



Precision Monolithics Inc.

1.0 SCOPE

This specification covers the detail requirements for an 8-bit monolithic multiplying digital-to-analog converter consisting of a reference current amplifier, R-2R ladder and eight high-speed current switches.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace spec control drawings.

1.2 Part Number. The complete part numbers per Table I of this specification follow:

<u>Device</u>	<u>Part Number</u>	<u>Package</u>
A	DAC-1508A8Q/883	Q

1.2.3 Case Outline.

<u>Letter</u>	<u>Case Outline (Lead finish per MIL-M-38510)</u>
Q	16-lead ceramic dual-in-line package (CERDIP)

1.3 Absolute Maximum Ratings. ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Power Supply Voltage

V_{CC}	+5.5V
V_{EE}	-16.5V
Digital Input Voltage, V_5 through V_{12}	+5.5, 0V
Applied Output Voltage.....	+0.5, -5.2V
Reference Current I_{14}	5mA
Power Dissipation (Package Limitation), P_d	
Ceramic Package	1000mW
Derate Above $T_A = +25^\circ\text{C}$	6.7mW/ $^\circ\text{C}$
Operating Temperature Range	-55 $^\circ\text{C}$ to +125 $^\circ\text{C}$
DICE Junction Temperature Range (T_J)	-65 $^\circ\text{C}$ to +150 $^\circ\text{C}$
Storage Temperature Range.....	-65 $^\circ\text{C}$ to +150 $^\circ\text{C}$

1.5 Thermal Characteristics:

Thermal Resistance, CERDIP (Q) package:

Junction-to-Case (θ_{JC}) = 29 $^\circ\text{C/W}$ MAX

Junction-to-Ambient (θ_{JA}) = 91 $^\circ\text{C/W}$ MAX

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TABLE 1

$V_{CC} = +5V; V_{EE} = -15V; I_{REF} = 2mA; -55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified

Characteristics	Symbol	Special Conditions	DAC-1508/883		Units
			LIMITS A		
			Min	Max	
Relative Accuracy	E_r	Error relative to Full-Scale I_O	-	± 0.19	%IFS
Monotonicity			8	-	Bits
Output Current	I_O	$V_{REF} = 10.000V, R_{14} = 5.000k\Omega$ All Bits High	1.9	2.1	mA
Output Current (Minimum)	$I_{O(Min)}$	All Bits Low	-	4	μA
Output Current Range	I_{OR}	$V_{EE} = -5V$, All Bits High	-	2.1	mA
		$V_{EE} = -15V$, All Bits High	-	4.2	mA
Reference Input Bias Current	I_{15}		-	-3	μA
Output Current Power Supply Sensitivity	$PSSI_{O+}$	$V_{CC} = 4.5V$ to $5.5V$	-	2.7	$\mu A/V$
	$PSSI_{O-}$	$V_{EE} = -4.5V$ to $-16.5V$	-	2.7	$\mu A/V$
Output Voltage Compliance	V_O	Full-Scale Current Change $\leq 0.19\%$ $I_{REF} = 1mA, V_{EE} = -5V$	-0.6	+0.5	V
		Full-Scale Current Change $\leq 0.19\%$ $I_{REF} = 1mA, V_{EE} = -10V$	-5	+0.5	V
Digital Input Logic Levels	V_{IH}	Logic "1"	2	-	V
	V_{IL}	Logic "0"	-	0.8	V
Digital Input Current	I_{IH} I_{IL}	$V_{IH} = 5V$	-	0.04	mA
		$V_{IL} = 0.8V$	-	-0.8	mA

DIGITAL-TO-ANALOG CONVERTERS



TABLE 1 (Continued)

$V_{CC} = +5V$; $V_{EE} = -15V$; $I_{REF} = 2mA$; $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ unless otherwise specified

Characteristics	Symbol	Special Conditions	DAC-1508/883		Units
			LIMITS A		
			Min	Max	
Power Supply Current	I_{CC}	All Bits Low	-	14	mA
	I_{EE}	All Bits Low	-	-13	mA
Power Dissipation	P_d	$V_{EE} = -5V$, All Bits Low	-	135	mW
		$V_{EE} = -15V$, All Bits Low	-	265	mW
Power Supply Voltage (Note 1)	V_{CCR}	$T_A = +25^{\circ}C$	+4.5	+5.5	V
	V_{EER}	$T_A = +25^{\circ}C$	-4.5	-16.5	V
Propagation Delay Time	t_{PLH}	$T_A = +25^{\circ}C$	-	100	ns
	t_{PHL}	$T_A = +25^{\circ}C$	-	100	ns

NOTES:

1. Guaranteed by $PSSI_{O\pm}$ testing.



TABLE 2

DAC-1508/883

**Electrical Test Requirements
For Class B Devices**

MIL-STD-883 Test Requirements	Subgroups (see Table 3)
Interim Electrical Parameters (pre Burn-In)	1
Final Electrical Test Parameters	1*, 2, 3
Group A Test Requirements	1, 2, 3

* PDA applies to Subgroup 1 only.
No other Subgroups are included in PDA.



