DATA SHEET

AA280-25, AA280-25LF: GaAs IC 5-Bit Digital Attenuator 0.5 dB LSB 300 kHz–2 GHz

Features

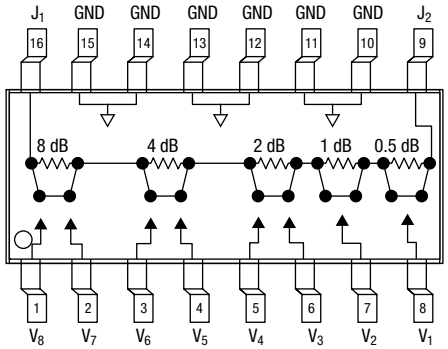
- Attenuation 0.5 dB steps to 15.5 dB with high accuracy
- Low DC power consumption
- Low-cost SOIC-16 plastic package
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

Description

The AA280-25 is a 5-bit, GaAs IC FET digital attenuator in a low-cost SOIC-16 package. This attenuator has an LSB of 0.5 dB and a total attenuation of 15.5 dB. The AA280-25 is particularly suited where high attenuation accuracy, low insertion loss and low intermodulation products are required. Typical applications include cellular radio, wireless data, wireless local loop and other gain level control circuits.

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

Pin Out

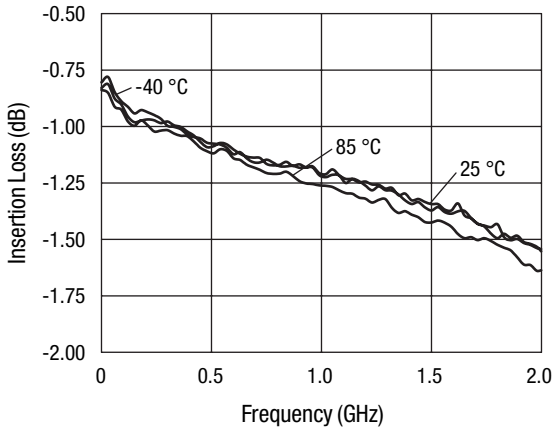


Electrical Specifications at -40 °C to +85 °C (0, -5 V)

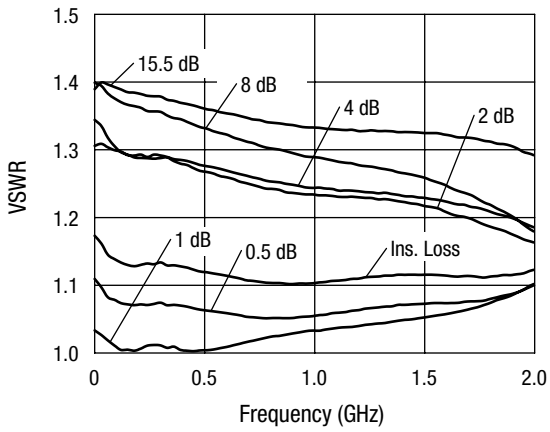
Parameter[1]	Condition	Frequency	Min.	Typ.	Max.	Unit
Insertion loss[2]		300 kHz–0.5 GHz 300 kHz–1.0 GHz 300 kHz–2.0 GHz		1.1 1.4 1.7	1.3 1.7 2.0	dB dB dB
Attenuation range				15.5		dB
Attenuation accuracy[2]		300 kHz–1.0 GHz 300 kHz–2.0 GHz		± (0.2 + 3% of Attenuation setting in dB) ± (0.4 + 3% of Attenuation setting in dB)		dB dB
VSWR (I/O)[3]		300 kHz–2.0 GHz		1.4:1	1.8:1	
Switching characteristics Rise, fall On, off Video feedthru	 10/90% or 90%/10% RF 50% CTL to 90%/10% RF T_{RISE} = 1 ns, BW = 500 MHz			 15 25 25		 ns ns mV
Input power for 1 dB compression		0.5–2.0 GHz 0.05 GHz	24 17	29 22		dBm dBm
Intermodulation intercept point (IP3)	For two-tone input power 5 dBm	0.5–2.0 GHz 0.05 GHz	44 35	50 40		dBm dBm
Thermal resistance				85		°C/W
Control voltages	V_{Low} = 0 to 0.2 V @ 20 µA max. V_{High} = -5 V @ 300 µA max.					

