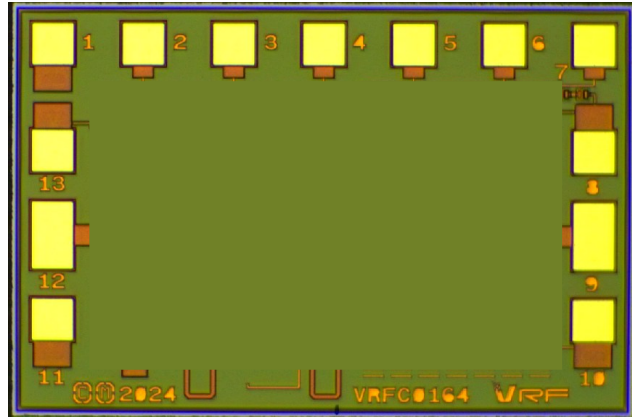


DC—12GHz GaAs MMIC Digital Control Attenuator

Advanced Product information v1

Features

- 5-Bit Digital Attenuator, 0.5 dB step
- 15.5 dB attenuation range
- Attenuation Error ≤ 1 dB
- Frequency Range: DC to 12 GHz
- Single supply +3V
- 50 Ω matched RF ports
- Die size = 1.5mm x 1.0mm



Description

The VRFC0164-BD is a GaAs digital attenuator MMIC which operates over the frequency range of 1 to 12GHz with an attenuation range of 15.5 dB. The device is set with a supply voltage of +3V.

Applications

- General Purpose
- Communications (commercial and military)
- Radars
- Cellular infrastructure

