

# GaAs IC 6 Bit Digital Attenuator with Driver

## 0.5 dB LSB Positive Control DC–1 GHz



AA113-310

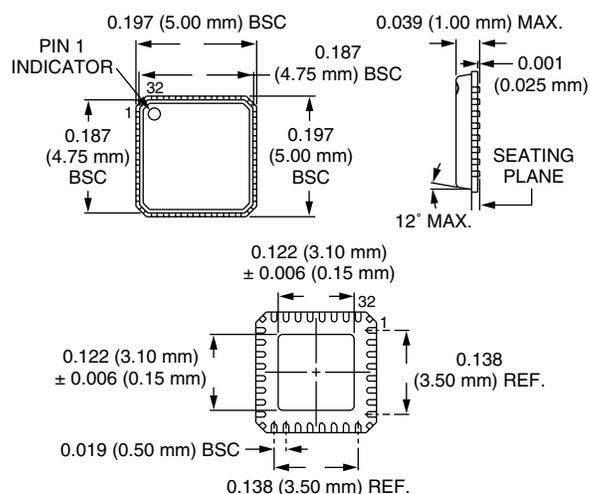
### Features

- Attenuation 0.5 dB Steps to 31.5 dB With High Accuracy
- Single Positive Control (+5 V) for Each Bit
- Low DC Power Consumption
- CMOS Integrated Silicon Driver
- Designed for Use at IF Frequencies

### Description

The AA113-310 is a 6 bit, single positive control GaAs IC FET digital attenuator with driver. It is particularly suited at IF frequencies where high attenuation accuracy, low insertion loss and low intermodulation products are required. Typical applications include base station, wireless data, broadband and wireless local loop gain control circuits.

### MLF 5 x 5 (-310)



### Electrical Specifications at 25°C (0, +5 V)

Parameter <sup>1</sup>	Frequency	Min.	Typ.	Max.	Unit
Insertion Loss <sup>2</sup>	DC–0.5 GHz		1.5	1.8	dB
	DC–1.0 GHz		1.8	2.2	dB
Attenuation Range			31.5		dB
Attenuation Accuracy <sup>3</sup>	DC–0.5 GHz	± (0.2 + 2% of Attenuation Setting in dB)			dB
	DC–1.0 GHz	± (0.25 + 3% of Attenuation Setting in dB)			dB
VSWR (I/O) <sup>4</sup>	DC–1.0 GHz		1.4:1	1.6:1	

### Operating Characteristics at 25°C (0, +5 V)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics <sup>5</sup>	Rise, Fall (10/90% or 90/10% RF)			30		ns
	On, Off (50% CTL to 90/10% RF)			50		ns
	Video Feedthru			50		mV
Input Power for 1 dB Compression	V <sub>CC</sub> = +5 V	0.5–1.0 GHz 0.05 GHz		+29 +22		dBm dBm
Intermodulation Intercept Point (IP3)	For Two-tone Input Power +5 dBm V <sub>CC</sub> = +5 V	0.5–1.0 GHz 0.05 GHz		+48 +36		dBm dBm
Supply Voltage	V <sub>CC</sub> = 5 V @ 700 μA Typ.					
Control Voltages	C <sub>TL05</sub> , C <sub>TL1</sub> , C <sub>TL2</sub> , C <sub>TL4</sub> , C <sub>TL8</sub> , C <sub>TL16</sub> , Low = 0 to 0.8 V @ 20 μA Typ. C <sub>TL05</sub> , C <sub>TL2</sub> , C <sub>TL4</sub> , C <sub>TL8</sub> , C <sub>TL16</sub> , High = 3.5 to 5.0 V @ 20 μA Typ.					

1. All measurements made in a 50 Ω system, unless otherwise specified.

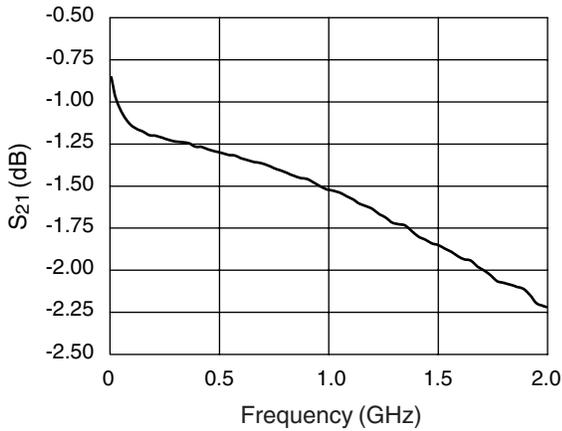
2. Insertion loss changes by 0.003 dB/°C.

