

**REVISIONS**

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Drawing updated to reflect current requirements. - ro	01-06-20	R. Monnin
B	Under table I, full scale temperature drift test, for device type 01 only; minimum limit column, delete -0.488 and substitute -0.586; maximum limit column, delete +0.488 and substitute +0.586. - ro	10-10-07	C. Saffle
C	Redrawn. Update paragraphs to MIL-PRF-38535 requirements. - drw	18-02-01	Charles F. Saffle
D	Make correction to title block by adding the word DIGITAL. Update document paragraphs to current MIL-PRF-38535 requirements. - ro	23-03-16	James R. Eschmeyer



THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.

Revision Status of Sheets

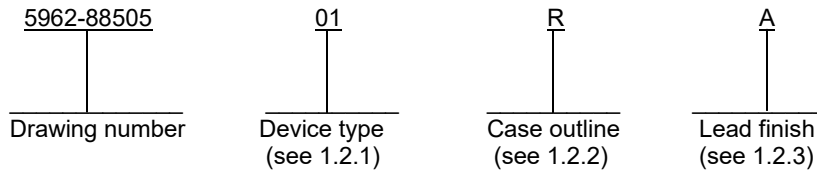
REV																				
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REV	D	D	D	D	D	D	D	D	D	D										
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PMIC N/A		PREPARED BY Marcia B. Kelleher		<b>DLA LAND AND MARITIME</b> COLUMBUS, OHIO 43218-3990 <a href="https://www.dla.mil/LandandMaritime">https://www.dla.mil/LandandMaritime</a>		
<b>STANDARD MICROCIRCUIT DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE		CHECKED BY Ray Monnin				
		APPROVED BY Michael A. Frye				
		DRAWING APPROVAL DATE 88-07-19				
MICROCIRCUIT, DIGITAL-LINEAR, 10-BIT ANALOG-TO-DIGITAL CONVERTER, MONOLITHIC SILICON		REVISION LEVEL D		SIZE A	CAGE CODE <b>67268</b>	<b>5962-88505</b>
AMSC N/A				SHEET	1 OF 10	

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	AD573	10 bit A/D converter with microprocessor interface
02	AD673	8 bit A/D converter with microprocessor interface

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>
R	GDIP1-T20 or CDIP2-T20	20	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.

VCC to digital common .....	+7 V dc
VEE to digital common .....	-16.5 V dc
Analog common to digital common .....	±1 V dc
Analog input to analog common .....	±15 V dc
Control inputs .....	0 V to VCC
Digital outputs (high impedance state) .....	0 V to VCC
Power dissipation (PD) .....	800 mW
Storage temperature range .....	-65°C to +150°C
Lead temperature (soldering 10 seconds) .....	+300°C
Thermal resistance, junction-to-case (θJC) .....	See MIL-STD-1835
Thermal resistance, junction-to-ambient (θJA) .....	85°C/W

1.4 Recommended operating conditions.

VCC .....	+5 V dc
VEE .....	-15 V dc
Ambient operating temperature range (TA) .....	-55°C to +125°C

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## 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 cited in the solicitation or contract.

