Product Features

Operating Frequency:100MHz～8GHz

Insertion Loss：-1.52dB@4GHz

Input Power for 1dB Compression：

+27.2dBm@4GHz

+5V Single-Supply Operation

Attenuation Value：16dB

Package：QFN16（3mm*3mm）

应用

Communication Base Stations

Electronic Warfare (EW)

Remote Sensing and Telemetry

VHF Communication Equipment

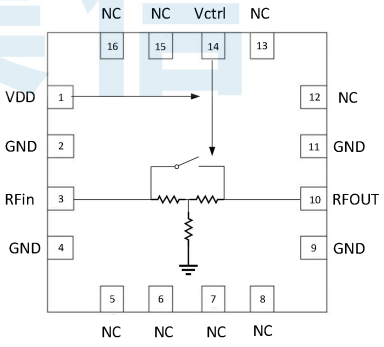
订购信息

Part Number	Package	Description
BR9365FDJ	QFN16	100MHz～8GHz 1-bit digital attenuator

产品概述

BR9365FDJ is a 1-bit digital attenuator covering a frequency range from 100 MHz to 8GHz. Operating from a standard 5V supply, it draws a quiescent current of 0.6 mA. It features an in-band insertion loss of less than 2 dB, a typical attenuation accuracy of ±0.2 dB, and a typical additional phase shift of -2.7°. The device is compatible with TTL/CMOS control signals for switching attenuation states.With high attenuation accuracy and low additional phase shift, the BR9365FDJ is suitable for a wide range of applications including communication base stations, electronic warfare, and telemetry/remote sensing systems.

Functional Block Diagram



Electrical Specifications

参数		最小值	典型值	最大值	单位
Insertion Loss	100MHz～8GHz	-1.8	-1.5	-0.5	dB
Input Return Loss	100MHz～8GHz	-	-15	-	dB
Output Return Loss	100MHz～8GHz	-	-15	-	dB
Attenuation Accuracy: (Referenced to Insertion Loss)	100MHz～8GHz	-0.6	±0.2	+1.1	dB
Input Power for 1dB Compression	100MHz～8GHz	17.5	26.5	-	dBm
Relative Phase	100MHz～8GHz	-	-3	-	°
Switching Characteristics Trise (50% CTL-90% RF) Tfall (50% CTL-10% RF)	200MHz	- -	50 50	- -	ns ns
Test Conditions:Vdd=+5V，I=0.6mA， Temp=+25℃					

Absolute Maximum Ratings

Maximum Supply Voltage (VDD): +7V

Maximum RF input Power: +28dBm

Control Voltage Range: 0V~VDD

Recommended Operating Conditions

Supply Voltage:+5V

Supply Current:0.6mA

Control Voltage:0～0.8V（low）

2.7V～Vdd（high）

Storage Temperature:-65℃～+150℃

Operating Temperature: -55℃～+125℃

Note: Operation of the device outside the parameter ranges given absolute-maximum-ratings conditions may cause permanent damage, and exposure to absolute-maximum-ratings conditions for extended periods will affect the reliability.

ESD WARNING



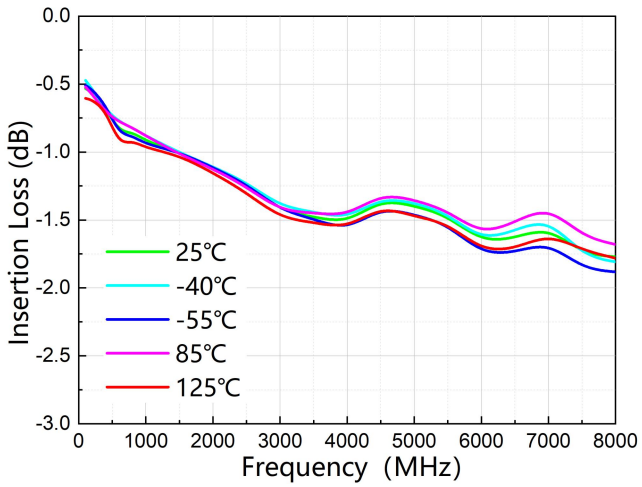
ELECTROSTATIC SENSITIVE DEVICE

OBSERVE HANDLING PRECAUTIONS

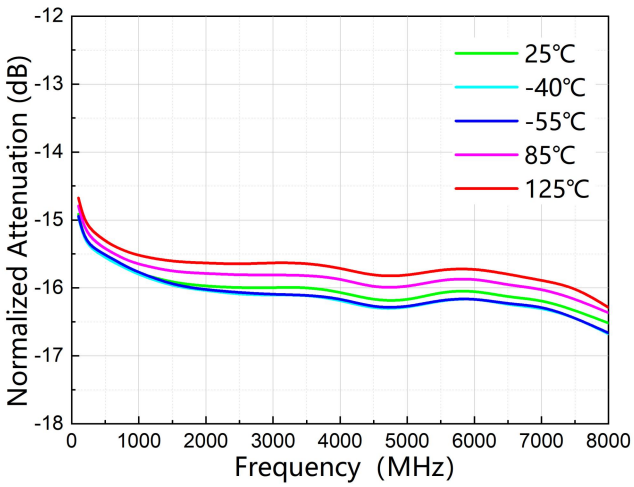
ESD Rating: Class 1C

Typical Performance (EVB test results)