1. All measurements made in a 50 Ω system, unless otherwise specified.
2. Attenuation referenced to insertion loss.
3. Input/Output.

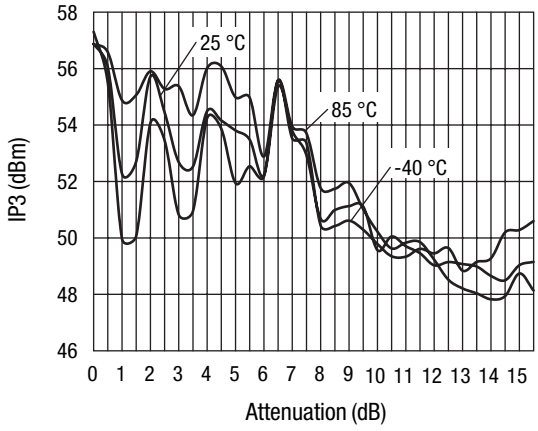
Typical Performance Data (0, -5 V)



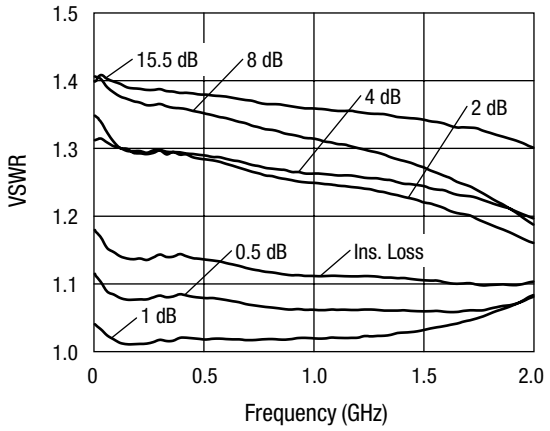
Insertion Loss vs. Frequency



VSWR vs. Frequency (25 ˚C)



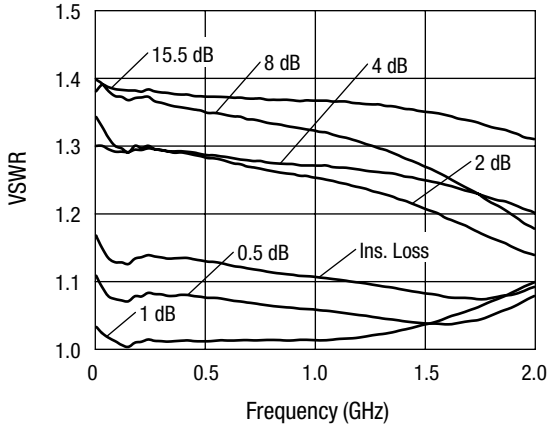
IP3 vs. Attenuation and Temperature



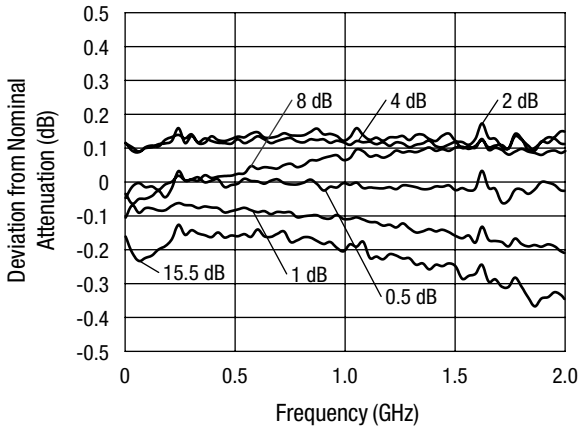
VSWR vs. Frequency (85 ˚C)

Compression Point vs. Attenuation, Voltage, and Temperature

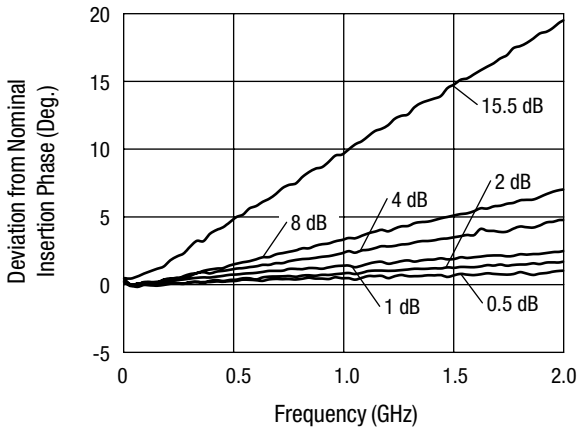
Attenuation State	Control Voltage (V)	Input Power @ 1 dB Compression		
		25 °C (dBm)	85 °C (dBm)	-40 °C (dBm)
Ins. loss	-5	28.3	28.1	29.1
0.5 dB	-5	28.5	28.3	29.4
1 dB	-5	28.7	28.7	29.6
2 dB	-5	28.4	28.3	29.1
4 dB	-5	32.9	32.9	33.9
8 dB	-5	36.8	36.8	36.8
15.5 dB	-5	32.7	32.1	32.8



