Product Features

Frequency: 10 MHz～4 GHz

Insertion Loss: 0.4 dB@1.5 GHz @5 V

Isolation: 30 dB@1.5 GHz@5 V

Input Power for 1dB Compression:

39.6 dBm@1.5 GHz@8 V

Switching Speed：55 ns (ON)

45 ns (OFF)

Supply Voltage: +3 V/+5 V/+8 V

Positive Control：0/+3 V～+8 V

Supply Current：1 mA

Package：eMSOP8

General Description

The BR9506EA is a high power SPDT switch manufactured using GaAs process over the frequency range of 10 MHz ~ 4 GHz. The product offers a low insertion loss of 0.4 dB and high isolation of 30dB. RF1 and RF2 are reflective shorts when “OFF”. On-chip circuitry allows single positive supply operation from +3 Vdc to +8 Vdc at very low DC current with control inputs compatible with CMOS and most TTL logic families.

Application

Cellular / 4G Infrastructure

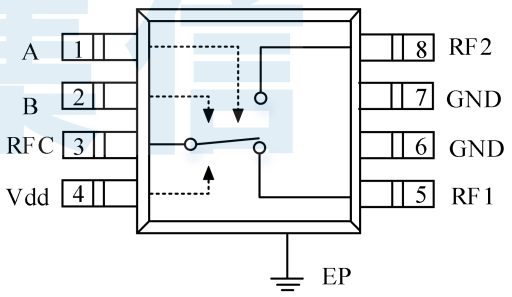
WiMAX, WiBro & Fixed Wireless

Automotive Telematics

Mobile Radio

Test Equipment

Functional Block Diagram



Ordering Information

Part Number	Package	Description
BR9506EA	eMSOP8	10MHz～4GHz SPDT RF Switch

Electrical Specifications

Parameter		Min.	Typ.	Max.	Units
Insertion Loss	0.01GHz～1GHz	-	-0.2	-	dB
	1GHz～2GHz	-	-0.4	-	dB
	2GHz～3GHz	-	-0.5	-	dB
	3GHz～4GHz	-	-0.6	-	dB
Isolation	0.01GHz～4GHz	-	-30	-	dB
Return Loss(On State)	0.01GHz～4GHz	-	-25	-	dB
Input Power for 1 dB Compression	0.01GHz～2.5GHz	-	37.1	-	dBm
Switching Characteristics					
t_{ON}，（50% CTL-90% RF）	200MHz	-	55	-	ns
t_{OFF}（50% CTL-10% RF）	Pin=0dBm	-	45	-	ns
Test Conditions：Vdd=+5V，Idd= 1mA，Temp=+25℃，Vctl=0/+5V					

Absolute Maximum Ratings

Maximum Operating Voltage：+9V

Maximum RF input Power：

34dBm@8V(30MHz~250MHz)

38dBm@8V(250MHz~1GHz)

39dBm@8V(1GHz~2.5GHz)

Control Voltage Range(A&B)：0V～Vdd

Recommended Operating Conditions

Supply Voltage：3V/5V/8V

Control Voltages：0V～0.8V（Low）

Vctl = Vdd（High）

Supply Current：1mA

Operating Temperature：-55℃～+125℃

Storage Temperature：-65℃～+150℃

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.

