NOTICE OF REVISION (NOR)

THIS REVISION DESCRIBED BELOW HAS BEEN AUTHORIZED FOR THE DOCUMENT LISTED.

1. DATE (YYMMDD) 97-03-21

Form Approved OMB No. 0704-0188

Public reporting burden for this collection is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed , and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of thi s collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Inform ation Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.
PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THES E ADDRESSED. RETURN COMPLETED FORM TO THE GOVERNMENT ISSUING CONTRACTING OFFICER FOR THE CONTRACT/ PROCURING ACTIVITY NUMBER LISTED IN ITEM 2 OF THIS FORM.

2. PROCURING ACTIVITY NO.

3. DODAAC

4. ORIGINATOR

a. TYPED NAME *(First, Middle Initial, Last)*

b. ADDRESS *(Street, City, State, Zip Code)*
Defense Supply Center Columbus
3990 E. Broad Street
Columbus, OH 43216-5000

5. CAGE CODE 67268

7. CAGE CODE 67268

6. NOR NO. 5962-R241-97

8. DOCUMENT NO. **5962-88658**

9. TITLE OF DOCUMENT
MICROCIRCUIT, LINEAR, 12-BIT A/D CONVERTER, HYBRID

10. REVISION LETTER

a. CURRENT A

b. NEW B

11. ECP NO. N/A

12. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES
All

13. DESCRIPTION OF REVISION

Sheet 1: Revisions ltr column; add "B".
Revisions description column; add "Changes in accordance with NOR 5962-R241-97".
Revisions date column; add "97-03-21".
Revision level block; change "A" to "B".
Rev status of sheets; for sheets 1, 8, 9, and 10, change "A" to "B".

Sheet 8: FIGURE 2 Terminal connections, pins 22 and 23, change "$\overline{\text{SERIAL OUT}}$" and "SERIAL OUT" to "NC" and "NC", respectively.
Revision level block; add "A".

Sheet 9: FIGURE 3, Logic diagram, delete the output line from the 12-bit SAR that connects directly to pin 23 and the NOT gate connecting to pin 22.
Revision level block; add "A".

Sheet 10: FIGURE 4, Timing diagram, delete the timing waveform for the "SERIAL OUT" in its entirety.
Revision level block; add "A".

14. THIS SECTION FOR GOVERNMENT USE ONLY

a. *(X one)*		
	X	(1) Existing document supplemented by the NOR may be used in manufacture.
		(2) Revised document must be received before manufacturer may incorporate this change.
		(3) Custodian of master document shall make above revision and furnish revised document.

b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT
DSCC-VAT

c. TYPED NAME *(First, Middle Initial, Last)*
Kendall A. Cottongim

d. TITLE
Team Chief,
Electronic Components Team

e. SIGNATURE
Kendall A. Cottongim

f. DATE SIGNED (YYMMDD) 97-03-21

15a. ACTIVITY ACCOMPLISHING REVISION
DSCC-VAT

b. REVISION COMPLETED *(Signature)*
Gary Zahn

c. DATE SIGNED (YYMMDD) 97-03-21

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changed to reflect MIL-H-38534 processing. Editorial changes throughout.	91-11-20	G. A. Lude

REV																				
SHEET																				
REV																				
SHEET																				

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

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 Zahn

CHECKED BY
Michael C. Jones

APPROVED BY
Greg A. Lude

DRAWING APPROVAL DATE
89-07-31

REVISION LEVEL
A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, LINEAR, 12-BIT A/D CONVERTER, HYBRID

SIZE	CAGE CODE	
A	**67268**	**5962-88658**

SHEET 1 OF 13

DESC FORM 193
JUL 91

5962-E130

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

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-88658	01	X	X
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
Drawing number	Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish per MIL-H-38534

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

Device type	Generic number	Circuit function
01	AD578SD	A/D converter, 12 bit, high speed
02	AD578TD	A/D converter, 12 bit, high speed
03	AD578ZSD	A/D converter, 12 bit, high speed
04	AD578ZTD	A/D converter, 12 bit, high speed

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
X	See figure 1, (32-lead, 1.640" x .605" x .280"), dual-in-line package

