AlGaAs PIN MMIC Digital Attenuator Die, 3-Bit, Parallel Control, 1 dB LSB, 80 - 100 GHz, 7 dB Attenuation Range

MAAD-011038-DIE
Rev. V2

Features

- 3-Bit Digital Attenuator, 1 dB LSB
- 7 dB Attenuation Range
- Wide Frequency Range: 80 - 100 GHz
- Parallel Control:
  Complementary Controls (per bit)
- Attenuation Accuracy:
  +/-(0.5 + 5 % of Attenuation Setting) dB
- Die Size: 2.88 x 1.02 mm

Applications

- MMW Radios
- Automotive Radars
- Radiometry
- Passive Imaging
- SATCOM
- MMW Test Equipment
- General Purpose

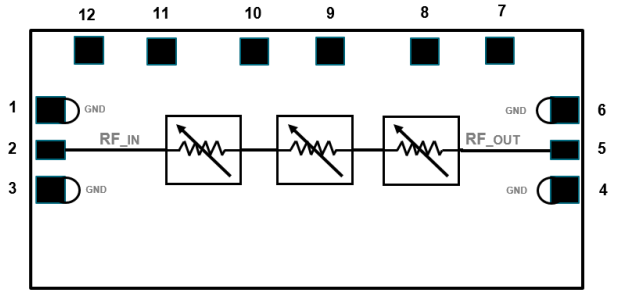
Description

The MAAD-011038-DIE is a wide band 3-bit, 1 dB step AlGaAs PIN MMIC digital attenuator covering a large frequency range from 80 to 100 GHz with excellent insertion loss and attenuation accuracy.

Ordering Information

Part Number	Package
MAAD-011038-DIE	Die in Gel Pack

Functional Schematic



Pin Configuration

Pin #	Function	Description
1, 3, 4, 6	GND	Ground[1]
2	RF IN	Input RF
5	RF OUT	Output RF
7	V4A	4 dB Control A
8	V4B	4 dB Control B
9	V2A	2 dB Control A
10	V2B	2 dB Control B
11	V1A	1 dB Control A
12	V1B	1 dB Control B

1. All GND pins are connected to the chip's back side thru substrate vias.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: Freq. = 80 - 100 GHz, T_A = 25°C, Z_0 = 50 Ω, P_{IN} = 0 dBm

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Reference Insertion Loss	—	dB	—	5	6
Attenuation Accuracy	Relative to Insertion Loss	± (0.5 + 5% of attenuation setting) dB typ.			
Return Loss	All states (worst case)	dB	—	12	—
Input P0.1dB	Reference State	dBm	—	21	—
IIP_3	2-Tone, +10 dBm/tone, 1 MHz Spacing (Reference State)	dBm	—	38	—
Control Voltage	HI @ 20 mA per BIT max. LOW @ 20 mA per BIT max.	V	— -5	1.3 —	1.7 0

Truth Table[2]

1 dB BIT		2 dB BIT		4 dB BIT		Attenuation (dB)
V1A	V1B	V2A	V2B	V4A	V4B	
0	1	0	1	0	1	Reference IL
1	0	0	1	0	1	1
0	1	1	0	0	1	2
0	1	0	1	1	0	4
1	0	1	0	1	0	7

2. "0" = 0 V, "1" = 1.3 V.

Absolute Maximum Ratings[3,4]

Parameter	Absolute Maximum
Input Power 80 - 100 GHz	29 dBm
Control Voltage	-5.5 V ≤ V_C ≤ 1.7 V @ 50 mA max.
Junction Temperature	+150°C
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

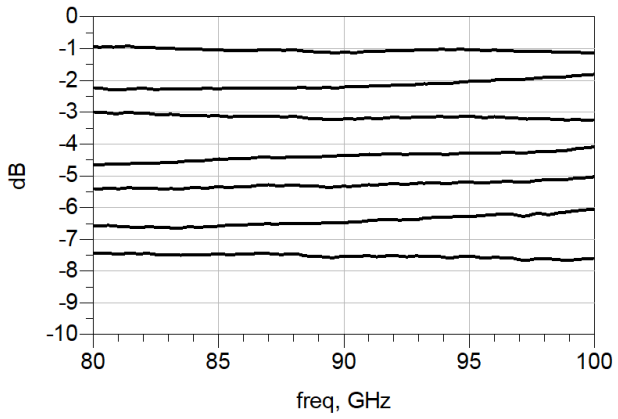
Please observe the following precautions to avoid damage:

Static Sensitivity

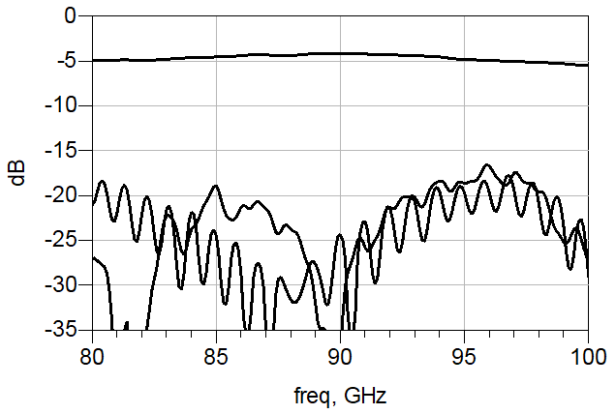
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1A devices.

