Features

·Freq: DC-18.0GHz

·Insertion Loss: 5.0dB

·Attenuation Range: 0.5~31.5dB

·Relative Phase Shift:±2°

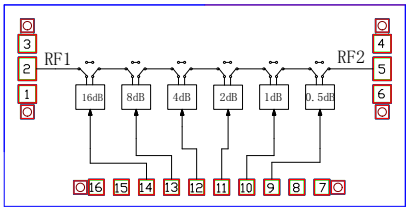
·RMS：0.2dB

·RF1/RF2 Stationary Wave：1.7/1.7

·50Ω Input/Output

·Die Size: 2.4×1.2×0.1mm^3

Functional Diagram



Generation Description

The MC14022 is a 6-bit, digital step attenuator working at DC-18.0GHz with a typical insertion loss of 5.0dB and the additional phase shift is less than ±2°. The logic control is 0V/+3.3V. A single Vcc bias of -5V is required. The Typical bias current is 7mA and the switch speed is less than 50ns.

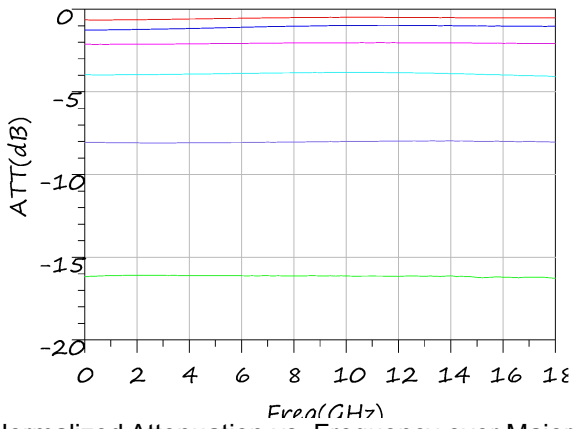
The chip applies the on-chip metallization through-hole technology thus no need for additional grounding measures which makes it very easy and convenient to use; the backside of the chip is metallized, suitable for conductive adhesive bonding or eutectic mounting process.

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

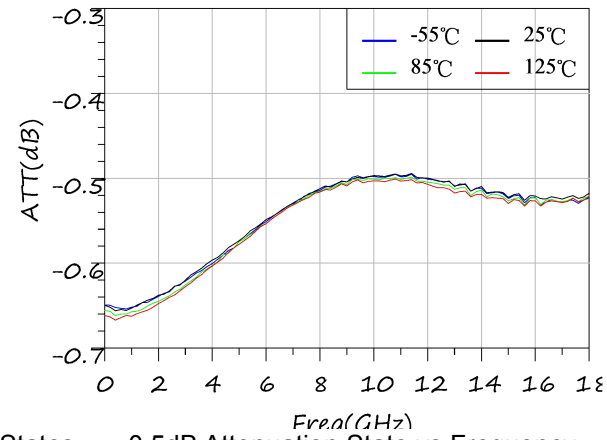
Parameter		Function	Min.	Typ.	Max.	Units
Frequency Range		Freq	DC	-	18.0	GHz
Insertion Loss		IL	-	5.0	-	dB
Attenuation Range		△IL	0.5~31.5			dB
Relative Phase Shift		△Phase	-	±2	-	°
Attenuation Accuracy	0.5	-	-	0.5	-	dB
	1.0	-	-	1.0	-	dB
	2.0	-	-	2.1	-	dB
	4.0	-	-	3.9	-	dB
	8.0	-	-	8.0	-	dB
	16.0	-	-	16.2	-	dB
RMS		-	-	0.2	-	dB
RF1 Stationary Wave		VSWR	-	1.7	-	-
RF2 Stationary Wave		VSWR	-	1.7	-	-

