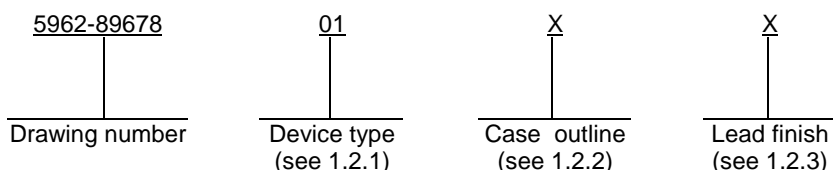


REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
A	Drawing updated to reflect current requirements. - lgt	01-08-03	Raymond Monnin																
<p>THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.</p>																			
REV																			
SHEET																			
REV																			
SHEET																			
REV STATUS				REV		A	A	A	A	A	A	A	A	A	A	A	A		
OF SHEETS				SHEET		1	2	3	4	5	6	7	8	9	10	11	12		
PMIC N/A				PREPARED BY Rick C. Officer						DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216 http://www.dsc.dla.mil									
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A				CHECKED BY Charles Reusing															
				APPROVED BY Michael Frye															
				DRAWING APPROVAL DATE 03 November 1989															
				REVISION LEVEL		A		SIZE	CAGE CODE	5962-89678									
						A		A	67268										
								SHEET		1 OF 12									

1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

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



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	DAC-8408A	Quad 8-bit multiplying CMOS, digital-to-analog converter with memory
02	DAC-8408B	Quad 8-bit multiplying CMOS, digital-to-analog converter with memory

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	GDIP1-T28 or CDIP2-T28	28	Dual-in-line

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings.

V_{DD} to I_{OUT2} (pins 5, 24)	0 V dc to +7.0 V dc
V_{DD} to DGND	0 V dc to +7.0 V dc
I_{OUT2} (pins 5, 24) to DGND	-0.3 V dc to $V_{DD} + 0.3$ V dc
Digital input voltage to DGND	-0.3 V dc to $V_{DD} + 0.3$ V dc
Output voltage (pins 4, 6, 23, 25) to DGND.....	-0.3 V dc to $V_{DD} + 0.3$ V dc
V_{REFA} , V_{REFB} , V_{REFC} , V_{REFD} to DGND	± 25 V dc
Voltage from R_{FBA} , R_{FBB} , R_{FBC} , R_{FBD} to DGND.....	± 25 V dc
Power dissipation (P_D) to +75°C.....	45 mW ^{1/}
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 60 seconds).....	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Thermal resistance, junction-to-ambient (θ_{JA})	120°C/W

1.4 Recommended operating conditions.

Ambient operating temperature range (T_A)	-55°C to +125°C
Reference voltage (V_{REF}).....	+10 V
V_{OUT1} and V_{OUT2}	0 V
V_{DD}	+5 V $\pm 10\%$
Source resistance (R_S)	50 Ω

^{1/} Derate above +75°C at 6.0 mW/°C.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A	REVISION LEVEL A	5962-89678	SHEET 2
---	------------------	---------------------	-------------------	------------

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks 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 solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-38535 -- Integrated Circuits, Manufacturing, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-103 -- List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbooks 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.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B 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-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-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-PRF-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-PRF-38535, appendix A 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 Functional diagram. The functional diagram shall be as specified on figure 3.

3.2.4 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.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 3

3.5 Marking. Marking shall be in accordance with MIL-PRF-38535, appendix A. 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-HDBK-103 (see 6.6 herein). For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device.

3.5.1 Certification/compliance mark. A compliance indicator "C" shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator "C" shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

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-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DSCC-VA shall be required in accordance with MIL-PRF-38535, appendix A.