### DEPARTMENT OF DEFENSE SPECIFICATION

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

### DEPARTMENT OF DEFENSE STANDARDS

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

### DEPARTMENT OF DEFENSE HANDBOOKS

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

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

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

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Timing waveforms. The timing waveforms 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 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ TA ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Relative accuracy	RA	Unipolar and bipolar major transactions ±3 codes	1	All	-0.195	+0.195	% of FS
			2, 3, 12	01	-0.098	+0.098	
			2, 3	02	-0.195	+0.195	
Differential nonlinearity	DNR	All codes test unipolar <u>2/</u> and bipolar	1	01	8		Bits
			2, 3, 12	01	10		
			1, 2, 3	02	8		
Full-scale error	Ae	Unipolar <u>3/</u>	1	All	-40	+40	mV
		Bipolar <u>3/</u>			-20	+20	
Full-scale temperature drift	ΔAe / Δt		2, 3	01	-0.586	+0.586	% of FS
				02	-0.781	+0.781	
Offset error	VOS	First transition	1	All	-20	+20	mV
			12	01	-10	+10	
Offset temperature drift	ΔVOS / Δt		2, 3	01	-0.195	+0.195	% of FS
				02	-0.391	+0.391	
Bipolar zero error	BPZE	Low side MSB transaction bipolar	1	All	-20	+20	mV
			12	01	-10	+10	
Bipolar zero temperature drift	ΔBPZE / Δt	Low side MSB transaction bipolar	2, 3	01	-0.195	+0.195	% of FS
				02	-0.391	+0.391	
Tri-state leakage current	IOLT	DB0 – DB9, VOH = 5.0 V, VOL = 0.0 V	1, 2, 3	01	-40	+40	μA
				02	-40	+40	
Power supply rejection ratio	PSRR	VCC = 5.0 V, -15.75 V ≤ VEE ≤ 14.25 V	1, 2, 3	All	-78.1	+78.1	mV
		VCC = 5.0 V, -12.6 V ≤ VEE ≤ -11.4 V	12	01	-19.5	+19.5	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – continued.

Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Power supply current	I <sub>CC</sub>	$\overline{\text{DATA READY}}$ low or $\overline{\text{DATA READY}}$ high (during conversion), T <sub>A</sub> = +25°C	1	All		15	mA
	I <sub>EE</sub>	T <sub>A</sub> = +25°C			-15		
Input voltage (high)	V <sub>IH</sub>	<u>4/</u>	1, 2, 3	All	2.0		V
Input voltage (low)	V <sub>IL</sub>	<u>4/</u>	1, 2, 3	All		0.8	V
Input current (high)	I <sub>IH</sub>	<u>4/</u>	1, 2, 3	All	-100	+100	μA
Input current (low)	I <sub>IL</sub>	<u>4/</u>	1, 2, 3	All	-100	+100	μA
Output voltage (low)	V <sub>OL</sub>	$\overline{\text{DATA READY}}$ , DB0-DB9, I <sub>OL</sub> = +3.2 mA	1, 2, 3	01		0.4	V
		$\overline{\text{DATA READY}}$ , DB0-DB7, I <sub>OL</sub> = +3.2 mA		02		0.4	
Output voltage (high)	V <sub>OH</sub>	DB0-DB9, I <sub>OH</sub> = -0.5 mA	1, 2, 3	01	2.4		V
		DB0-DB7, I <sub>OH</sub> = -0.5 mA		02	2.4		
Input resistance	R <sub>IN</sub>		4, 5, 6	All	3	7	kΩ
Conversion time	t <sub>C</sub>	See figure 2, T <sub>A</sub> = +25°C	9	All	10	30	μs
Covert pulse width	t <sub>CS</sub>	See figure 2, T <sub>A</sub> = +25°C	9	All	500		ns
$\overline{\text{DATA READY}}$ delay convert	t <sub>DSC</sub>	See figure 2, T <sub>A</sub> = +25°C	9	All		1.5	μs
Data valid after $\overline{\text{HBE}}$ or $\overline{\text{LBE}}$ high	t <sub>HD</sub>	See figure 2, <u>5/</u> T <sub>A</sub> = +25°C	9	01	50		ns
Data valid after $\overline{\text{DATA ENABLE}}$ high	t <sub>HD</sub>	See figure 2, <u>5/</u> T <sub>A</sub> = +25°C	9	02	50		ns
Output float delay	t <sub>HL</sub>	See figure 2, T <sub>A</sub> = +25°C	9	All		200	ns
Data access time	t <sub>DD</sub>	See figure 2, T <sub>A</sub> = +25°C	9	All		250	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – continued.

