

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:

<u>5962-89900</u>	<u>01</u>	<u>E</u>	<u>X</u>
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	AD9000S	6-Bit high speed A/D converter

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
E	CDIP1-T16 or GDIP2-T16	16	Dual-in-Line
3	CQCC1-N28	28	Square 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. 1/

Positive supply voltage (+V _S)	- - - - -	-0.3 V dc to +6.0 V dc
Negative supply voltage (-V _S)	- - - - -	-6.0 V dc to +0.3 V dc
Analog-to-digital ground voltage differential	- - - - -	0.5 V dc
Analog input voltages (A _{IN} , +V _{REF} , -V _{REF}) 2/	- - - - -	±3 V dc
Differential reference voltage (+V _{REF} to -V _{REF}) 3/	- - - - -	6 V dc
ENCODE input voltage	- - - - -	-V _S to 0 V
HYSTERESIS control voltage	- - - - -	0 V dc to +3.0 V dc
Digital output current	- - - - -	20 mA
Power dissipation (P _D)	- - - - -	745 mW
Storage temperature range	- - - - -	-65°C to +125°C
Junction temperature (T _J)	- - - - -	+175°C
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C
Thermal resistance, junction-to-ambient (θ _{JA}):		
Case outline 3	- - - - -	62°C/W
Case outline E	- - - - -	67°C/W
Thermal resistance, junction-to-case (θ _{JC})	- - - - -	See MIL-STD-1835

1.4 Recommended operating conditions.

Ambient operating temperature range	- - - - -	-55°C to +125°C
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- 1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
- 2/ Under normal operating conditions, the analog input voltages should not exceed nominal ±2 V operating range, nor the supply voltages (+V_S and -V_S), whichever is smaller.
- 3/ Under normal operating conditions the differential reference voltage may range from ±0.5 V to ±2 V; +V_{REF} ≥ -V_{REF}.

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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 - Integrated Circuits (Microcircuits) Manufacturing, 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 outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

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

3.3 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 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.

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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	Device type	Limits		Unit
					Min	Max	
Resolution	RES		1, 2, 3	01	6		Bits
Differential linearity	DNL		1	01		0.5	LSB
			2, 3			1.0	
Integral linearity	INL		1	01		0.5	
			2, 3			1.0	

INITIAL OFFSET ERROR

Top of reference ladder	E _{OT}		1	01		0.875	LSB
			2, 3			1.5	
Bottom of reference ladder	E _{OB}		1	01		0.875	
			2, 3			1.5	

ANALOG INPUT

Input bias current (sampling)	I _{BINS}	A _{IN} = +V _{REF}	1, 2, 3	01		800	μA
Input bias current (latched)	I _{BINL}	A _{IN} = +V _{REF}	1, 2, 3	01		20	μA
Input capacitance	C _{AIN}	See 4.3.1.b	4	01		50	pF

REFERENCE INPUT

Reference ladder resistance	R _{REF}	2/ 3/	1	01	80	200	Ω
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DYNAMIC PERFORMANCE 4/

Conversion rate	t _{CONV}		1	01	75		ns
Conversion time (+1 clock)	t _C		1	01		13.3	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions ^{1/} $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	

DYNAMIC PERFORMANCE - Continued. 4/

Output propagation delay	t_{PD}	<u>5/</u>	9	01	8	12	ns
Output hold time	t_{OH}	<u>6/</u>	9	01	8	14	ns
Output rise time	t_R	<u>7/</u>	9	01		4.5	ns
Output fall time	t_F	<u>7/</u>	9	01		4.5	ns

ENCODE INPUT

Logic "1" voltage	V_{E1}		1, 2, 3	01	-1.1		V
Logic "0" voltage	V_{E0}		1, 2, 3	01		-1.5	V
Logic "1" current	I_{E1}		1, 2, 3	01		100	μA
Logic "0" current	I_{E0}		1, 2, 3	01		100	μA
Input capacitance	C_{EIN}		4	01		5.0	pF
ENCODE pulse width high	t_{PWH}		9	01	6.6		ns
ENCODE pulse width low	t_{PWL}		9	01	6.6		ns

AC LINEARITY

Signal to noise ratio <u>7/</u>	SNR		1	01	31		dB
Signal to noise ratio <u>8/</u>	SNR		1	01	40		dB

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	Device type	Limits		Unit
					Min	Max	
DIGITAL OUTPUTS 4/							
Logic "1" voltage	V _{D1}		1, 2, 3	01	-1.1		V
Logic "0" voltage	V _{D0}		1, 2, 3	01		-1.5	V
POWER SUPPLY 9/							
Positive supply current	+I _S	+V _S = +5.0 V	1	01		70	mA
			2, 3			75	
Negative supply current	-I _S	-V _S = -5.2 V	1	01		80	mA
			2, 3			85	

- 1/ Supply voltages are: $+V_S = +5.0 \text{ V}$ and $-V_S = -5.2 \text{ V}$ and differential reference voltage = 2.0 V unless otherwise stated.
- 2/ Under normal operating conditions, the analog input voltages should not exceed nominal $\pm 2 \text{ V}$ operating range, nor the supply voltages ($+V_S$ and $-V_S$), whichever is smaller.
- 3/ Under normal operating conditions the differential reference voltage may range from $\pm 0.5 \text{ V}$ to $\pm 2 \text{ V}$; $+V_{REF} \geq -V_{REF}$.
- 4/ Output terminated with 100Ω resistors to -2.0 V .
- 5/ Measured from the leading edge of ENCODE to data out on Bit 1 (MSB).
- 6/ Measured from the trailing edge of ENCODE to data out on Bit 1 (MSB).
- 7/ RMS signal to RMS noise, with 540 kHz analog input signal.
- 8/ Peak-to-peak signal to RMS noise, with 540 kHz analog input signal.
- 9/ Supply voltage should remain stable within $\pm 5\%$ for normal operation.

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Case outline	E	3
Device type	01	
Terminal number	Terminal symbol	
1	-V _S	-V _S
2	AGND	NC
3	V _H	AGND
4	ENCODE	NC
5	-V _{REF}	NC
6	A _{IN}	V _H
7	+V _S	ENCODE
8	+V _{REF}	NC
9	BIT 6 (LSB)	NC
10	BIT 5	-V _{REF}
11	BIT 4	NC
12	BIT 3	NC
13	BIT 2	NC
14	BIT 1 (MSB)	A _{IN}
15	OVERFLOW	+V _S
16	DGND	+V _{REF}
17	---	NC
18	---	NC
19	---	BIT 6 (LSB)
20	---	BIT 5
21	---	BIT 4
22	---	BIT 3
23	---	BIT 2
24	---	BIT 1 (MSB)
25	---	OVERFLOW
26	---	NC
27	---	NC
28	---	DGND

FIGURE 1. Terminal connections.

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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.

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 A, B, 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.

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. Subgroup 4 (C_{AIN} measurement only) shall be measured only for the initial test and after process or design changes which may affect analog input capacitance.

c. Subgroups 5, 6, 7, 8, 10 and 11 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. 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.

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TABLE II. Electrical test requirements.

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)	1*, 2, 3, 4, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 9
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

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.

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