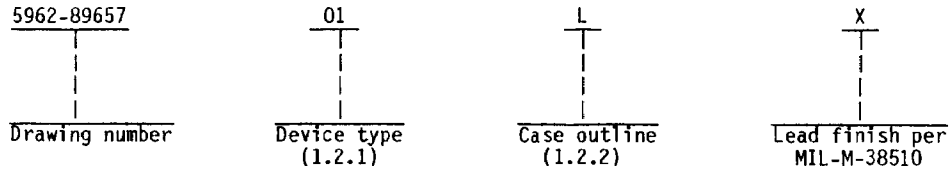


NOTICE OF REVISION (NOR) (See MIL-STD-480 for instructions) This revision described below has been authorized for the document listed.		DATE (YYMMDD) 92/01/27	Form Approved OMB No. 0704-0188
Public reporting burden for this collection is estimated to average 1 hour per response, including the time for 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 this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.			
1. ORIGINATOR NAME AND ADDRESS Defense Electronics Supply Center Dayton, Ohio 45444-5277	2. CAGE CODE 67268	3. NOR NO. 5962-R120-92	
	4. CAGE CODE 67268	5. DOCUMENT NO. 5962-89657	
6. TITLE OF DOCUMENT Microcircuit, Linear, Dual, CMOS, 12-Bit, D/A Converter, Monolithic Silicon.	7. REVISION LETTER (Current)		(New) A
	8. ECP NO. No registered users.		
9. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES			
10. DESCRIPTION OF REVISION Sheet 1: Revisions ltr column; add "A" Revisions description column; add "Changes in accordance with NOR 5962-R120-92". Revisions date column; add "92-01-27". Sheet 2: Paragraph 1.2.2; Outline letter column; add "3". Case outline column; add "C-4 (28-terminal, .460" x .460" x .100)", square chip carrier package. Sheet 7: Figure 1; Add new column for device type 01 and add case outline "3". For terminal number "1" terminal symbol should be "NC", number "2" symbol is "AGND", number "3" symbol is "I _{OUTA} ", number "4" symbol is "R _{FBA} ", number "5" symbol is "V _{REFA} ", number "6" symbol is "CSA", number "7" symbol is "DB0(LSB)", number "8" symbol is "NC", number "9" symbol is "DB1", number "10" symbol is "DB2", number "11" symbol is "DB3", number "12" symbol is "DB4", number "13" symbol is "DB5", number "14" symbol is "DGND", number "15" symbol is "NC", number "16" symbol is "DB6", number "17" symbol is "DB7", number "18" symbol is "DB8", number "19" symbol is "DB9", number "20" symbol is "DB10", number "21" symbol is "DB11(MSB)", number "22" symbol is "NC", number "23" symbol is "WR", number "24" symbol is "CSB", number "25" symbol is "V _{DD} ", number "26" symbol is "V _{REFB} ", number "27" symbol is "R _{FBB} ", and number "28" symbol is "I _{OUTB} ".			
11. THIS SECTION FOR GOVERNMENT USE ONLY			
a. CHECK ONE [X] EXISTING DOCUMENT SUPPLEMENTED [] REVISED DOCUMENT MUST BE [] CUSTODIAN OF MASTER DOCUMENT BY THIS NOR MAY BE USED IN RECEIVED BEFORE MANUFACTURER SHALL MAKE ABOVE REVISION AND MANUFACTURE. MAY INCORPORATE THIS CHANGE. FURNISH REVISED DOCUMENT TO:			
b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT DESC-ECS	SIGNATURE AND TITLE BRANCH CHIEF	DATE (YYMMDD) 92/01/27	
12. ACTIVITY ACCOMPLISHING REVISION DESC-ECS	REVISION COMPLETED (Signature)	DATE (YYMMDD) 92/01/27	

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:



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

Device type	Generic number	Circuit function	Gain error
01	7547S	Dual, CMOS, 12-bit DAC	±6.0 LSB
02	7547T	Dual, CMOS, 12-bit DAC	±3.0 LSB
03	7547U	Dual, CMOS, 12-bit DAC	±2.0 LSB

