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DATA SHEET

AA210-25, AA210-25LF: GaAs IC 4-Bit Digital Attenuator 1 dB LSB 300 kHz–2 GHz

Features

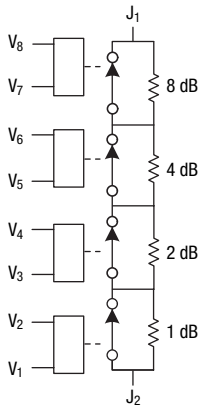
- Attenuation 1 dB steps to 15 dB with high accuracy
- Low intermodulation products
- Low-cost SOIC-16 plastic package
- Low DC power consumption
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

Description

The AA210-25 is an IC FET digital attenuator consisting of four monolithic attenuators with LSB of 1 dB and a total attenuation of 15 dB with all attenuators connected. Attenuator bits are switched with -5 and 0 V. The AA210-25 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.

Block Diagram



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

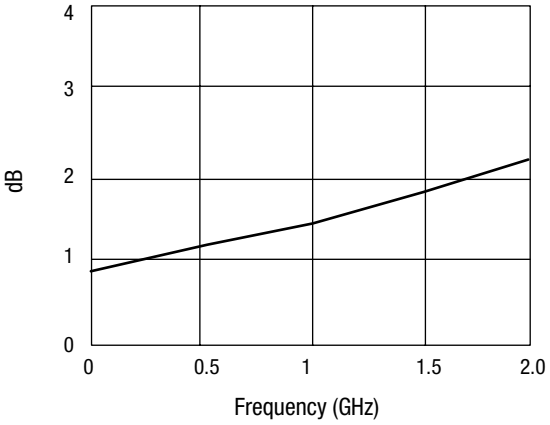
Parameter[1]	Frequency	Min.	Typ.	Max.	Unit
Insertion loss[2]	300 kHz–0.1 GHz		0.9	1.2	dB
	300 kHz–0.5 GHz		1.1	1.5	dB
	300 kHz–1.0 GHz		1.3	1.8	dB
	300 kHz–2.0 GHz		2.1	2.5	dB
Attenuation range			15		dB
Attenuation accuracy[3]	300 kHz–1.0 GHz	± (0.25 + 3% of attenuation setting in dB)			dB
	300 kHz–2.0 GHz	± (0.4 + 5% of attenuation setting in dB)			dB
VSWR (I/O)	300 kHz–1.0 GHz		1.3:1	1.4:1	
	300 kHz–2.0 GHz		1.6:1	1.8:1	

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.

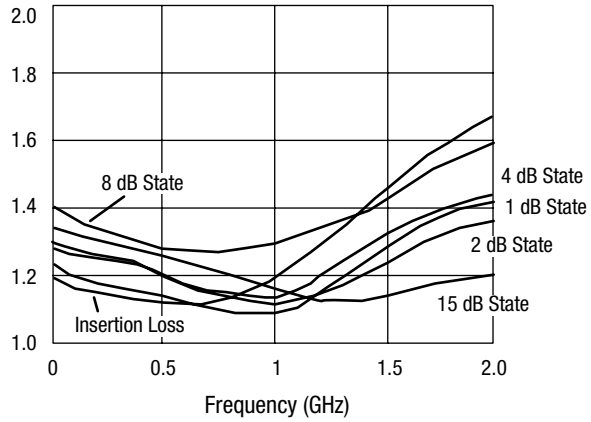
Operating Characteristics at 25 °C (0, -5 V)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			15		ns
On, off	50% CTL to 90/10% RF			25		ns
Video feedthru	T_{RISE} = 1 ns, BW = 500 MHz			25		mV
Input power for 1 dB compression		0.5–2 GHz 0.05 GHz		28 22		dBm dBm
Intermodulation lintercept point (IP3)	For two-tone input power 5 dBm	0.5–2 GHz 0.05 GHz		48 38		dBm dBm
Control voltages	V_{LOW} = 0 to -0.2 V @ 10 µA typ. V_{HIGH} = -5 @ 10 µA Typ. to -8 V @ 200 µA typ.					

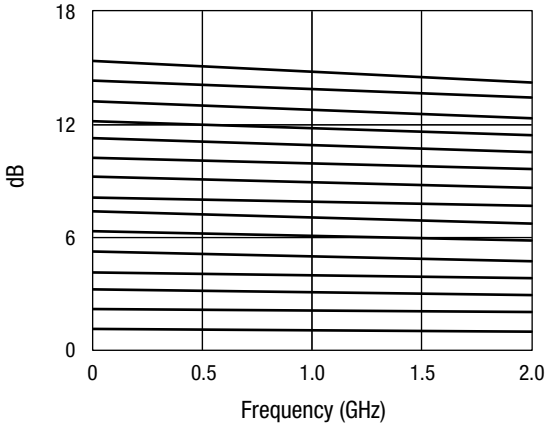
Typical Performance Data (0, -5 V)



Insertion Loss vs. Frequency

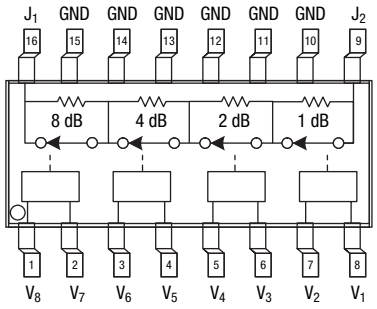


VSWR vs. Frequency



Attenuation vs. Frequency (All States)

Pin Out



Absolute Maximum Ratings

Characteristic	Value
RF input power	1.5 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.

Truth Table

V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	Attenuation J_1–J_2
1 dB		2 dB		4 dB		8 dB		
-5	0	-5	0	-5	0	-5	0	Reference I. L.
0	-5	-5	0	-5	0	-5	0	1 dB
-5	0	0	-5	-5	0	-5	0	2 dB
-5	0	-5	0	0	-5	-5	0	4 dB
-5	0	-5	0	-5	0	0	-5	8 dB
0	-5	0	-5	0	-5	0	-5	15 dB

SOIC-16