3. Attenuation referenced to insertion loss.

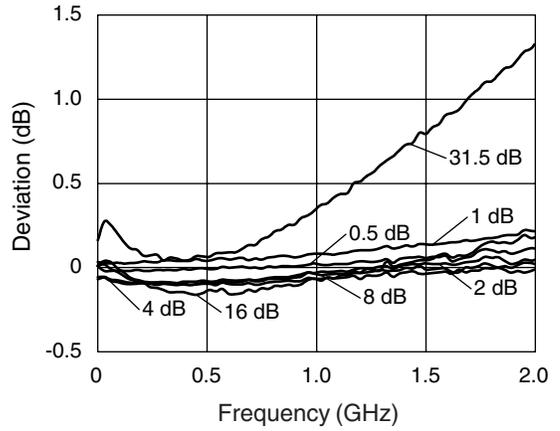
4. Input/output.

5. Video feedthru measured with 1 ns risetime pulse and 500 MHz bandwidth.

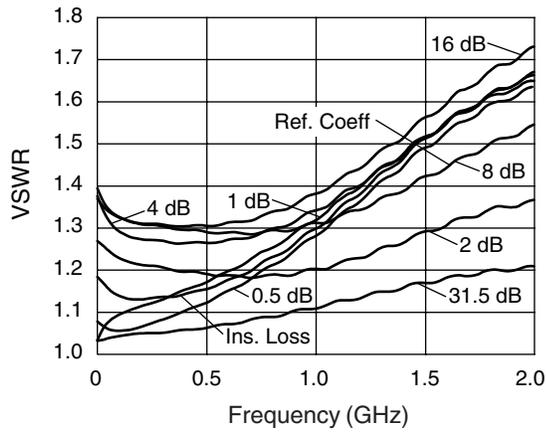
**Typical Performance Data (V<sub>CC</sub> = +5 V)**



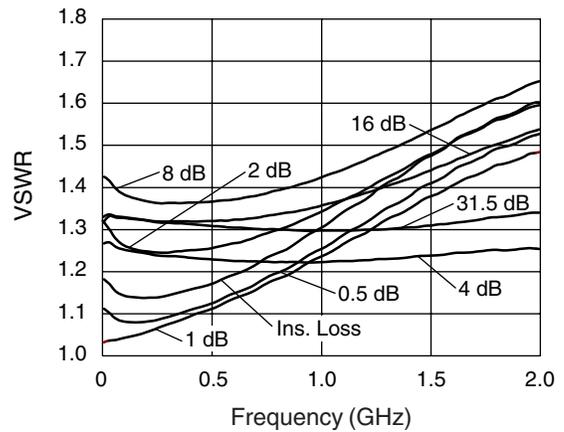
**Insertion Loss vs. Frequency**



**Attenuation Accuracy vs. Frequency**



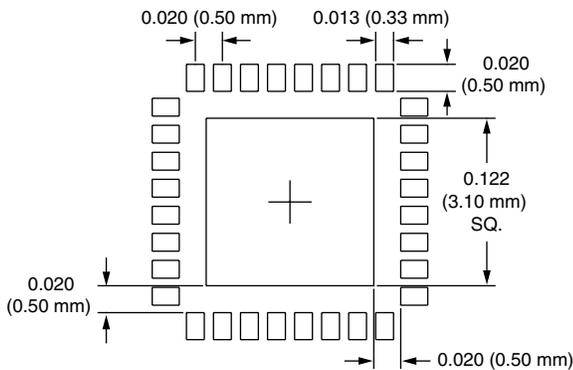
**Input VSWR vs. Frequency**



**Output VSWR vs. Frequency**

**Surface Mount Land Pattern**

5 x 5 mm MLF 32 Lead



Dimensions in inches (mm).

**Absolute Maximum Ratings**

Characteristic	Value
RF Input Power	2 W > 500 MHz, 0/6 V 0.5 W > 50 MHz, 0/6 V
Supply Voltage	6 V
Control Voltage <sup>1</sup>	-0.2 V, +6 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
θ <sub>JC</sub>	85°C/W

Note: Exceeding these ratings may cause irreversible damage.  
1. Control voltage must not exceed supply voltage.

**Truth Table**

C <sub>TL05</sub>	C <sub>TL1</sub>	C <sub>TL2</sub>	C <sub>TL4</sub>	C <sub>TL8</sub>	C <sub>TL16</sub>	Attenuation J <sub>1</sub> -J <sub>2</sub>
0	0	0	0	0	0	Ins. Loss
1	0	0	0	0	0	0.5 dB
0	1	0	0	0	0	1 dB
0	0	1	0	0	0	2 dB
0	0	0	1	0	0	4 dB
0	0	0	0	1	0	8 dB
0	0	0	0	0	1	16 dB
1	1	1	1	1	1	31.5 dB

"0" = 0 to 0.5 V (V<sub>CC</sub> = 5 V).  
 "1" = 3.5 to 5 V (V<sub>CC</sub> = 5 V).

**Pin Out**

