SHEET		<b>1</b>						

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

5962-E1742

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 on-JAN devices".

5962-88604	01	K	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	29861A	High performance 10-bit bidirectional transceiver, three-state
02	29863A	High performance 9-bit bidirectional transceiver, three-state

<u>Outline letter</u>	<u>Case outline</u>
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

Supply voltage range	- - - - -	-0.5 V dc to +7.0 V dc
Input voltage range	- - - - -	-1.5 V dc to +6.0 V dc
Storage temperature range	- - - - -	-65°C to +150°C
Maximum power dissipation (P <sub>D</sub> ) 1/	- - - - -	2.2 W
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C
Thermal resistance, junction-to-case (θ <sub>JC</sub> ):		
Cases K, L, and 3	- - - - -	See MIL-M 38510, appendix C
Junction temperature (T <sub>J</sub> )	- - - - -	150°C/W
DC output voltage range	- - - - -	-0.5 V dc to 5.5 V dc
DC output current: Into output	- - - - -	+100 mA
DC output current: Out of output	- - - - -	-50 mA
DC input current range: Into input	- - - - -	-30 mA to +5.0 mA

Supply voltage range ( $V_{CC}$ )	4.5 V dc to +5.5 V dc
Minimum high level input voltage ( $V_{IH}$ )	2.0 V dc
Maximum low level input voltage ( $V_{IL}$ )	0.7 V dc
Case operating temperature range ( $T_C$ )	-55°C to +125°C

<b>STANDARDIZED</b> <b>MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		5962-88604
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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 Drawing (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 tables. The truth tables shall be as specified on figure 2.

3.2.3 Logic diagrams. The logic diagrams shall be as specified on figure 3.

3.2.4 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 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).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T <sub>C</sub> < +125°C 4.5 V < V <sub>CC</sub> < 5.5 V unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
High level output voltage	V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	I <sub>OH</sub> = -15 mA	1, 2, 3	A11	2.4		V
			I <sub>OH</sub> = -24 mA			2.0		
Low level output voltage	V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 32 mA V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>		1, 2, 3	A11		0.5	V
Input clamp voltage	V <sub>IC</sub>	V <sub>CC</sub> = 4.5 V, I <sub>IN</sub> = -18 mA		1, 2, 3	A11		-1.2	V
Input hysteresis	V <sub>HYST</sub>			1, 2, 3	A11	200		mV
Low level input current	I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0.4 V $\overline{\text{OE}}$ input		1, 2, 3	A11		-0.5	mA
High level input current	I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 2.7 V $\overline{\text{OE}}$ input		1, 2, 3	A11		50	μA
High input current	I <sub>I</sub>	V <sub>CC</sub> = 5.5 V V <sub>IN</sub> = 5.5 V	$\overline{\text{OE}}$ input	1, 2, 3	A11		100	μA
			I/O port				150	
Output off-state (high impedance) output current	I <sub>OZH</sub>	V <sub>CC</sub> = 5.5 V	V <sub>OUT</sub> = 2.7 V	1, 2, 3	A11		100	μA
	I <sub>OZL</sub>		V <sub>OUT</sub> = 0.4 V				-550	
Output short circuit current	I <sub>OS</sub>	V <sub>CC</sub> = 5.5 V, V <sub>OUT</sub> = 0.0 V <u>1/</u>		1, 2, 3	A11	-75	-250	mA