1.3 Absolute maximum ratings.

Supply voltages ($\pm V_{CC}$)	±18 V dc
Logic supply voltage ($+V_{DD}$)	+7 V dc
Analog inputs (pins 27 and 28)	±25 V dc
Digital inputs	+5.5 V dc
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance:	
Junction-to-case (Θ_{JC})	8°C/W
Junction-to-ambient (Θ_{JA})	25°C/W
Junction temperature (T_J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range ($\pm V_{CC}$):	
Device types 01 and 02	±13.5 V dc to ±16.5 V dc
Device types 03 and 04	±11.4 V dc to ±12.6 V dc
Logic supply voltage range ($+V_{DD}$)	+4.75 V dc to +5.25 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specifications and standard. Unless otherwise specified, the following specifications and standard 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.

SPECIFICATIONS

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.
MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specifications, and standard 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 MIL-H-38534 and as specified herein.

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

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 and figure 1.

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

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

3.2.4 Timing diagram. Timing diagram shall be as specified on figure 4.

3.2.5 Digital output data. Digital output data shall be as specified on figure 5.

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 described in table I.

3.5 Marking. Marking shall be in accordance with MIL-H-38534. 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 QML-38534 (see 6.6 herein).

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECT review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed.

3.7 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 QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-ECT prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-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-H-38534.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Gain error	V_{GE}	10 V unipolar, 20 V bipolar, end-point electrical	1	All	-0.25	+0.25	%/FSR
			1	All	-0.30	+0.30	
Gain drift	V_{GD}	10 V unipolar, 20 V bipolar	2, 3	01,03	-50	+50	ppm/°C
				02,04	-30	+30	
Unipolar offset error	V_{OSE}	10 V unipolar	1	All	-0.25	+0.25	%/FSR
Unipolar offset drift	V_{OSD}	10 V unipolar	2, 3	01,03	-15	+15	ppm/°C
				02,04	-10	+10	
Bipolar offset error	V_{OSE}	20 V bipolar, end-point electrical	1	All	-0.25	+0.25	%/FSR
			1	All	-0.30	+0.30	
Bipolar offset drift	V_{OSD}	20 V bipolar	2, 3	01,03	-25	+25	ppm/°C
				02,04	-20	+20	
Linearity error	RA	10 V unipolar, 20 V bipolar	1	All	-0.50	+0.50	LSB
		10 V unipolar, 20 V bipolar	2, 3	All	-0.75	+0.75	
Differential linearity error	DNL	10 V unipolar, 20 V bipolar	1, 2, 3	All	-1.0	+1.0	
10 V reference error	V_{RE}		1	All	-100	+100	mV
			2,3	All	-20	+20	ppm/°C
$+V_{DD}$ Power supply sensitivity	PSRR	2/	1,2,3	All	-0.005	+0.005	%/%+V_{DD}

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 types	Limits Min	Limits Max	Unit
$\pm V_{CC}$ Power supply sensitivity	PSRR	2/	1,2,3	01,02	-0.005	+0.005	%/%$\pm V_{CC}$
$\pm V_{CC}$ Power supply sensitivity	PSRR	2/	1,2,3	03,04	-0.007	+0.007	
Digital output high drive	V_{OH}	at -80 µA I_{OH} 2/	1,2,3	All	2.4		V dc
Digital output low drive	V_{OL}	at 3.2 mA I_{OL} 2/	1,2,3	All		0.4	
$+V_{DD}$ Supply drain	$+I_{DD}$	All bits on 2/	1,2,3	All		150	mA
$+V_{CC}$ Supply drain	$+I_{CC}$	All bits on 2/	1,2,3	All		8	
$-V_{CC}$ Supply drain	$-I_{CC}$	All bits on 2/	1,2,3	All		35	
Power dissipation	P_D	$T_A = +25°C$		All		715	mW
Conversion speed	t_C	3/	9,10,11	01,03		6	µs
			9,10,11	02,04		4.5	

1/ $+V_{DD}$ = +4.75 V to +5.25 V; $\pm V_{CC}$ = ±13.5 V to ±16.5 V for device types 01 and 02; $\pm V_{CC}$ = ±11.4 V to ±12.6 V for device types 03 and 04.

2/ Subgroups 2 and 3 shall be tested as part of device initial characterization and every 52 weeks thereafter. Subgroups 2 and 3 shall also be tested after all design and process changes and shall be guaranteed to the limits specified in table I for all lots not specifically tested. Subgroup 1 shall be tested with every lot.

