

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

## 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:

5962-89678	01	X	X
-----	-----	-----	-----
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	DAC-8408A	Quad 8-bit multiplying CMOS D/A converter with memory
02	DAC-8408B	Quad 8-bit multiplying CMOS D/A converter with memory

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
X	D-10 (28-lead, 1.490" x .610" x .232"), dual in-line package

## 1.3 Absolute maximum ratings.

V <sub>DD</sub> to I <sub>OUT2</sub> (pins 5, 24)	0 V, +7 V
V <sub>DD</sub> to DGND	0 V, +7 V
I <sub>OUT2</sub> (pins 5, 24) to DGND	-0.3 V, V <sub>DD</sub> +0.3 V
Digital input voltage to DGND	-0.3 V, V <sub>DD</sub> +0.3 V
Output voltage (pins 4, 6, 23, 25) to DGND	-0.3 V, V <sub>DD</sub> +0.3 V
V <sub>REFA</sub> , V <sub>REFB</sub> , V <sub>REFC</sub> , V <sub>REFD</sub> to DGND	±25 V
Voltage from R <sub>FBA</sub> , R <sub>FBB</sub> , R <sub>FBC</sub> , R <sub>FBD</sub> to DGND	±25 V
Power dissipation (P <sub>D</sub> ) 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 <sub>JC</sub> )	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ <sub>JA</sub> )	120°C/W

## 1.4 Recommended operating conditions.

Ambient operating temperature range (T <sub>A</sub> )	-55°C to +125°C
Reference voltage (V <sub>REF</sub> )	+10 V
V <sub>OUT1</sub> and V <sub>OUT2</sub>	0 V
V <sub>DD</sub>	+5 V ±10%
Source resistance (R <sub>S</sub> )	50Ω

1/ Derate above +75°C by 6.0 mW/°C.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>	5962-89678	
		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 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.

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**

5962-89678

REVISION LEVEL

SHEET

3

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.

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 verify the truth table.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		5962-89678
		REVISION LEVEL	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} < T_A < +125^{\circ}\text{C}$ $V_{\text{OUT}1} = V_{\text{OUT}2} = 0\text{ V};$ $V_{\text{DD}} = +5\text{ V};$ $V_{\text{REF}} = \pm 10\text{ V}$ unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Relative accuracy	INL		01	1,2,3		$\pm 1/4$	LSB
			02			$\pm 1/2$	
Differential nonlinearity	DNL		01	1,2,3		$\pm 1/2$	LSB
			02			$\pm 1$	
Gain error	GFSE		A11	1,2,3		$\pm 1$	LSB
DC power supply rejection $\frac{1}{\Delta V_{\text{DD}}} \frac{\Delta \text{gain}}{\Delta V_{\text{DD}}}$	PSRR		A11	1,2,3		0.001	%/%
Output leakage current $\frac{2}{I_{\text{LKG}}}$	$I_{\text{LKG}}$		A11	1		$\pm 30$	nA
				2,3		$\pm 100$	
Input resistance	$R_{\text{REF}}$		A11	1,2,3	6	14	k $\Omega$
Input resistance match	$\Delta R_{\text{REF}}$	Measuring at $V_{\text{REFA}}$ , B, C, D pins	A11	1,2,3		$\pm 1$	%
Digital input high	$V_{\text{IH}}$		A11	1,2,3	2.4		V
Digital input low	$V_{\text{IL}}$		A11	1,2,3		0.8	V
Input current	$I_{\text{IN}}$	$V_{\text{IN}} = 0\text{ V or } V_{\text{DD}}$	A11	1		$\pm 1$	$\mu\text{A}$
				2,3		$\pm 10$	
Digital output low	$V_{\text{OL}}$	$I_{\text{SINK}} = 1.6\text{ mA}$	A11	1,2,3		0.4	V
Digital output high	$V_{\text{OH}}$	$I_{\text{SOURCE}} = 400\text{ }\mu\text{A}$	A11	1,2,3	4		V

See footnotes at end of table.

**STANDARDIZED  
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

5962-89678

REVISION LEVEL

SHEET

5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T <sub>A</sub> ≤ +125°C V <sub>OUT1</sub> = V <sub>OUT2</sub> = 0 V; V <sub>DD</sub> = +5 V; V <sub>REF</sub> = ±10 V unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Supply current	I <sub>DD</sub>	Digital inputs = V <sub>IL</sub> or V <sub>IH</sub> Digital inputs = 0 V or V <sub>DD</sub>	A11	1		1.0 0.05	mA
		Digital inputs = V <sub>IL</sub> or V <sub>IH</sub> Digital inputs = 0 V or V <sub>DD</sub>	A11	2, 3		1.5 0.05	
Input capacitance	C <sub>IN</sub>	See 4.3.1c	A11	4		8	pF
Functional test		See 4.3.1d	A11	7, 8			
Write to data strobe time <u>4/</u>	t <sub>DS1</sub> or t <sub>DS2</sub>	<u>3/</u>	A11	9, 10, 11	90		ns
Data valid to strobe set-up time <u>4/</u>	t <sub>DSU</sub>	<u>3/</u>	A11	9, 10, 11	150		ns
Data valid to strobe hold time	t <sub>DH</sub>	<u>3/</u>	A11	9	10		ns
				10, 11 <u>4/</u>	10		
DAC select to strobe set-up time	t <sub>AS</sub>	<u>3/</u>	A11	9	0		ns
				10, 11 <u>4/</u>	0		
DAC select to strobe hold time	t <sub>AH</sub>	<u>3/</u>	A11	9	0		ns
				10, 11 <u>4/</u>	0		
Write select to strobe set-up time	t <sub>WSU</sub>	<u>3/</u>	A11	9	0		ns
				10, 11 <u>4/</u>	0		
Write select to strobe hold time	t <sub>WH</sub>	<u>3/</u>	A11	9	0		ns
				10, 11 <u>4/</u>	0		