See footnote 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 4.5 V < V <sub>CC</sub> < 5.5 V unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Bus leakage current	I <sub>OFF</sub>	V <sub>CC</sub> = 0.0 V, V <sub>OUT</sub> = 2.9 V		1, 2, 3	A11		100	μA
Supply current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5 V Outputs unloaded	Output logic low	1, 2, 3	A11		140	mA
			Output logic high				115	
			Output logic Hi-Z				130	
Propagation delay from R <sub>i</sub> to T <sub>i</sub> or T <sub>i</sub> to R <sub>i</sub>	t <sub>PLH</sub>	See figure 4 C <sub>L</sub> = 50 pF R <sub>1</sub> = 500Ω R <sub>2</sub> = 500Ω		9,10,11	A11		9.0	ns
Propagation delay from R <sub>i</sub> to T <sub>i</sub> or T <sub>i</sub> to R <sub>i</sub>	t <sub>PHL</sub>			9,10,11	A11		9.0	ns
Output enable time O <sub>ET</sub> to T <sub>i</sub> or O <sub>ER</sub> to R <sub>i</sub>	t <sub>pZH</sub>			9,10,11	A11		12.0	ns
Output enable time O <sub>ET</sub> to T <sub>i</sub> or O <sub>ER</sub> to R <sub>i</sub>	t <sub>pZL</sub>			9,10,11	A11		13.0	ns
Output disable time O <sub>ET</sub> to T <sub>i</sub> or O <sub>ER</sub> to R <sub>i</sub>	t <sub>pHZ</sub>			9,10,11	A11		10.0	ns
Output disable time O <sub>ET</sub> to T <sub>i</sub> or O <sub>ER</sub> to R <sub>i</sub>	t <sub>pLZ</sub>			9,10,11	A11		10.0	ns

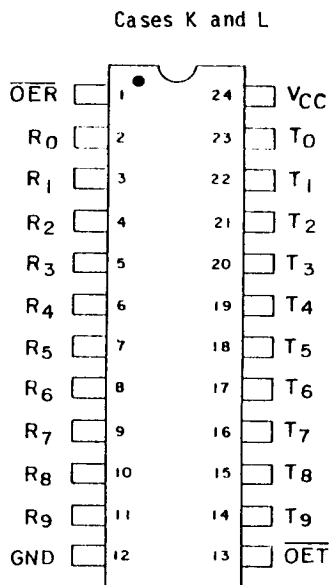
1/ Not more than one output should be shorted at a time. Duration should not exceed 1 second.

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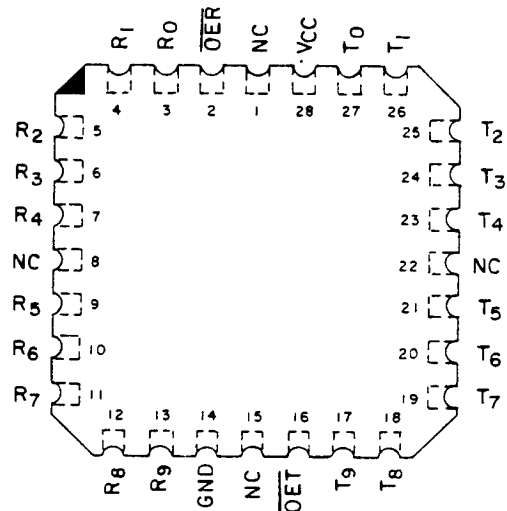
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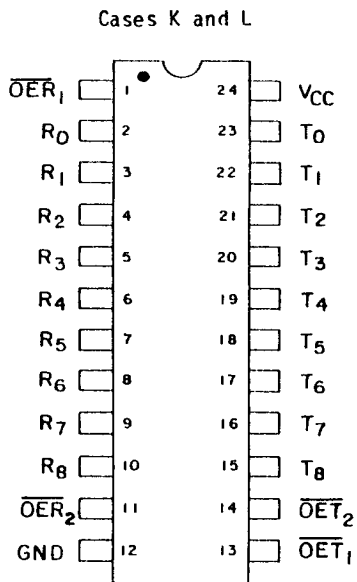
Device type 01



Case 3



Device type 02



Case 3

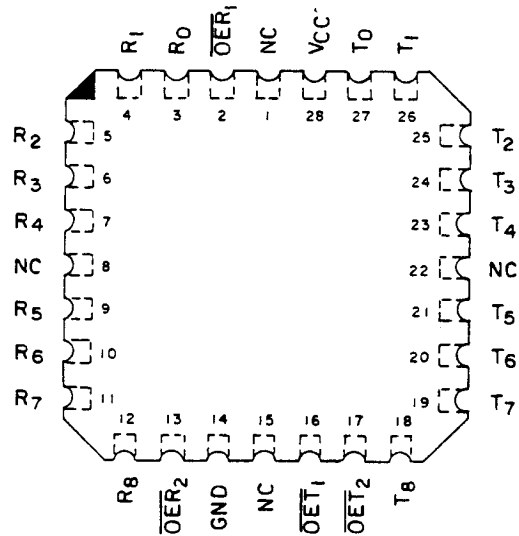


FIGURE 1. Terminal connections.