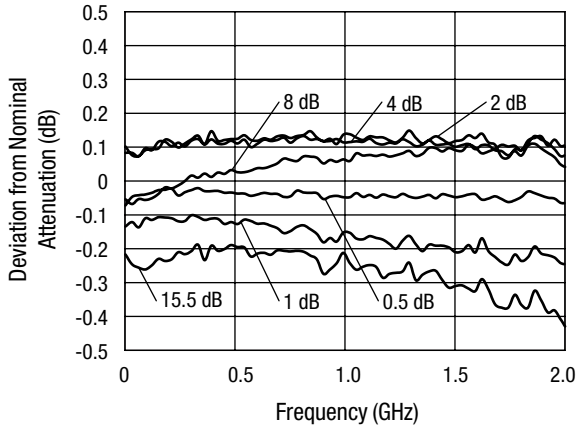
VSWR vs. Frequency (-40 ˚C)



Attenuation Accuracy vs. Frequency (25 ˚C)



Attenuation Phase Accuracy vs. Frequency (25 ˚C)



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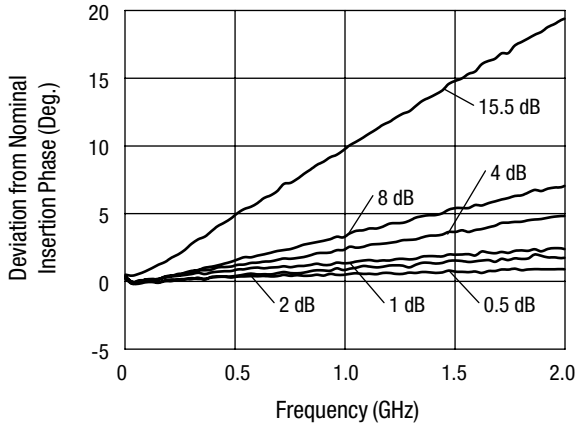

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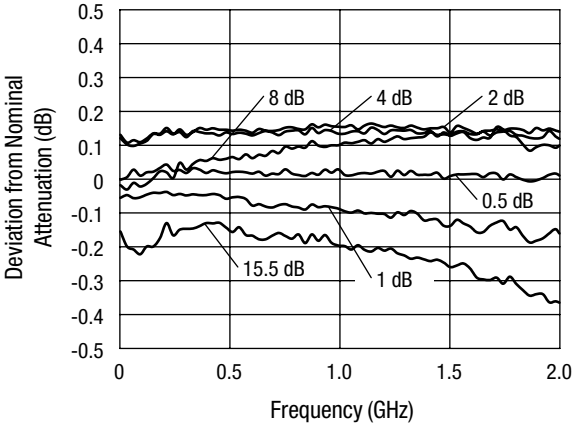
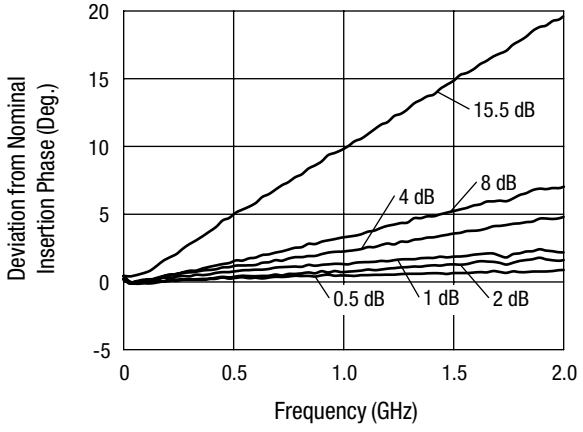
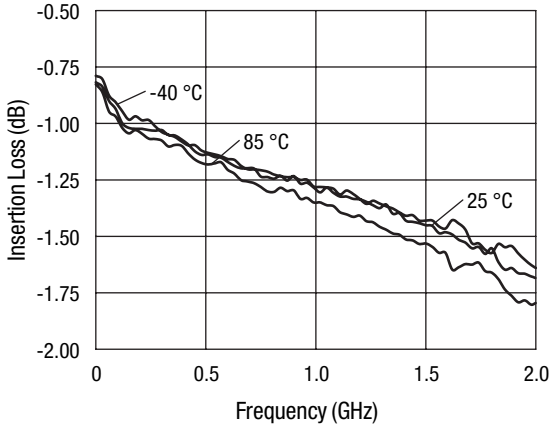


