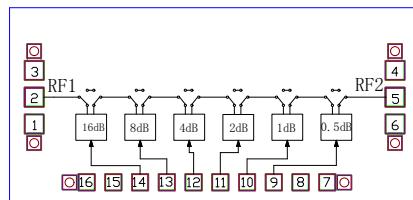


Features

- Freq: DC-40.0GHz
- Insertion Loss: 4.0dB
- Attenuation Range: 0.5~31.5dB
- RMS: 0.8dB
- RF1/RF2 Stationary Wave: 1.4/1.4
- 50Ω Input/Output
- Die Size: 2.3×1.1×0.1mm³

Functional Diagram



Generation Description

The MC14944 is a 6-bit, digital step attenuator working at DC-40.0GHz with a typical insertion loss of 4.0dB. The logic

control is 0V/+3.3V. A single Vcc bias of -5V is required. The Typical bias current is 6mA and the switch speed is less than 50ns.

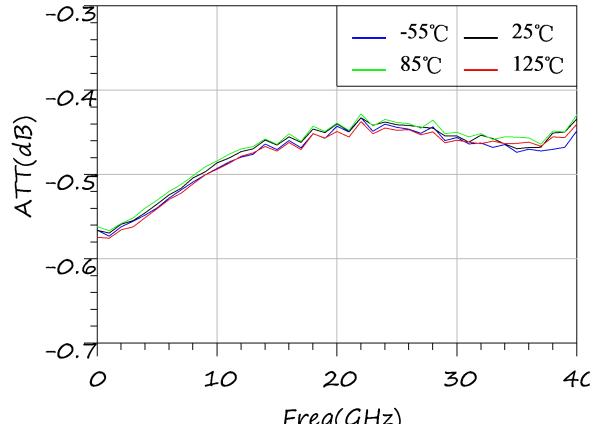
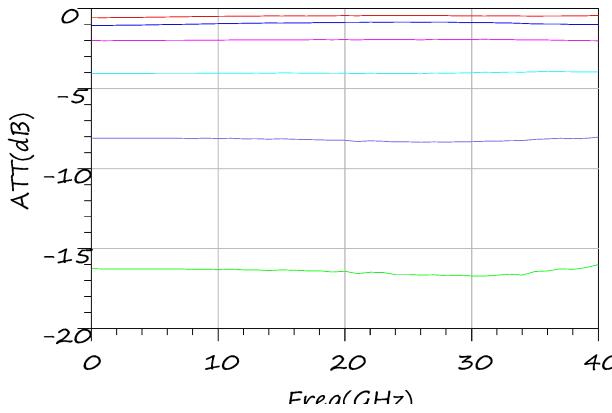
The chip applies the on-chip metallization through-hole technology thus no need for additional grounding measures which makes it very easy and convenient to use; the backside of the chip is metallized, suitable for conductive adhesive bonding or eutectic mounting process..

Electrical Specification (T_A=+25°C, 50Ω system, 0V/+3.3V Control (0V/+5VControl Compatible))

Parameter	Function	Min.	Typ.	Max.	Units
Frequency Range	Freq	DC	-	40.0	GHz
Insertion Loss	IL	-	4.0	-	dB
Attenuation Range	ΔIL	0.5~31.5			
Attenuation	0.5	-	-	0.5	dB
	1.0	-	-	1.0	dB
	2.0	-	-	2.0	dB
	4.0	-	-	4.0	dB
	8.0	-	-	8.0	dB
	16.0	-	-	16.5	dB
RMS	-	-	0.8	-	dB
RF1 Stationary Wave	VSWR	-	1.4	-	-
RF2 Stationary Wave	VSWR	-	1.4	-	-

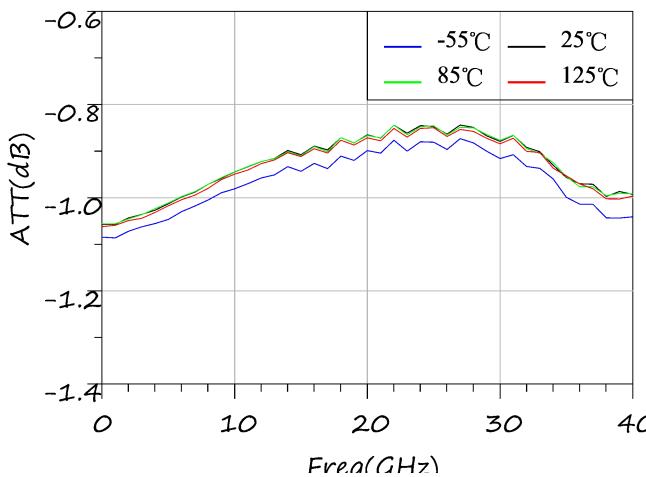
[1] The chips are 100% DC and RF tested.