Electrical Specifications

$T=+25^{\circ}\text{C}$, $V_c = +3\text{V} / 0\text{V}$,

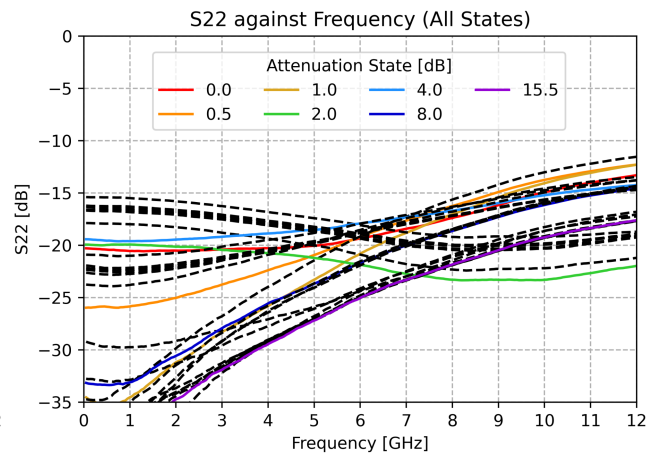
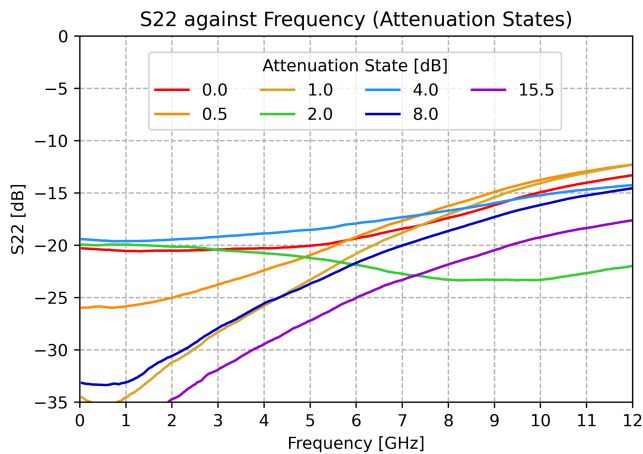
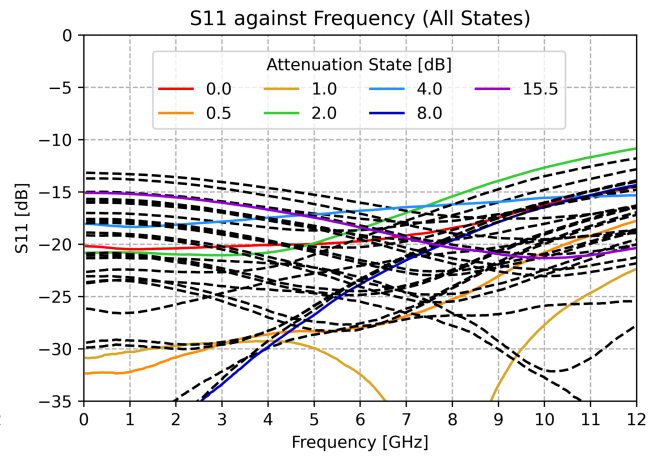
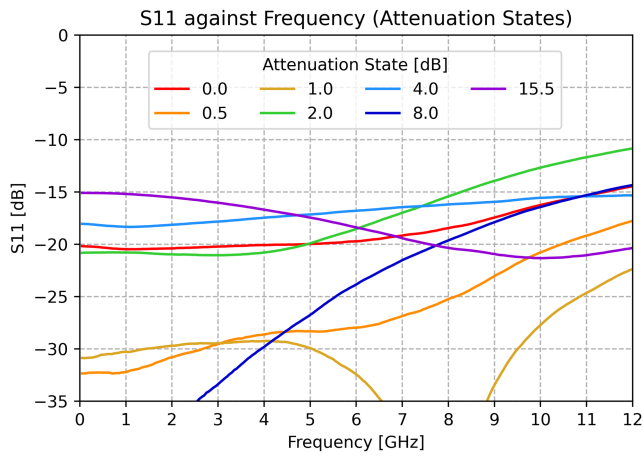
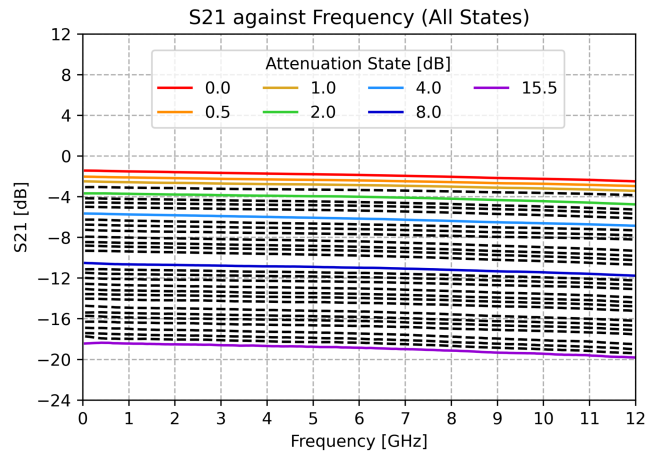
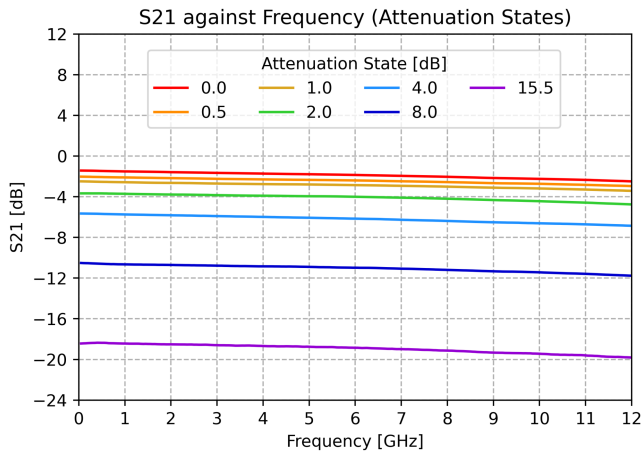
Parameter	Test Condition	Specification			Unit
		Min.	Typ.	Max.	
Frequency Bandwidth		1	-	12	GHz
Reference Insertion Loss	Small Signal	1.4	-	2.5	dB
Attenuation Error	Relative to reference state	-	-	<1.7 at 12GHz	dB
I/P Return Loss	Small Signal	>12	>15		dB
O/P Return Loss	Small Signal		>13		dB
Input P1dB		>11	>13		dBm
IIP3	-20dBm Tone power, 10MHz tone spacing		>27		dBm
Id	All States		0.4 / 3		mA