- 1/ VCC = +5 V, VEE = -15 V, analog input through 15 Ω resistor to VEE pin, unipolar configuration. Unipolar configuration bipolar offset control pin is grounded. Bipolar configuration bipolar offset control pin is not connected.
- 2/ Minimum resolution for which no missing codes are guaranteed: For device type 01 (10-Bit resolution device), 0.098% of full scale = 1 LSB. For device type 02 (8-Bit resolution device), 0.391% of full scale = 1 LSB.
- 3/ Device type 01 full scale error guaranteed trimmable with a 200 Ω potentiometer. Device type 02 full scale error guaranteed trimmable with a 50 Ω potentiometer.
- 4/ Conditions for device type 01 are CONVERT,  $\overline{\text{LBE}}$ , and  $\overline{\text{HBE}}$ . Conditions for device type 02 are CONVERT and  $\overline{\text{DATA ENABLE}}$ .
- 5/ If not tested, shall be guaranteed to the limits specified in table I herein.

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. 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 DLA Land and Maritime-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 DLA Land and Maritime-VA shall be required for any change that affects this drawing.

3.9 Verification and review. DLA Land and Maritime, DLA Land and Maritime'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.

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Device types	01	02
Case outline	R	
Terminal number	Terminal symbol	
1	DB0 LSB	NC (SEE NOTE)
2	DB1	NC (SEE NOTE)
3	DB2	DB0 LSB
4	DB3	DB1
5	DB4	DB2
6	DB5	DB3
7	DB6	DB4
8	DB7	DB5
9	DB8	DB6
10	DB9 MSB	DB7 MSB
11	VCC	VCC
12	CONVERT	CONVERT
13	VEE	VEE
14	ANALOG IN	ANALOG IN
15	ANALOG COMMON	ANALOG COMMON
16	BIPOLAR OFFSET CONTROL	BIPOLAR OFFSET CONTROL
17	DIGITAL COMMON	DIGITAL COMMON
18	$\overline{\text{DATA READY}}$	$\overline{\text{DATA READY}}$
19	$\overline{\text{LBE}}$	NC
20	$\overline{\text{HBE}}$	$\overline{\text{DATA ENABLE}}$

NOTE: For device type 02, pins 1 and 2 are internally connected to test points and should be left floating.

FIGURE 1. Terminal connections.