Typical Testing Characteristics

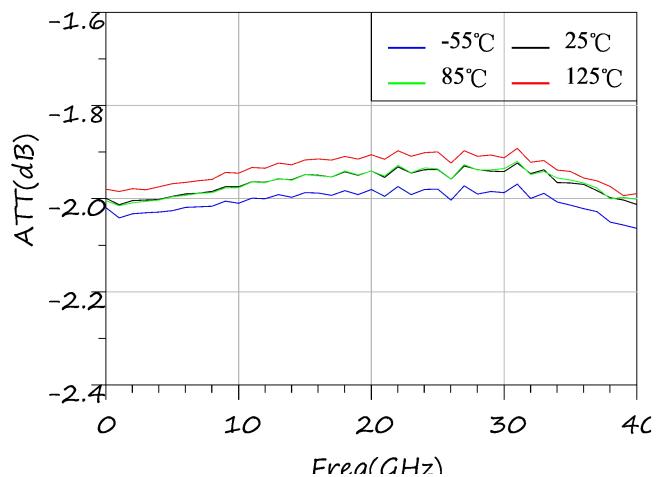


Normalized Attenuation vs. Frequency over Major Attenuation States

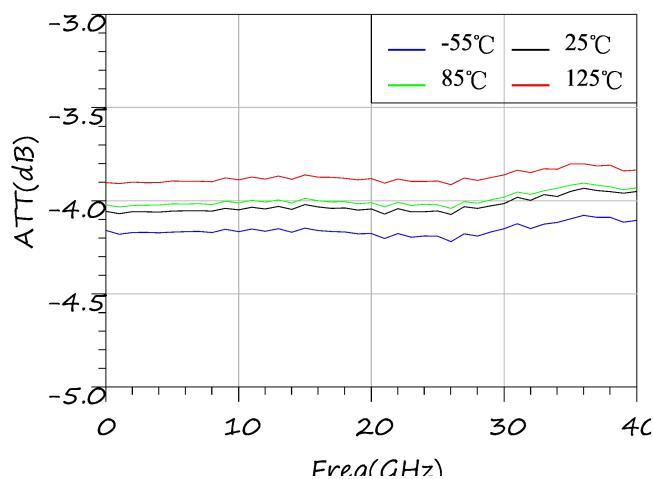
0.5dB Attenuation State vs Frequency



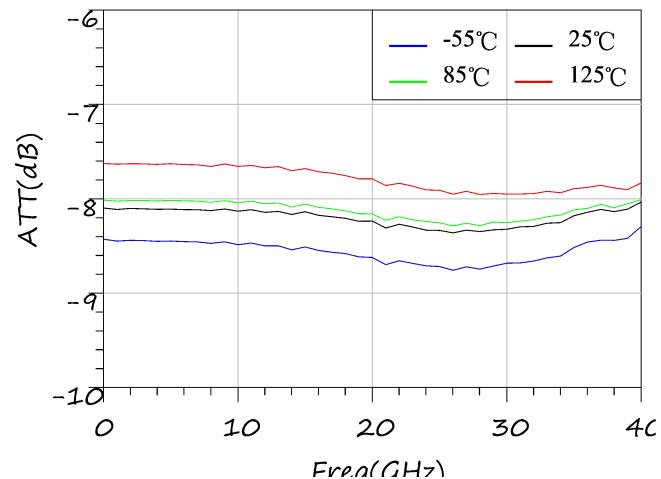
1dB Attenuation State vs Frequency



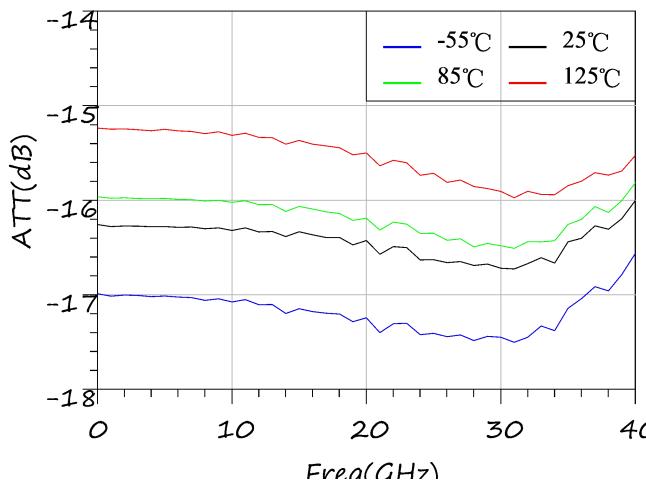
2dB Attenuation State vs Frequency



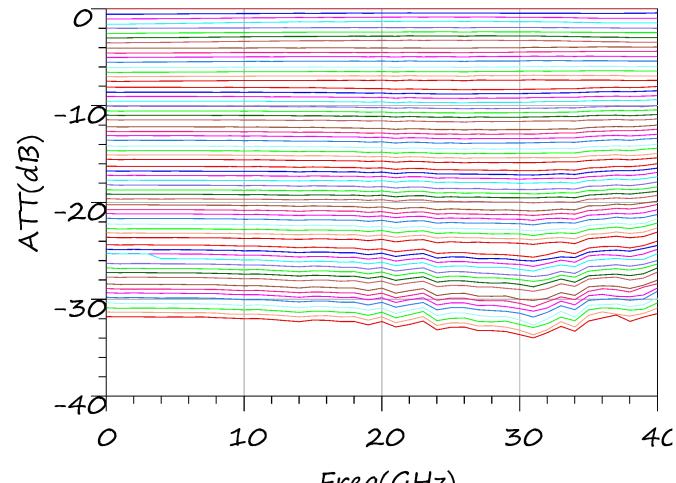
4dB Attenuation State vs Frequency



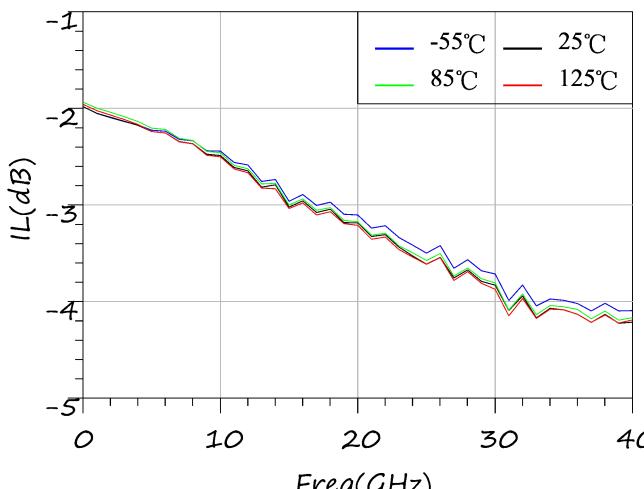
8dB Attenuation State vs Frequency



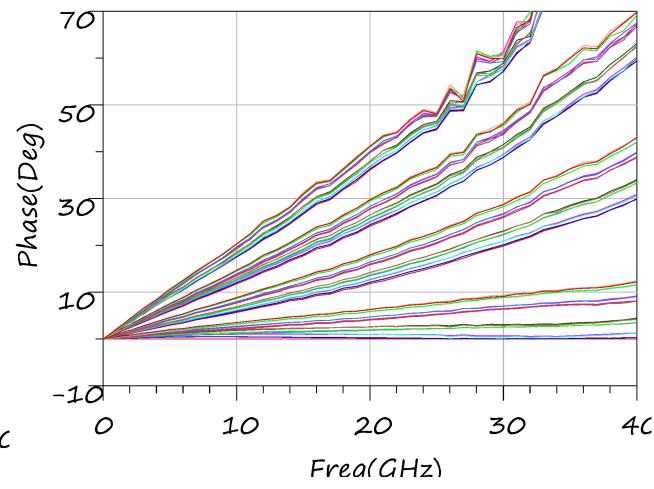
16dB Attenuation State vs Frequency



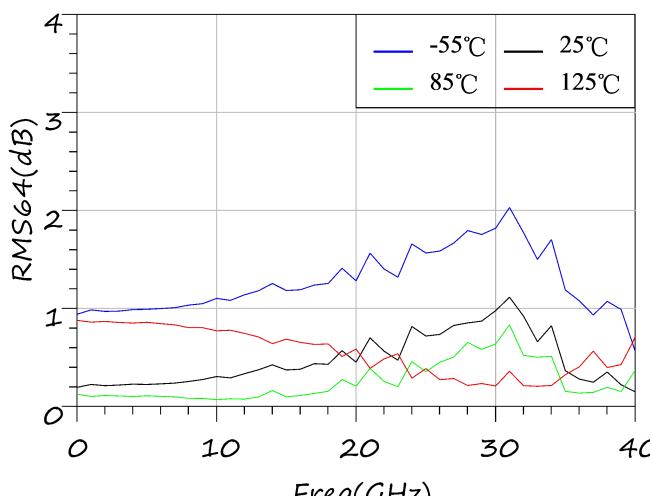
ALL Attenuation State vs Frequency



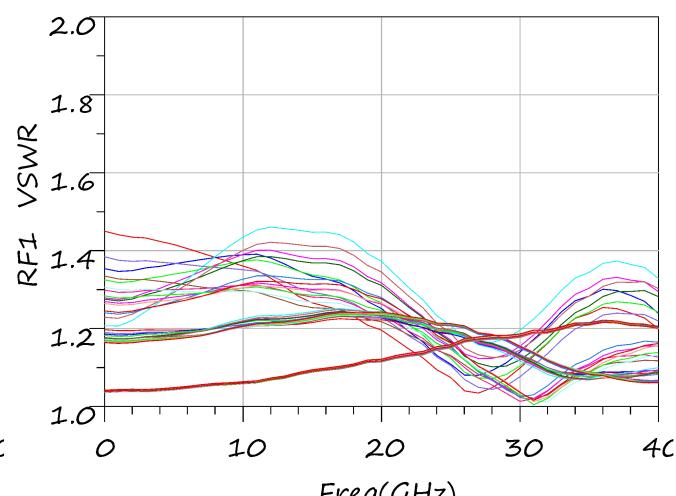
Insertion Loss vs Frequency



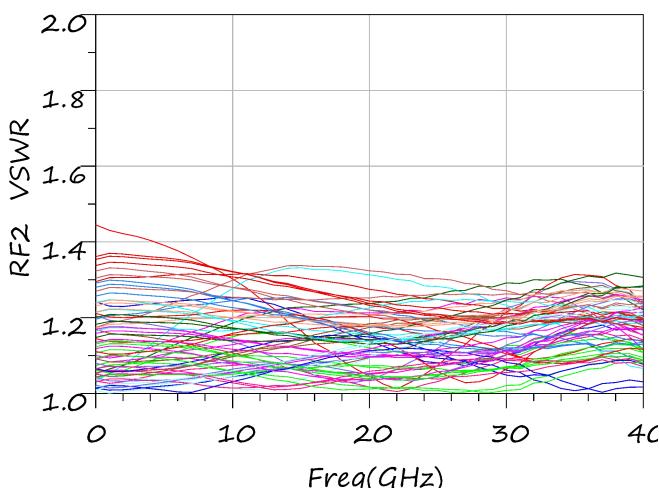
Relative Phase Shift vs Frequency



Attenuation Accuracy vs Frequency



RF1 Stationary Wave vs Frequency



RF2 Stationary Wave vs Frequency