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Device type 01

Inputs				Outputs		Function
$\overline{OET}$	$\overline{OER}$	$R_i$	$T_i$	$R_i$	$T_i$	
L	H	L	N/A	N/A	L	Transmit
L	H	H	N/A	N/A	H	Transmit
H	L	N/A	L	L	N/A	Receive
H	L	N/A	H	H	N/A	Receive
H	H	X	X	Z	Z	Hi-Z

Device type 02

Inputs						Outputs		Function
$\overline{OET}_1$	$\overline{OET}_2$	$\overline{OER}_1$	$\overline{OER}_2$	$R_i$	$T_i$	$R_i$	$T_i$	
L	L	H	X	L	N/A	N/A	L	Transmit
L	L	X	H	L	N/A	N/A	L	Transmit
H	X	L	L	N/A	L	L	N/A	Receive
X	H	L	L	N/A	L	L	N/A	Receive
L	L	H	X	H	N/A	N/A	H	Transmit
L	L	X	H	H	N/A	N/A	H	Transmit
H	X	L	L	N/A	H	H	N/A	Receive
X	H	L	L	N/A	H	H	N/A	Receive
H	X	H	X	X	X	Z	Z	Hi-Z
X	H	X	H	X	X	Z	Z	Hi-Z

H = High

X = Don't care

L = Low

N/A = Not applicable

Z = High impedance

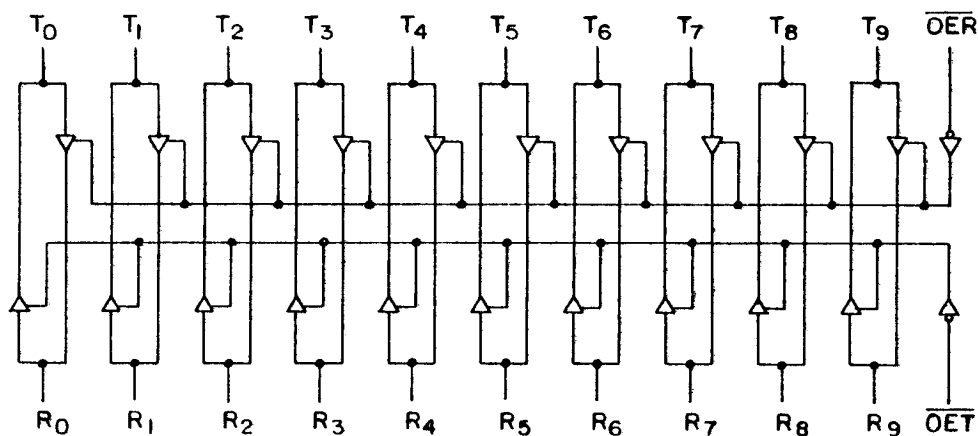
FIGURE 2. Truth tables.

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Device type 01



Device type 02

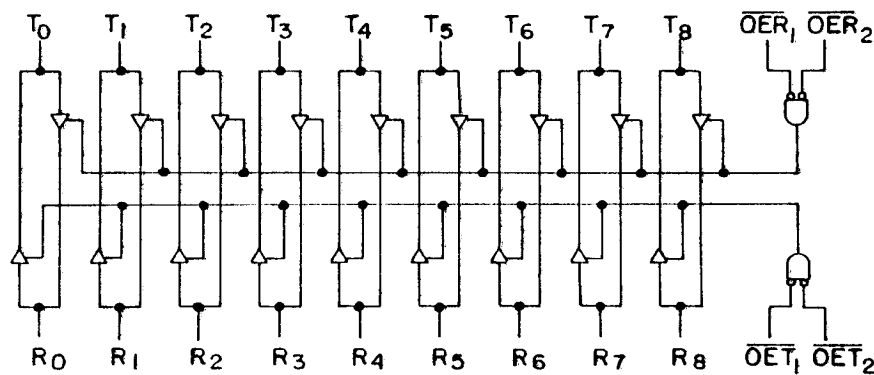


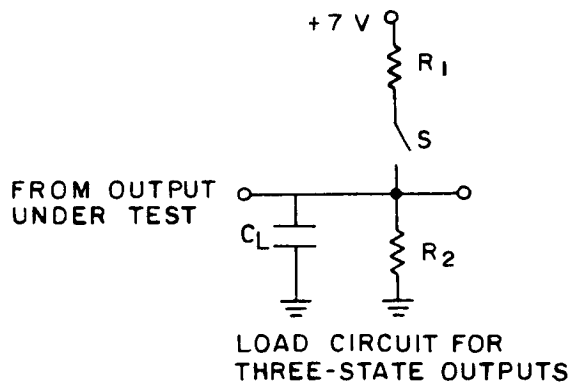
FIGURE 3. Logic diagrams.