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 _{DD} to DGND	0.3 V dc to +17 V dc
V _{REFA} , V _{REFB} to AGND	±25 V dc
V _{BFBA} , V _{BFBB} to AGND	±25 V dc
Digital input voltage to DGND	0.3 V dc to V _{DD} +0.3 V
Voltage at I _{OUTA} , I _{OUTB} to DGND	-0.3 V dc to V _{DD} +0.3 V
AGND to DGND	-0.3 V dc to V _{DD} +0.3 V
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Power dissipation (P _D)	450 mW 1/
Thermal resistance, junction-to-case (θ _{JC})	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ _{JA})	120°C/W
Junction temperature (T _J)	+175°C

1.4 Recommended operating conditions.

Supply voltage range (V _{DD})	10.8 V dc to 16.5 V dc
Minimum high level input voltage	2.4 V dc
Maximum low level input voltage	0.8 V dc
Ambient operating temperature range (T _A)	-55°C to +125°C
Voltage at V _{REFA} , V _{REFB}	10 V dc
Voltage at AGND, I _{OUTA}	0 V dc
Voltage at AGND, I _{OUTB}	0 V dc

1/ Derate above T_A = +75°C at 6.0 mW/°C.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89657
	REVISION LEVEL	SHEET 2

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 Truth table. The truth table shall be as specified on figure 2.

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

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).

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 3

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified	Device type	Group A subgroups	Limits		Unit	
					Min	Max		
Resolution 2/	RES	Guaranteed minimum resolution	A11	1,2,3	12		Bits	
Relative accuracy	RA	V _{DD} = 10.8 V and 16.5 V	01	1,2,3		±1.0	LSB	
					02, 03	1		±1.0
						2,3,12		±0.5
Differential nonlinearity	DNL	Guaranteed monotonic to 12-bits, V _{DD} = 10.8 V and 16.5 V	A11	1,2,3		±1.0	LSB	
Gain error	AE	Measured using RFBA and RFBB. Both DAC registers loaded with all 1's, V _{DD} = 10.8 V	01	1,2,3		±6.0	LSB	
					02	1		±3.0
						03		
					02	2,3,12		±3.0
						03		
Gain temperature coefficient 2/	$\frac{\Delta AE}{\Delta T}$		A11	4		±5.0	ppm/C	
Power supply rejection ratio, V _{REFB} to I _{OUTB}	PSRR	V _{DD} = 10.8 V and 16.5 V	A11	1		±0.01	%/%	
					V _{DD} = 10.8 V	2,3		±0.02
Output leakage current	I _{OUTA}	DAC A loaded with all 0's, V _{DD} = 16.5 V	A11	1		±10	nA	
					2,3	±250		
	I _{OUTB}			1		±10	nA	
					2,3	±250		

See footnotes at end of page.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 4

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified	Device type	Group A subgroups	Limits		Unit	
					Min	Max		
Output current settling time to 0.01% of FSR <u>2/</u>	t _{SL}	I _{OUT} load = 100Ω, C _{EXT} = 13 pF, DAC output measured from falling edge of WR	A11	9		1.5	μs	
				10,11		1.5		
Feedthrough error, V _{REFA} to I _{OUTA} or V _{REFB} to I _{OUTB} <u>2/</u>	FT	V _{REFA} = V _{REFB} = ±20 V _{pp} , 10 kHz sine wave, DAC register loaded with all 0's	A11	4		-65	dB	
				5,6		-65		
Reference input resistance	R _{IN}	V _{DD} = 10.8 V	A11	1,2,3	9.0	20	kΩ	
Reference input resistance match (V _{REFA} /V _{REFB})	R _{MIN}	V _{DD} = 10.8 V	01,02	1,2,3		±3.0	%	
				03	1			±3.0
					2,3			±1.0
Digital input high voltage	V _{IH}	V _{DD} = 10.8 V and 16.5 V	A11	1,2,3	2.4		V	
Digital input low voltage	V _{IL}	V _{DD} = 10.8 V and 16.5 V	A11	1,2,3		0.8	V	
Input current	I _{IN}	V _{IN} = V _{DD} = 16.5 V	A11	1		1.0	μA	
				2,3		10		
Digital input capacitance <u>2/</u>	C _{IN}	T _A = +25°C	A11	4		10	pF	
Output capacitance <u>2/</u>	C _{OUTA}	DAC A = all 0's, T _A = +25°C	A11	4		70	pF	
		DAC A = all 1's, T _A = +25°C				140		
Output capacitance <u>2/</u>	C _{OUTB}	DAC B = all 0's, T _A = +25°C	A11	4		70	pF	
		DAC B = all 1's, T _A = +25°C				140		

