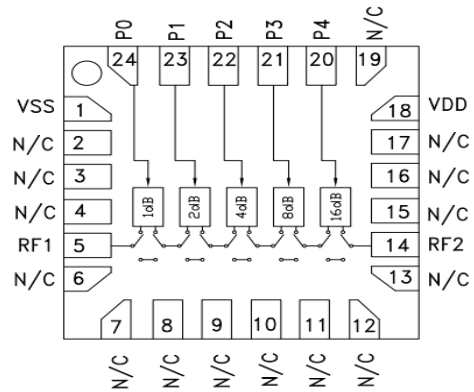


Functional Diagram



Performance features :

- Operating frequency: 0.1GHz~34GHz
- Insertion loss: 4.5dB
- Attenuation range: 1~31dB
- Input return loss: 10dB
- Output return loss: 12dB
- Package size: 4X4mm ,QFN-24

Product Description :

The CW939bSP4 is a GaAs MMIC wideband 5-bit CNC attenuator with operating frequency coverage from 0.1 to 34 GHz, insertion loss typical value of 4.5 dB, its basic attenuation bits are 1 dB, 2 dB, 4 dB, 8 dB, 16 dB and total attenuation is 31 dB. This CNC attenuator is controlled by 0/+5V logic and has no power consumption. With excellent attenuation characteristics and port standing wave characteristics over the entire operating frequency range, it is ideally suited for applications in microwave hybrid ICs and multi-chip modules as well as low-power systems.

Electrical parameters : ($T_A=25^{\circ}\text{C}$, 0V/+5V Control)

Indicators	Minimum value	Typical values	Maximum value	Unit
Frequency range	0.1~34			GHz
Attenuation range	1~31			dB
Insertion loss	-	4.5	5	dB
Switching times	-	30	-	ns
Input return loss	10			dB
Output return loss	12			dB

Control truth table : (VSS=-5V , Control bit voltage 0/+5V)

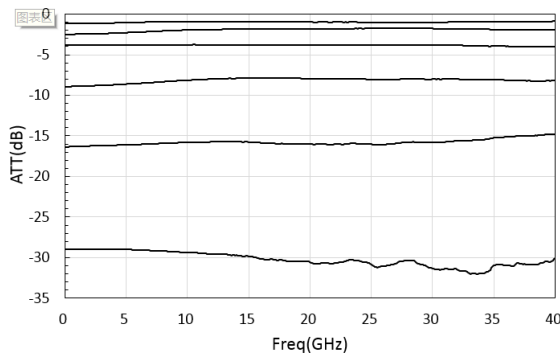
Control status					Decay state
P4 16dB	P3 8dB	P2 4dB	P1 2dB	P0 1dB	
+5	+5	+5	+5	+5	Reference state
+5	+5	+5	+5	0	1dB
+5	+5	+5	0	+5	2dB
+5	+5	0	+5	+5	4dB
+5	0	+5	+5	+5	8dB
0	+5	+5	+5	+5	16dB
0	0	0	0	0	31dB

Use of restriction parameters :

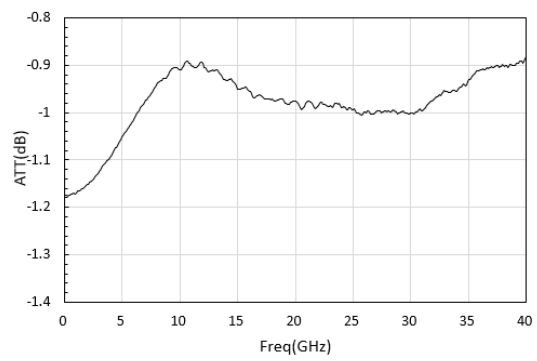
Maximum power	27dBm
Storage temperature	-65°C~150°C
Operating temperature	-55°C~85°C

Typical curves : (TA=+25°C)

