FUNCTIONAL SPECIFICATIONS
(Typical at +25°C and ±15V supplies unless otherwise noted.)

DESCRIPTION	
INPUTS	
Resolution	16 bits
Coding, Unipolar Output	Complementary binary
Coding, Bipolar Output	Complementary offset binary
Input Logic Level, Bit ON ("0") ①	0V to +0.8V at −1mA
Input Logic Level, Bit OFF ("1") ①	+2.4V to +5.5V at +40 A
Logic Loading	1 TTL load
PERFORMANCE ②	
Nonlinearity Error, max.	±0.0045% of FSR
Monotonicity, +10°C to +40°C	14 bits
Gain Error, Before Trimming	±0.1%
Zero Error, Before Trimming	±0.15% of FSR
Gain Tempco, max. ③	±15ppm/°C of FSR
Gain Tempco, max. BGC	±20ppm/°C of FSR
Zero Tempco, Unipolar, max.	±5ppm/°C of FSR
Offset Tempco, Bipolar, max.	±8ppm/°C of FSR
Differential Nonlinearity Tempco, max.	±2ppm/°C of FSR
Settling Time, 10V Change ④	15 µs
Slew Rate	±20V/ s
Power Supply Rejection	±0.003%FSR/% ⑤
OUTPUTS	
Output Voltage Range, Unipolar ⑥	0 to +10V
Output Voltage Range, Bipolar	±5V
Output Voltage Range, "−1" Suffix	±10V
Output Current, min. ⑦	±5mA
Output Impedance	0.05
POWER REQUIREMENTS	
Quiescent, All Bits High	+15V, ±0.5V at 20mA
	−15V, ±0.5V at 25mA
	±12V operation ⑧
PHYSICAL/ENVIRONMENTAL	
Operating Temperature Range, Case	0°C to +70°C (BMC, BGC, BMC-C, BGC-C)
	−40°C to +100°C (BME, BGE, BME-C, BGE-C)
	−55°C to +125°C (BMM, 883, BMM-C, -C/883)
Storage Temperature Range	−65°C to +150°C
Package Type	24-pin DDIP
Weight	0.22 ounces (6.3 grams)

Footnotes:

① Drive from TTL output with only the DAC-HP as load.
② FSR is full-scale range and is 10V for 0 to +10V or −5V to +5V outputs, 20V for ±10V output, etc.
③ For all models except DAC-HP16BGC.
④ Settling to ±0.5mV.
⑤ ±0.006%FSR/% maximum over full military temperature range for MM and 883 models.
⑥ Unipolar output range for suffix "−1" models, 0 to +10V, is reached at the 1/2 scale point.
⑦ Pin 17.
⑧ For ±12V operation, consult factory.

ABSOLUTE MAXIMUM RATINGS		
PARAMETERS	**LIMITS**	**UNITS**
Positive Supply, Pin 23	+18	Volts
Negative Supply, Pin 19	−18	Volts
Digital Input Voltage, Pins 1–16	+5.5	Volts
Output Current, Pin 17	±20	mA
Lead Temperature (soldering, 10s)	300	°C

TECHNICAL NOTES

1. It is recommended that these converters be operated with local supply bypass capacitors of 1mF (tantalum type) at the +15V and −15V supply pins. The capacitors should be connected as close to the pins as possible. In highfrequency noise environments, an additional 0.01mF ceramic capacitor should be used in parallel with each tantalum bypass.

2. When laying out the circuit board for this device, isolate the analog, digital and power grounds as much as possible from each other before joining them at pin 20.

3. If the reference output (pin 24) is used, it must be buffered by an operational amplifier in the noninverting mode. See Figure 2. Current drawn from pin 24 should be limited to ±10mA in order that the temperature coefficient of the reference circuit not be affected. This is sufficient current for the bias current requirements of most popular operational amplifier types.

CALIBRATION PROCEDURE

For bipolar operation, connect Bipolar Offset (pin 18) to Summing Junction (pin 21). For unipolar operation, connect Bipolar Offset (pin 18) to Ground (pin 20). In making the following adjustments, refer to the Coding Tables and Connection Diagrams.

1. **Zero Adjustment.** Set the input digital code to 1111 1111 1111 1111 and adjust the ZERO ADJ. potentiometer to give 0.00000V output for unipolar operation or −FS output for bipolar operation.

