REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
B	Added device type 02. Redrew entire document. -sld	99-07-22	Raymond Monnin

REV																			
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REV STATUS	REV	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

PMIC N/A

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DRAWING APPROVAL DATE
92-12-21

REVISION LEVEL
B

DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43216

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

MICROCIRCUIT, HYBRID, LINEAR, SAMPLING A/D CONVERTER, 16-BIT RESOLUTION

SIZE	CAGE CODE	
A	**67268**	**5962-92253**

SHEET 1 OF 14

DSCC FORM 2233
APR 97

5962-E325-99

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

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes, class D (lowest reliability), class E, (exceptions), class G (lowest high reliability), class H (high reliability), and class K, (highest reliability) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:

5962	-	92253	01	H	X	X
Federal stock class designator	RHA designator (see 1.2.1)		Device type (see 1.2.2)	Device class designator (see 1.2.3)	Case outline (see 1.2.4)	Lead finish (see 1.2.5)

Drawing number

1.2.1 Radiation hardness assurance (RHA) designator. Device classes H and K RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

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

Device type	Generic number	Circuit function
01 1/	MN6450T/B CH	Sampling A/D converter, 16-bit resolution
02	MN6450S/B CH	Sampling A/D converter, 16-bit resolution

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

Device class	Device performance documentation
D, E, G, H, or K	Certification and qualification to MIL-PRF-38534

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	See figure 1	32	Dual-in-line

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1/ Device type 01 is no longer available, use device type 02 as a replacement.

1.3 Absolute maximum ratings. 1/

Positive supply voltage range (V_{CC})	0 V dc to +16.5 V dc
Negative supply voltage range (V_{EE})	0 V dc to -16.5 V dc
Logic supply voltage range (V_{DD})	-0.3 V dc to +6 V dc
Analog input channels	±16.5 V dc
Digital input range	-0.3 V dc to +6 V dc
Power dissipation (P_D)	740 mW
Thermal resistance, junction to case (θ_{JC})	5°C/W
Thermal resistance, junction to ambient (θ_{JA})	28°C/W
Lead temperature (soldering, 10 seconds)	+300°C
Storage temperature range	-65°C to +150°C
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC})	+11.4 V dc to +16.5 V dc
Negative supply voltage range (V_{EE})	-11.4 V dc to -16.5 V dc
Logic supply voltage range (V_{DD})	+4.5 V dc to +5.5 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. The following specification, standards, and handbook form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Methods and Procedures for Microelectronics
MIL-STD-973 - Configuration Management
MIL-STD-1835 - Microcircuit Case Outlines

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-780 - Standard Microcircuit Drawings

(Unless otherwise indicated, copies of the specification, standards, and handbook are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. Therefore, the tests and inspections herein may not be performed for the applicable device class (see MIL-PRF-38534). Furthermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