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

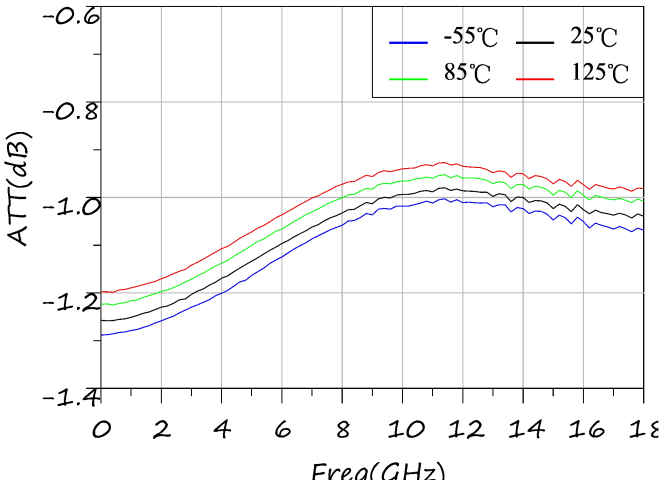
Typical Testing Characteristics



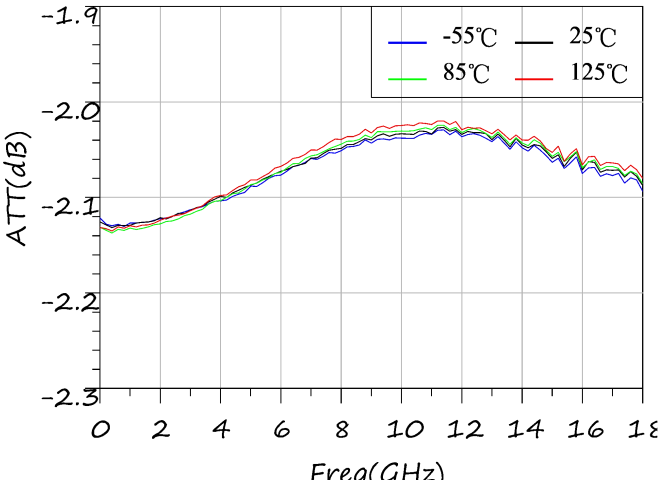
Normalized Attenuation vs. Frequency over Major Attenuation States