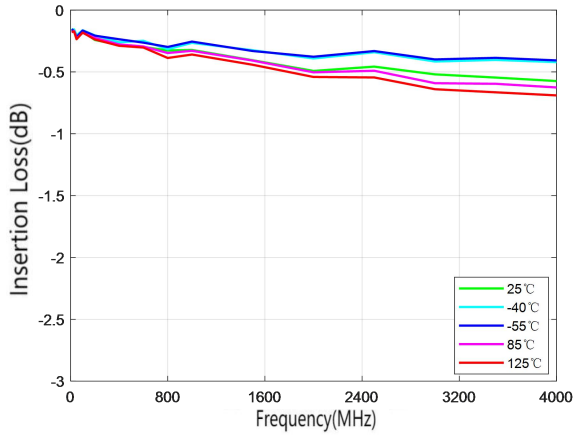
ESD WARNING

ELECTROSTATIC SENSITIVE DEVICE

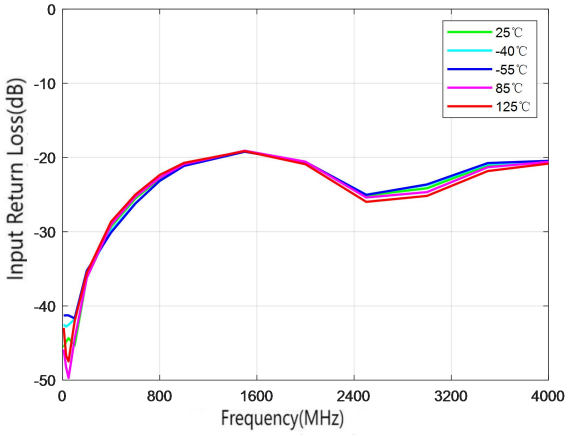
OBSERVE HANDLING PRECAUTIONS

Typical Performance (EVB test results)

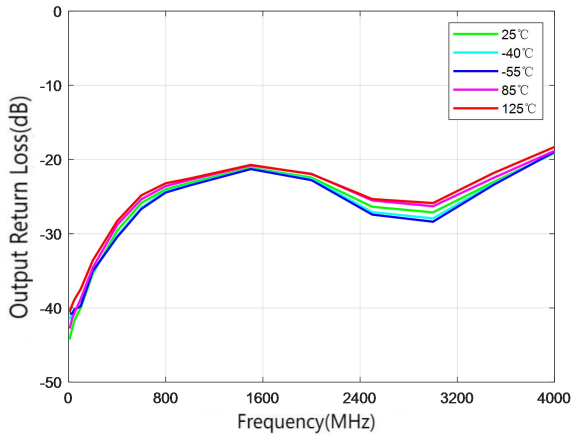
Parameter	Typ.							Units
Frequency	10	30	50	100	200	400	800	MHz
RFC Input Return Loss	-45.6	-44.8	-44.3	-45.3	-36.2	-29.3	-22.9	dB
RF1/RF2 Output Return Loss	-44.2	-42.8	-41.6	-40.0	-35.4	-29.6	-24.0	dB
Insertion Loss	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	dB
Isolation （RFC To RF1/RF2）	-54.6	-51.0	-47.5	-41.1	-36.4	-32.0	-30.1	dB
Isolation （RF1 To RF2）	-57.8	-51.5	-47.0	-41.0	-35.9	-31.5	-30.0	dB
Input Power for 1dB Compression	29.4	31.0	31.3	31.5	32.1	35.3	35.9	dBm
Frequency	1000	1500	2000	2500	3000	3500	4000	MHz
RFC Input Return Loss	-21.0	-19.2	-20.7	-25.1	-24.1	-21.0	-20.5	dB
RF1/RF2 Output Return Loss	-23.1	-21.1	-22.4	-26.4	-27.1	-23.0	-19.1	dB
Insertion Loss	-0.3	-0.4	-0.5	-0.5	-0.5	-0.6	-0.7	dB
Isolation （RFC To RF1/RF2）	-30.1	-30.7	-32.4	-35.2	-36.5	-43.4	-42.5	dB
Isolation （RF1 To RF2）	-30.0	-30.0	-30.7	-31.1	-30.6	-30.4	-29.4	dB
Input Power for 1dB Compression	36.7	37.5	39.0	37.7	/	/	/	dBm
Switching time	55ns turn on					45ns turn off		
Test Conditions：V_{dd}=+5V，I_{dd}= 1mA，Temp=+25℃，V_{ctl}=0/+5V								



