

Digital Attenuator, 50 dB, 6-Bit, TTL Driver DC - 2 GHz

AT20-0106

V3.00

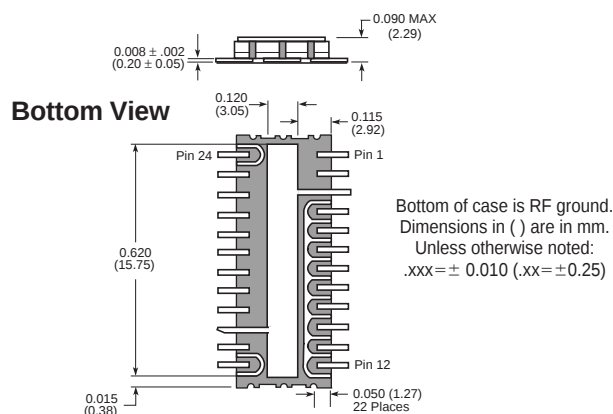
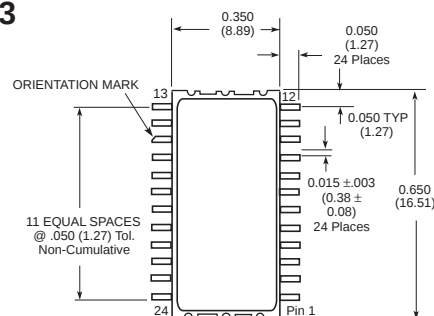
Features

- Attenuation: 1-dB steps to 50 dB²
- Temperature Stability: ± 0.18 dB from -40°C to $+85^{\circ}\text{C}$ Typical
- Low DC Power Consumption
- Surface Mount Package
- Integral TTL Driver
- High Intercept Point
- Low Cost/High Performance

Description

M/A-COM's AT20-0106 is a GaAs FET 6-bit digital attenuator with a 1-dB minimum step size and 50 dB total attenuation. This attenuator and integral TTL driver is in a ceramic 24-lead surface mount package. The AT20-0106 is ideally suited for use where accuracy, fast switching, low power consumption and low intermodulation products are required. Typical applications include dynamic range setting in precision receiver circuits and other gain/leveling control circuits. Available with enhanced performance as fully hermetic version. Environmentally screenable as P/N AT-106.

CR-13



Electrical Specifications¹, $T_A = +25^{\circ}\text{C}$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Reference Insertion Loss	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz	dB dB dB		3.0 3.5 4.0	3.6 4.1 4.6
Attenuation Accuracy ^{3,4}	Any Single Bit Any Combination of Bits (For Attenuation to 26 dB) Any Combination of Bits (For Attenuation 27 to 50 dB)	DC - 2.0 GHz DC - 2.0 GHz DC - 1.5 GHz	dB dB dB	+/- (0.3 + 4% of attenuation setting) +/- (0.4 + 4% of attenuation setting) +/- (0.5 + 5% of attenuation setting)	
VSWR	0.05-0.10 GHz 0.101-2.0 GHz				2.0:1 1.8:1
Trise, Tfall Ton, Toff Transients	10% to 90% 50% Control to 90/10% RF In-band (peak-peak)	nS nS mV		50	50 150
1 dB Compression ⁵	Input Power Input Power	0.05 GHz 0.5 - 2.0 GHz	dBm dBm	+20 +28	
Input IP_3 ⁵	For two-tone input power up to +5 dBm	0.05 GHz 0.5 - 2.0 GHz	dBm dBm	+34 +46	
Input IP_2 ⁵	For two-tone input power up to +5 dBm	0.05 GHz 0.5 - 2.0 GHz	dBm dBm	+75 +79	
V_{CC} V_{EE}		V V	4.5 -8.0	5.0	5.5 -5.0
I_{CC}	$V_{CC} = 4.5$ to 5.5 V $V_{ctl} = 0$ to 0.8 V, or $V_{CC} - 2.1$ V to V_{CC}	mA			6.0
I_{EE}	$V_{EE} = -5.0$ to -8.0 V	mA			1.0

1. All specifications apply when operated with bias voltages of +5 V for V_{CC} and -5.0 V to -8.0 V for V_{EE} , and 50 Ω impedance at all ports unless otherwise specified.

2. Above reference insertion loss.

3. This attenuator is guaranteed monotonic.

4. For the attenuator to meet the guaranteed specifications, it is necessary to have a DC return on either RF1 or RF2. The DC return can be either a 10 K Ω resistor, or an RF choke.

5. $V_{EE} = -5$ V for the typical numbers given.

Specifications Subject to Change Without Notice.

