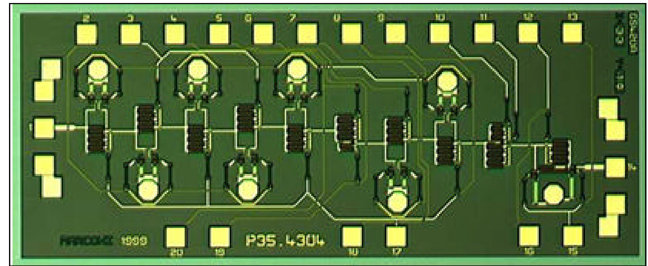
6 Bit Digital Attenuator, 0.5 - 16GHz



Features

- Broadband 0.5 - 16GHz
- Low insertion loss; 4dB typ at 8GHz
- Attenuation 0.5dB steps to 31.5dB
- Fast switching speed
- Through GaAs vias for improved performance

Description

The P35-4304-000-200 is a high performance Gallium Arsenide monolithic 6 bit digital attenuator offering an attenuation range of 31.5dB in 0.5dB steps. It is suitable for use in broadband communications, instrumentation and electronic warfare applications. The attenuator is controlled by the application of complimentary 0V/-5V or 0/-8V signals to the control lines in accordance with the truth table below. The full attenuation range is achieved by modifying the control lines in combination.

The die is fabricated using MOC's 0.5µm gate length MESFET process (S20). It is fully protected using Silicon Nitride passivation for excellent performance and reliability.

Electrical Performance

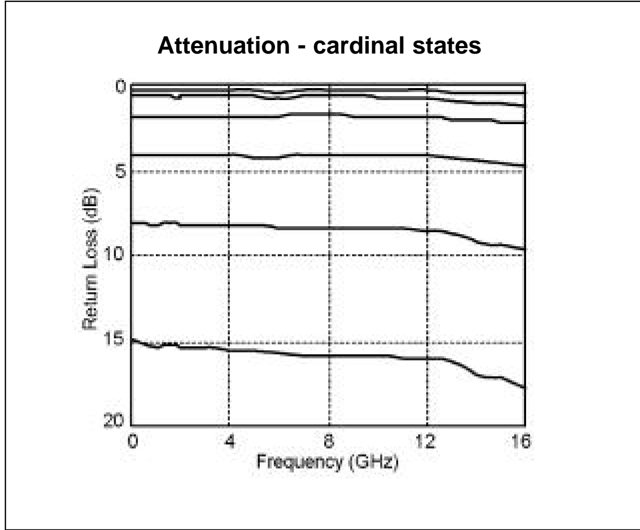
Ambient temperature = 22±3°C , Z_O = 50Ω, Control voltages = 0V/-5V unless otherwise stated

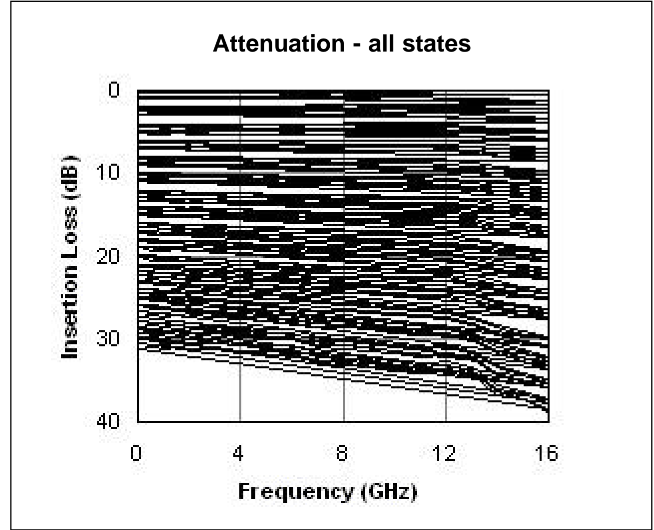
Parameter	Conditions	Min	Typ	Max	Units
Insertion Loss[1]	0.5 - 8GHz	-	4	5	dB
(reference state)	8GHz - 16GHz	-	5	6	dB
Attenuation Range	0.5 - 16GHz	-	31.5	-	dB
Step Size	0.5 - 16GHz	-	0.5	-	dB
Attenuation Accuracy	0.5 - 8GHz	-	-	±0.3 ±3%	dB
	8 - 12GHz	-	-	±0.5 ±10%	dB
	12 - 16GHz	-	-	±0.5 ±15%	dB
Input Return Loss	0.5 - 16GHz	10	20	-	dB
Output Return Loss	0.5 - 16GHz	10	20	-	dB
Input Power @ P-1dB Point	0.5 - 16GHz	-	18	-	dBm
Switching Speed	50% Control to 10%90%RF	-	5	10	nS

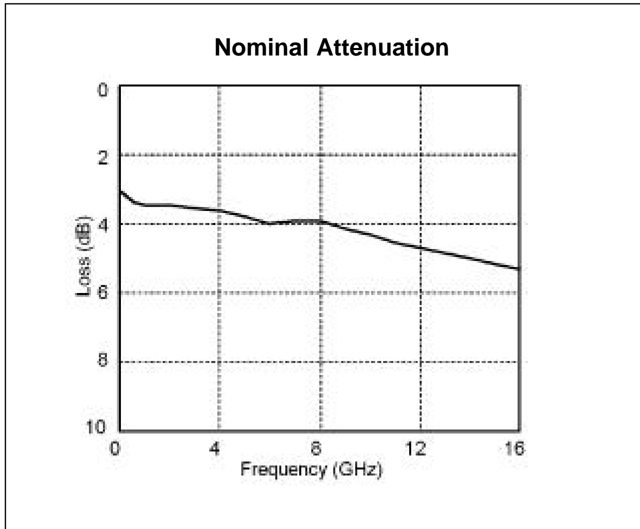
Notes

Insertion Loss measured in low loss state.