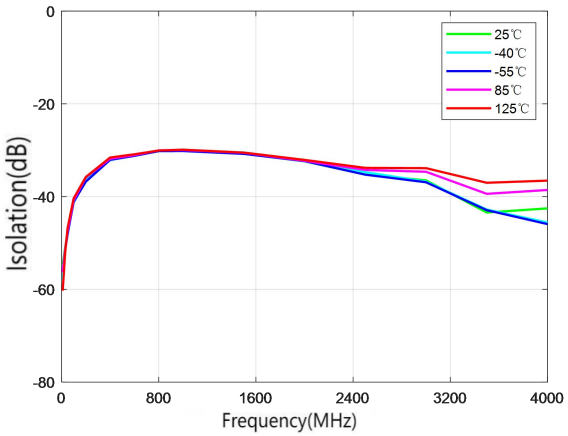
Insertion Loss vs. Freq



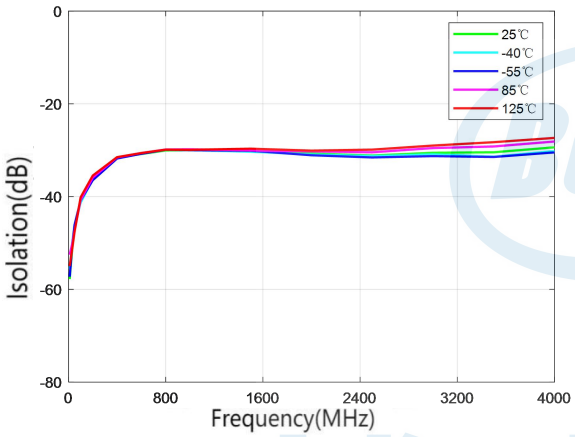
RFC Input Return Loss vs. Freq



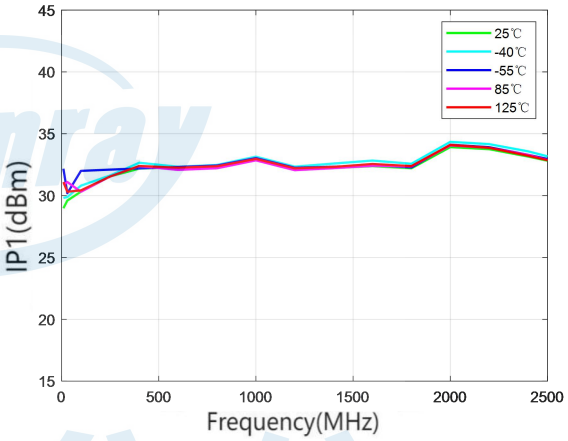
RF1/RF2 Output Return Loss vs. Freq



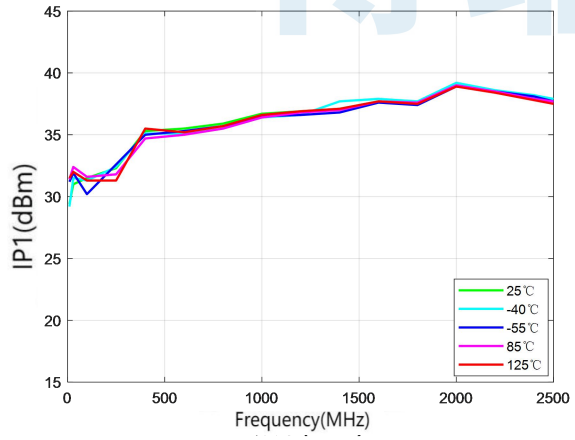
RFC To RF1/RF2 Isolation vs. Freq



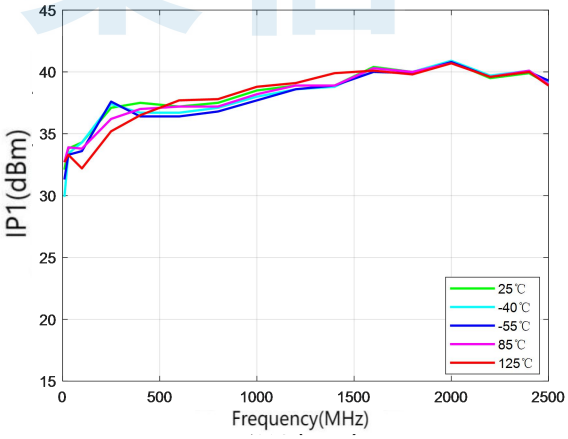
RF1 To RF2 Isolation vs. Freq



IP1 vs. Freq (+3V V_{dd})

