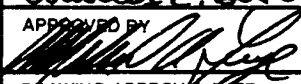


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REV STATUS OF SHEETS	REV SHEET	1	2	3	4	5	6	7	8	9	10	11	12															
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PMIC N/A STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	PREPARED BY <i>Rick C. Offner</i> CHECKED BY <i>Charles E. Berore</i> APPROVED BY  DRAWING APPROVAL DATE 23 JANUARY 1990 REVISION LEVEL	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUITS, LINEAR, 12-BIT DIGITAL-TO-ANALOG CONVERTER, MONOLITHIC SILICON <table style="width: 100%;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 25%;">CAGE CODE 67268</td> <td style="width: 60%;">5962-89617</td> </tr> </table>	SIZE A	CAGE CODE 67268	5962-89617
SIZE A	CAGE CODE 67268	5962-89617			
		SHEET 1 OF 12			

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5962-E1490

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:

5962-89617	01	L	X
-----	-----	-----	-----
-----	-----	-----	-----
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	AD767	12-bit digital-to-analog converter

1.2.2 Case outline. The case outline 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

1.3 Absolute maximum ratings.

V_{CC} to power ground - - - - -	0 V dc to +18 V dc
V_{EE} to power ground - - - - -	0 V dc to -18 V dc
Digital inputs to power ground - - - - -	-1.0 V dc to +7.0 V dc
Reference input to reference ground - - - - -	+12 V dc
Bipolar offset to reference ground - - - - -	+12 V dc
10 V span R to reference ground - - - - -	+12 V dc
20 V span R to reference ground - - - - -	+24 V dc
Ref out or V_{OUT} short circuit duration - - - - -	1/
Storage temperature range - - - - -	-65°C to +150°C
Lead temperature (soldering, 10 seconds) - - - - -	+300°C
Power dissipation - - - - -	1.0 W
Thermal resistance, junction-to-case (θ_{JC}) - - - - -	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ_{JA}) - - - - -	80°C/W
Junction temperature (T_J) - - - - -	+175°C

1/ Indefinite short to power ground; momentary short to V_{CC} .

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1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC}) - - - - - +12 V dc to +15 V dc
Negative supply voltage range (V_{EE}) - - - - - -12 V dc to -15 V dc
Ambient operating temperature range (T_A) - - - - - -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 1.

3.2.2 Functional block diagram. The functional block diagram shall be as specified on figure 2.

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

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Relative accuracy	RA	All bits with positive errors on and all bits with negative errors on	1,2,3		±1.0	LSB
Differential nonlinearity	DNL	Major carry errors	1,2,3		±1.0	LSB
Gain error <u>2/</u>	A _E	All bits on, T _A = +25°C	1		±.20	%FSR
Gain temperature coefficient	$\frac{\Delta A_E}{\Delta T}$	All bits on	2,3		±30	ppm/°C
Unipolar offset error	V _{OS}	All bits off, T _A = +25°C	1		±2.0	LSB
Unipolar offset temperature coefficient	$\frac{\Delta V_{OS}}{\Delta T}$	All bits off	2,3		±3.0	ppm/°C
Bipolar zero error <u>2/</u>	B _{PZE}	MSB on, all other bits off, bipolar mode, T _A = +25°C	1		±.10	%FSR
Bipolar zero temperature coefficient	$\frac{\Delta B_{PZE}}{\Delta T}$	MSB on, all other bits off, bipolar mode	2,3		±10	ppm/°C
Reference input resistance <u>3/</u>	R _{IN}	T _A = +25°C	4	15	25	kΩ
Reference output voltage	V _{REF}	Unipolar mode, 1.1 mA external load	1,2,3	9.9	10.10	V
Output current <u>3/</u>	I _{OUT}		1,2,3	±5.0		mA
Output short circuit current <u>3/</u>	I _{SC}		1,2,3		40	mA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Power supply rejection ratio	PSRR	+11.4 V ≤ V _{CC} ≤ +16.5 V,	1		±10	ppm of FSR/%
			2,3		±20	
		-11.4 V ≤ V _{EE} ≤ -16.5 V,	1		±10	
			2,3		±20	
Power supply current	I _{CC}	V _{CC} = +16.5 V, T _A = +25°C, all bit on	1,2,3		+13	mA
	I _{EE}	V _{EE} = -16.5 V, T _A = +25°C, all bits off			-23	
Digital input high voltage	V _{IH}		1,2,3	2.0		V
Digital input low voltage	V _{IL}		1		0.8	V
			2,3		0.7	
Digital input high current	I _{IH}	V _{IH} = 5.5 V, T _A = +25°C	1		10	μA
Digital input low current	I _{IL}	V _{IL} = 0.0 V, T _A = +25°C	1		5.0	μA
Data setup time	t _{DS}	See figure 3 4/	9,10,11	90		ns
Data hold time	t _{DH}		9,10,11	20		ns
$\overline{\text{CS}}$ pulse width	t _{CP}		9,10,11	90		ns

See footnotes at end of table.