Typical Performance at 22°C



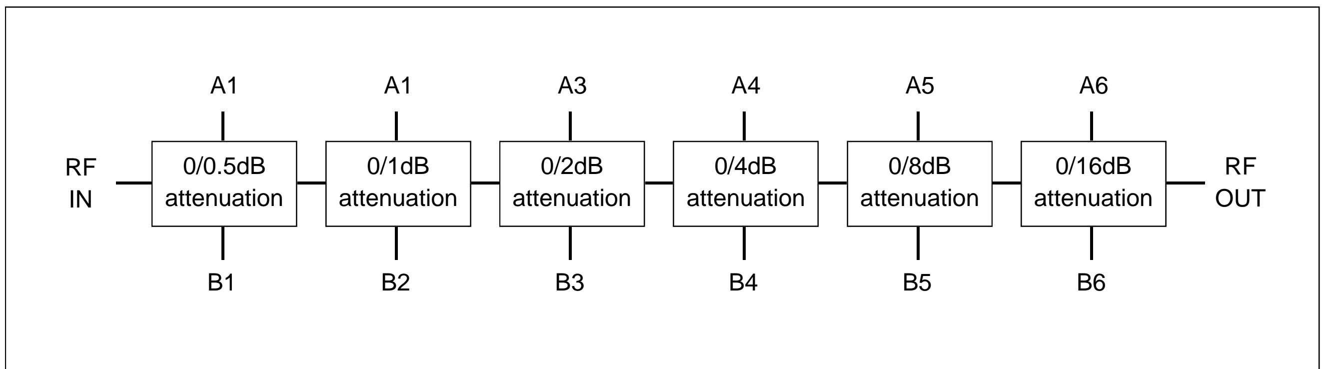




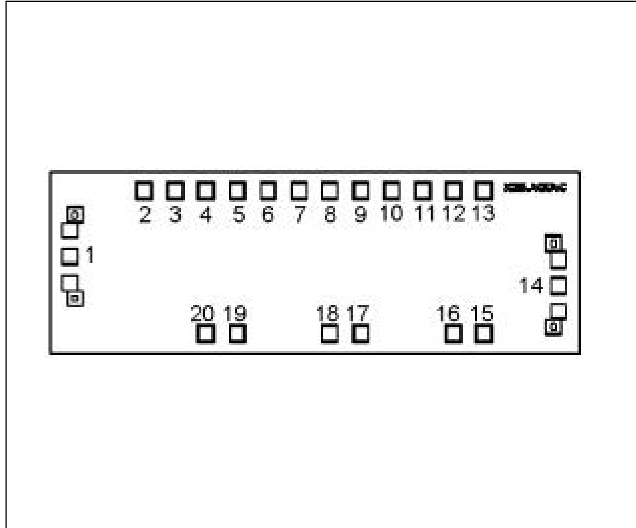
Absolute Maximum Ratings

Max control voltage	-8V
Max I/P power	+25 dBm
Operating temperature	-60°C to +125°C
Storage temperature	-65°C to +150°C

Attenuator Schematic



Chip Outline



Die size:	3.45 x 1.42mm
Bond pad size	120µm x 120µm
Die thickness:	200µm

Pad Details

Pad	Function
1	RF Input
2	B5
3	A5
4	A2*
5	B2*
6	A4
7	B4
8	B6*
9	A6*
10	B1
11	A1
12	A3*
13	B3*
14	RF Output
15	B3*
16	A3*
17	A6*
18	B6*
19	B2*
20	A2*

* Note option of alternative bond pads on opposite side of die

Switching Truth Table

Control Line												Attenuation
0.5dB bit		1dB bit		2dB bit		4dB bit		8dB bit		16dB bit		
A1	B1	A2	B2	A3	B3	A4	B4	A5	B5	A6	B6	
0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	Reference
-5V	0V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	+0.5dB
0V	-5V	-5V	0V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	+1dB
0V	-5V	0V	-5V	-5V	0V	0V	-5V	0V	-5V	0V	-5V	+2dB
0V	-5V	0V	-5V	0V	-5V	-5V	0V	0V	-5V	0V	-5V	+4dB
0V	-5V	0V	-5V	0V	-5V	0V	-5V	-5V	0V	0V	-5V	+8dB
0V	-5V	0V	-5V	0V	-5V	0V	-5V	0V	-5V	-5V	0V	+16dB

Handling, Mounting and Bonding Instructions

The back of the die is gold metallized and can be die-attached manually onto gold, eutectically with Au-Sn (80:20) or with low temperature conductive epoxy. The maximum allowable die temperature is 310°C for 2 minutes. Bonds should be made onto the exposed gold pads with 17 or 25 microns pure gold or half-hard gold wire. Bonding should be achieved with the die face at 225°C to 275°C with a heated thermosonic wedge (approx. 125°C) and a maximum force of 60 grams. Ball bonds may be used but care must be taken to ensure the ball size is compatible with the bonding pads shown. The length of the bond wires should be minimised to reduce parasitic inductance, particularly those to the RF and ground pads.

Ordering Information: P35-4304-000-200

462/SM/02427/200 Issue 1/1

The data and product specifications are subject to change without notice. These devices should not be used for device qualification and production without prior notice.

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