Attenuation Accuracy vs. Frequency (-40 ˚C)

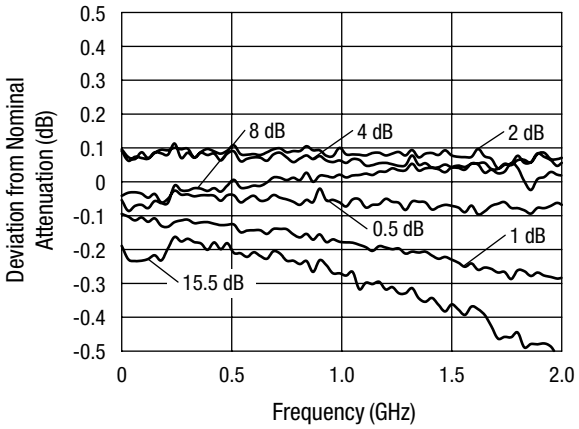


Attenuation Phase Accuracy vs. Frequency (-40 ˚C)

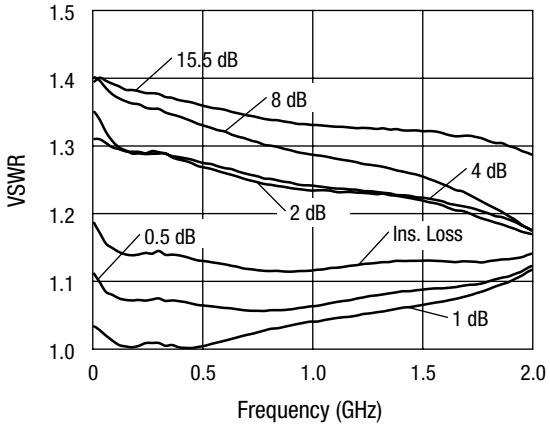
Typical Performance Data (0, -3 V)



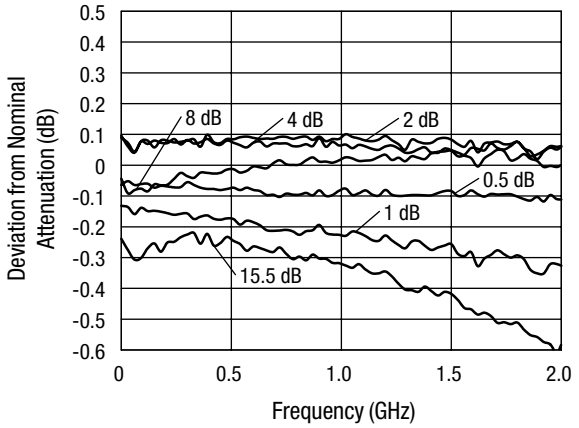
Insertion Loss vs. Frequency



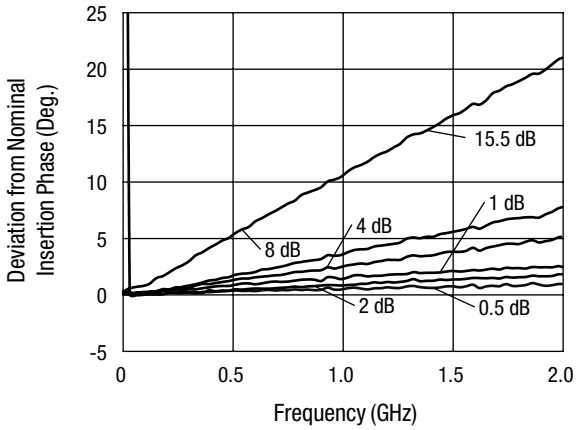
Attenuation Accuracy vs. Frequency (25 ˚C)