DC—12GHz GaAs MMIC Digital Control Attenuator

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Measured Performance

$T=+25^{\circ}\text{C}$, $V_C=+3\text{V}/0\text{V}$, $I_C=0.4\text{mA}$, (Reference Plane: Die including bond wires)

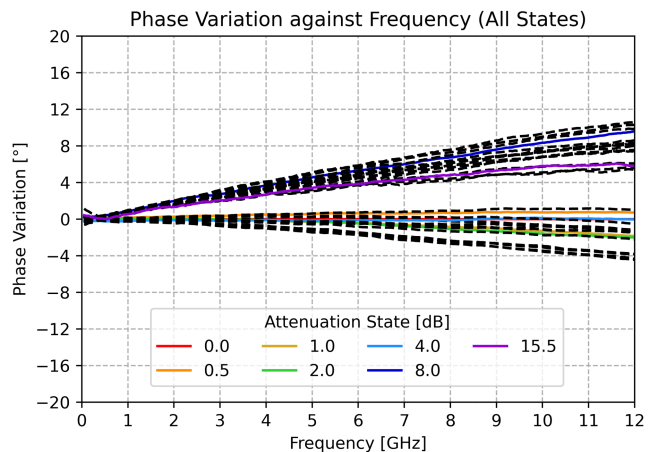
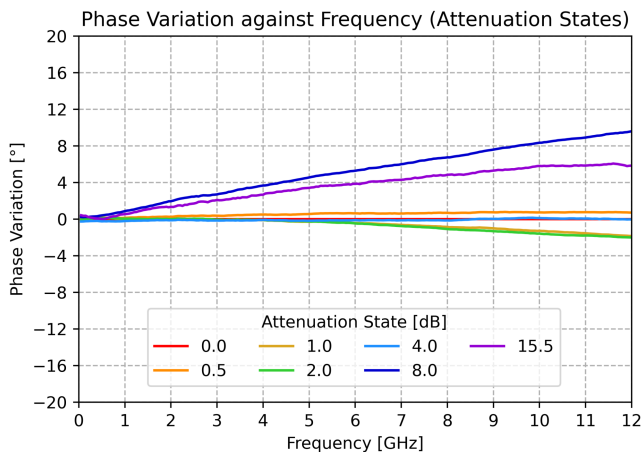
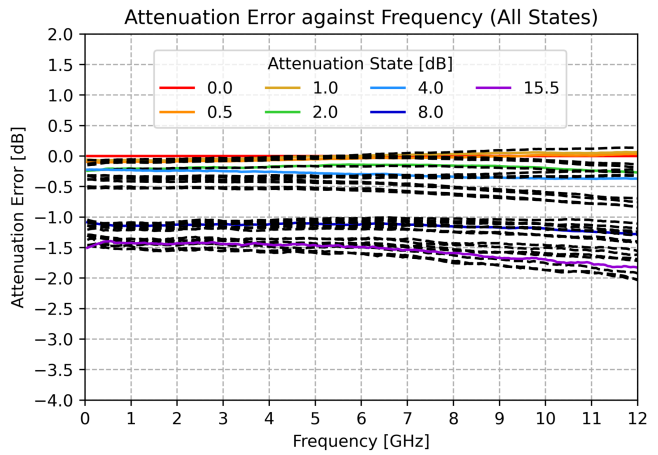
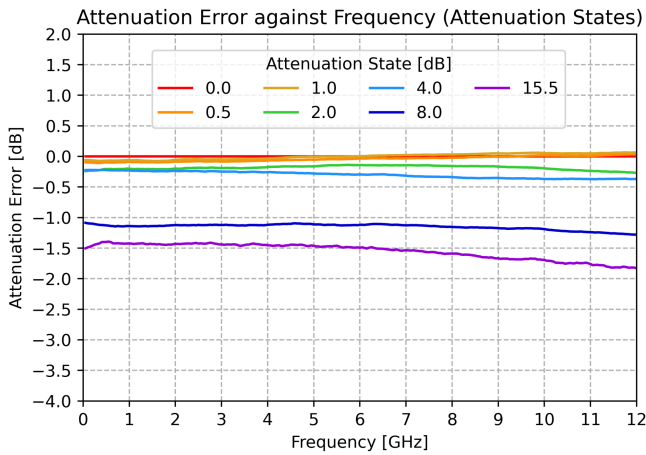
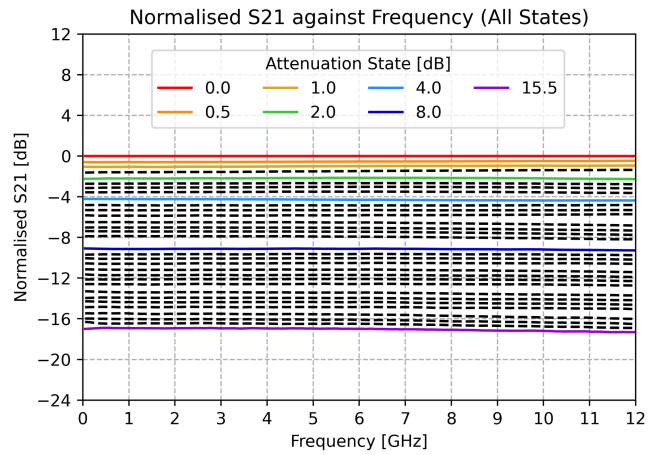
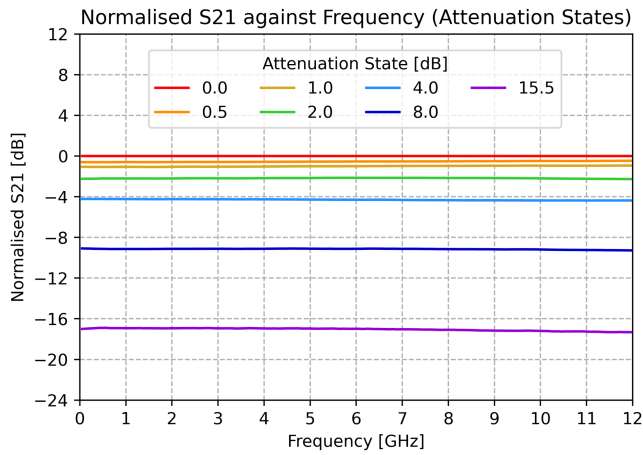