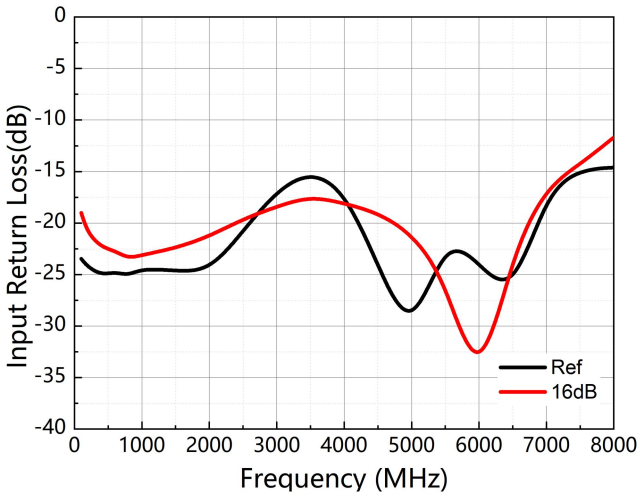
Parameter	Typ.							Units
Frequency	100	200	400	600	800	1000	1500	MHz
Insertion Loss	-0.53	-0.56	-0.67	-0.85	-0.85	-0.91	-1.0	dB
Attenuation Accuracy	1.08	0.68	0.52	0.40	0.30	0.21	0.07	dB
Relative Phase	-13.6	-7.9	-5.3	-4.5	-4.2	-3.7	-2.9	°
Input Return Loss	-23.4	-24.2	-25.0	-24.7	-25.0	-24.3	-24.6	dB
Output Return Loss	-23.4	-24.2	-25.0	-25.1	-25.4	-25.3	-25.0	dB
Input Power for 1dB Compression	17.5	20.5	23.7	25	25.2	25.7	26.3	dBm
Frequency	2000	2500	3000	3500	4000	4500	5000	MHz
Insertion Loss	-1.11	-1.23	-1.43	-1.47	-1.52	-1.34	-1.39	dB
Attenuation Accuracy	0.02	0.00	0.002	0.01	-0.05	-0.18	-0.19	dB
Relative Phase	-2.3	-2.1	-2.1	-2.3	-2.7	-2.5	-2.2	°
Input Return Loss	-24.7	-20.7	-16.8	-14.9	-16.7	-24.0	-31.3	dB
Output Return Loss	-23.9	-20.7	-17.4	-15.6	-16.6	-20.8	-30.9	dB
Input Power for 1dB Compression	26.5	27.4	27.6	27.7	27.2	26.8	27.6	dBm
Frequency	5500	6000	6500	7000	7500	8000	-	MHz
Insertion Loss	-1.46	-1.66	-1.63	-1.54	-1.75	-1.77	-	dB
Attenuation Accuracy	-0.05	-0.03	-0.13	-0.17	-0.32	-0.51	-	dB
Relative Phase	-2.2	-3.3	-3.9	-4.4	-5.6	-5.7	-	°
Input Return Loss	-21.1	-23.9	-27.2	-16.9	-14.7	-14.6	-	dB
Output Return Loss	-23.7	-26.4	-29.3	-18.1	-14.8	-14.7	-	dB
Input Power for 1dB Compression	27.8	28.6	-	-	-	-	-	dBm
Switching Characteristics	50ns (50% CTL-90% RF)				50ns (50% CTL-10% RF)			ns
Test Conditions:Vdd=+5V，I=0.6mA，Temp=+25℃								