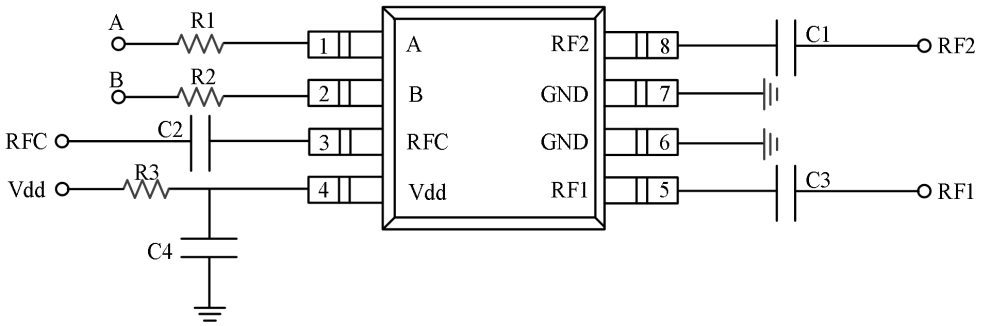


IP1 vs. Freq (+5V V_{dd})



IP1 vs. Freq (+8V V_{dd})

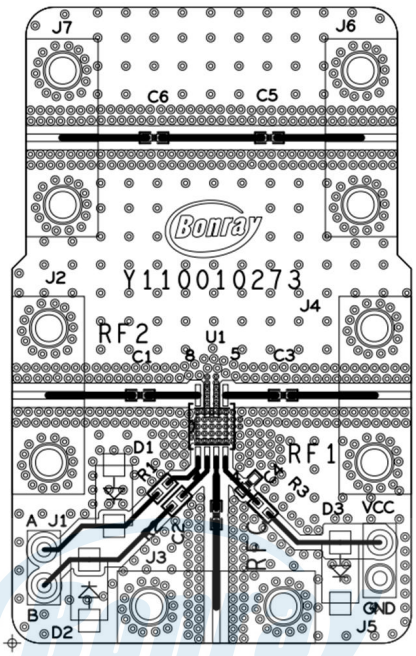
Typical Application Schematic

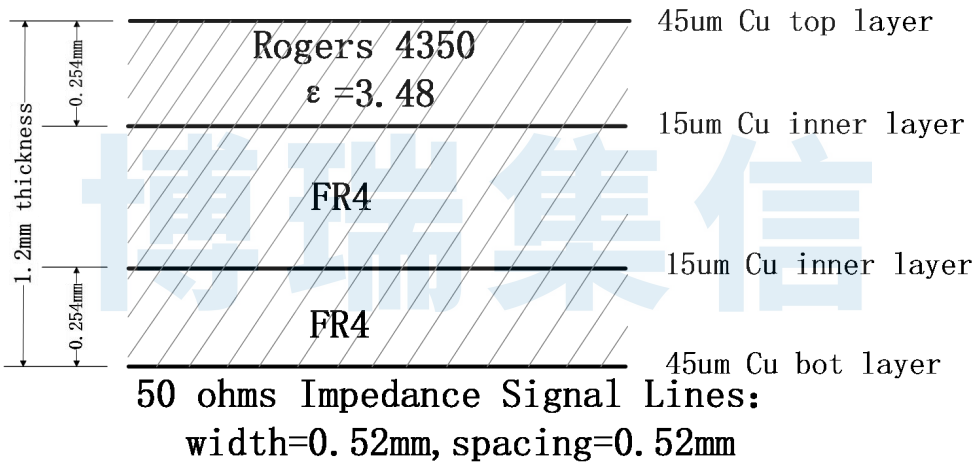


Bill of Material

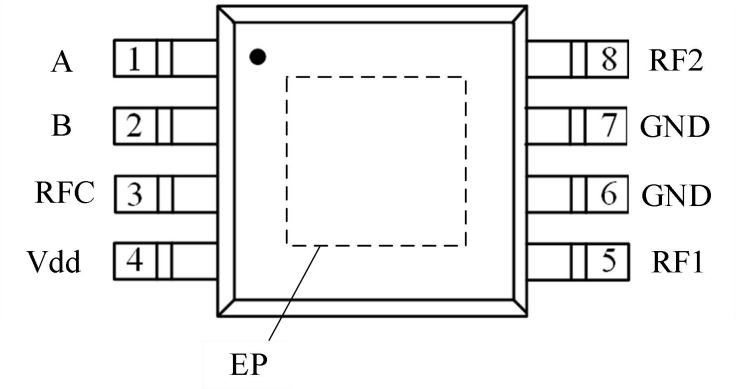
Designator	Package	Description	Part Number
R1~R3	0402	100Ω	RC0402JR-07100RL
C4	0402	100pF	GRM1555C1H101JA01D
C1~C3	0402	1μF	GCM155C71A105KE38D

PCB Evaluation Board





Pin Configuration and Description

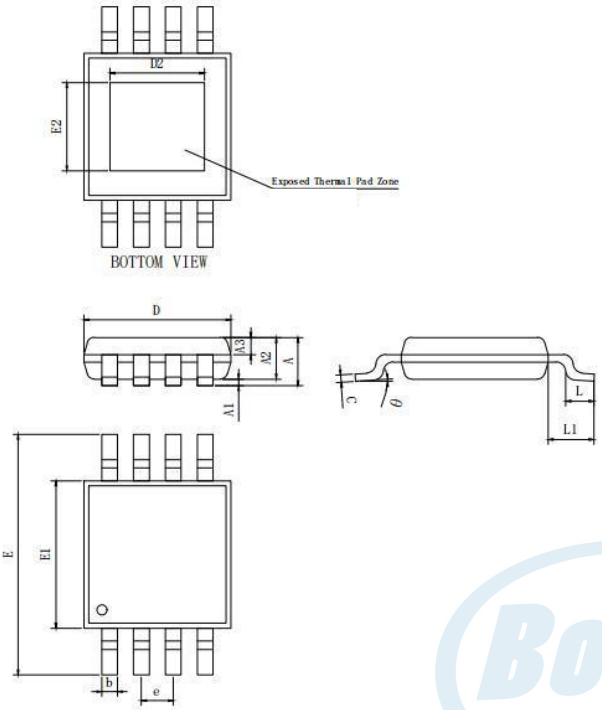


Pin Number	Pin Name	Description
1,	A	Control pins, See truth table.
2	B	
3,5,8	RFC, RF1, RF2	RF pins. DC Block is required.
4	Vdd	Power supply pin.
6,7	GND	RF/DC ground pins. Connect to RF/DC ground
-	EP	RF/DC ground. Use recommended via pattern for suggested footprint. to minimize inductance and thermal resistance; See PCB Mounting Pattern for suggested footprint.

Truth Table

Control Input(Vctrl)			Signal Path State	
Vdd	A	B	RFC-RF1	RFC-RF2
3V	3V	0V	OFF	ON
	0V	3V	ON	OFF
5V	5V	0V	OFF	ON
	0V	5V	ON	OFF
8V	8V	0V	OFF	ON
	0V	8V	ON	OFF

Package Dimensions (mm)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.10
A1	0.00	--	0.13
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.28	--	0.36
c	0.15	--	0.19
D	2.90	3.00	3.10
E	4.68	--	5.08
E1	2.90	3.00	3.10
e	0.65BSC		
L	0.40	--	0.80
L1	0.95REF		
θ	0	--	8°
D2	1.93REF		
E2	1.57REF		