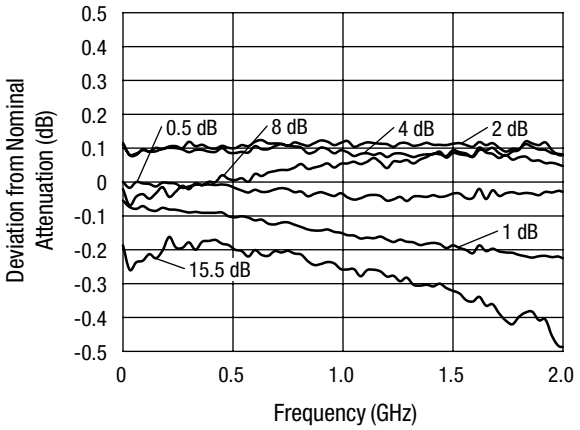
VSWR vs. Frequency (25 ˚C)



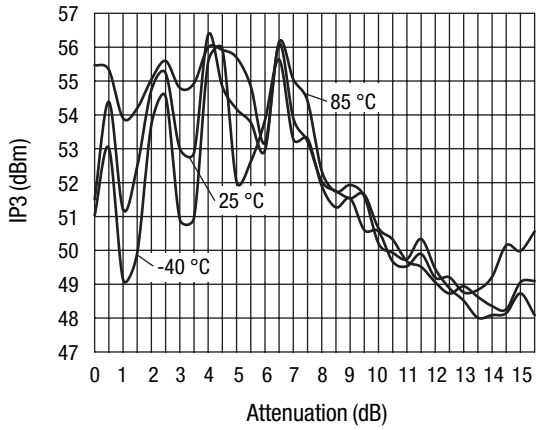
Attenuation Accuracy vs. Frequency (85 ˚C)



Attenuation Phase Accuracy vs. Frequency (25 ˚C)



Attenuation Accuracy vs. Frequency (-40 ˚C)

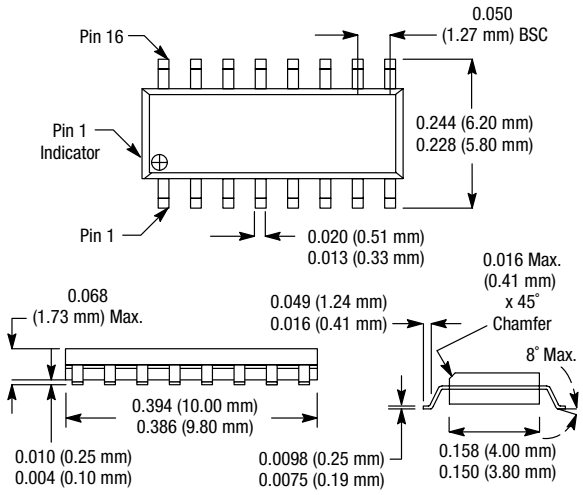


IP3 vs. Attenuation and Temperature

Truth Table

V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	Attenuation J_1–J_2
0.5 dB Bit	1 dB Bit	2 dB Bit		4 dB Bit		8 dB Bit		
-5	-5	-5	0	-5	0	-5	0	Reference I.L.
0	-5	-5	0	-5	0	-5	0	0.5 dB
-5	0	-5	0	-5	0	-5	0	1 dB
-5	-5	0	-5	-5	0	-5	0	2 dB
-5	-5	-5	0	0	-5	-5	0	4 dB
-5	-5	-5	0	-5	0	0	-5	8 dB
0	0	0	-5	0	-5	0	-5	15.5 dB max. atten.

SOIC-16



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	-3	22.7	23.3	24.2
0.5 dB	-3	23.5	24.2	25.1
1 dB	-3	24.6	25	25.9
2 dB	-3	22.9	23.4	24.3
4 dB	-3	31.6	31.8	33.1
8 dB	-3	31	28.7	26.4
15.5 dB	-3	25	24.4	25

Absolute Maximum Ratings

Characteristic	Value
RF input power	2.0 W > 500 MHz 0/-8 V 0.5 W > 50 MHz 0/-8 V
Control voltage	+0.2 V, -8 V
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

CAUTION: *Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.*

Recommended Solder Reflow Profiles

Refer to the *"Recommended Solder Reflow Profile"* Application Note.

Tape and Reel Information

Refer to the *"Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation"* Application Note.