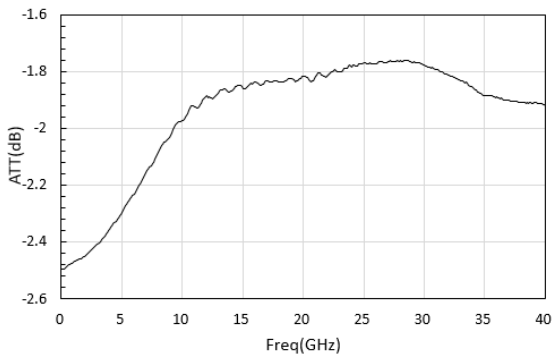
Basic decay state



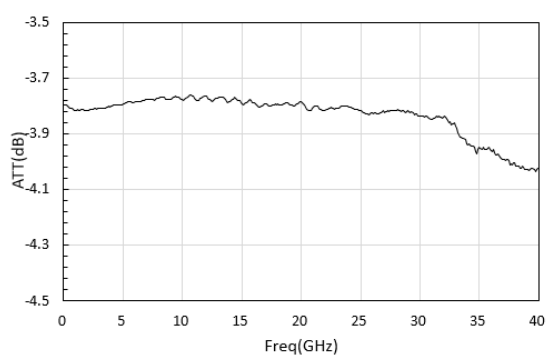
1dB attenuation state



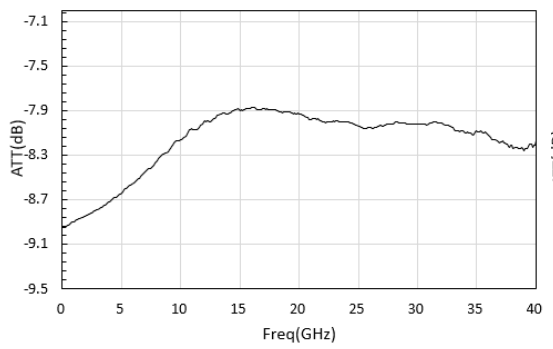
2dB attenuation state



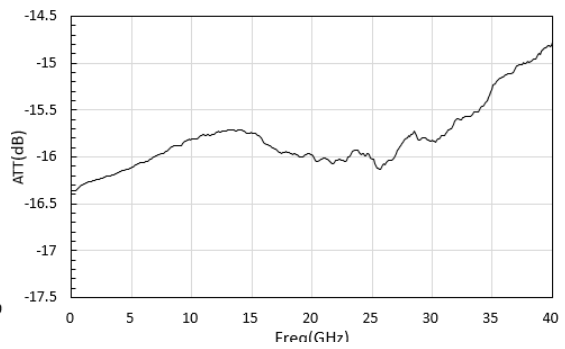
4dB attenuation state



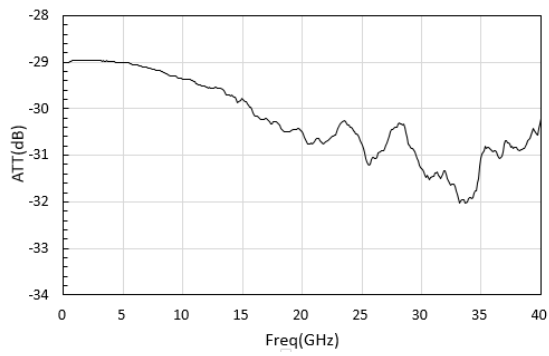
8dB attenuation state



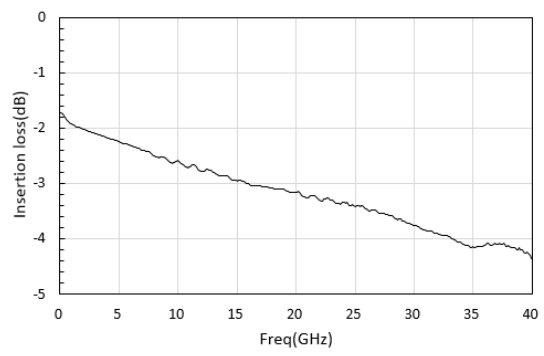
16dB attenuation state



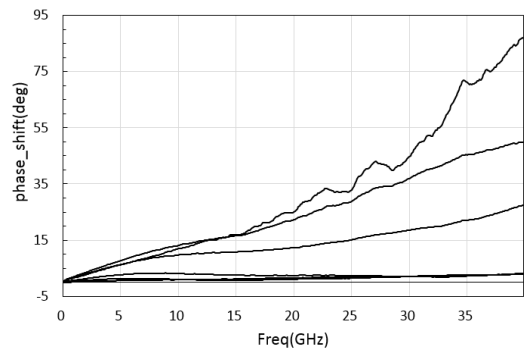
31dB attenuation state



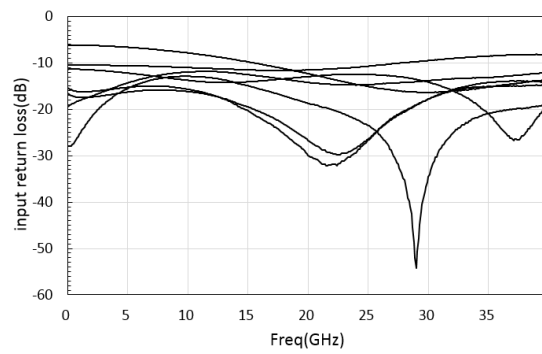
Insertion loss



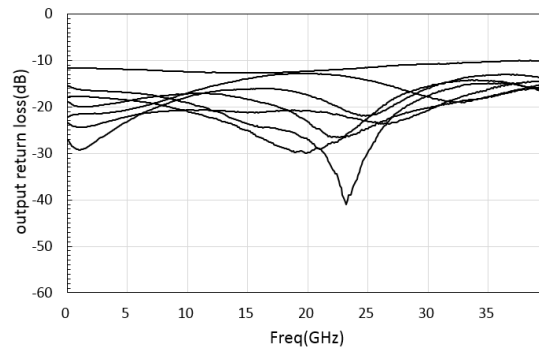
Attenuation of additional phase shift



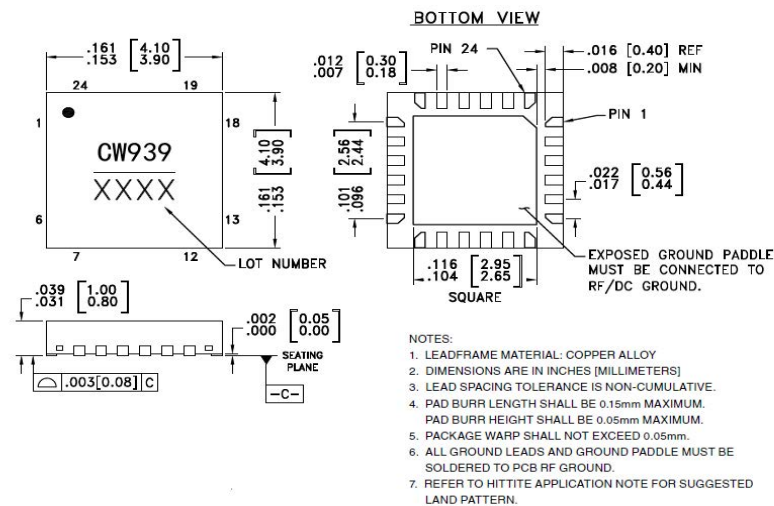
Input return loss



Output return loss



Dimensional drawings : (Unit mm)



Truth Table

Control Voltage Input					Attenuation State RF1 - RF2
P4 16 dB	P3 8 dB	P2 4 dB	P1 2 dB	P0 1 dB	
High	High	High	High	High	Reference I.L.
High	High	High	High	Low	1 dB
High	High	High	Low	High	2 dB
High	High	Low	High	High	4 dB
High	Low	High	High	High	8 dB
Low	High	High	High	High	16 dB
Low	Low	Low	Low	Low	31 dB

Any Combination of the above states will provide an attenuation approximately equal to the sum of the bits selected.

Pin Descriptions

Pad Number	Function	Description	Interface Schematic
1	Vss	Negative Bias -5V	
2-4, 6-13, 15-17, 19	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
5, 14	RF1, RF2	These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V.	
18	Vdd	Positive Bias +5V	
20 - 24	P0 - P4	See truth table and control voltage table.	
	GND	Package bottom must be connected to RF/DC ground.	

Application Circuit