3/ Subgroups 10 and 11 shall be tested as part of device initial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

4.2 Screening. Screening shall be in accordance with MIL-H-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 using the circuit submitted with the certificate of compliance (see 3.7 herein).

(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.

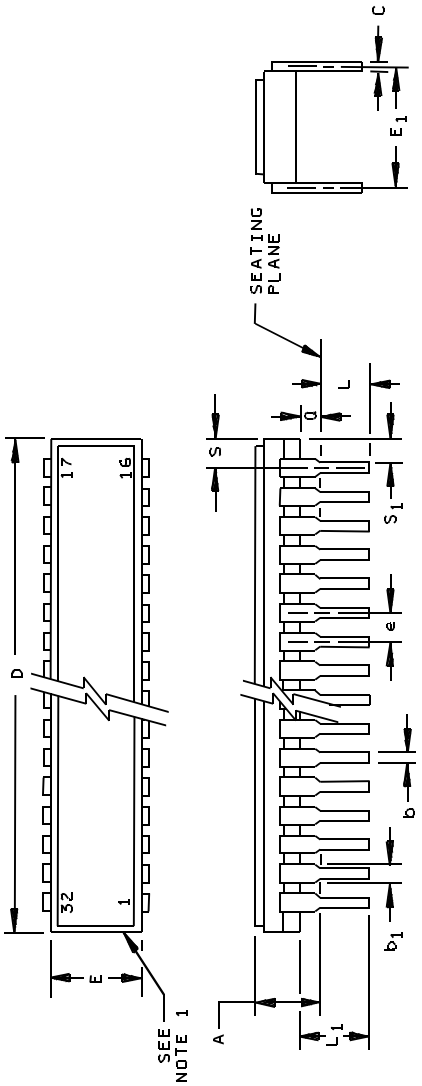


FIGURE 1. Case outline X.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88658
		REVISION LEVEL A	SHEET 6

Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A		.280		7.11	
b	.016	.020	0.41	0.51	
b_1	.035	.045	0.89	1.14	2
c	.009	.012	0.23	0.30	
D	1.584	1.640	40.23	41.66	
E	.580	.605	14.73	15.37	
E_1	.590	.610	14.99	15.49	6
e	.100 BSC		2.54 BSC		4,7
L	.125	.200	3.18	5.08	
L_1	.180		4.57		
Q	.015	.060	0.38	1.52	3
S		.098		2.49	5
S_1	.005		0.13		5

NOTES:
1. Index area; a notch or a lead one indentification mark is located adjacent to lead one.
2. The minimum limit for dimension b_1 may be .023 inch (0.58 mm) for all four corner leads only.
3. Dimension Q shall be measured from the seating plane to the base plane.
4. The basic pin spacing is .100 inch (2.54 mm) between centerlines.
5. Applies to all four corners.
6. E_1 shall be measured at the centerline of the leads.
7. Thirty spaces.
8. Dimensions are in inches.
9. Metric equivalents are given for general information only.

FIGURE 1. Case outline X - Continued.

Device types	01, 02, 03, and 04
Case outline	X
Terminal number	Terminal symbol
1	BIT 12
2	BIT 11
3	BIT 10
4	BIT 9
5	BIT 8
6	BIT 7
7	BIT 6
8	BIT 5
9	BIT 4
10	BIT 3
11	BIT 2
12	BIT 1
13	BIT 1
14	SHORT CYCLE
15	DIGITAL GND
16	+5 V
17	CLOCK ADJ
18	CLOCK OUT
19	CLOCK IN
20	EOC
21	CONVERT START
22	SERIAL OUT
23	SERIAL OUT
24	REF OUT
25	GAIN (REF IN)
26	BIPOLAR OFFSET
27	10 V SPAN INPUT
28	20 V SPAN INPUT
29	ZERO ADJ
30	ANALOG GND
31	+15 V
32	-15 V

FIGURE 2. Terminal connections.