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 specified 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 of Device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked as listed in QML-38534.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input voltage range	V_I	Unipolar	1,2,3	All	0	+5	V
					0	+10	
		Bipolar	1,2,3	All	-5	+5	V
					-10	+10	
Input voltage high	V_{IH}	For all digital inputs	1,2,3	All	+2.0		V
Input voltage low	V_{IL}	For all digital inputs	1,2,3	All		+0.8	V
Input current high	I_{IH}	V_{IH} = +2.4 V	1,2,3	All	-10	+10	µA
Input current low	I_{IL}	V_{IL} = +0.4 V	1,2,3	All	-10	+10	µA
Output voltage high	V_{OH}	I_{OH} = -6 mA 2/	1,2,3	All	+3.9		V
Output voltage low	V_{OL}	I_{OL} = +6 mA 2/	1,2,3	All		+0.26	V
Conversion status output voltage high	V_{OH1}	I_{OH} = 40 µA	1,2,3	All	+2.4		V
Conversion status output voltage low	V_{OL1}	I_{OL} = 1.6 mA	1,2,3	All		+0.4	V
Positive supply current	I_{CC}	V_{CC} = +16.5 V	1,2,3	All		10	mA
Negative supply current	I_{EE}	V_{EE} = -16.5 V	1,2,3	All		-31	mA
Logic supply current	I_{DD}	V_{DD} = +5.5 V	1,2,3	All		25	mA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Power dissipation	P_D	Worse case (all 1's or all 0's)	1,2,3	All		740	mW
Power supply rejection ratio	PSSR	$+14.5\ V \le V_{CC} \le +15.5\ V$	1,2,3	All	-0.001	+0.001	%FSR/ %Vs
		$-15.5\ V \le V_{EE} \le -14.5\ V$			-0.001	+0.001	
		$+4.75\ V \le V_{DD} \le +5.25\ V$			-0.001	+0.001	
Unipolar 10 V 3/	V_{+FS}	MSB LSB nominal 1111 1111 1111 111* +9.99977	4	01	+9.99477	+10.0048	V
				02	+9.98977	+10.0098	
Bipolar 10 V 3/	V_{+FS}	MSB LSB nominal 1111 1111 1111 111* +4.99977	4	01	+4.99477	+5.00477	V
				02	+4.98977	+5.00975	
	V_{-FS}	MSB LSB nominal 0000 0000 0000 000* -4.99992		01	-5.00492	-4.99492	
				02	-5.0099	-4.98993	
Bipolar 20 V 3/	V_{+FS}	MSB LSB nominal 1111 1111 1111 111* +9.99954	4	01	+9.98954	+10.0095	V
				02	+9.97954	+10.0195	
	V_{-FS}	MSB LSB nominal 0000 0000 0000 000* -9.99985		01	-10.0098	-9.98985	
				02	-10.0198	-9.97985	
Unipolar offset 10 V 3/	V_{UO}	MSB LSB nominal 0000 0000 0000 000* +0.076	4	01	-1.924	+2.076	mV
				02	-2.924	+3.076	
Bipolar 10 V zero 3/	V_{BZ1}	MSB LSB nominal **** **** **** **** -0.076	4	01	-2.076	+1.924	mV
				02	-3.0765	+2.9235	
Bipolar 20 V zero 3/	V_{BZ2}	MSB LSB nominal **** **** **** **** -0.153	4	01	-4.153	+3.847	mV
				02	-6.153	+5.847	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Bipolar zero drift	dV_{BZ}/dT		5,6	01	-2.5	+2.5	ppmFSR/°C
				02	-4	+4	
Unipolar offset drift	dV_{UO}/dT		5,6	01	-2.5	+2.5	
				02	-4	+4	
Unipolar full scale drift	dV_{FS}/dT		5,6	01	-10	+10	
				02	-15	+15	
Bipolar full scale drift	dV_{FS}/dT		5,6	01	-10	+10	
				02	-15	+15	
Integral linearity error	LE	offset endpoint method ±1 LSB at 16 bits 4/	4,5,6	01	-0.0015	+0.0015	%FSR
			4	02	-0.0015	+0.0015	%FSR
			5,6		-0.0022	+0.0022	
Differential linearity error	DLE	No missing codes at 16 bits	4,5,6	All	-0.9		LSB
Resolution	RES		4,5,6	All		16	bits
Reference voltage	V_{REF}	5/	4	All	+4.45	+4.55	V
Reference drift	dV_{REF}/dT		5,6	All	-10	+10	ppm/°C
Conversion time	t_c		9,10,11	All		17.525	µs

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output leakage high impedance	I_{OZ}		1,2,3	All	-10	+10	µA
Spurious signals range	SSR	Bipolar 10 V range, F_{SAMPLE} = 47 kHz, f_{IN} = 1 kHz	4	01	-98		dB
				02	-96		
			5,6	01	-96		
				02	-94		
		Bipolar 10 V range, F_{SAMPLE} = 47 kHz, f_{IN} = 12 kHz	4	01	-92		
				02	-90		
			5,6	01	-90		
				02	-88		
Signal to noise ratio	SNR	Bipolar 10 V range, 6/ F_{SAMPLE} = 47 kHz, f_{IN} = 1 kHz, 0 dB	4	01	88		dB
				02	85		
			5,6	01	85		
				02	83		
		Bipolar 10 V range, F_{SAMPLE} = 47 kHz, f_{IN} = 12 kHz, 0 dB	4	01	84		
				02	81		
			5,6	01	82		
				02	79		

See footnotes at top of next page.

TABLE I. Electrical performance characteristics - Continued.

1/ Unless otherwise specified, V_{CC} = +15 V, V_{EE} = -15 V, V_{DD} = +5 V.

