TOPAZ SEMICONDUCTOR

CDG4469

8-BIT HIGH FREQUENCY DIGITAL CONTROLLED ATTENUATOR

FEATURES

- Input Voltage up to $6.0V_{RMS}$
- Attenuation Range of 0 to 127.5dB
- Precise Attenuation Selectable in 0.5dB steps
- Wide Frequency Range, up to 5MHz
- Constant Input Impedance of 650 ohms
- Wide Power Supply Range, ±6.0 to ±15V
- Lower Power Consumption, 0.5μW typ. with ±15V Power Supplies

APPLICATIONS

- Video Attenuation
- Digital Amplifier Gain Control
- Variable Burst Generation
- Log D/A Conversion
- Frequency Synthesizers

DESCRIPTION

Topaz Semiconductor CMOS/D-MOS high frequency attenuators feature high-speed, low-power CMOS input logic and level translation circuitry and high speed, low capacitance Lateral D-MOS switches. CMOS and Lateral D-MOS circuitry are fabricated together on single silicon chips and mounted on hybrid circuit substrates with precision trimmed resistors.

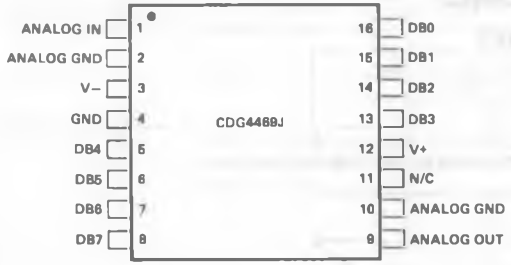
All devices contain diodes to protect inputs against damage due to high static voltages or electric fields; however, it is advised that precautions be taken not to exceed the maximum recommended input voltages. All unused inputs must be connected to an appropriate logic level.

ORDERING INFORMATION

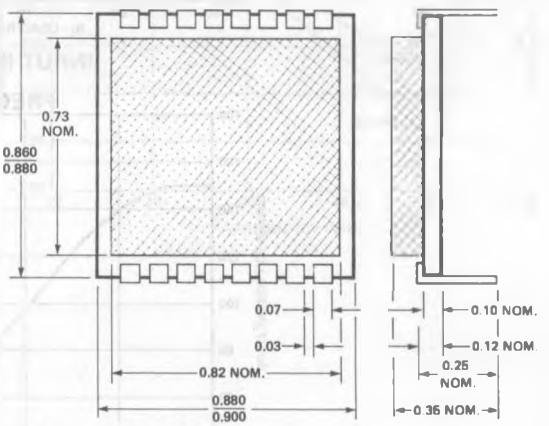
16-Pin Ceramic Package	CDG4469J

PIN CONFIGURATION

TOP VIEW

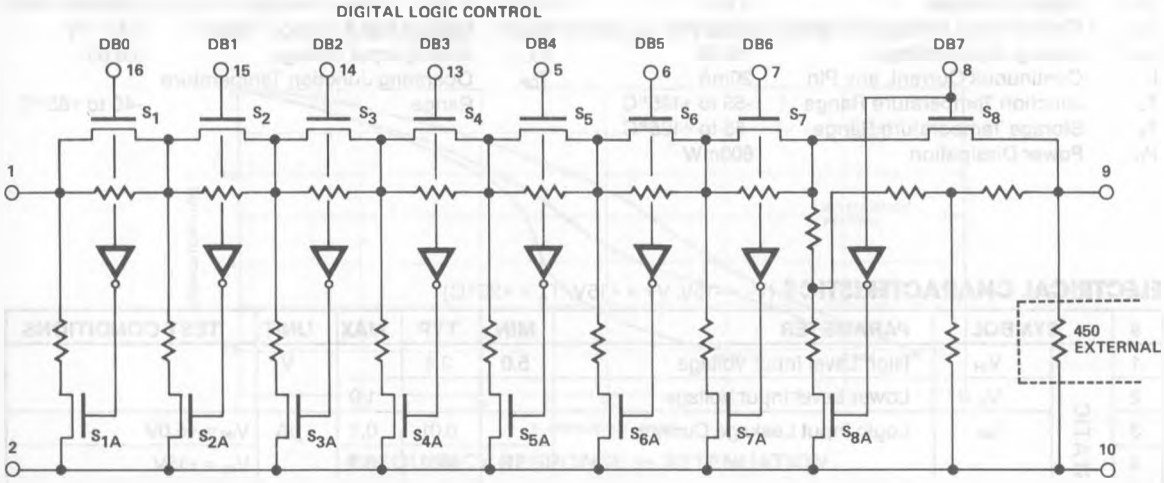


PACKAGE DIMENSIONS



ALL DIMENSIONS IN INCHES

SCHEMATIC DIAGRAM



ATTENUATOR SETTING TABLE

Note: Examples only. Added attenuation value can be set between 0 and 127.5 dB in 0.5 dB steps.

