

DATA SHEET

AA105-86, AA105-86LF: GaAs IC 4-Bit Digital Attenuator, 1 dB LSB 0.5–3.0 GHz

Features

- Attenuation 1 dB steps to 15 dB with high accuracy
- Single positive control (3 to 5 V) for each bit
- Low DC power consumption
- Miniature, low-cost MSOP-10 plastic package
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

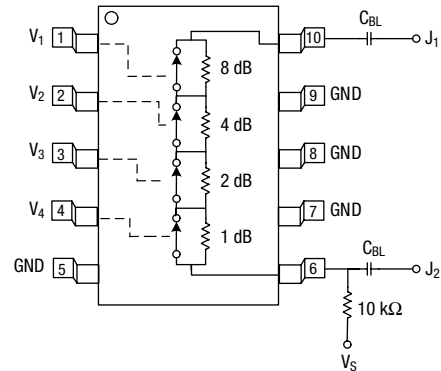
Description

The AA105-86 is a 4-bit, single positive control GaAs IC FET digital attenuator. It requires DC blocking capacitors, positive supply voltage (V_S) and four individual positive bit control voltages (V_1 – V_4). The AA105-86 is particularly suited where high attenuation accuracy, low insertion loss and low intermodulation products are required. Typical applications include cellular radio, wireless data, and wireless local loop gain level control circuits.

NEW Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.



Pin Out



DC blocking capacitors (C_{BL}) and biasing resistor must be supplied externally for positive voltage operation.
 $C_{BL} = 47$ pF for operation >500 MHz.

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

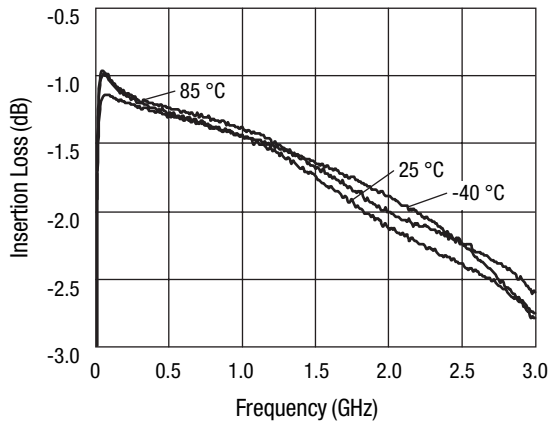
Parameter ⁽¹⁾	Condition	Frequency	Min.	Typ.	Max.	Unit
Insertion loss		0.5–1.0 GHz		1.5	1.8	dB
		1.0–2.0 GHz		2.1	2.4	dB
		2.0–2.5 GHz		2.4	2.7	dB
		2.5–3.0 GHz		2.7	3.0	dB
Attenuation range				15		dB
Attenuation accuracy ⁽²⁾		0.5–1.0 GHz	± (0.2 + 2% of Attenuation setting in dB)			dB
		1.0–3.0 GHz	± (0.3 + 3% of Attenuation setting in dB)			dB
VSWR (I/O) ⁽³⁾		0.5–2.5 GHz		1.5:1	2.0:1	
		2.5–3.0 GHz		1.7:1	2.2:1	
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			180		ns
On, off	50% CTL to 90/10% RF			270		ns
Video feedthru	T _{RISE} = 1 ns, BW = 500 MHz			50		mV
Input power for 1 dB compression	V _S = 3 V	0.5–3.0 GHz	20	24		dBm
	V _S = 5 V	0.5–3.0 GHz	25	29		dBm
Intermodulation intercept point (IP3)	For two-tone input power +5 dBm V _S = 3 V V _S = 5 V	0.5–3.0 GHz	43	49		dBm
		0.5–3.0 GHz	44	50		dBm
Control voltages	V _{LOW} = 0 to 0.2 V @ 20 µA max. V _{HIGH} = 3 V @ 100 µA max. to 5 V @ 200 µA max. V _S = V _{HIGH} ± 0.2 V					

