REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Table I, I_{REF}, correct minimum limit. Table II, remove subgroups 4, 5, and 6 from groups C and D end-point electrical parameters. Update format. Editorial changes throughout.	1989 NOV 15	M. A. Frye

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

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: Gary Zeller

CHECKED BY: Charles E. Besore

APPROVED BY: M. A. Frye

DRAWING APPROVAL DATE: 16 May 1988

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, LINEAR, CONTINUOUSLY VARIABLE SLOPE DELTA (CVSD) MODULATOR/ DEMODULATOR, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-87643

SHEET OF 1

DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

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:

5962-87643	01	E	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	3517	Continuously variable slope delta (CVSD) modulator/demodulator

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
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range (V_{CC})	-0.4 V dc to +18 V dc
Differential analog input voltage (V_{ID})	±5.0 V dc
Digital threshold voltage (V_{TH})	-0.4 V to V_{CC}
$V_{CC}/2$ output current (I_{REF})	-25 mA
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D)	500 mW
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ_{JA})	+100°C/W
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	4.75 V dc to 16.5 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 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 Block diagram. The block diagram shall be as specified on figure 2.

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

3.3 Electrical performance characteristics. Unless otherwise specified, 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).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	V_{CC}	Group A subgroups	Limits Min	Limits Max	Unit
Power supply current (idle channel)	I_{CC}		5 V	1,2,3		5.0	mA
			15 V			10.0	
Gain control current range	I_{GCR}		12 V	4,5,6	0.001	3.0	mA
Analog comparator input range	V_I	$4.75\ V \le V_{CC} \le 16.5\ V$		4,5,6	1.3	V_{CC} -1.3	V
Analog output range	V_O	$4.75 \le V_{CC} \le 16.5\ V$, $I_O = \pm 5.0\ mA$		4,5,6	1.3	V_{CC} -1.3	V
Input bias currents (comparator in active region)	I_{IB}	Analog input	12 V	4,5,6		1.5	µA
		Analog feedback				1.5	
		Syllabic filter				0.5	
		Reference input				-0.5	
Input offset current (comparator in active region)	I_{IO}	Analog input/analog feedback	12 V	4,5,6		0.6	µA
		Integrator amplifier				0.2	
Input offset voltage V/I converter	V_{IO}		12 V	4,5,6		6.0	mV
Transconductance	gm	V/I converter = 0 to 3.0 mA	12 V	4,5,6	0.1		mA/mV
		Integrator amplifier = 0 to 5.0 mA			1.0		
Propagation delay times, 1/ clock trigger to digital output	t_{PLH}	C_L = 25 pF to GND	12 V	9,10,11		2.5	µs
	t_{PHL}					2.5	

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	V_{CC}	Group A subgroups	Limits		Unit
					Min	Max	
Propagation delay times, 1/ clock trigger to coincidence output	t_{PLH}	C_L = 25 pF to GND R_L = 4 kΩ to V_{CC}	12 V	9,10,11		3.0	µs
	t_{PHL}					2.0	
Coincidence output voltage - low logic state	$V_{OL(con)}$	$I_{OL(con)}$ = 3.0 mA	12 V	9,10,11		0.25	V
Coincidence output leakage - current - high logic state	$I_{OH(con)}$	V_{OH} = 15 V	12 V	9,10,11		0.5	µA
Applied digital threshold voltage range (pin 12) 2/	V_{TH}		12 V	1,2,3	+1.2	V_{CC} -2.0	V
Digital threshold input current	$I_{I(TH)}$	1.2 V $\le V_{TH} \le V_{CC}$ - 2.0 V (V_{IL} applied to pins 13-15) 2/	12 V	1,2,3		5.0	µA
		1.2 V $\le V_{TH} \le V_{CC}$ - 2.0 V (V_{IH} applied to pins 13-15) 2/				-50	
Maximum integrator amplifier output current	I_O		12 V	1,2,3	±5.0		mA
$V_{CC}/2$ generator maximum output current (source only)	I_{REF}		12 V	1,2,3	+10		mA
$V_{CC}/2$ generator output impedance	Z_{REF}	0 to 10 mA	12 V	1,2,3		6.0	Ω
$V_{CC}/2$ generator tolerance	ϵ/r	4.75 V $\le V_{CC} \le$ 16.5 V	12 V	1,2,3		±3.5	%
Logic input voltage (pins 13, 14 and 15) 2/	V_{IL}	Low logic state	12 V	4,5,6	GND	V_{TH} -0.4	V
	V_{IH}	High logic state			V_{TH} +0.4	18.0	

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	V_{CC}	Group A subgroups	Limits		Unit
					Min	Max	
Dynamic total loop offset voltage	ΣV Offset	I_{GC} = 33.0 µA	12 V	4		±5.0	mV
				5,6		±10	
			5 V	4		±6.0	
				5,6		±10	
Digital output voltage	V_{OL}	I_{OL} = 3.6 mA	12 V	4,5,6		0.4	V
	V_{OH}	I_{OH} = -0.35 mA			V_{CC} -1.0		
Syllabic filter applied voltage	$V_{I(syl)}$		12 V	4,5,6	+3.2	V_{CC}	V
Integrating current	I_{INT}	I_{GC} = 12.0 µA	12 V	4,5,6	8.0	12	µA
		I_{GC} = 1.5 mA			1.45	1.55	mA
		I_{GC} = 3.0 mA			2.75	3.25	
Dynamic integrating current match	$V_{O(ave)}$	I_{GC} = 1.5 mA	12 V	4,5,6		±250	mV

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	V_{CC}	Group A subgroups	Limits		Unit
					Min	Max	
Input current - high logic state	I_{IH}	V_{IH} = 18 V Digital data input	12 V	4,5,6		±5.0	µA
		V_{IH} = 18 V Clock input				±5.0	
		V_{IH} = 18 V Encode/ $\overline{\text{decode}}$ input				±5.0	
Input current - low logic state	I_{IL}	V_{IL} = 0 V Digital data input	12 V	4,5,6		-10	µA
		V_{IL} = 0 V Clock input				-360	
		V_{IL} = 0 V Encode/ $\overline{\text{decode}}$ input				-36	
		V_{IL} = 0.4 V				-72	

1/ All propagation delay times measured 50% to 50% from the negative going edge of the clock (from V_{CC} to +0.4 V).