Typical Performance Curves

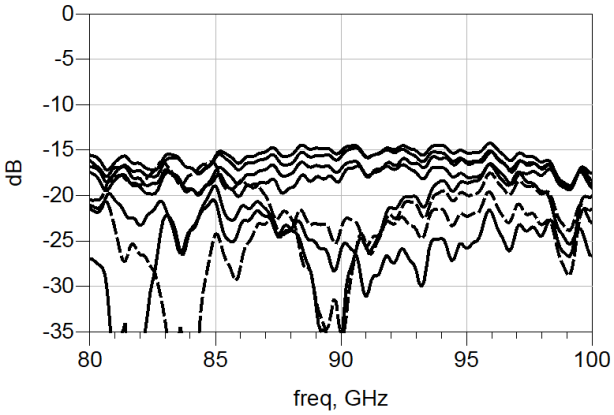
Relative Attenuation



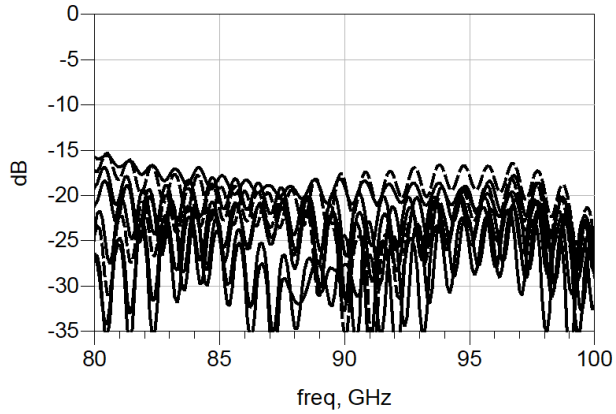
Thru S-Parameters



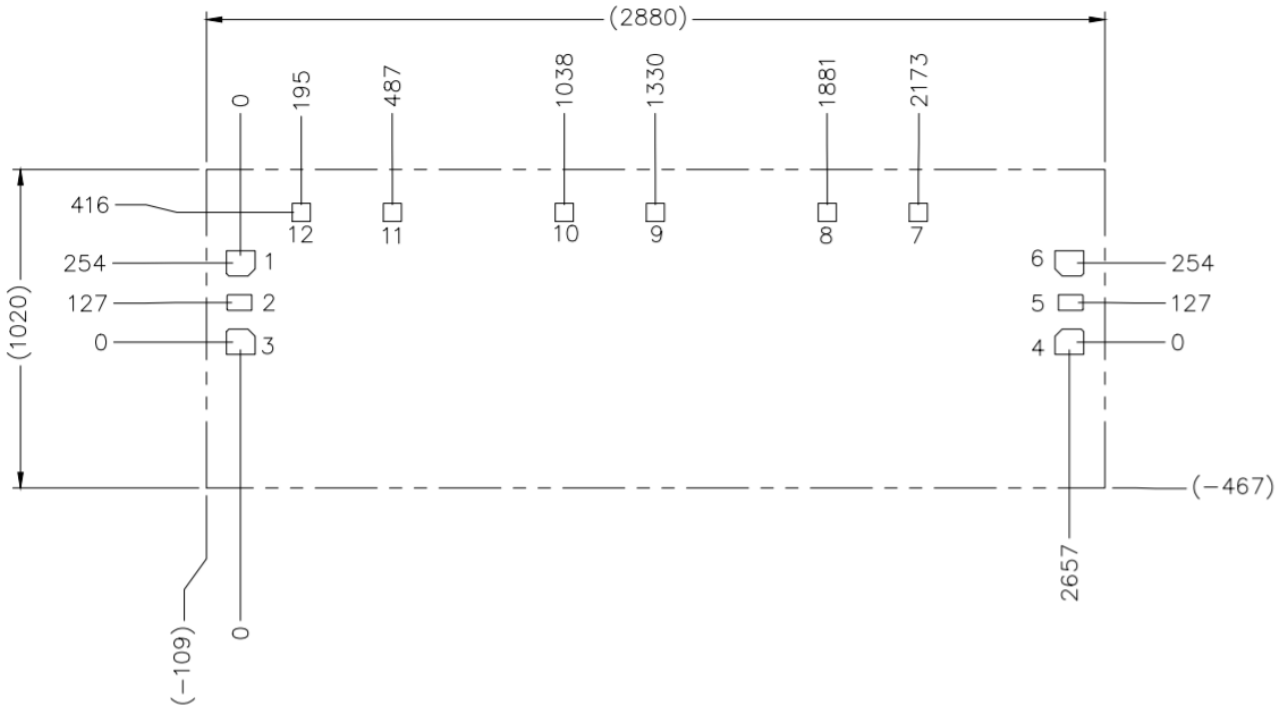
S11 (All States)



S22 (All States)



Outline Drawing



Bond Pad Dimensions (µm)

Pad	X	Y
1, 3, 4, 6	92	81
2, 5	79	50
7 - 12	58	58

Unless otherwise specified, all dimensions shown are µm with a tolerance of ±5 µm.
Die thickness is 100 µm ±10 µm.
Bond pad/backside metallization is gold.