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

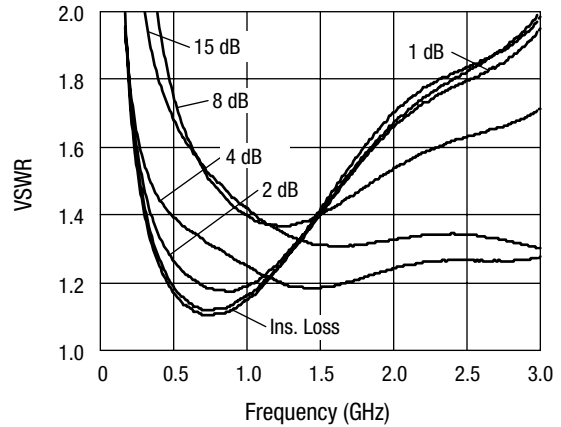
2. Attenuation referenced to insertion loss.

3. Input/output.

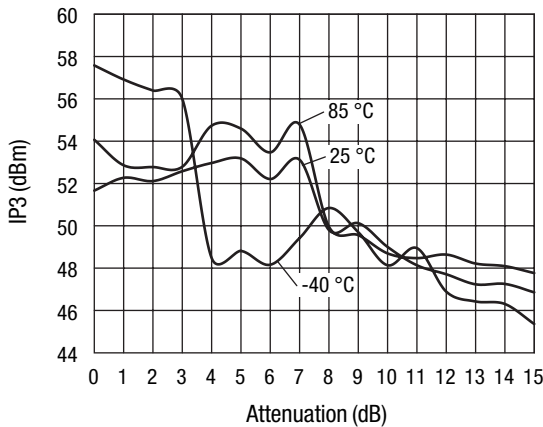
Typical Performance Data (0, 5 V)



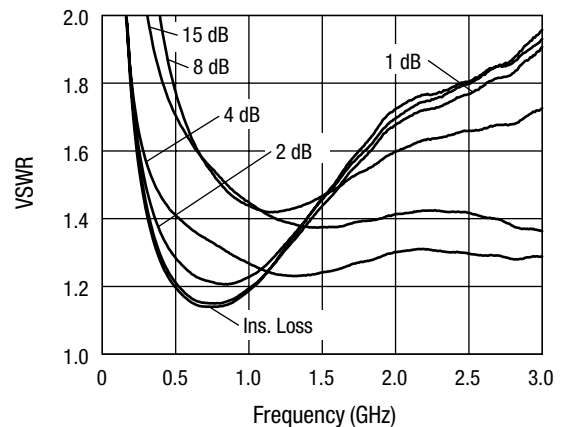
Insertion Loss vs. Frequency



VSWR vs. Frequency (25 °C)



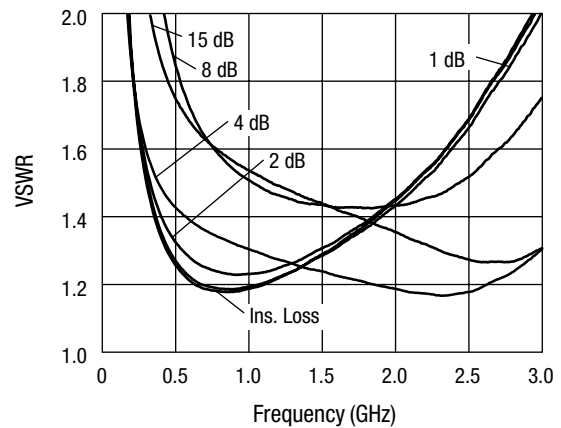
IP3 vs. Attenuation and Temperature (500 MHz)