ADDED ATTENUATION (dB)	DATA BIT #—LOGIC SETTING							
	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
0.5	1	0	0	0	0	0	0	0
1.0	0	1	0	0	0	0	0	0
2.0	0	0	1	0	0	0	0	0
4.0	0	0	0	1	0	0	0	0
8.0	0	0	0	0	1	0	0	0
16	0	0	0	0	0	1	0	0
32	0	0	0	0	0	0	1	0
64	0	0	0	0	0	0	0	1

EXAMPLES OF OTHER ATTENUATION SETTINGS

1.5	1	1	0	0	0	0	0	0
3.5	1	1	1	0	0	0	0	0
15.5	1	1	1	1	1	0	0	0
31.5	1	1	1	1	1	1	0	0
63.5	1	1	1	1	1	1	1	0
127.5	1	1	1	1	1	1	1	1

ABSOLUTE MAXIMUM RATINGS

V-, V+	Supply Voltages	±20V
V_{IN}	Control Input Voltage Range	V- to V+
V_A	Analog Input Voltage	±8.0V
I	Continuous Current, any Pin	20mA
T_J	Junction Temperature Range	-55 to +125°C
T_s	Storage Temperature Range	-55 to +125°C
P_D	Power Dissipation	600mW

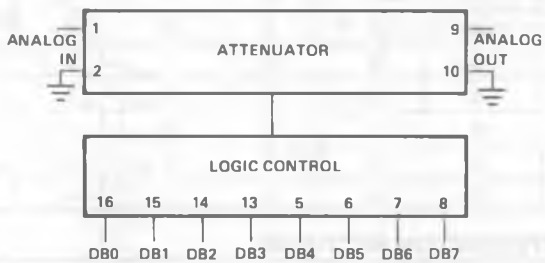
RECOMMENDED OPERATING CONDITIONS

V-, V+	Supply Voltage Ranges	±6.0V to ±15V
V_{IN}	Control Input Voltage Range	0 to +5V
V_A	Analog Input Voltage	±8.0V
T_{OP}	Operating Junction Temperature Range	-40 to +85°C

ELECTRICAL CHARACTERISTICS (V- = -15V, V+ = +15V, T_A = +25°C)

#	SYMBOL		PARAMETER	MIN	TYP	MAX	UNIT	TEST CONDITIONS
1	STATIC	V_{IH}	High Level Input Voltage	5.0	3.4		V	
2		V_{IL}	Lower Level Input Voltage			1.0		
3		I_{IN}	Logic Input Leakage Current		0.01	0.1	μA	V_{IN} = +5.0V
4					0.02	0.1		V_{IN} = +15V
5		I-	Negative Supply Quiescent Current		-0.5	-10	μA	V_{IN} = 0 or V+
6		I+	Positive Supply Quiescent Current		0.5	10		
7	DYNAMIC		Insertion Loss		3.9	4.5	dB	R_{IN} = 650 Ω, R_L = 450 Ω Attenuation Setting = 0dB
8		t_{on}	Turn-ON Time		140	250	nS	V_{IN} = 5.0V
9		t_{off}	Turn-OFF Time		100	220		

BLOCK DIAGRAM

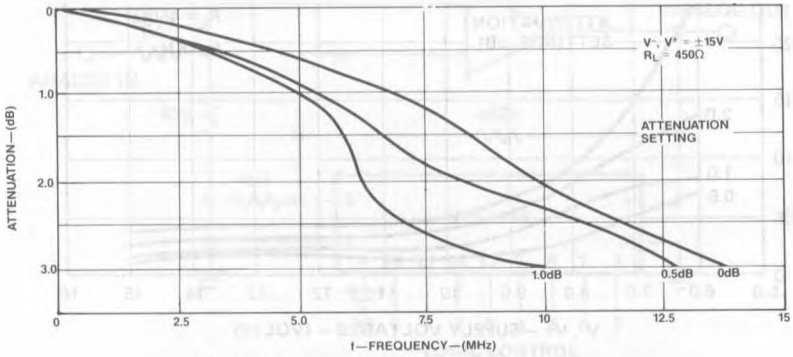


All Data Bit Pins must be connect to logic '0' or Logic '1' input according to Attenuation Setting.