Absolute Maximum Ratings

Parameter Limits	Value
Input Power, 50Ω	23dBm
Digital Control Input Voltage	0V~+5V
Storage Temperature Range	-65~+150°C
Operating Temperature Range	-55~+125°C
Mounting Temperature (30s, N ₂ protection)	300°C
Exceeding the above conditions may cause permanent damage to the chip.	



This product is ESD(Electrostatic discharge) sensitive. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

- Assembling in a clean environment
- Avoiding rapid temperature changes during the mounting process
- Do not touch the surface or use dry and wet chemical methods to clean the surface
- Using 2 bonding wires (shaped as figure \(\wedge\)) for input and output, the bonding wires should be as short as possible
- Storing in a dry, nitrogen environment

Pad Descriptions

Pad Number	Function	Description	Interface Schematic
2	RF1	RF signal input/Output, 50Ω matched, Without blocking capacitor inside	
5	RF2	RF signal input/Output, 50Ω matched, Without blocking capacitor inside	
8, 15	VEE	Bias voltage terminal, External-5V. The two VEEs are connected internally, therefore connecting any one of them when using	
9~14	IN	DC control signal, external 0V/+3.3V voltage	
1, 3, 4, 6, 7, 16	GND	Grounding Pad for probe test	
Die Bottom	GND	Die bottom must be connected to RF/DC ground	

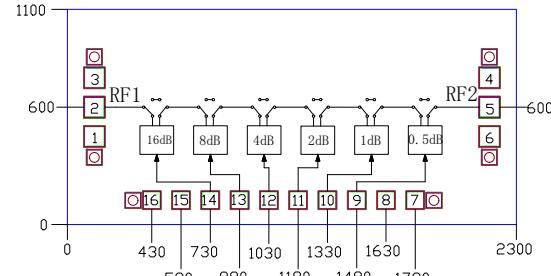
Control Voltage Range

Typ.	Control Voltage Range
0V	0V~+0.5V
+3.3V	+3V~+5V

Truth Table

Bias Voltage	Control Input						Status
	VEE	IN1	IN2	IN3	IN4	IN5	
-5V	0V	0V	0V	0V	0V	0V	Reference
-5V	0V	0V	0V	0V	0V	3.3V	0.5dB
-5V	0V	0V	0V	0V	3.3V	0V	1dB
-5V	0V	0V	0V	3.3V	0V	0V	2dB
-5V	0V	0V	3.3V	0V	0V	0V	4dB
-5V	0V	3.3V	0V	0V	0V	0V	8dB
-5V	3.3V	0V	0V	0V	0V	0V	16dB

Outline Drawing



Notes:

1. Units: μm
2. Back side metallization: Gold
3. Back side metal is ground
4. Bonding Pad size: $100\mu\text{m}$
5. Outline Dimensional Tolerance: $\pm 50\mu\text{m}$

Assembly Drawing

