RFMD + TriQuint = Qorvo

RFSW6124

Absorptive High Isolation SPDT Switch 50MHz to 6000MHz

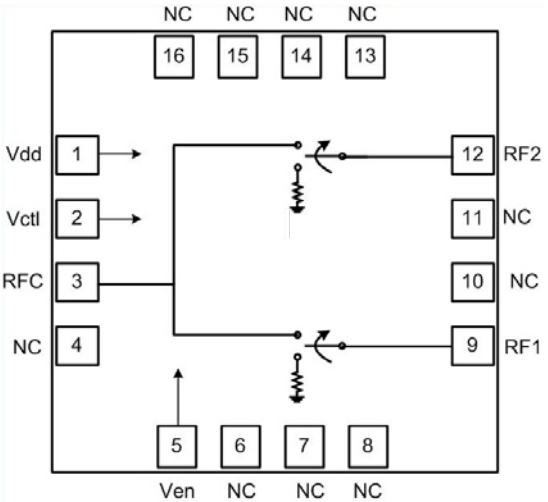
Package: QFN, 16-pin, 4.0mm x 4.0mm

Features

- 50MHz to 6000MHz Operation
- Symmetric SPDT
- Non-Reflective (RF1, RF2)
- Terminated All-off State (RF1, RF2)
- High Isolation: 70dB at 2GHz
- High IIP3: 58dBm at 5V
- 3V and 5V Logic Compatible
- TTL Logic Compatible

Applications

- Cellular, 3G, LTE Infrastructure
- WiBro, WiMAx. LTE
- Wireless Backhaul
- High Performance Communications Systems
- Test Equipment



Functional Block Diagram

Product Description

The RFSW6124 is a GaAs pHEMT single-pole double-throw (SPDT) switch designed for use in cellular, 3G, LTE, and other high performance communications systems. It offers a high isolation symmetric topology with excellent linearity and power handling capability. The design is non-reflective such that RF ports 1 and 2 are terminated in the off-state. The enable pin allows for a terminated "all-off state". The RFSW6124 is 3V and 5V positive logic compatible.

Ordering Information

RFSW6124SQ	Sample Bag with 25 pieces
RFSW6124SR	7" Reel with 100 pieces
RFSW6124TR13	13" Reel with 2500 pieces
RFSW6124PCK-410	0.4GHz to 6GHz PCBA with 5-piece sample bag

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Absolute Maximum Ratings

Parameter	Rating	Unit
Control Voltage (V_{CTL}, V_{EN})	7.0	V
Supply Voltage (V_{DD})	7.0	V
Maximum CW Input Power for V_{DD} = 3V	Reference the Power Tables on Page 4	
Maximum CW Input Power for V_{DD} = 5V		
Operating Temperature Range	-40 to +105	°C
Storage Temperature Range	-40 to +150	°C
Maximum Junction Temperature	+150	°C
ESD Rating - Human Body Model (HBM)	1000	V
Moisture Sensitivity Level	MSL1	

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2011/65/EU (at time of this document revision).

RFMD Green: RoHS compliant per EU Directive 2011/65/EU, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Nominal Operating Parameters

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
General Performance					Electrical Specifications, T_A=25°C, V_{CRTL}=0/+3 V_{DC}, V_{DD}=+5V_{DC}, 50Ω system.
Operating Frequency Range	50		6000	MHz	
Insertion Loss[2] (RFC to RF1/RF2)		0.65	1.1	dB	0.4GHz
		0.68	1.1	dB	1GHz
		0.75	1.1	dB	2GHz
		0.88		dB	3GHz
		0.93		dB	4GHz
		1.04		dB	6GHz
Isolation (RFC to RF1/RF2)		70		dB	0.4GHz
		72		dB	1GHz
		73		dB	2GHz
		60		dB	3GHz
		53		dB	4GHz
		45		dB	6GHz
Isolation (RF1 to RF2)		65		dB	0.4GHz
		60		dB	1GHz
		54		dB	2GHz
		51		dB	3GHz
		48		dB	4GHz
		44		dB	6GHz
Return Loss (RF1/RF2 On-state)		24		dB	0.4GHz
		21		dB	1GHz
		26		dB	2GHz
		22		dB	3GHz
		20		dB	4GHz
		14		dB	6GHz