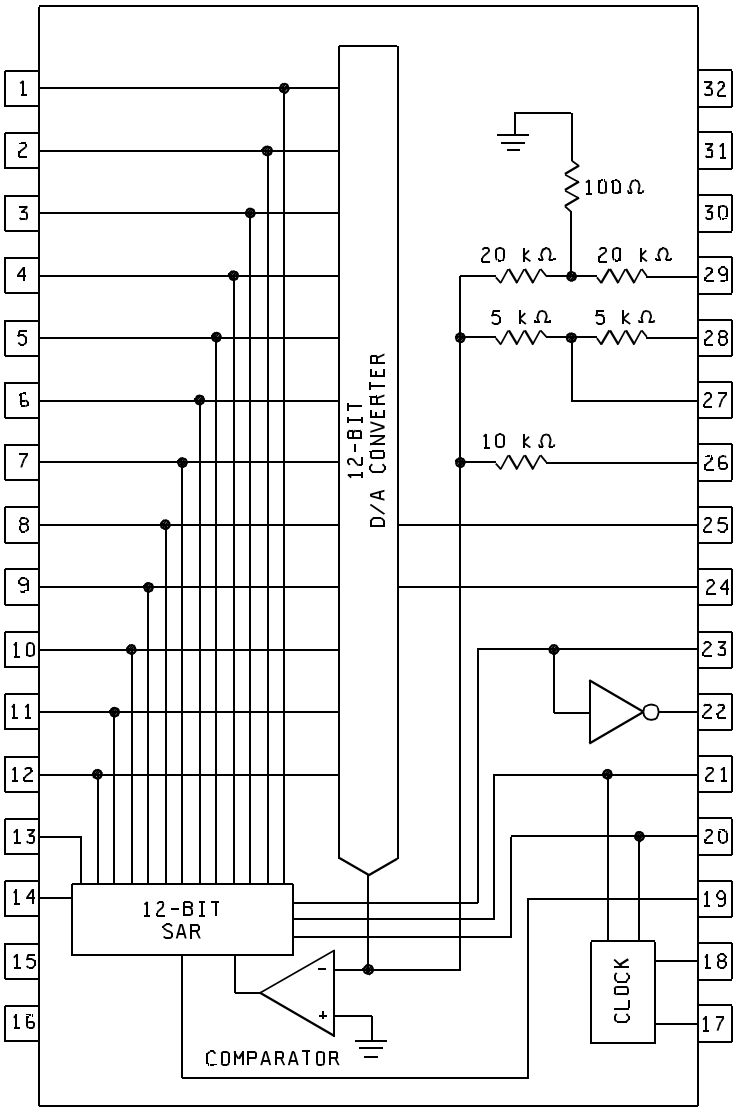
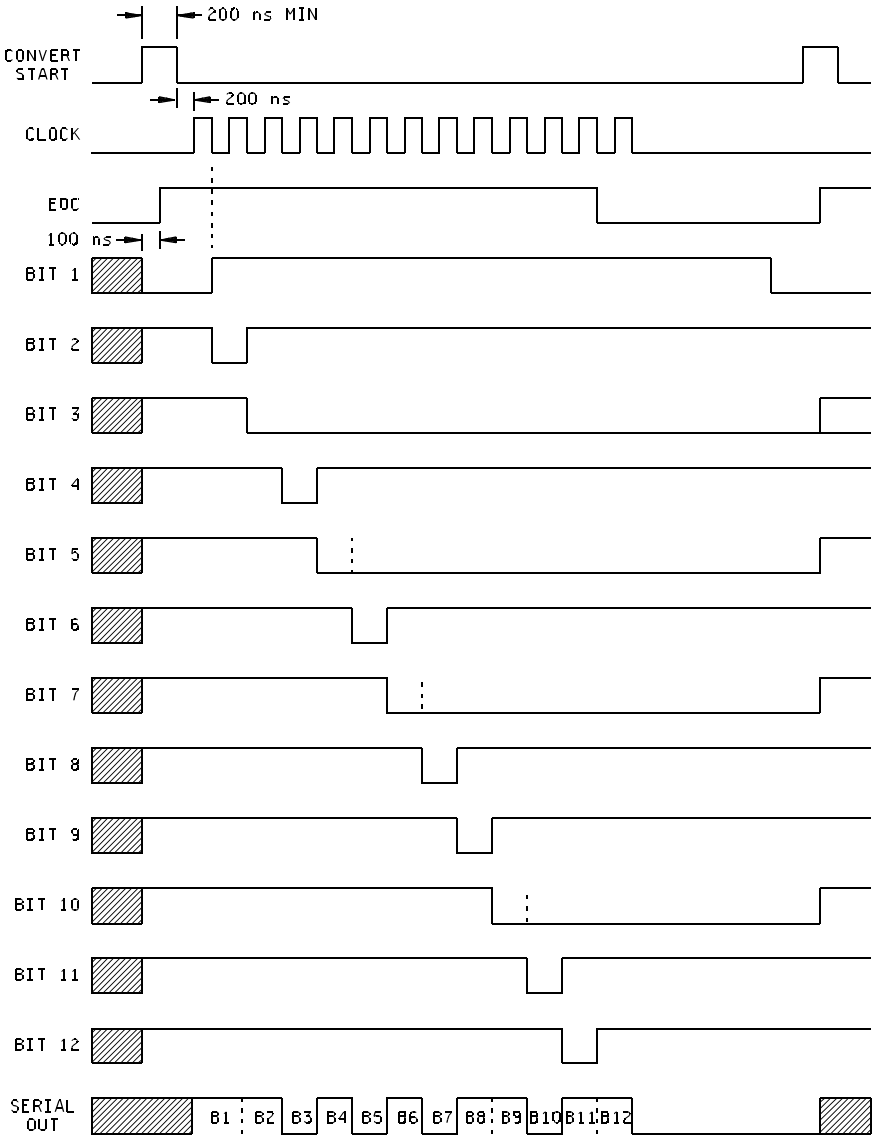