**STANDARDIZED
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Output voltage settling time	t _{SL}	R _L = 2.0 kΩ, C _L = 500 pF, see figure 3 4/	R _{FB} = 10 kΩ	9,10,11		4.0	μs
			R _{FB} = 5.0 kΩ	9,10,11		3.0	

1/ V_{CC} = +15 V, V_{EE} = -15 V, 50Ω resistor between pin 6 and pin 7, \overline{CS} = logic 0,
V_{IH} = 2.0 V, V_{IL} = 0.8 V and unipolar 10 V configuration, unless otherwise specified.

2/ Adjustable to 0 V.

3/ If not tested, shall be guaranteed to the limits specified in table I.

4/ V_{CC} = +12 V or +15 V and V_{EE} = -12 V or -15 V.

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 ambient 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 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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Device type	01
Case outline	L
Terminal number	Terminal symbol
1	20 V SPAN
2	10 V SPAN
3	SUM JCT
4	BIP OFF
5	AGND
6	REF OUT
7	REF IN
8	V _{CC}
9	V _{OUT}
10	V _{EE}
11	CS
12	DGND
13	DB ₀ (LSB)
14	DB ₁
15	DB ₂
16	DB ₃
17	DB ₄
18	DB ₅
19	DB ₆
20	DB ₇
21	DB ₈
22	DB ₉
23	DB ₁₀
24	DB ₁₁ (MSB)

FIGURE 1. Terminal connections.

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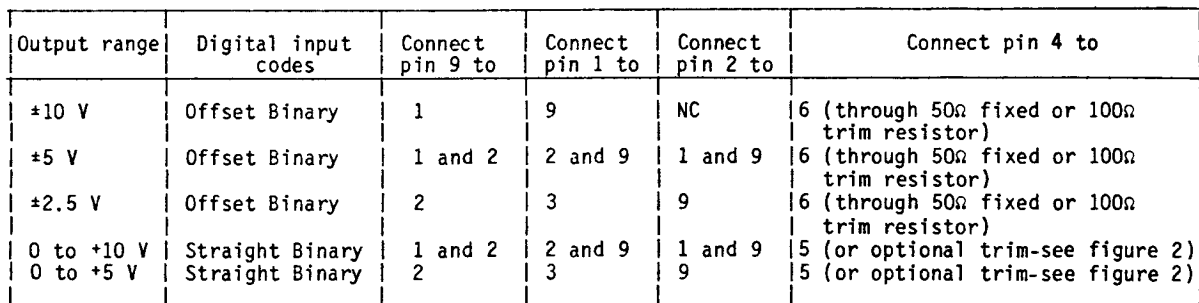


FIGURE 2. Functional block diagram.

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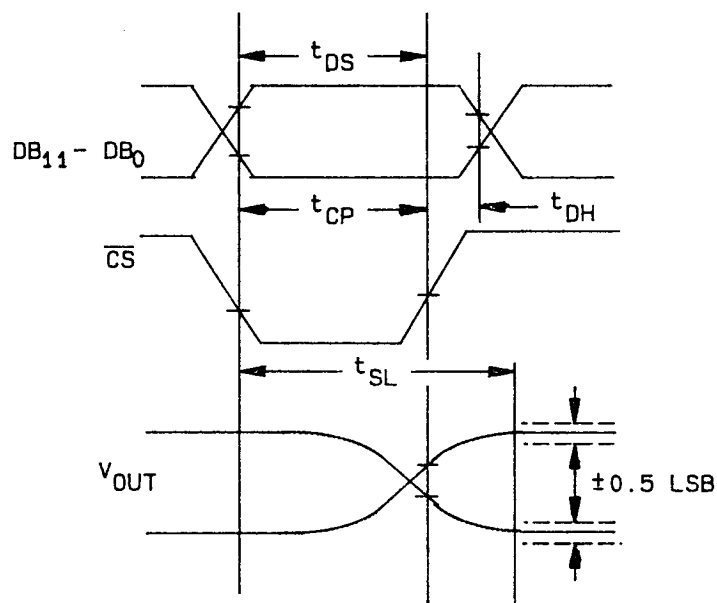


FIGURE 3. Timing diagram.

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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, B, C, or 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.

4.3.1 Group A inspection.

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

b. Subgroups 5, 6, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

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, B, C, or D 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)	1
Final electrical test parameters (method 5004)	1*, 2, 3
Group A test requirements (method 5005)	1, 2, 3, 4**, 9**, 10**, 11**
Group C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

** Subgroups 4, 9, 10 and 11, if not tested, shall be guaranteed to the limits specified in table I.

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 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-ECS. The approved source of supply 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>
5962-8961701LX	24355	AD767SD/883B

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

24355

Vendor name
and address

Analog Devices
Route 1 Industrial Park
P.O. Box 9106
Norwood, MA 02062
Point of contact: 804 Woburn Street
Wilmington, MA 01887

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