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
General Performance (continued)					Electrical Specifications, T_A=25°C, V_{CRTL}=0/+3 V_{DC}, V_{DD}=+5V_{DC}, 50Ω system.
Return Loss (RF1/RF2 Off-state)		15		dB	0.4GHz
		19		dB	1GHz
		20		dB	2GHz
		21		dB	3GHz
		25		dB	4GHz
		35		dB	6GHz
Input IP3		56		dBm	V_{DD} = 3V, 2GHz +12dBm input power per tone, 1MHz tone spacing
		58		dBm	V_{DD} = 5V, 2GHz +12dBm input power per tone, 1MHz tone spacing
Output IP2		98		dBm	25°C, 5V, 1850MHz
Input 0.1dB Compression Point		26		dBm	V_{DD} = 3V, 2GHz
		33		dBm	V_{DD} = 5V, 2GHz
Input 1dB Compression Point		30		dBm	V_{DD} = 3V, 2GHz
		35		dBm	V_{DD} = 5V, 2GHz
Switching Speed - T_{RISE}, T_{FALL}		48	100	ns	10/90% RF, reference switch table on page 4
Power Supply					
Supply Voltage (V_{DD})	3.0	5.0	5.25	V	
Supply Current (I_{DD})		0.3	0.5	mA	V_{DD} = 5.0V
Control Current (I_{CTL}, I_{EN})		0.5	3.0	µA	V_{CTL} = 5.0V
Control Voltage (V_{CTL})	Low, V_{CTL} = 0V to 0.8V High, V_{CTL} = 2.0V to V_{DD}			V	TLL logic compatible

Notes:
1. Data shown is taken with external coaxial DC blocks.
2. De-embedded EVB through loss.

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Max Operating Power

Input	State	VEN	VDD = 3V, ≤105C	VDD = 5V, 85C	VDD = 5V, 105C
RFC, RF1/2	On	Low	26dBm	33dBm	33dBm
RFC	Both Off	High	20dBm	27dBm	27dBm
RF1/2	Off	Low or High	20dBm	27dBm	25dBm

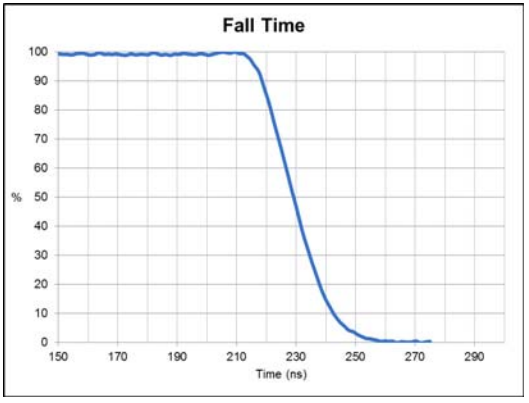
Absolute Max Power

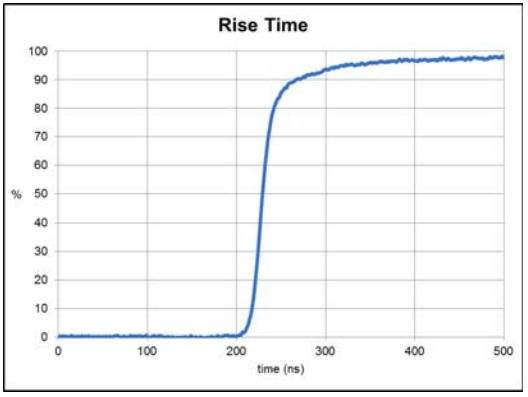
Input	State	VEN	VDD = 3V, ≤105C	VDD = 5V, 85C	VDD = 5V, 105C
RFC, RF1/2	On	Low	32dBm	37dBm	37dBm
RFC	Both Off	High	26dBm	31dBm	31dBm
RF1/2	Off	Low or High	26dBm	31dBm	29dBm