TABLE 3

Group A Inspection

$V_{CC} = +5V, V_{EE} = -15V, I_{REF} = 2mA$ unless otherwise specified.

Subgroup	Symbol	Special Conditions	DAC-1508/883 LIMITS A		Units
			Min	Max	
Subgroup 1	E_T	Error relative to Full-Scale I_O	-	± 0.19	%IFS
$T_A = +25^\circ C$	Monotonicity		8	-	Bits
	I_O	$V_{REF} = 10.000V, R_{14} = 5.000k\Omega$ All Bits High	1.9	2.1	mA
	$I_{O(Min)}$	All Bits Low	-	4	μA
	I_{OR}	$V_{EE} = -5V, \text{All Bits High}$ $V_{EE} = -15V, \text{All Bits High}$	-	2.1	mA
			-	4.2	mA
	I_{15}		-	-3	μA
	PSSI $_{O+}$ PSSI $_{O-}$	$V_{CC} = 4.5V, 5.5V$ $V_{EE} = -4.5V, -16.5V$	-	2.7	$\mu A/V$
			-	2.7	$\mu A/V$
	V_O	Full-Scale Current Change $\leq 0.19\%$ $I_{REF} = 1mA, V_{EE} = -5V$	-0.6	+0.5	V
			-5	+0.5	V
	V_{IH}	Logic "1"	2	-	V
	V_{IL}	Logic "0"	-	0.8	V
	I_{IH}	$V_{IH} = 5V$	-	0.04	mA
	I_{IL}	$V_{IL} = 0.8V$	-	-0.8	mA
I_{CC}	All Bits Low	-	14	mA	
I_{EE}	All Bits Low	-	-13	mA	



TABLE 3

Group A Inspection (Continued)

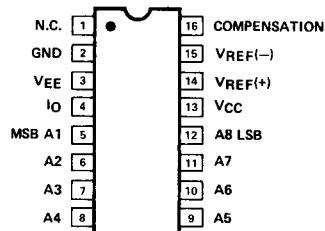
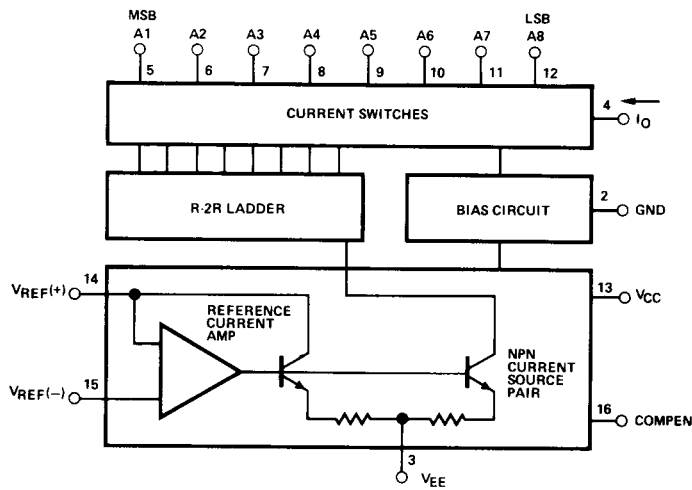
$V_{CC} = +5V$; $V_{EE} = -15V$; $I_{REF} = 2mA$ unless otherwise specified.

Subgroup	Symbol	Special Conditions	DAC-1508/883		Units
			LIMITS A		
			Min	Max	
Subgroup 1 $T_A = +25^\circ C$	P_d	$V_{EE} = -5V$, All Bits Low	-	135	mW
		$V_{EE} = -15V$, All Bits Low	-	265	mW
Subgroup 2 $T_A = +125^\circ C$		All Tests, Limits and Conditions are the same as for Subgroup 1.			
Subgroup 3 $T_A = -55^\circ C$		All Tests, Limits and Conditions are the same as for Subgroup 1.			

DIGITAL-TO-ANALOG CONVERTERS



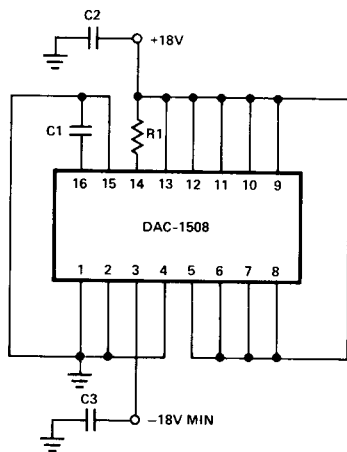
3.2.1 Simplified Schematic and Pin Connections.



16-PIN HERMETIC DIP
(Q-Suffix)

3.2.4 Microcircuit Group Assignment. This microcircuit is covered by microcircuit group 56.

4.2 Life Test/Burn-In Circuit.



R1 = 9kΩ
C1 = 0.001μF
C2, C3 = 0.01μF