DC—12GHz GaAs MMIC Digital Control Attenuator

Advanced Product information v1

Measured Performance

$T=+25^{\circ}\text{C}$, $V_C=+3\text{V}/0\text{V}$, $I_C=0.4\text{mA}$, (Reference Plane: Die including bond wires)

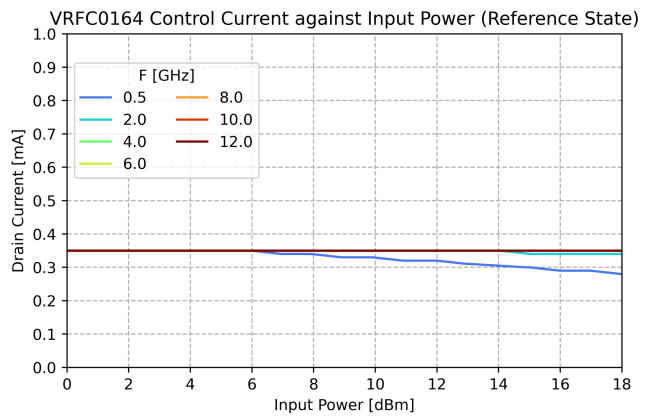
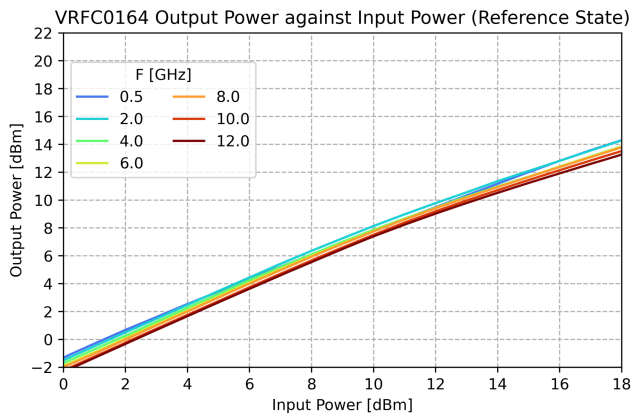
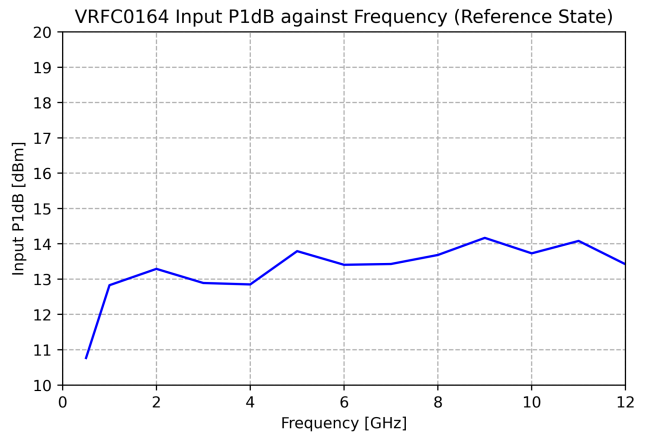
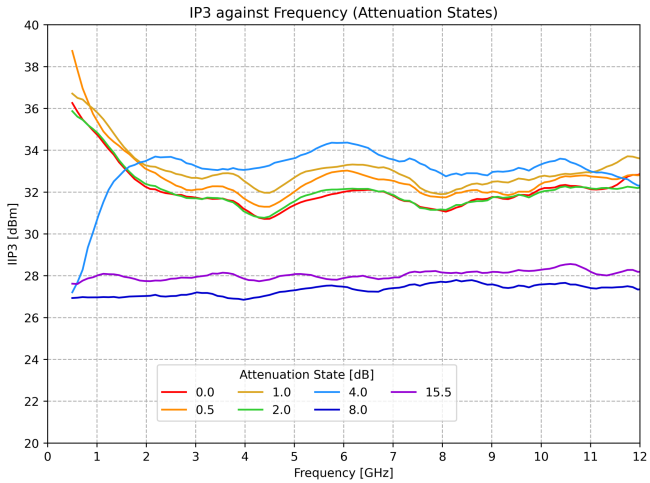


DC—12GHz GaAs MMIC Digital Control Attenuator

Advanced Product information v1

Measured Performance

$T=+25^{\circ}\text{C}$, $V_C = +3\text{V} / 0\text{V}$, $I_C = 0.4\text{mA}$, (Reference Plane: Die including bond wires)



DC—12GHz GaAs MMIC Digital Control Attenuator

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Truth Table

“1” = +3V, “0” = 0V,

Attenuation (dB)	0.5dB bit	1dB bit	2dB bit	4dB bit	8dB bit
	Pad 2	Pad 3	Pad 5	Pad 6	Pad 4
Reference State	0	0	0	0	0
0.5	1	0	0	0	0
1	0	1	0	0	0
2	0	0	1	0	0
4	0	0	0	1	0
8	0	0	0	0	1
15.5	1	1	1	1	1

Absolute Maximum Ratings ^{[1][2]}

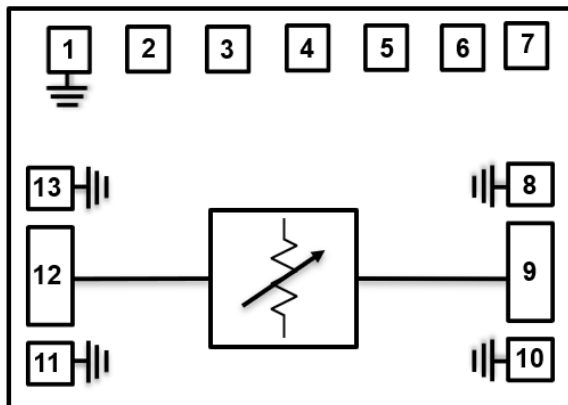
Parameter	Value
Control Voltage	+4V
Input Power	21dBm
Junction Temperature	175°C
Storage Temperature	-40 to 85°C
Storage temperature	-55 to 150°C

[1] Operation outside these conditions may cause permanent damage to the device.