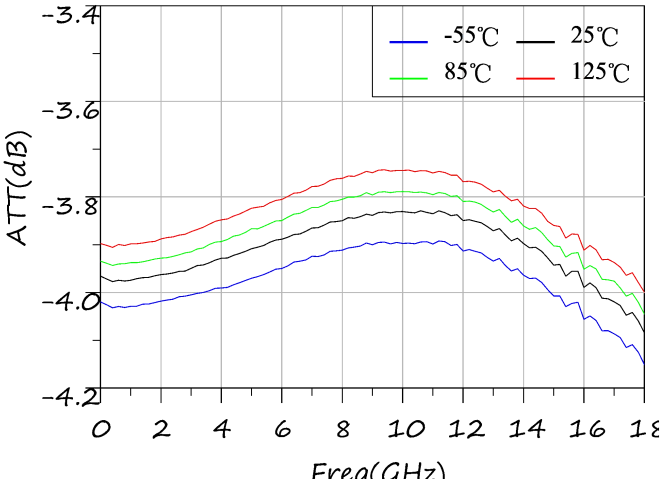
0.5dB Attenuation State vs Frequency



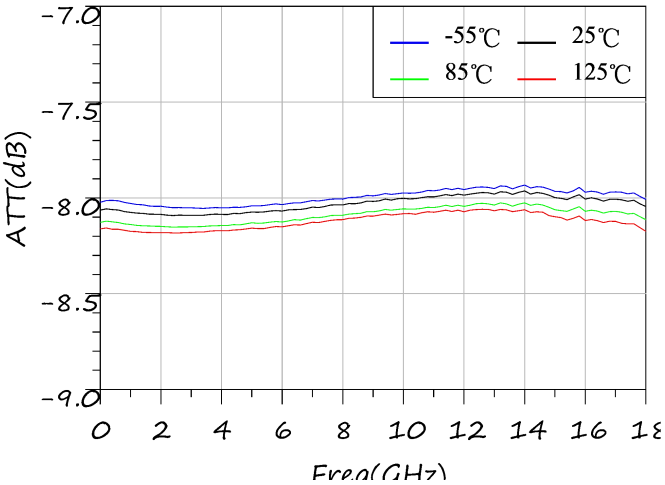
1dB Attenuation State vs Frequency



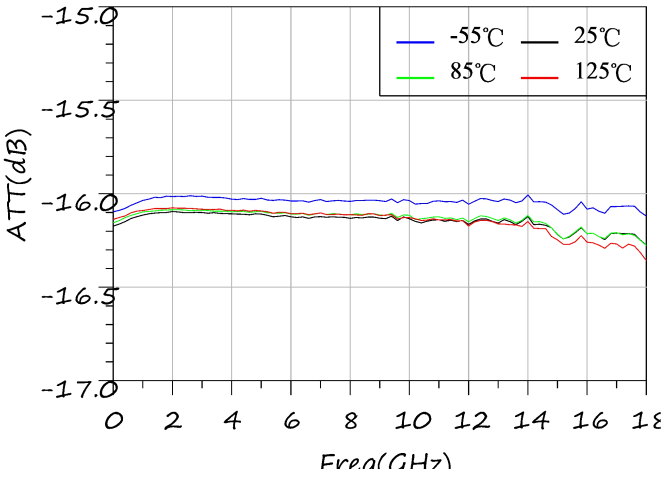
2dB Attenuation State vs Frequency



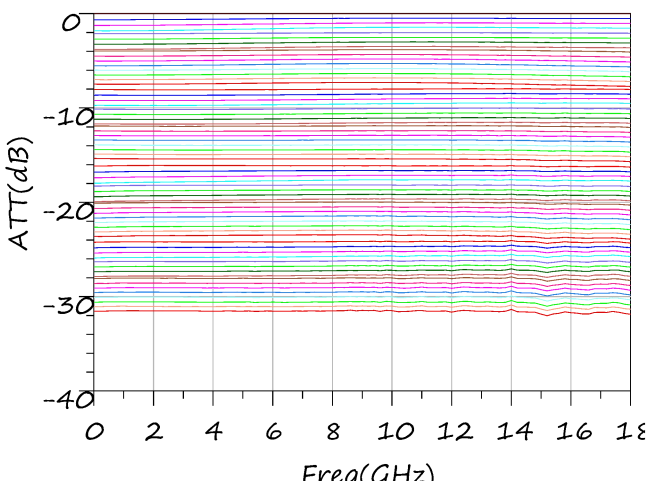
4dB Attenuation State vs Frequency



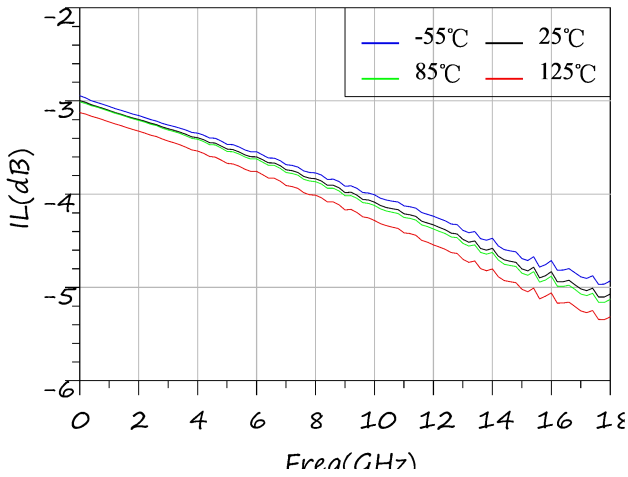
8d B Attenuation State vs Frequency



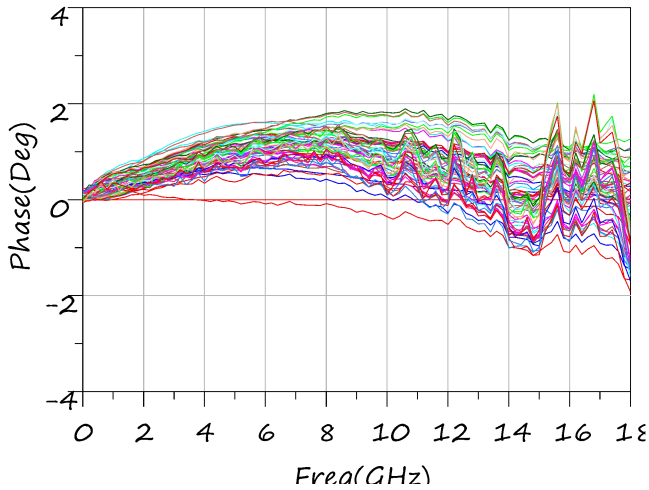
16dB Attenuation State vs Frequency



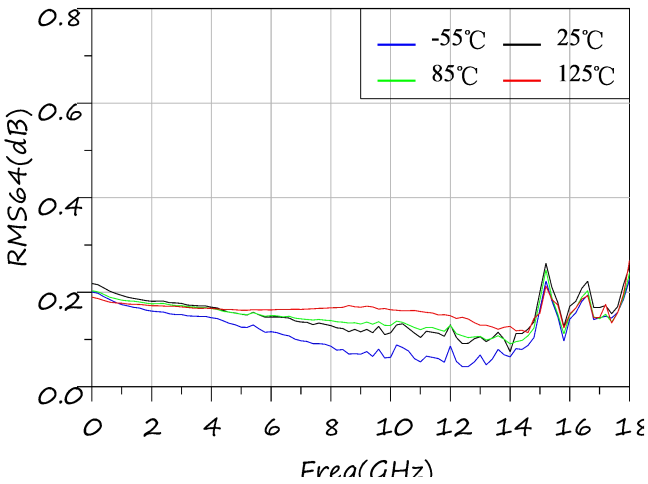
ALL Attenuation State vs Frequency



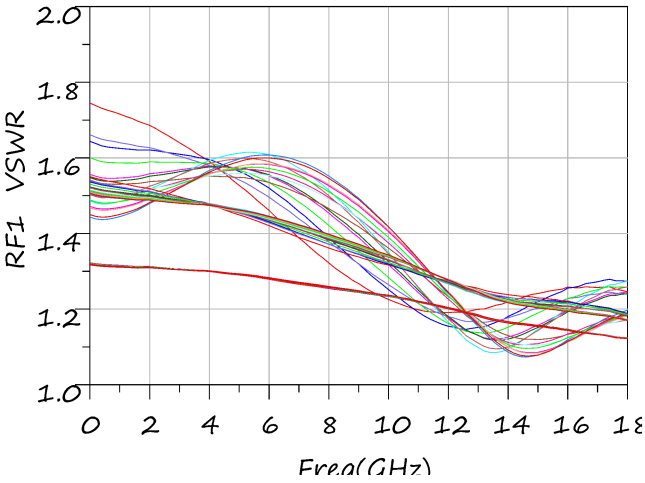
Insertion Loss vs Frequency



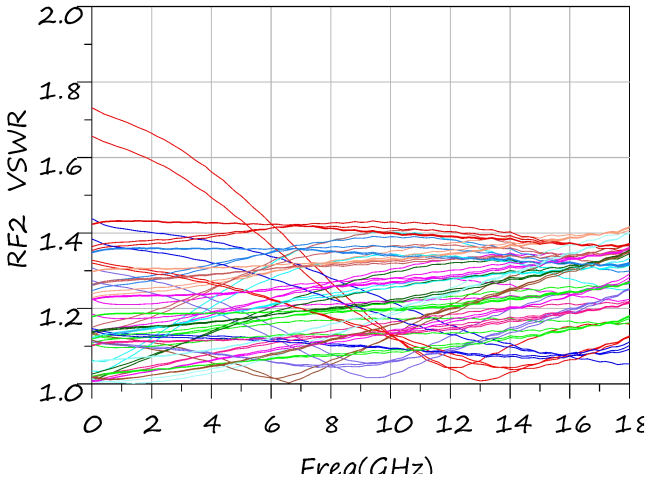
Relative Phase Shift vs Frequency



Attenuation Accuracy vs Frequency



RF1 Stationary Wave vs Frequency



RF2 Stationary Wave vs Frequency

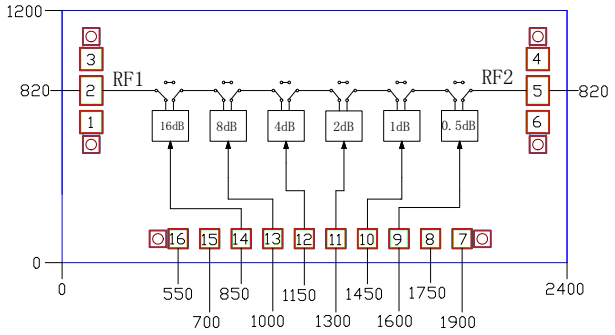
Absolute Maximum Ratings

Parameter Limits	Value
Input Power, 50Ω	23dBm
Digital Control Input Voltage	0V~+5V
Storage Temperature Range	-65~+150℃
Operating Temperature Range	-55~+125℃
Mounting Temperature (30s, N_2 protection)	300℃
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 ⋀) for input and output, the bonding wires should be as short as possible
·Storing in a dry, nitrogen environment

Outline Drawing



Notes:

1. Units:μm
2. Back side metallization: Gold
3. Back side metal is ground
4. Bonding Pad size:100μm
5. Outline Dimensional Tolerance: ±50μm

Pad Descriptions

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

Control Voltage Range

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

Truth Table

Bas Voltage	Control Input						Status
VEE	IN1	IN2	IN3	IN4	IN5	IN6	
-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

Assembly Drawing