FIGURE 3. Logic diagram.



Clock:
Internal: Connect clock out (18) to clock in (19).
External: Connect external clock to clock in (19), clock should be at least 30 percent duty cycle with minimum period, t_{MIN} of 100 ns.

Note: The rising edge of convert start pulse resets the MSB to zero, and the LSB to one. The trailing edge initiates conversion.

FIGURE 4. Timing diagram.

Analog input - volts (center of quantization interval)				Digital output code (binary for unipolar ranges; offset binary for bipolar ranges)	
0 to +10 V Range	0 to +20 V Range	-5 V to +5 V Range	-10 V to +10 V Range	B1 (MSB)	B12 (LSB)
+9.9976	+19.9951	+4.9976	+9.9951	1 1 1 1 1 1 1 1 1 1 1 1	
+9.9952	+19.9902	+4.9952	+9.9902	1 1 1 1 1 1 1 1 1 1 1 0	
-	-	-	-	-	
-	-	-	-	-	
+5.0024	+10.0049	+0.0024	+0.0049	1 0 0 0 0 0 0 0 0 0 0 1	
+5.0000	+10.0000	+0.0000	+0.0000	1 0 0 0 0 0 0 0 0 0 0 0	
-	-	-	-	-	
-	-	-	-	-	
+0.0024	+0.0051	-4.9976	-9.9951	0 0 0 0 0 0 0 0 0 0 0 1	
+0.0000	+0.0000	-5.0000	-10.0000	0 0 0 0 0 0 0 0 0 0 0 0	

FIGURE 5. Digital output data.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

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

b. Subgroups 4, 5, 6, 7, and 8 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

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 3.7 herein).

(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.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameters	1
Final electrical test parameters	1*, 2, 3, 4,
Group A test requirements	1, 2, 3, 9, 10, 11
Group C end-point electrical parameters	1, 2, 3

* PDA applies to subgroup 1.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

5. PACKAGING

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

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for original equipment design applications and logistic support of existing equipment.

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-ECT, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-ECT, Dayton, Ohio 45444, or telephone (513) 296-5374.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-ECT.

STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 9-11-20

Approved sources of supply for SMD 5962-88658 are listed below for immediate acquisition 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 DESC-ECT. This bulletin is superseded by the next dated revision of QML-38534.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN 1/
5962-8865801XX	51640	AD578SD/883B
5962-8865802XX	51640	AD578TD/883B
5962-8865803XX	51640	AD578ZSD/883B
5962-8865804XX	51640	AD578ZTD/883B

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirement of this drawing.

Vendor CAGE number	Vendor name and address
51640	Analog Devices Microelectronics Division 831 Woburn Street Wilmington, MA 01887

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