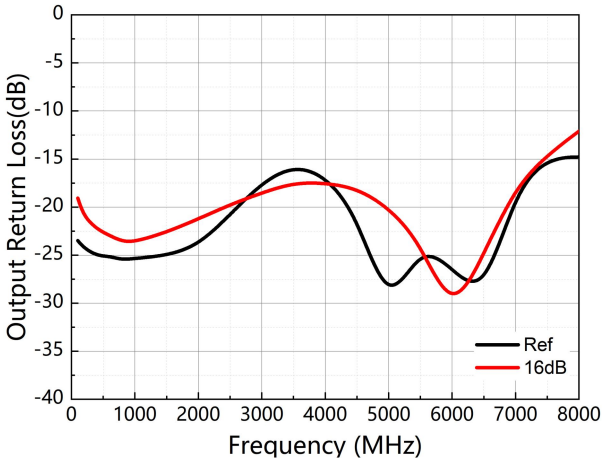
Insertion Loss vs. Freq



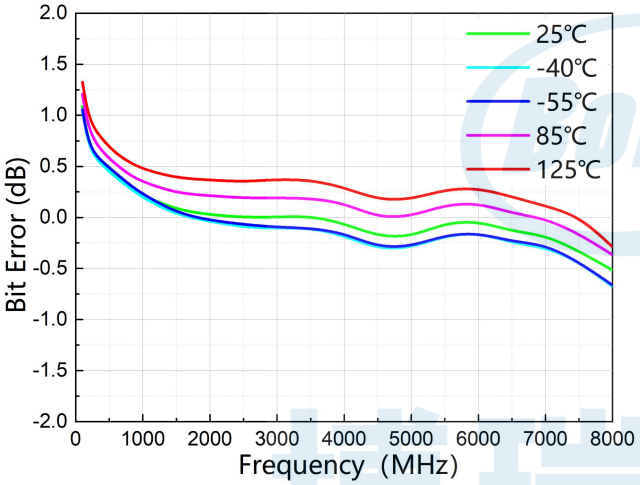
Normalized Attenuation vs. Freq



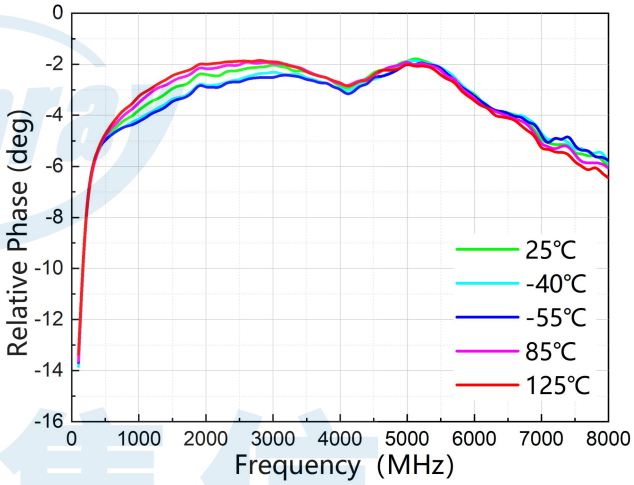
Input Return Loss vs. Freq



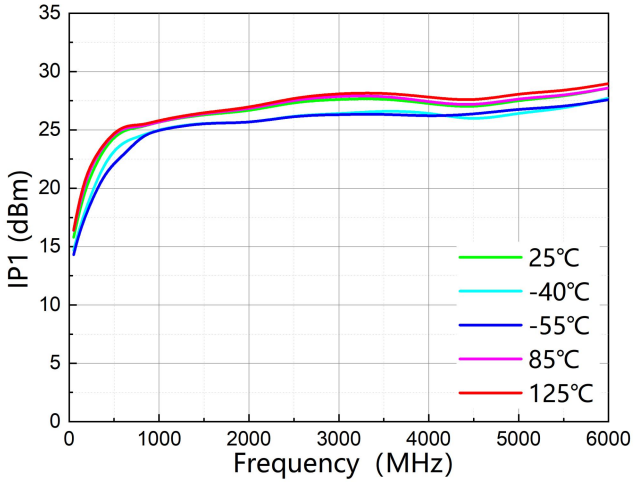
Output Return Loss vs. Freq



Bit Error vs. Freq

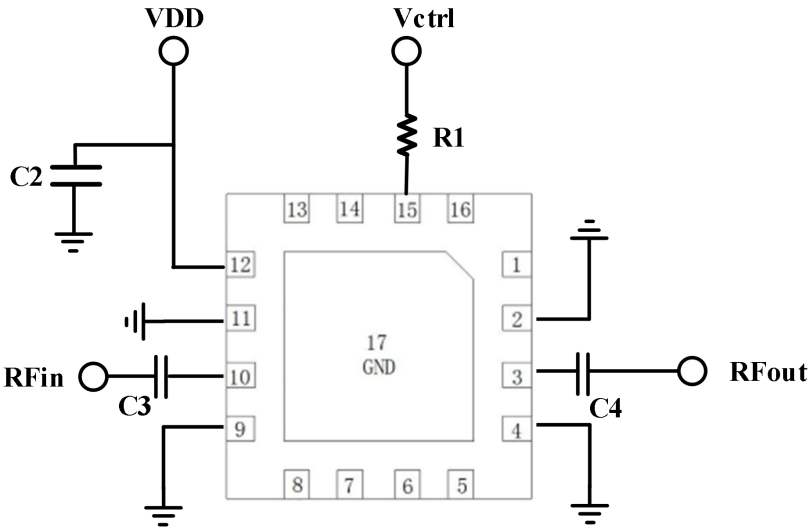


Relative Phase vs. Freq



Input Power for 1dB Compression vs. Freq

Typical Application Schematic



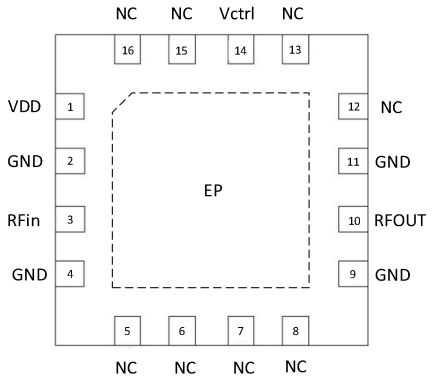
Bill of Material

Reference Designator	Package	Value	P/N
U1	QFN16	1-Bit Digital Attenuator	BR9365FDJ
C2	0402	1nF	GRM155R71H102KA37D
C3、C4	0402	100nF	GRM155R71H104KE14D
R1	0402	100Ω	RC0402JR-07100RL

Truth Table

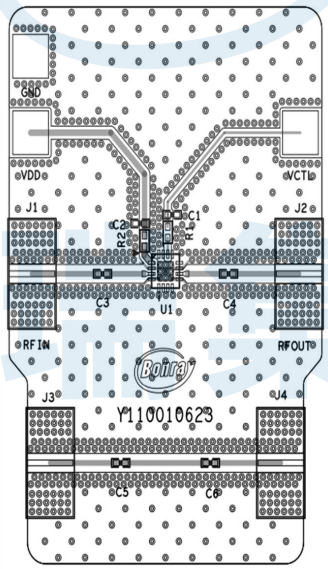
Vctrl	Attenuation State
0	Insertion loss in reference state
1	16dB

Pin Configuration and Description

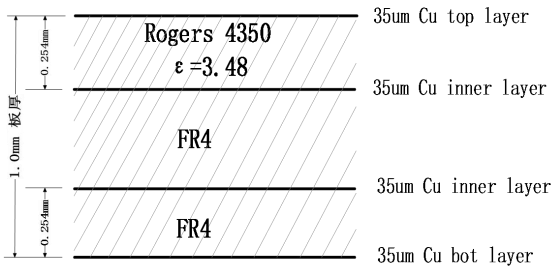


Pin Number	Pin Name	Description
1	VDD	Power supply pin.
2、4、9、11	GND	Grounding pin