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C < T _A < +125°C unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Functional test		See figure 4.3.1c	A11	7			
Data setup time	t _{DS}	See figure 3	A11	9	60		ns
				10,11 2/	80		
Data hold time	t _{DH}	See figure 3	A11	9	25		ns
				10,11 2/	25		
Chip select or update to write setup time	t _{CWS}	See figure 3	A11	9	80		ns
				10,11 2/	100		
Chip select or update to write hold time	t _{CWH}	See figure 3	A11	9	0		ns
				10,11 2/	0		
Write pulse width	t _{WR}	See figure 3	A11	9	80		ns
				10,11 2/	100		
Supply current	I _{DD}	V _{DD} = 16.5 V	A11	1,2,3		2.0	mA

1/ V_{DD} = 10.8 V to 16.5 V, unless otherwise specified. V_{REFA} = V_{REFB} = 10 V, voltage at AGND = 0 V, voltage at I_{OUTA} = I_{OUTB} = 0 V.






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

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 6

Device type(s)	01, 02, 03
Case outline(s)	L
Terminal number	Terminal symbol
1	AGND
2	I _{OUTA}
3	R _{FBA}
4	V _{REFA}
5	C _{SA}
6	DB ₀ (LSB)
7	DB ₁
8	DB ₂
9	DB ₃
10	DB ₄
11	DB ₅
12	DGND
13	DB ₆
14	DB ₇
15	DB ₈
16	DB ₉
17	DB ₁₀
18	DB ₁₁ (MSB)
19	WR
20	C _{SB}
21	V _{DD}
22	V _{REFB}
23	R _{FBB}
24	I _{OUTB}

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 7

CSA	CSB	WR	Function
X	X	1	No data transfer
1	1	X	No data transfer
		0	A rising edge on $\overline{\text{CSA}}$ or $\overline{\text{CSB}}$ loads data to the respective DAC from data bus
0	1		DACA register loaded from data bus
1	0		DACB register loaded from data bus
0	0		DACA and DACB register loaded from data bus


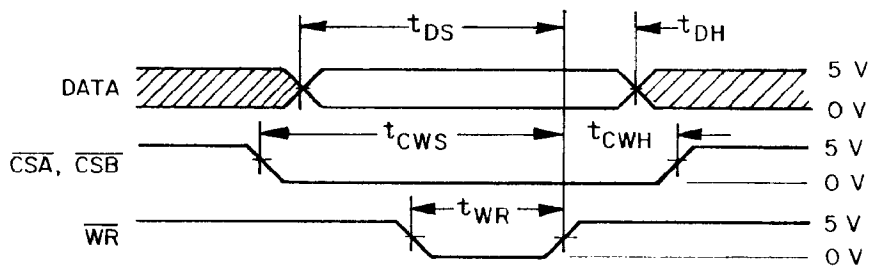
0 = Logic low level
 1 = Logic high level
 X = Irrelevant
 = Rising edge triggered

FIGURE 2. Truth table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 8



NOTES:

1. All input signal rise and fall times are measured from 10% to 90% of +5.0 V, $t_r = t_f = 20$ ns.
2. Timing measurement reference level is $\frac{V_{IH} + V_{IL}}{2}$

FIGURE 3. Timing diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89657
		REVISION LEVEL	SHEET 9

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.

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.

c. Subgroup 12 test is used for grading and part selection at $+25^\circ\text{C}$ and is not included in PDA calculations.

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 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 7 shall verify the truth table as specified on figure 2 herein.

d. Subgroup 12 test is used for grading and part selection at $T_A = +25^\circ\text{C}$.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89657
	REVISION LEVEL	SHEET 10

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,7,12
Group A test requirements (method 5005)	1,2,3,4**,5**,6**, 7,9,10**,11**,12
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

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

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.

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).

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89657
	REVISION LEVEL	SHEET 11

6.4 Record of users. Military and industrial users shall inform Defense Electronic 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 <u>1/</u>
5962-8965701LX	24355	AD7547SQ/883B
5962-8965702LX	24355	AD7547TQ/883B
5962-8965703LX	24355	AD7547UQ/883B

1/ Caution. Do not use this number for item acquisition. Items acquired by 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

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-89657
	REVISION LEVEL	SHEET 12