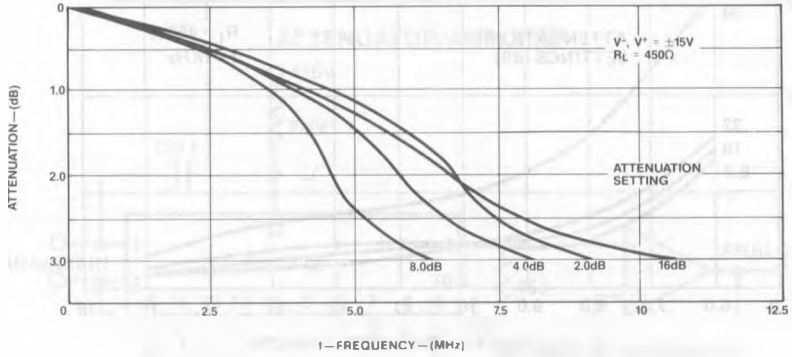
TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C)

Note: For additional performance curves refer to AN02, CDG4469J Applications Note.

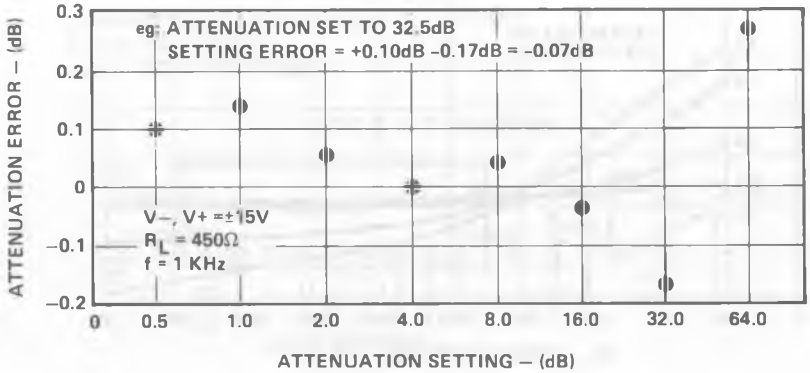
FREQUENCY RESPONSE vs ATTENUATION



FREQUENCY RESPONSE vs ATTENUATION

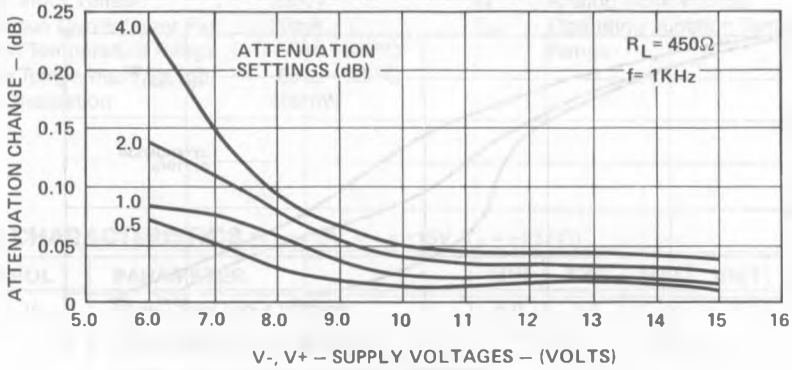


ATTENUATION ERROR vs ATTENUATION SETTING

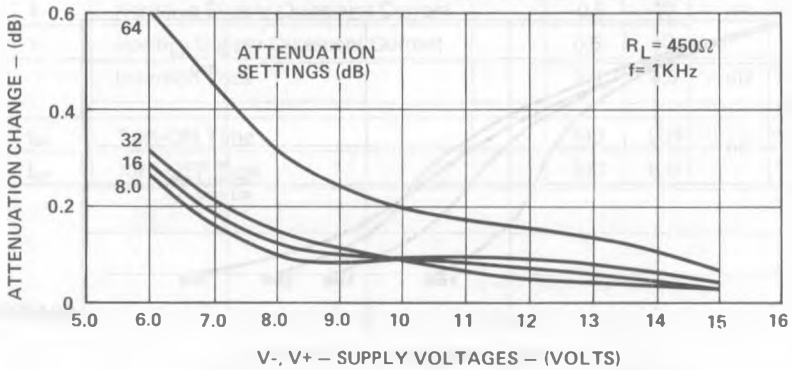


TYPICAL PERFORMANCE CHARACTERISTICS (Cont) (T_A = +25°C)