Typical Switch Time versus Temperature

Temp	TF (ns)	TR (ns)
-40°C	21	48.1
0°C	20	48.5
25°C	20	44.3
85°C	19	40.2

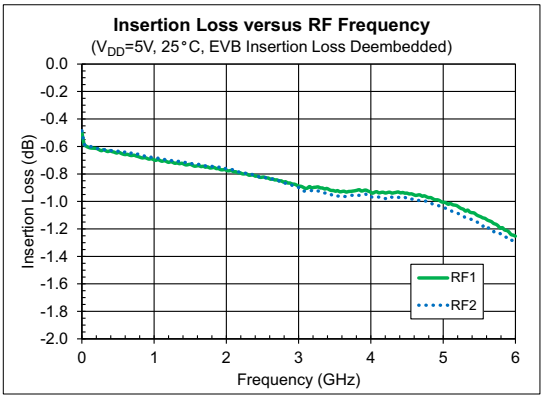
Note: 10/90% RF

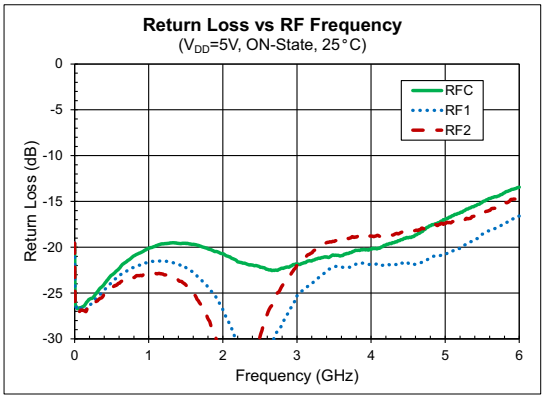


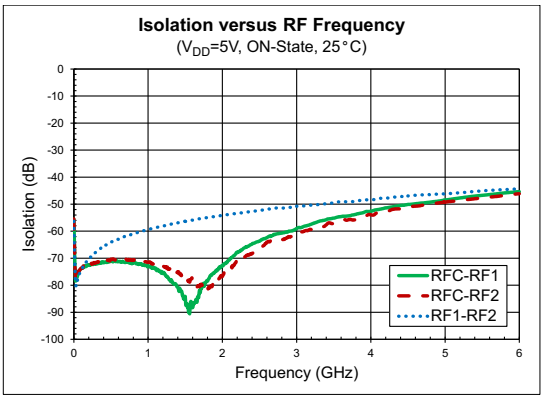


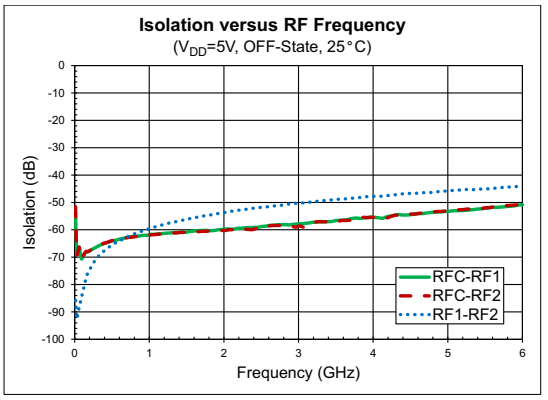
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or customerservice@rfmd.com.

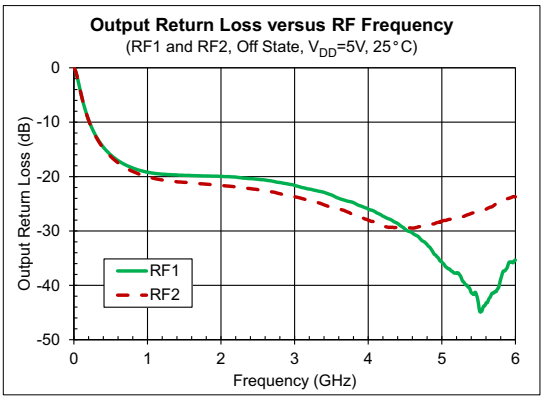
Typical Performance: T=25°C, V_{DD} = 5V unless otherwise noted