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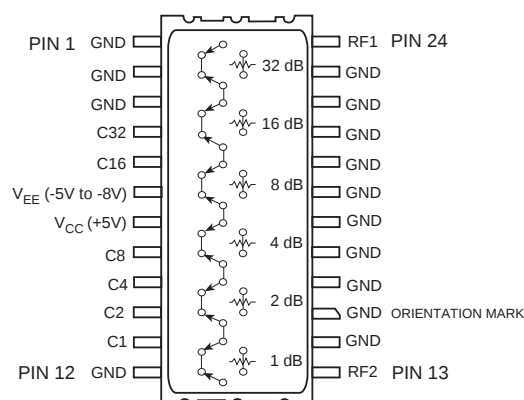
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Absolute Maximum Ratings¹

Parameter	Absolute Maximum
Maximum Input Power	
0.5 GHz	+27 dBm
0.5 - 2.0 GHz	+34 dBm
Supply Voltages	
V _{CC}	+5.5 V
V _{EE}	-8.5 V
Control Voltage	-0.5 V to V _{CC} + 0.5 V
Operating Temperature	-40°C to +125°C
Storage Temperature	-65°C to +150°C

- 1. Operation of this device above any one of these parameters may cause permanent damage.**

Functional Schematic (Top View)



Truth Table

Control Inputs						
C6	C5	C4	C3	C2	C1	Attenuation
0	0	0	0	0	0	Reference
0	0	0	0	0	1	1 dB
0	0	0	0	1	0	2 dB
0	0	0	1	0	0	4 dB
0	0	1	0	0	0	8 dB
0	1	0	0	0	0	16 dB
1	0	0	0	0	1	32 dB
1	1	1	1	1	1	63 dB

0 = TTL Low

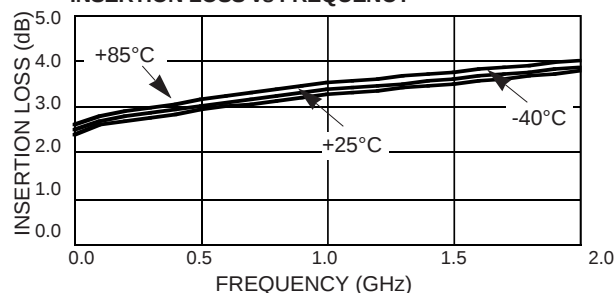
1 = TTL High

Ordering Information

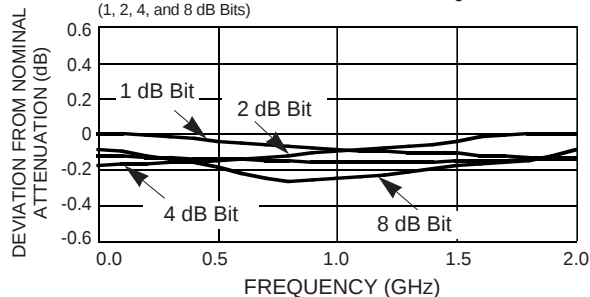
Part Number	Package
AT20-0106	Ceramic

Typical Performance

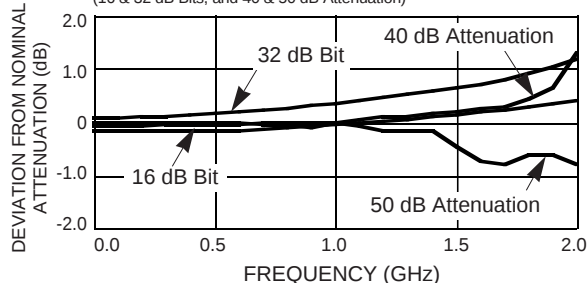
INSERTION LOSS vs FREQUENCY



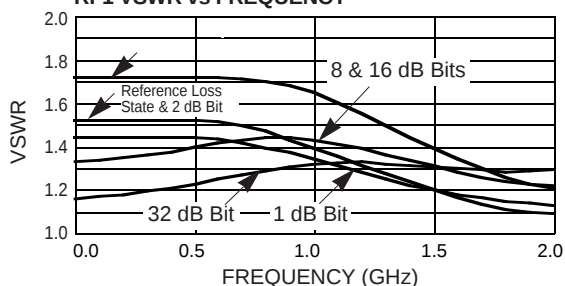
ATTENUATION ACCURACY vs FREQUENCY



ATTENUATION ACCURACY vs FREQUENCY (16 & 32 dB Bits, and 40 & 50 dB Attenuation)



RF1 VSWR vs FREQUENCY



ARF2 VSWR vs FREQUENCY