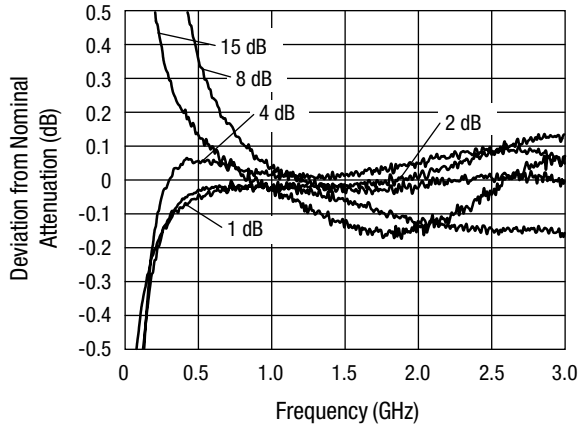
VSWR vs. Frequency (85 °C)

Compression Point vs. Attenuation, Voltage, and Temperature

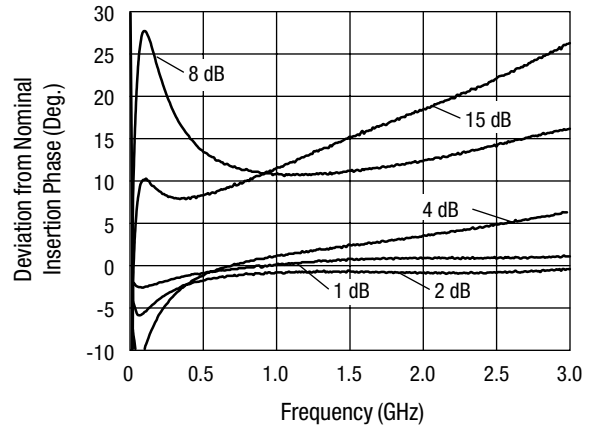
Attenuation State	Control Voltage (V)	Input Power @ 1 dB Compression		
		25 °C (dBm)	85 °C (dBm)	-40 °C (dBm)
Ins. loss	5	31.1	30.9	31.2
1 dB	5	31.3	31.4	31.3
2 dB	5	31	30.8	31.1
4 dB	5	32.5	31.4	33.6
8 dB	5	33	32.4	33.5
15 dB	5	29.9	28	31.4



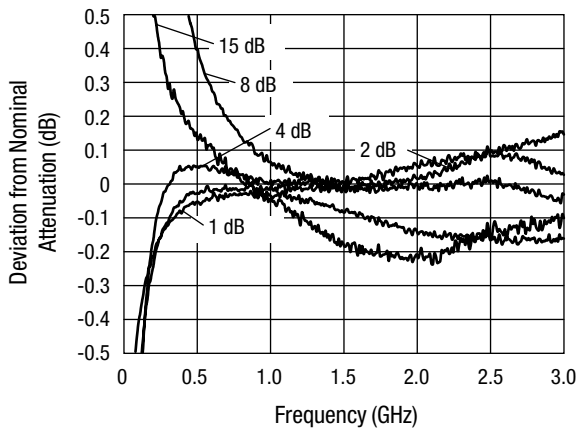
VSWR vs. Frequency (-40 °C)



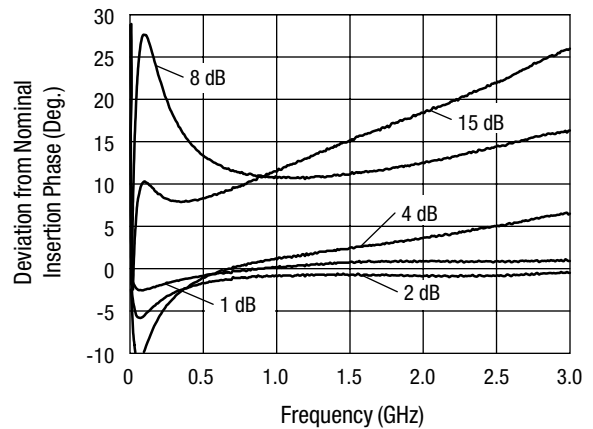
Attenuation Accuracy vs. Frequency (25 °C)