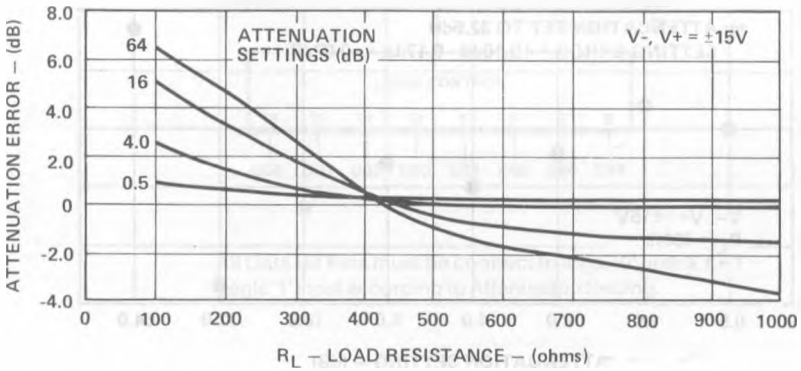
ATTENUATION CHANGE vs SUPPLY VOLTAGES



ATTENUATION CHANGE vs SUPPLY VOLTAGES

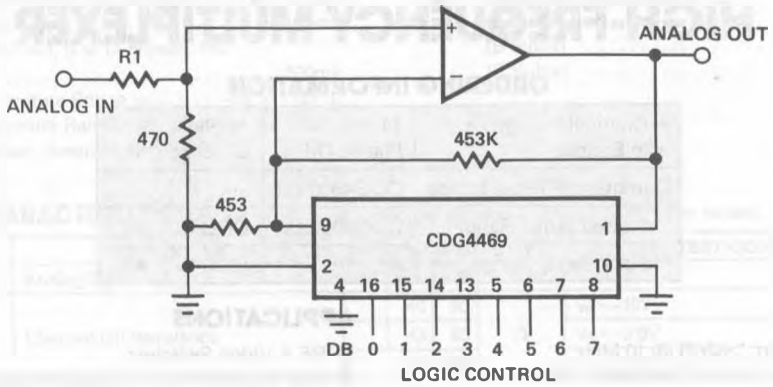


ATTENUATOR ERROR vs LOAD RESISTANCE



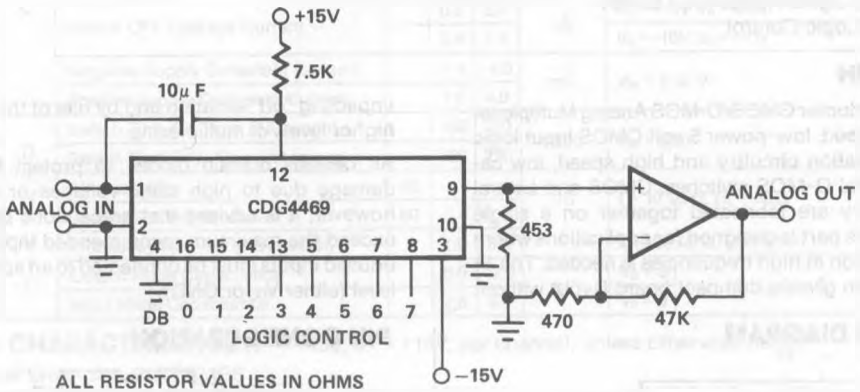
APPLICATIONS

GAIN CONTROL 0 to +60dB



ALL RESISTOR VALUES IN OHMS
R_1 – 0 dB ADJUST

ATTENUATOR/AMPLIFIER



ALL RESISTOR VALUES IN OHMS
RANGE – +40 TO -87.5 dB
FREQUENCY – UP TO 500KHz

LOG D-A CONVERTER