3	RFin	RF Input Pin; This pin is DC-coupled and internally matched to 50 Ω. DC block is required.
5、6、7、8、13、15、16	NC	No electrical connection. These pins should be connected to ground
10	RFout	RF Output Pin; This pin is DC-coupled and internally matched to 50 Ω. DC block is required.
13	Vctrl	Control voltage input pins. Select the required attenuation. See Truth Table.
-	EP	Exposed pin. The exposed pad must be connected to RF/DC ground.

PCB Evaluation Board

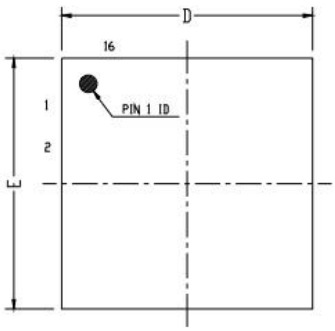


ART FILM - TOP



50ohm Transmission line:
width=0.53mm, spacing=0.53mm

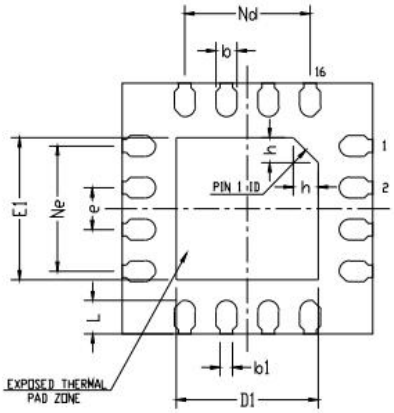
Package Dimensions (mm)



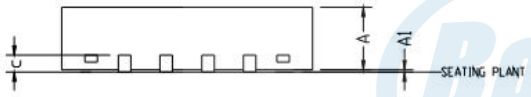
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	--	0.02	0.05
b	0.20	0.25	0.30
b1	0.15REF		
c	0.203REF		
D	2.90	3.00	3.10
D2	1.60	1.70	1.80
e	0.50BSC		
Ne	1.00BSC		
Nd	1.00BSC		
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
L	0.35	0.40	0.45
h	0.20	0.25	0.30