<b>STANDARD MICROCIRCUIT DRAWING</b> DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE <b>A</b>		<b>5962-88505</b>
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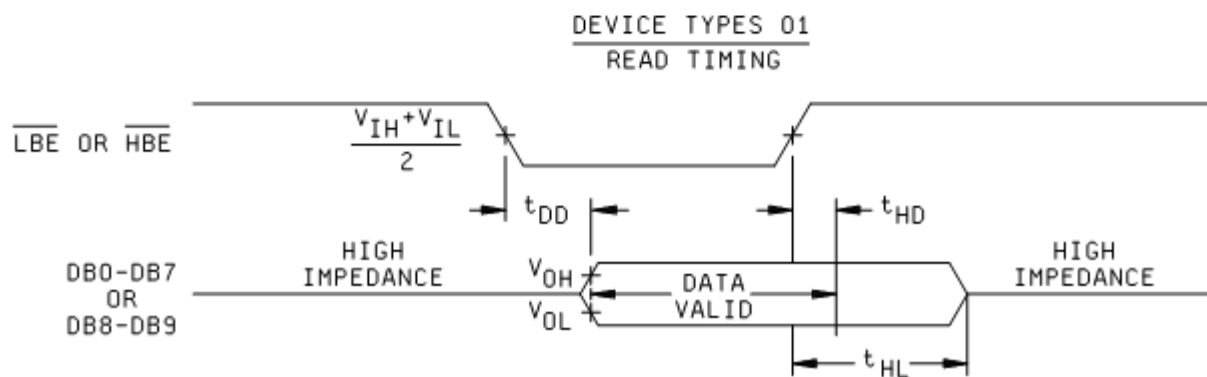
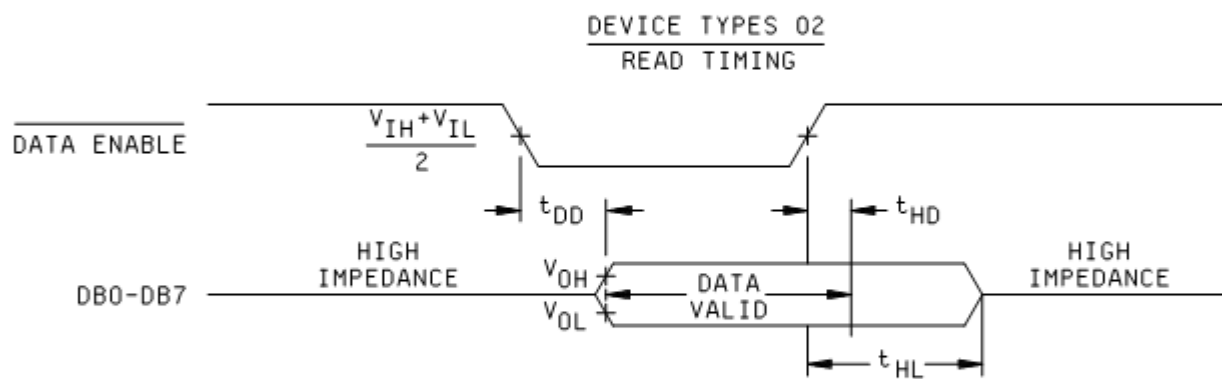
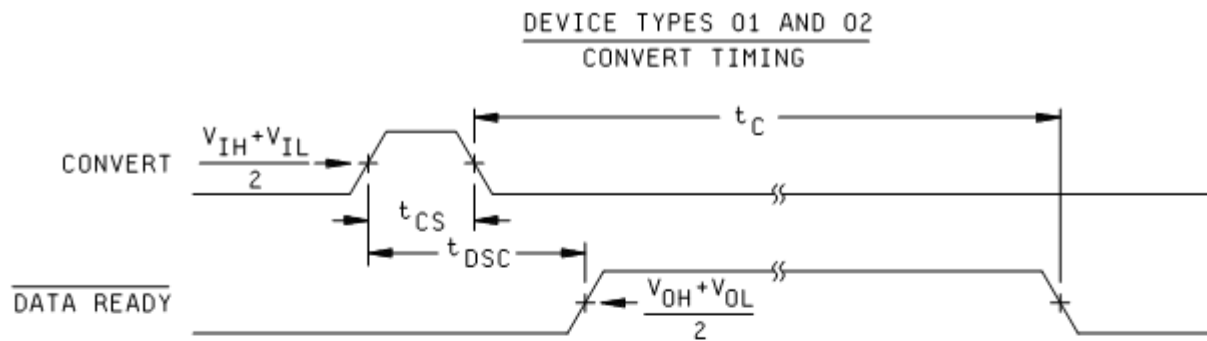


FIGURE 2. Timing waveforms.

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#### 4. VERIFICATION

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 B. 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 method 1015 of MIL-STD-883.
  - (2) TA = +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.
- c. Optional subgroup 12 is used for grading and part selection at 25°C, and is not included in PDA.

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, 8, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Optional subgroup 12 is used for grading and part selection at 25°C.

##### 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 B. 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 method 1005 of MIL-STD-883.
  - (2) TA = +125°C, minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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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)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 4, 9, 12
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6, 9, 12
Groups C and D end-point electrical parameters (method 5005)	1

\* PDA applies to subgroup 1.

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, or email communication.

6.4 Record of users. Military and industrial users shall inform DLA Land and Maritime when a system application requires configuration control and the applicable SMD to that system. DLA Land and Maritime 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 DLA Land and Maritime-VA, telephone (614) 692-8108.

6.5 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0591.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-HDBK-103 and QML-38535. The vendors listed in MIL-HDBK-103 and QML-38535 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DLA Land and Maritime-VA.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 23-03-16

Approved sources of supply for SMD 5962-88505 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 DLA Land and Maritime-VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DLA Land and Maritime maintains an online database of all current sources of supply at <https://landandmaritimeapps.dla.mil/programs/smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8850501RA	24355	AD573SD/883
5962-8850502RA	24355	AD673SD/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  
 Rt 1 Industrial Park  
 PO Box 9106  
 Norwood, MA 02062  
 Point of contact: 804 Woburn Street  
 Wilmington, MA 01887-3462

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