2. **Gain Adjustment.** Set the input digital code to 0000 0000 0000 0000 and adjust the GAIN ADJ. potentiometer to give +FS − 1LSB output for either unipolar or bipolar operation.
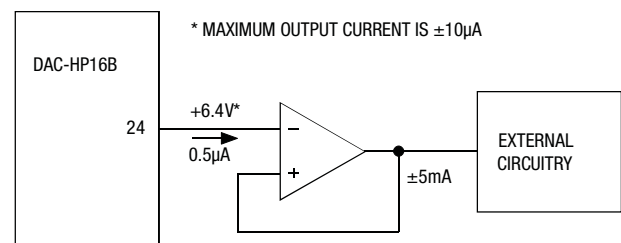

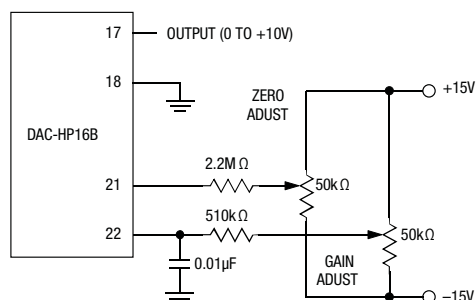Figure 2. Use of Reference Output

CODING TABLES

INPUT CODE				SCALE	OUTPUT VOLTAGE	OUTPUT VOLTAGE SUFFIX "-1"
MSB			LSB			
0000	0000	0000	0000	+FS − 1LSB	+4.99985V	+9.99969V
0011	1111	1111	1111	+1/2FS	+2.50000	+5.00000
0111	1111	1111	1111	0	0.00000	0.00000
1011	1111	1111	1111	−1/2FS	−2.50000	−5.00000
1111	1111	1111	1110	−FS + 1LSB	−4.99985	−9.99969
1111	1111	1111	1111	−FS	−5.00000V	−10.00000V

Table 1. Bipolar Output — Complementary Offset Binary

INPUT CODE				SCALE	OUTPUT VOLTAGE
MSB			LSB		
0000	0000	0000	0000	+FS − 1LSB	+9.99985V
0011	1111	1111	1111	+3/4FS	+7.50000
0111	1111	1111	1111	+1/2FS	+5.00000
1011	1111	1111	1111	+1/4FS	+2.50000
1111	1111	1111	1110	+1LSB	+153µV
1111	1111	1111	1111	0	0

Table 2. Unipolar Output — Complementary Binary

CONNECTION DIAGRAMS

Figure 3. Unipolar Operations
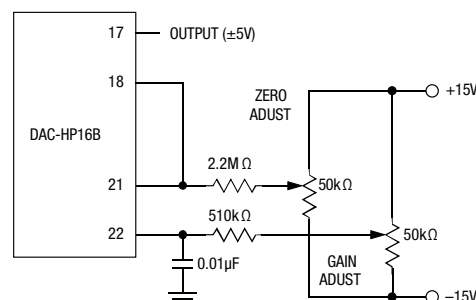
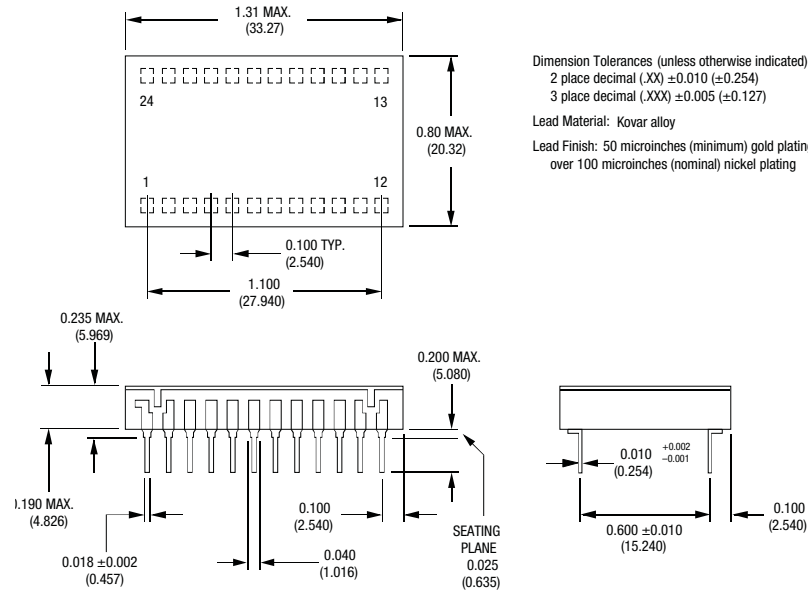Figure 4. Bipolar Operations