[2] Combination of maximum rating conditions may reduce the values. Device performance at these ratings is not implied.

Pin Configuration

Pin #	Function	Description
1	GND	Ground
2	0.5Bit VC	0.5Bit Voltage Control
3	1Bit VC	1Bit Voltage Control
4	8Bit VC	8Bit Voltage Control
5	2Bit VC	2Bit Voltage Control
6	4Bit VC	4Bit Voltage Control
7	3V VD	3V Voltage Control
8	RF GND	RF Ground
9	RF OUT	Output RF
10	RF GND	RF Ground
11	RF GND	RF Ground
12	RF IN	Input RF
13	RF GND	RF Ground

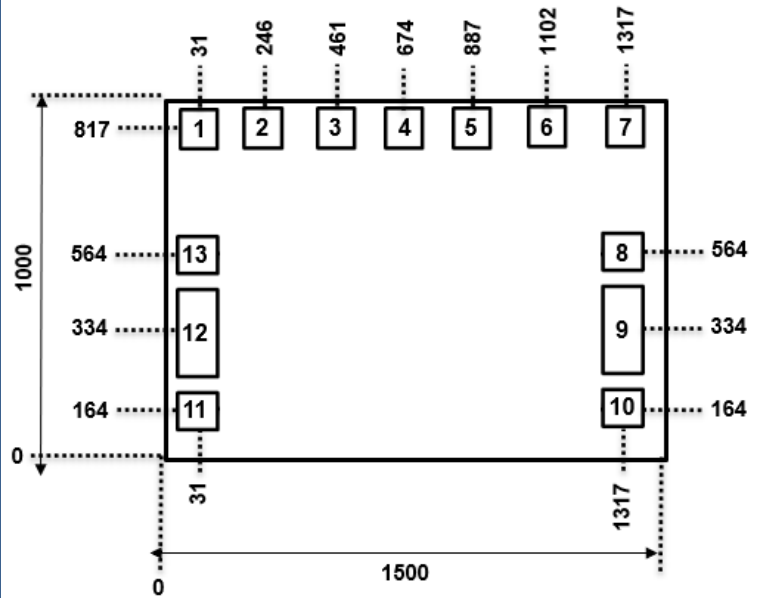


DC—12GHz GaAs MMIC Digital Control Attenuator

Advanced Product information v1

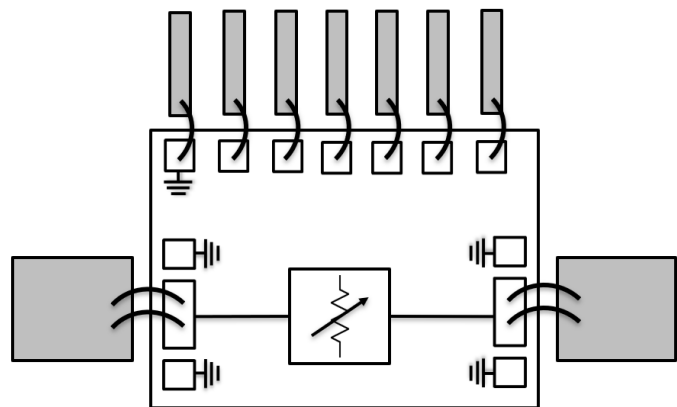
Assembly Diagram

Pad #	Location ^[3] (x,y)	
	X / um	Y / um
1	31	817
2	246	817
3	461	817
4	674	817
5	887	817
6	1102	817
7	1317	817
8	1317	564
9	1317	334
10	1317	164
11	31	164
12	31	334
13	31	564



[3] From origin to centre of pad

Parameter	Value
GND bond pad opening	100um x 100um
VCTRL bond pad opening	100um x 100um
RF bond pad opening	100um x 160um
RF bond wire length	500um
Die size	1.5mm x 1mm
Die thickness	100um



Order Information

Part Number	Package
VRFC0164	Die in Gel Pack

GaAs devices are ESD sensitive and precautions should be observed during storage, handling, assembly and testing.