3.9 Verification and review. DSCC, DSCC'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-PRF-38535, appendix A.

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°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.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C V _{OUT1} = V _{OUT2} = 0 V V _{DD} = +5 V; V _{REF} = ±10 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Relative accuracy	INL		1, 2, 3	01		±0.25	LSB
				02		±0.50	
Differential nonlinearity	DNL		1, 2, 3	01		±0.50	LSB
				02		±1.0	
Gain error	G _{FSE}		1, 2, 3	All		±1.0	LSB
DC power supply rejection $\frac{\Delta\text{Gain}}{\Delta V_{DD}}$ ^{1/}	PSRR		1, 2, 3	All		0.001	$\frac{\%}{\%}$
Output leakage current ^{2/}	I _{LKG}		1	All		±30	nA
			2, 3			±100	
Input resistance	R _{REF}		1, 2, 3	All	6	14	kΩ
Input resistance match	ΔR _{REF}	Measuring at V _{REFA, B, C, D} pins	1, 2, 3	All		±1.0	%
Digital input high	V _{IH}		1, 2, 3	All	2.4		V
Digital input low	V _{IL}		1, 2, 3	All		0.8	V
Input current	I _{IN}	V _{IN} = 0 V or V _{DD}	1	All		±1.0	μA
			2, 3			±10.0	
Digital output low	V _{OL}	I _{SINK} = 1.6 mA	1, 2, 3	All		0.4	V
Digital output high	V _{OH}	I _{SOURCE} = 400 μA	1, 2, 3	All	4		V
Supply current	I _{DD}	Digital inputs = V _{IL} or V _{IH}	1	All		1.0	mA
		Digital inputs = 0 V or V _{DD}				0.05	
		Digital inputs = V _{IL} or V _{IH}	2, 3			1.5	
		Digital inputs = 0 V or V _{DD}				0.05	
Input capacitance	C _{IN}	See 4.3.1c	4	All		8	pF
Functional test		See 4.3.1d	7, 8	All			
Write to data strobe time ^{4/}	t _{DS1} or t _{DS2}	^{3/}	9, 10, 11	All	90		ns
Data valid to strobe set-up time ^{4/}	t _{DSU}	^{3/}	9, 10, 11	All	150		ns
Data valid to strobe hold time	t _{DH}	^{3/}	9	All	10		ns
			10, 11 ^{4/}		10		

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C V _{OUT1} = V _{OUT2} = 0 V V _{DD} = +5 V; V _{REF} = ±10 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
DAC select to strobe set-up time	t _{AS}	3/	9	All	0		ns
			10, 11 4/		0		
DAC select to strobe hold time	t _{AH}	3/	9	All	0		ns
			10, 11 4/		0		
Write select to strobe set-up time	t _{WSU}	3/	9	All	0		ns
			10, 11 4/		0		
Write select to strobe hold time	t _{WH}	3/	9	All	0		ns
			10, 11 4/		0		
Read to data strobe width	t _{RDS}	3/	9	All	220		ns
			10, 11 4/		350		
Data strobe to output valid time	t _{CO}	3/	9	All	320		ns
			10, 11 4/		430		
Output data to deselect time	t _{OTD}	3/	9	All	200		ns
			10, 11 4/		270		
Read select to strobe setup time	t _{RSU}	3/	9	All	0		ns
			10, 11 4/		0		
Read select to strobe hold time	t _{RH}	3/	9	All	0		ns
			10, 11 4/		0		

1/ ΔV_{DD} = ±10%.

2/ All digital inputs = 0 V.

3/ See figure 4.

4/ Subgroups 10 and 11, if not tested, shall be guaranteed to the limits specified in table I.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 6

Device type	01 and 02
Case outline	X
Terminal number	Terminal symbol
1	V _{DD}
2	V _{REFA}
3	R _{FBA}
4	I _{OUT1A}
5	I _{OUT2A} / I _{OUT2B}
6	I _{OUT1B}
7	R _{FBB}
8	V _{REFB}
9	D _{B0} (LSB)
10	D _{B1}
11	D _{B2}
12	D _{B3}
13	D _{B4}
14	D _{B5}
15	D _{B6}
16	D _{B7} (LSB)
17	A / \bar{B}
18	R / \bar{W}
19	$\bar{DS1}$
20	$\bar{DS2}$
21	V _{REFD}
22	R _{FBD}
23	I _{OUT1D}
24	I _{OUT2C} / I _{OUT2D}
25	I _{OUT1C}
26	R _{FBC}
27	V _{REFC}
28	DGND

FIGURE 1. Terminal connections.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 7

CONTROL LOGIC				MODE	DAC
$\overline{DS1}$	$\overline{DS2}$	A / \overline{B}	R / \overline{W}		
L	H	H	L	WRITE	A
L	H	L	L	WRITE	B
H	L	H	L	WRITE	C
H	L	L	L	WRITE	D
L	H	H	H	READ	A
L	H	L	H	READ	B
H	L	H	H	READ	C
H	L	L	H	READ	D
L	L	H	L	WRITE	A & C
L	L	L	L	WRITE	B & D
H	H	X	X	HOLD	A/B/C/D
L	L	H	H	HOLD	A/B/C/D
L	L	L	H	HOLD	A/B/C/D