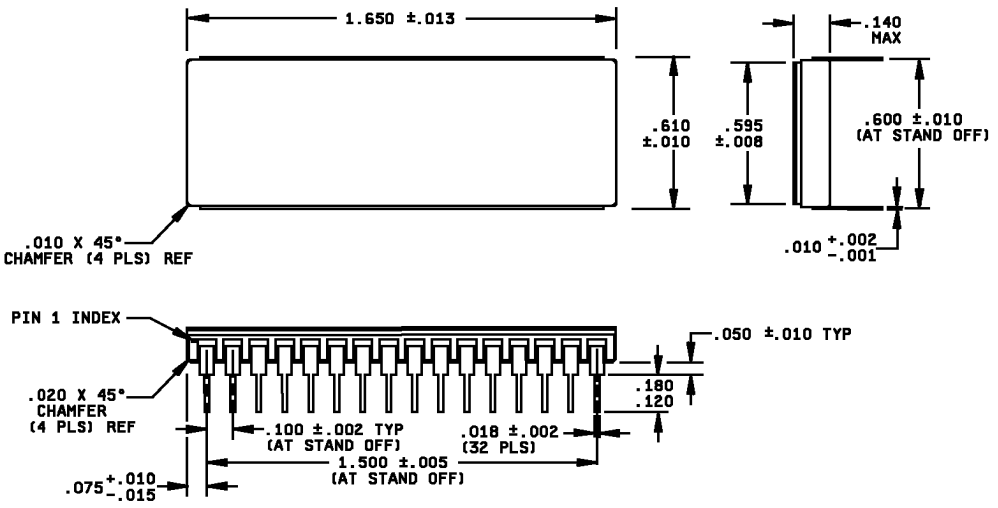
2/ For all digital outputs, except conversion status.

3/ * Indicates the output will transition from a "1" to "0" or vice versa as the analog input passes through the voltages listed in the limit columns.

4/ Specification listed applies after calibration at the specified temperature.

5/ Reference output is to be bypassed to analog ground with a 10 µf capacitor in parallel with a 0.1 µf capacitor. Reference must not be used for applications circuits without buffering.

6/ Parameter shall be tested under F_{IN} = 1 kHz, 0 dB condition as part of intial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.



Inches	mm
.001	0.03
.002	0.02
.005	0.13
.008	0.20
.010	0.25
.013	0.33
.015	0.38
.018	0.46
.020	0.51
.075	1.90
.100	2.54
.120	3.05
.140	3.56
.180	4.57
.595	15.11
.600	15.24
.610	15.50
1.500	38.10
1.650	41.91

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inches (0.13 mm).

FIGURE 1. Case outline.

Device types	01 and 02		
Case outline	X		
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	Bit 16 (LSB)	17	V_{CC}
2	Bit 15	18	3-State/$\overline{\text{Read}}$
3	Bit 14	19	Data/$\overline{\text{Status}}$
4	Bit 13	20	V_{EE}
5	Bit 12	21	10 V analog input
6	Bit 11	22	5 V analog input
7	Bit 10	23	Analog ground
8	Bit 9	24	Reference output
9	Bit 8	25	Bipolar/$\overline{\text{Unipolar}}$
10	Bit 7	26	Clock input
11	Bit 6	27	Reset
12	Bit 5	28	Background calibration
13	Bit 4	29	Start convert
14	Bit 3	30	Conversion status
15	Bit 2	31	Digital ground
16	Bit 1 (MSB)	32	V_{DD}

FIGURE 2. Terminal connections.

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	---
Final electrical parameters	1*,2,3,4,5,6,9,10,11
Group A test requirements	1,2,3,4,5,6,9,10,11
Group C end-point electrical parameters	1,2,3
MIL-STD-883, group E end-point electrical parameters for RHA devices	Subgroups** (in accordance with method 5005, group A test table)

* PDA applies to subgroup 1.
** When applicable to this standard microcircuit drawing, the subgroups shall be defined.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. 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 either DSCC-VA or the acquiring activity upon request. Also, 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 as specified in accordance with table I of method 1015 of MIL-STD-883.

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 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

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

b. Subgroups 7 and 8 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test, 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 either DSCC-VA or the acquiring activity upon request. Also, 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 as specified in accordance with table I of method 1005 of MIL-STD-883.

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

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

a. RHA tests for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.

b. End-point electrical parameters shall be as specified in table II herein.

c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.

d. The devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25EC " 5 percent, after exposure.

e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.

f. For device classes H and K, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.

g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

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 Supply Center Columbus when a system application requires configuration control and the applicable SMD. DSCC 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 microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0512.

6.6 Sources of supply. Sources of supply are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 99-07-22

Approved sources of supply for SMD 5962-92253 are listed below for immediate acquisition information only and shall be added to QML-38534 during the next revision. QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9225301HXA 5962-9225301HXC	3/ 3/	MN6450T/B CH MN6450T/B CH
5962-9225302HXA 5962-9225302HXC	50507 50507	MN6450S/B CH MN6450S/B CH

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.
2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
3/ Part is no longer available from the approved source supply.

Vendor CAGE number	Vendor name and address
50507	Micro Networks Company 324 Clark Street Worcester, MA 01606-1298

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in the information bulletin.