See footnotes at end of table.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		5962-89678
		REVISION LEVEL	SHEET 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T <sub>A</sub> ≤ +125°C V <sub>OUT1</sub> = V <sub>OUT2</sub> = 0 V; V <sub>DD</sub> = +5 V; V <sub>REF</sub> = ±10 V unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Read to data strobe width	t <sub>RDS</sub>	3/	A11	9	220		ns
				10,11 <sup>4/</sup>	350		
Data strobe to output valid time	t <sub>CO</sub>	3/	A11	9	320		ns
				10,11 <sup>4/</sup>	430		
Output data to deselect time	t <sub>OTD</sub>	3/	A11	9	200		ns
				10,11 <sup>4/</sup>	270		
Read select to strobe setup time	t <sub>RSU</sub>	3/	A11	9	0		ns
				10,11 <sup>4/</sup>	0		
Read select to strobe hold time	t <sub>RH</sub>	3/	A11	9	0		ns
				10,11 <sup>4/</sup>	0		

1/ Delta V<sub>DD</sub> = ±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.

**STANDARDIZED  
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

5962-89678

REVISION LEVEL

SHEET

7

Device types	01 and 02
Case outline	X
Terminal number	Terminal symbol
1	VDD
2	VREFA
3	RFBA
4	IOUT1A
5	IOUT2A/IOUT2B
6	IOUT1B
7	RFBB
8	VREFB
9	DB0 (LSB)
10	DB1
11	DB2
12	DB3
13	DB4
14	DB5
15	DB6
16	DB7 (MSB)
17	A/B
18	R/W
19	DS1
20	DS2
21	VREFD
22	RFBD
23	IOUT1D
24	IOUT2C/IOUT2D
25	IOUT1C
26	RFBC
27	VREFC
28	DGND

FIGURE 1. Terminal connections.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>	5962-89678	
		REVISION LEVEL	SHEET 8

CONTROL LOGIC				MODE	DAC
DS1	DS2	A/B	R/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 STATE H=HIGH STATE X=IRRELEVANT

FIGURE 2. Truth table.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		5962-89678
		REVISION LEVEL	SHEET 9