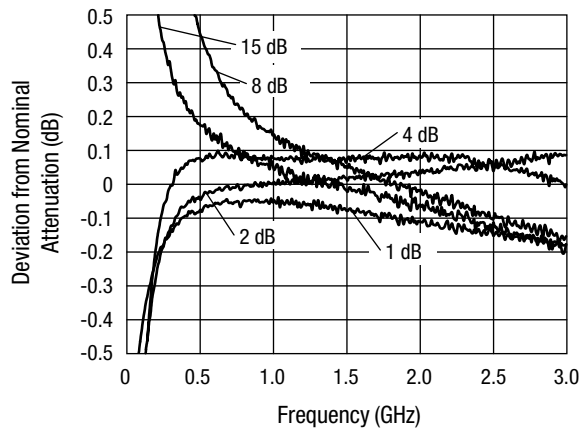
Attenuation Phase Accuracy vs. Frequency (25 °C)



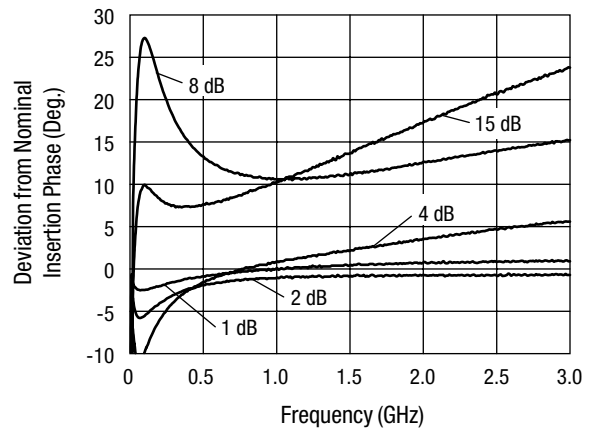
Attenuation Accuracy vs. Frequency (85 °C)



Attenuation Phase Accuracy vs. Frequency (85 °C)

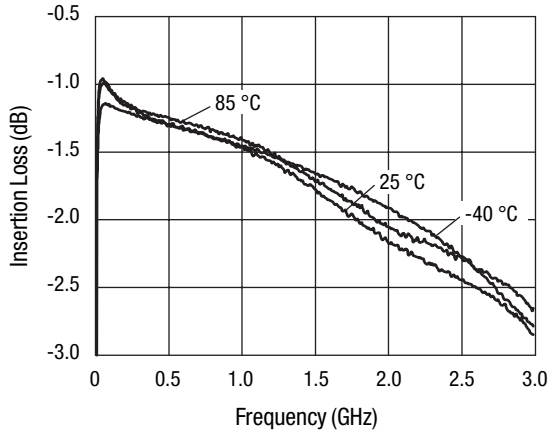


Attenuation Accuracy vs. Frequency (-40 °C)

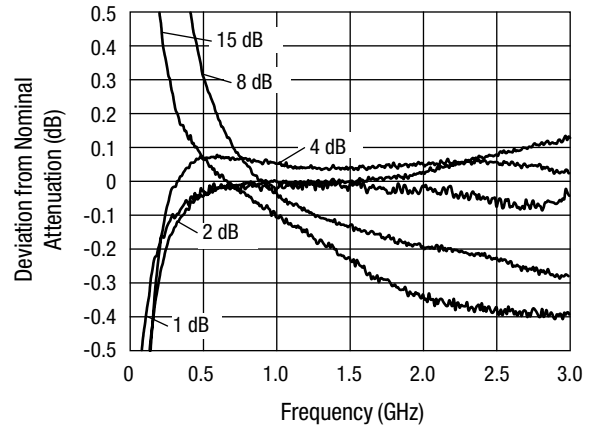


Attenuation Phase Accuracy vs. Frequency (-40 °C)