Figure 5. Output Circuit

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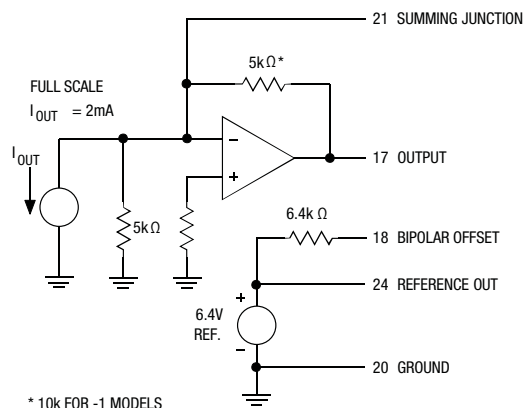
MECHANICAL DIMENSIONS (inches (mm))

1.31 MAX. (33.27)

0.80 MAX. (20.32)

24   13

1   12

0.100 TYP. (2.540)

1.100 (27.940)

0.235 MAX. (5.969)

0.200 MAX. (5.080)

0.190 MAX. (4.826)

0.100 (2.540)

0.018 ±0.002 (0.457)

0.040 (1.016)

SEATING PLANE 0.025 (0.635)

0.010 (0.254) +0.002 −0.001

0.600 ±0.010 (15.240)

0.100 (2.540)

Dimension Tolerances (unless otherwise indicated):
2 place decimal (.XX) ±0.010 (±0.254)
3 place decimal (.XXX) ±0.005 (±0.127)

Lead Material: Kovar alloy

Lead Finish: 50 microinches (minimum) gold plating
over 100 microinches (nominal) nickel plating

ORDERING INFORMATION

MODEL NUMBER	OPERATING TEMP RANGE	BITS	SEAL	RoHS
DAC-HP16BGC	0 to +70°C	16	Epoxy	No
DAC-HP16BGC-C	0 to +70°C	16	Epoxy	Yes
DAC-HP16BMC	0 to +70°C	16	Hermetic	No
DAC-HP16BMC-C	0 to +70°C	16	Hermetic	Yes
DAC-HP16BME	−40 to +100°C	16	Hermetic	No
DAC-HP16BME-C	−40 to +100°C	16	Hermetic	Yes
DAC-HP16BMM	−55 to +125°C	16	Hermetic	No
DAC-HP16BMM-C	−55 to +125°C	16	Hermetic	Yes
DAC-HP16BMM-QL	−55 to +125°C	16	Hermetic	No
DAC-HP16BMM-QL-C	−55 to +125°C	16	Hermetic	Yes
DAC-HPB/883	−55 to +125°C	16	Hermetic	No
DAC-HPB/883-C	−55 to +125°C	16	Hermetic	Yes
DAC-HP16BGC-1	0 to +70°C	16	Epoxy	No
DAC-HP16BGC-1-C	0 to +70°C	16	Epoxy	Yes
DAC-HP16BMC-1	0 to +70°C	16	Hermetic	No
DAC-HP16BMC-1-C	0 to +70°C	16	Hermetic	Yes
DAC-HP16BME-1	−40 to +125°C	16	Hermetic	No
DAC-HP16BME-1-C	−40 to +125°C	16	Hermetic	Yes
DAC-HP16BMM-1	−55 to +125°C	16	Hermetic	No
DAC-HP16BMM-1-C	−55 to +125°C	16	Hermetic	Yes
DAC-HP16BMM-1-QL	−55 to +125°C	16	Hermetic	No
DAC-HP16BMM-1-QL-C	−55 to +125°C	16	Hermetic	Yes
DAC-HPB-1/883	−55 to +125°C	16	Hermetic	No
DAC-HPB-1/883-C	−55 to +125°C	16	Hermetic	Yes
5962-8953101HXC	−55 to +125°C	16	Hermetic	No
5962-8953102HXC	−55 to +125°C	16	Hermetic	No
5962-8953101HXA	−55 to +125°C	16	Hermetic	No
5962-8953102HXA	−55 to +125°C	16	Hermetic	No

The MIL-STD-883 units are available under DESC
Drawing Number 5962-89528. Contact DATEL for 883 product specifications.

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