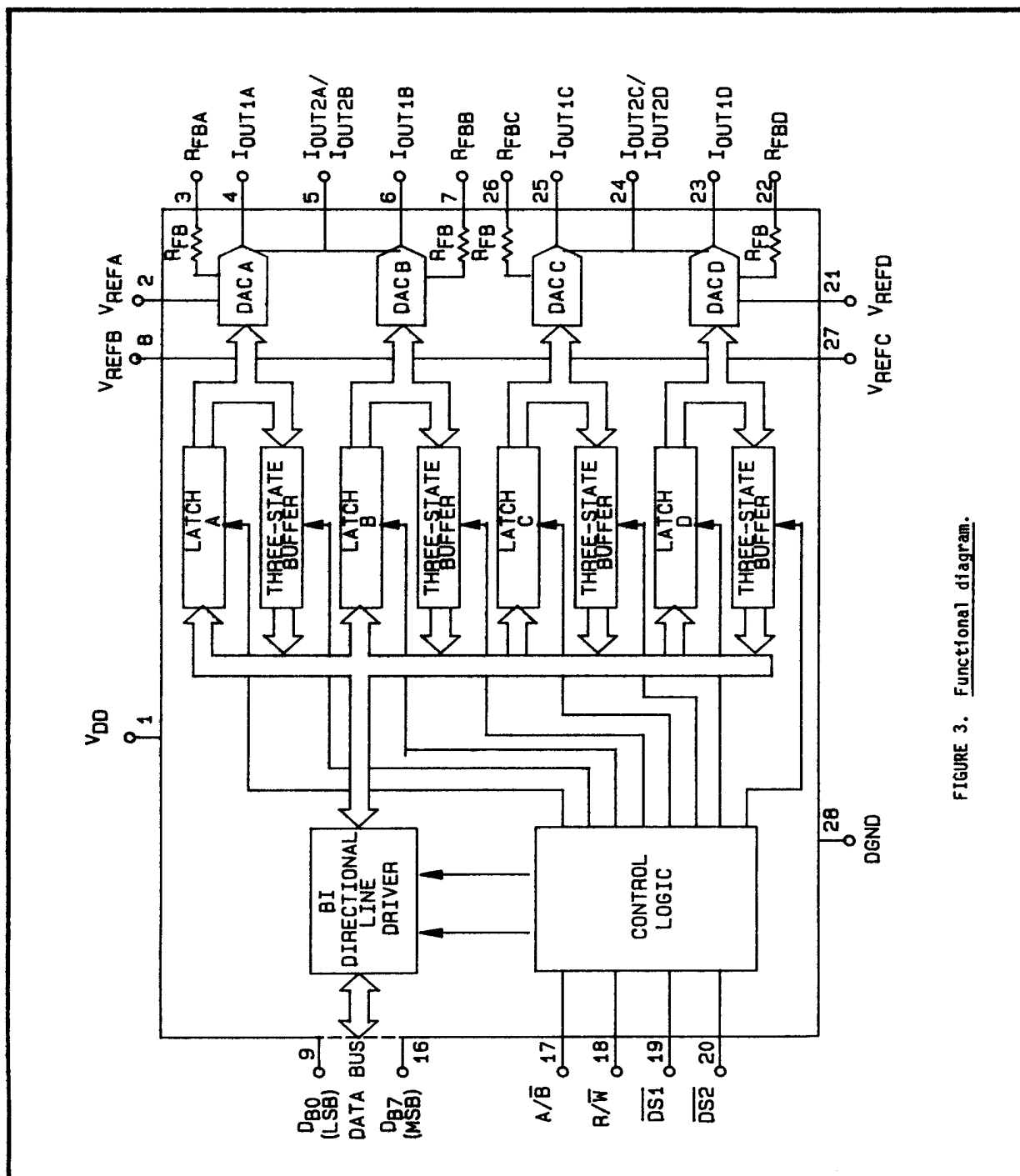
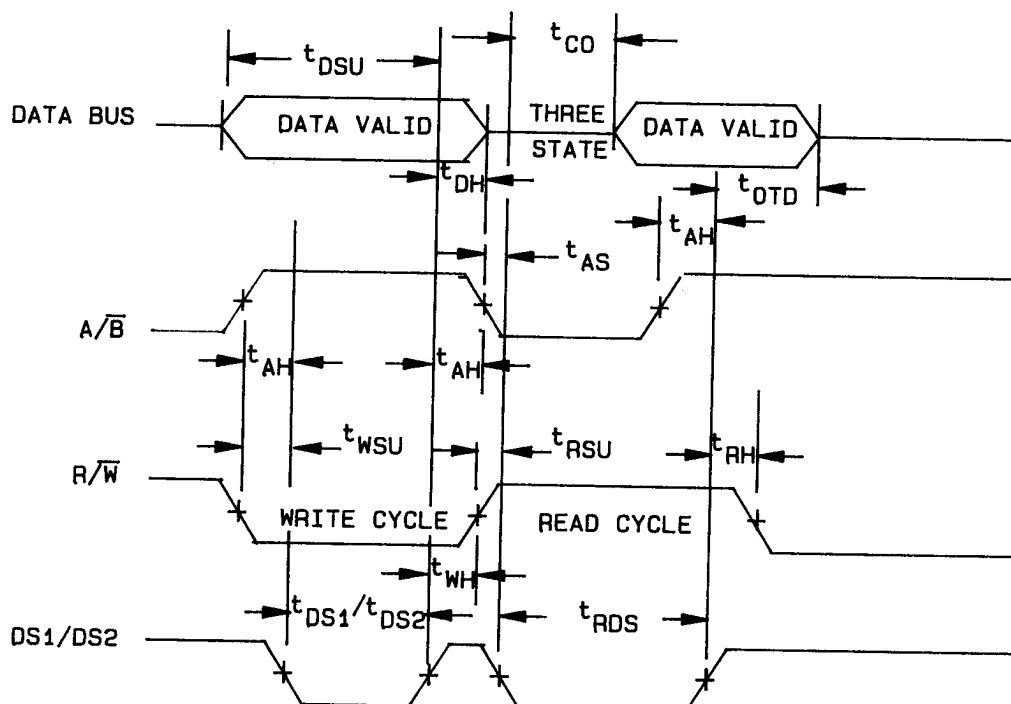


FIGURE 3. Functional diagram.

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>	5962-89678	
		REVISION LEVEL	SHEET 10

# TIMING DIAGRAM



TIMING MEASUREMENT REFERENCE LEVEL IS  $\frac{V_{IH} + V_{INL}}{2}$

FIGURE 4. Timing diagram.

## STANDARDIZED MILITARY DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

5962-89678

REVISION LEVEL

SHEET 11

DESC FORM 193A  
SEP 87

\* U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per 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**
Group 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.

#### 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).

<b>STANDARDIZED MILITARY DRAWING</b> DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>	5962-89678	
		REVISION LEVEL	SHEET 12

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 are current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor 1/ similar part number
5962-8967801XX	06665	DAC8408AT/883
5962-8967802XX	06665	DAC8408BT/883

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

06665

Vendor name  
and address

Precision Monolithics Incorporated  
1500 Space Park Drive  
Santa Clara, CA 95050

**STANDARDIZED  
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

5962-89678

REVISION LEVEL

SHEET

13