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Parameter	S Position
$t_{PLH}$	Open
$t_{PHL}$	Open
$t_{PHZ}$	Open
$t_{PZH}$	Open
$t_{PLZ}$	Closed
$t_{PZL}$	Closed

Switch positions for parameter testing

#### ENABLE AND DISABLE TIMES

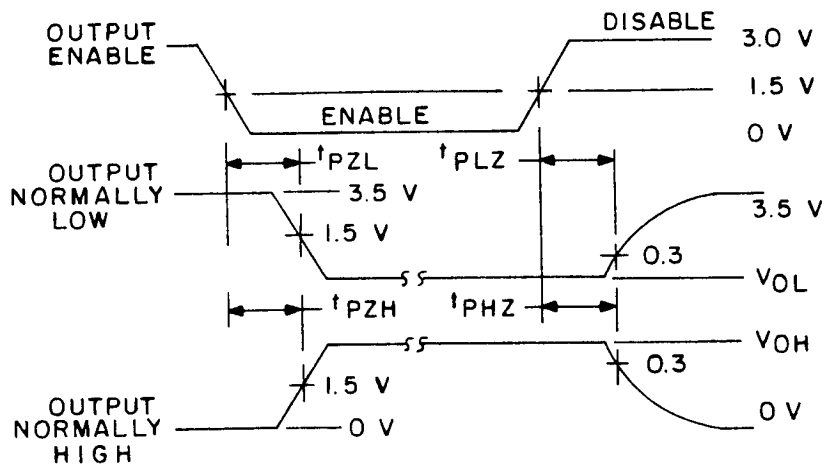


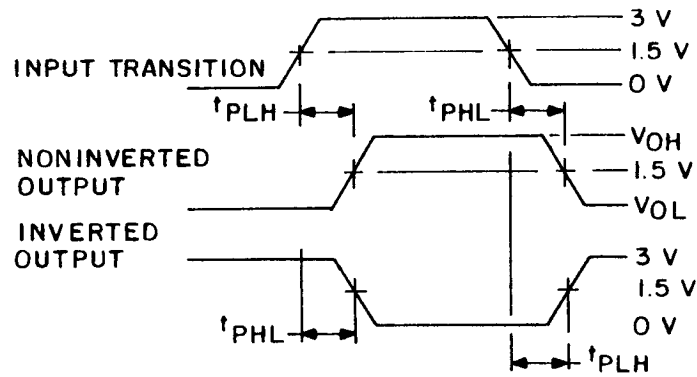
FIGURE 4. Switching waveforms and test circuits.

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# PROPAGATION DELAY



Note: Pulse generator for all pulses, rate  $\leq 1.0$  MHz;  $Z_0 = 50\Omega$ ;  $t_r \leq 2.5$  ns;  $t_f \leq 2.5$  ns.

FIGURE 4. Switching waveforms and test circuits-Continued.

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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. 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 A 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.

##### 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 testing shall include verification of 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 A using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2)  $T_A = +125^{\circ}\text{C}$ , minimum.

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

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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, 9,10,11
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 subgroups 1 and 7.

## 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-ECC, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513) 296-8525.

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6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 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 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 <u>1/</u>
5962-8860401KX	34335	AM29861A/BKA
5962-8860401LX	34335	AM29861A/BLA
5962-88604013X	34335	AM29861A/B3A
5962-8860402KX	34335	AM29863A/BKA
5962-8860402LX	34335	AM29863A/BLA
5962-88604023X	34335	AM29863A/B3A

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

34335

Vendor name  
and address

Advanced Micro Devices, Incorporated  
901 Thompson Place  
P.O. Box 3453  
Sunnyvale, CA 94088

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