

GENERAL DESCRIPTION

The DAC-M multiplying digital-to-analog converters are the smallest high performance units of this type currently available. These devices are completely self-contained, compatible with DTL and TTL logic, and include reference buffer amplifiers and output amplifier within the small (2" X 2" X 0.4") module.

The DAC-M is available in 12-bit and 8-bit versions, with binary input logic coding. The analog output voltage is the algebraic product of the analog (reference) input and the digital input number, over the full four quadrants.

The design utilizes Analog Devices' new μ DAC Model AD555 quad voltage switch, with a precision R-2R ladder network. The package has been designed with an eye to minimum board area, as well as allowing board spacing of 0.5". Electrical connection arrangement is compatible with automated assembly requirements.

EXCEPTIONAL PERFORMANCE OVER TEMPERATURE

Both versions (8- and 12-bit) of the DAC-M perform exceptionally well over temperature variations. For instance, the DAC-12M can be operated in environments varying as much as 20°C in temperature, without having either gain or zero error exceed one LSB! Spectacular performance when compared to that of most other similar products currently on the market, some of which go out of specification after temperature shift of only 2°C!

TRUE FOUR-QUADRANT OPERATION

The output of any DAC can be considered to be the product of the reference and the digital number input. Most DAC's, however, are designed for fixed and highly stable reference voltage input. This limits the applicability to those situations where a variable reference is not required.

A true multiplying DAC, such as the DAC-M, is designed to allow use of ac (or varying dc) reference voltages. The DAC-M can be thought of as a digitally controlled voltage divider, in which voltages of different polarity (or phase) can be applied to the opposite ends of the resistance element, and the position of the slider contact is digitally set by the logic input. When used with an offset binary input code, the "slider" position is effectively zero center, and the result is a true four-quadrant multiplication, with maintenance of both arithmetic and algebraic sign rules.

The DAC-M can be operated in 4 quadrants with only one polarity of reference input voltage, since the built-in buffer and inverter provide for generation of the second reference signal. The flexible terminal arrangement allows the user to supply both reference polarities, if he prefers.

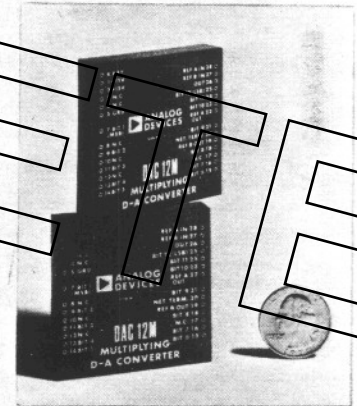
APPLICATIONS

Multiplying DAC's are used extensively in the construction of digital-to-synchro converters for use in computer-controlled shaft positioning, in fields as diverse as aircraft control systems, numerically controlled machine tools, and the setting of final control elements (such as valves) in chemical process plants. The ac performance of the DAC-M qualifies it for service as a digitally-set variable gain amplifier, as well as in computer graphics, in vector generation and point plotting systems. It is also useful as the basis of a programmable level signal generator, for use in computer controlled automatic test systems.

DAC-8M AND DAC-12M MULTIPLYING DIGITAL-TO-ANALOG CONVERTERS

FEATURES

- 4-Quadrant Multiplication
- Only One Reference Polarity or Phase Needed
- No Trimming
- Operates from $\pm 15V$
- No External Amplifiers Needed
- Exceptional Performance over Temperature



APPLICATIONS

- Digital Control of Synchros/Resolvers
- Numerically Controlled Machines
- CRT Graphic Displays
- Radar PPI Displays
- Digital Control of Amplifier Gain



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DAC-8M/12M MULTIPLYING D/A CONVERTERS
 SPECIFICATIONS (Typical @ +25°C and nominal supply voltages, unless otherwise noted)

MODEL	DAC-8M	DAC-12M
RESOLUTION	8-Bits	12-Bits
RELATIVE ACCURACY (% of Full Scale)	0.2%	0.02%
SPEED		
Slewing Rate	10V/μs	*
Settling Time	10μs to 0.2%	15μs to 0.01%
Bandwidth (small signal)	over 1MHz	*
Full Output Freq. (±10V)	200kHz	*
REFERENCE		
Input Voltage	±10V	*
Input Impedance	10k	*
AC CHARACTERISTICS		
Carrier leakage at digital zero, analog full scale		*
Input @ 400Hz	2.5mV	*
Noise Broadband (10Hz to 10kHz)	2.5mV	*
LOGIC INPUT (TTL COMPATIBLE)		
"0"	$E < +0.8V @ 500\mu A, \text{max}$	*
"1"	$+2 < E < +6V @ +100\mu A, \text{max}$	*
OUTPUT		
Voltage	±10V	*
Current	5mA	*
Impedance	< 1 ohm	*
TEMP COEFFICIENT		
Gain	< 25ppm/°C	< 5ppm/°C
Zero	< 50μV/°C	*
TEMP RANGE		
Operating	0°C to +70°C	*
Storage	-55°C to +125°C	*
POWER REQUIREMENTS	+15V @ 17mA	*
	-15V @ 20mA	*
PACKAGE (Pins on 0.1" grid)	2"X2"X0.4"	*
Pins	0.020"	*
PRICE (1-9)	\$205.	\$310.

*Specifications same as Model DAC-8M.
 Specifications subject to change without notice

NOTE ON LADDER TERMINATION

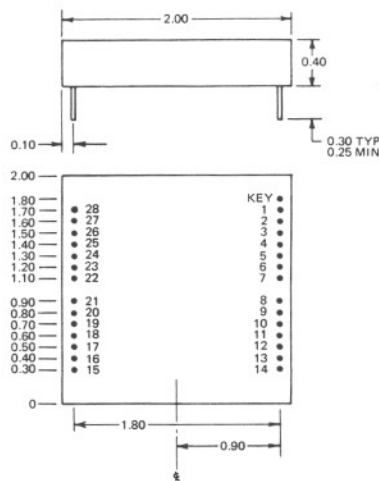
Ladder network termination (pin 20) may be connected to ground, or to Ref A OUT or Ref B OUT. When connected to Ref B OUT, an input offset binary code word of 100000000000 corresponds to output zero, the most popular usage format of offset binary.

ORDERING GUIDE: DAC-M

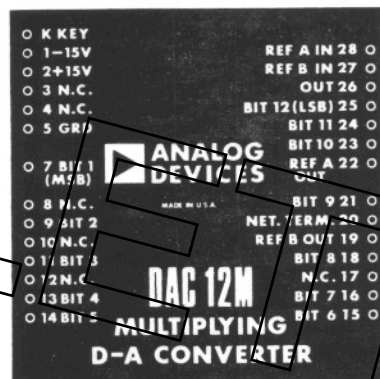
MODEL NUMBER: DAC- XX M

DAC	No. of Bits	M
	8	
	12	

OUTLINE DIMENSIONS
(In Inches)



PIN CONNECTIONS (TOP VIEW)



Mating Socket 4102 \$15.
 Pin Socket 2-330808-8 (29 required)
 \$0.20 ea.

NOTES FOR DAC-8M:
 1. Pin 18 is LSB
 2. N/C to Pins 21, 23, 24, 25

DAC-12M BLOCK DIAGRAM