2/ Pin numbers correspond with case E functions.

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.

Device type	01	
Case outlines	E	2
Terminal number	Terminal symbol	
1	Analog input	NC
2	Analog feedback	Analog input
3	Syllabic filter	Analog feedback
4	Gain control	Syllabic filter
5	Ref input (+)	Gain control
6	Filter input (-)	NC
7	Analog output	Ref input (+)
8	V_{EE}	Filter input (-)
9	Digital output	Analog output
10	$V_{CC}/2$ output	V_{EE}
11	$\overline{\text{Coincidence output}}$	NC
12	Digital threshold	Digital output
13	Digital data input (-)	$V_{CC}/2$ output
14	Clock	$\overline{\text{Coincidence output}}$
15	$\overline{\text{Encode/decode}}$	Digital threshold
16	V_{CC}	NC
17		Digital data input (-)
18		Clock
19		$\overline{\text{Encode/decode}}$
20		V_{CC}

NC = No connection

FIGURE 1. Terminal connections.

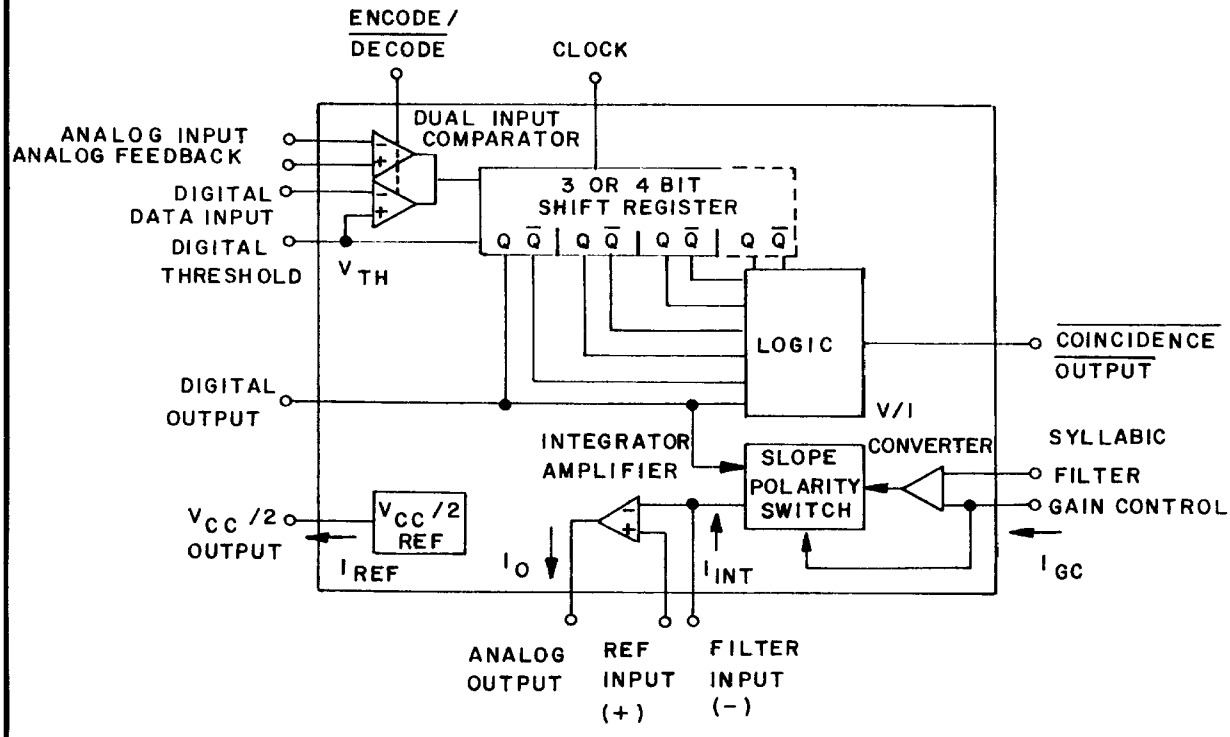

FIGURE 2. Block diagram.

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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 or B using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°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 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 or B using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

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

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1,2,3,4,5,6
Final electrical test parameters (method 5004)	1*,2,3,4,5,6 9,10,11
Group A test requirements (method 5005)	1,2,3,4,5,6,9, 10,11
Groups C and D end-point electrical parameters (method 5005)	1,2,3

* PDA applies to subgroup 1.

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.

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 1/
5962-8764301EX	04713	3517/BEAJC
5962-87643012X	04713	3517/B2AJC

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
04713	Motorola Incorporated Semiconductor Products Division 5005 E. McDowell Road Phoenix, AZ 85008 Point of contact: 7402 S. Price Road Tempe, AZ 85283