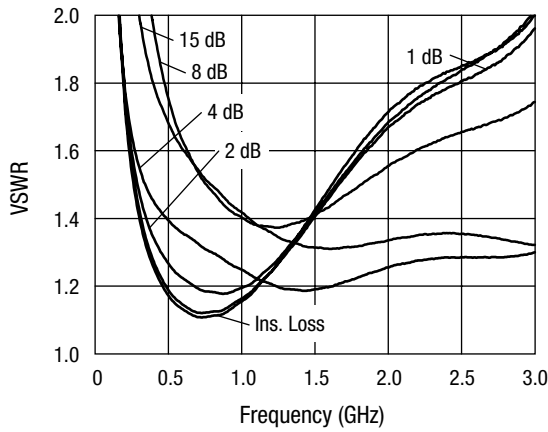
Typical Performance Data (0, 3 V)



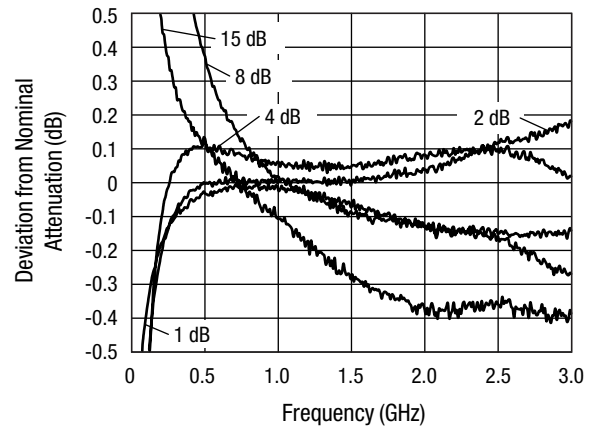
Insertion Loss vs. Frequency



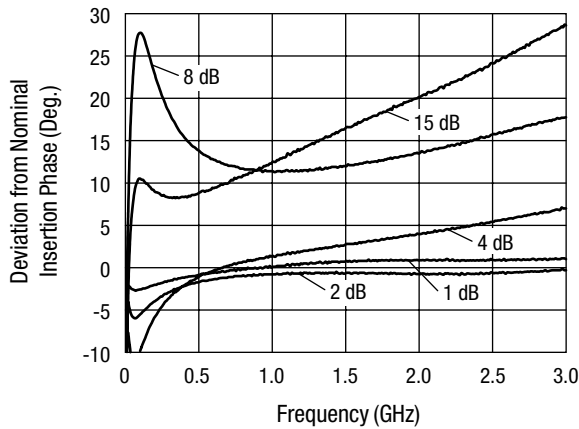
Attenuation Accuracy vs. Frequency (25 °C)



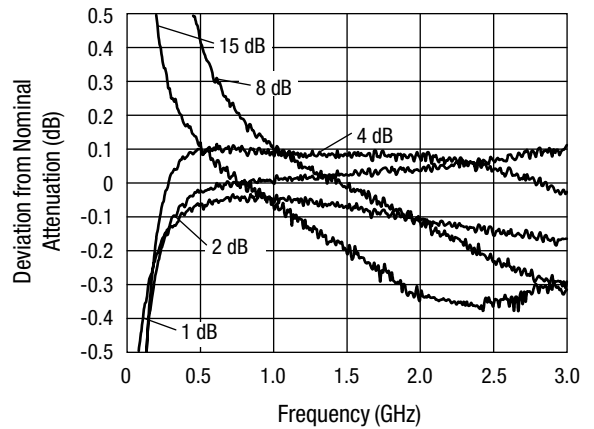
VSWR vs. Frequency (25 °C)



Attenuation Accuracy vs. Frequency (85 °C)



Attenuation Phase Accuracy vs. Frequency (25 °C)



Attenuation Accuracy vs. Frequency (-40 °C)

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