L = Low
H = High
X = Don't care

FIGURE 2. Truth table.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 8

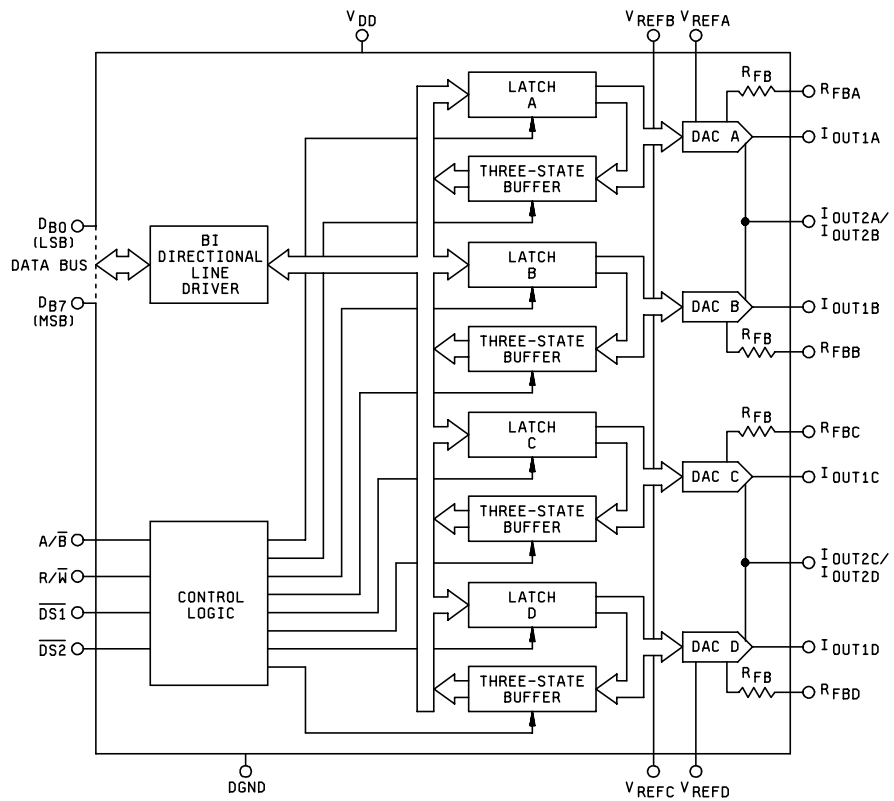


FIGURE 3. Functional diagram.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 9

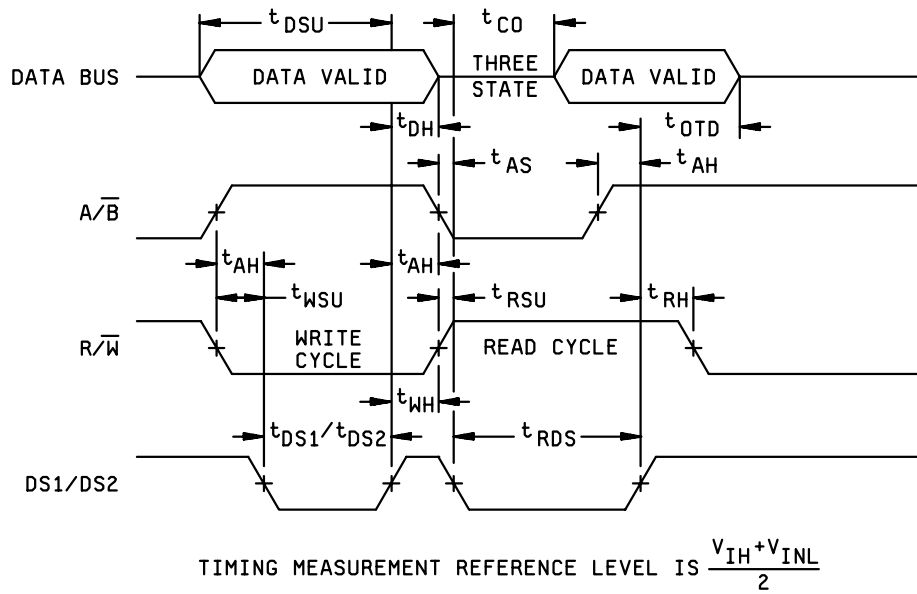


FIGURE 4. Timing diagram.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 10

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 7, 8
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 8, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

** Subgroups 10, and 11, if not tested shall be guaranteed to the limits specified in table I herein.

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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance.
- d. Subgroups 7 and 8 shall include verification of the truth table.

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.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 11

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

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 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 microelectronics 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) 692-0547.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DSCC-VA.

STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE A		5962-89678
		REVISION LEVEL A	SHEET 12

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 01-08-03

Approved sources of supply for SMD 5962-89678 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 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 MIL-HDBK-103 and QML-38535.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8967801XA	24355	DAC8408AT/883
5962-8967802XA	24355	DAC8408BT/883

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.

Vendor CAGE
number

24355

Vendor name
and address

Analog Devices, Inc.
Rt. 1 Industrial Park
P.O. Box 9106
Norwood, Ma. 02062
Point of Contact:
1500 Space Park Dr.
P.O. Box 58020
Santa Clara, Ca. 95050-8020

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