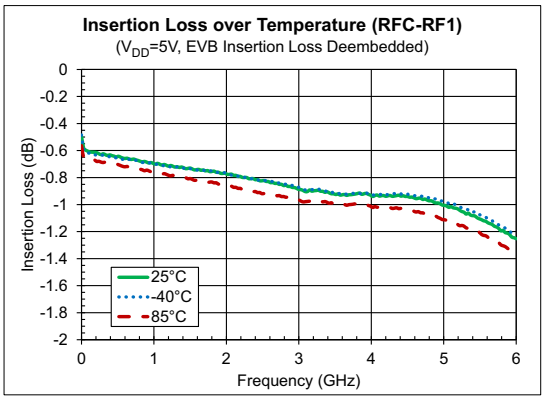




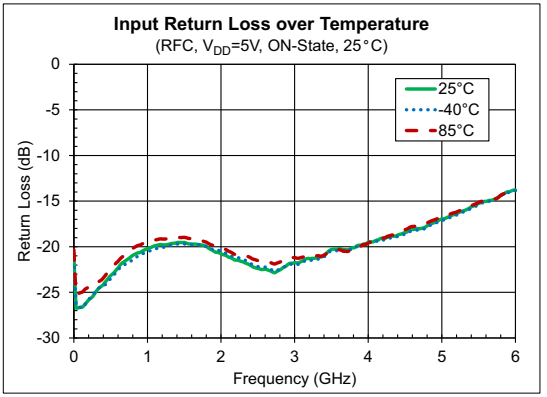


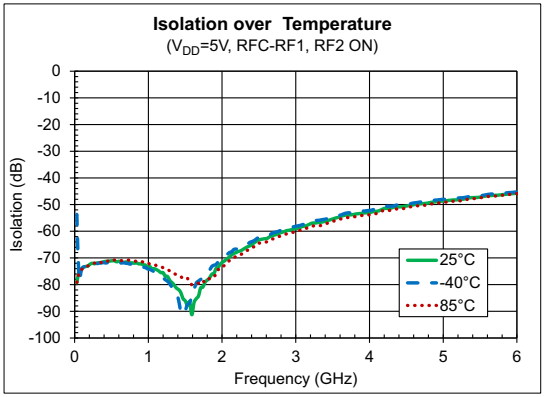


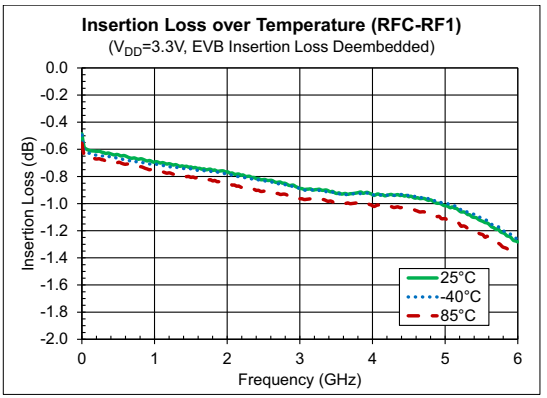


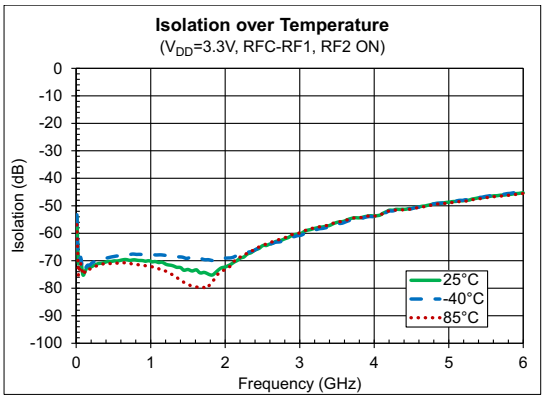


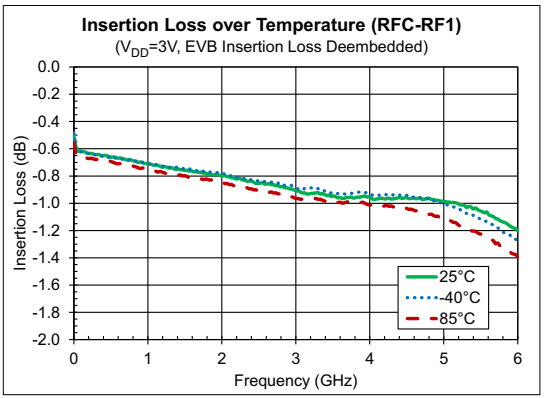
Typical Performance: Over Voltage and Temperature

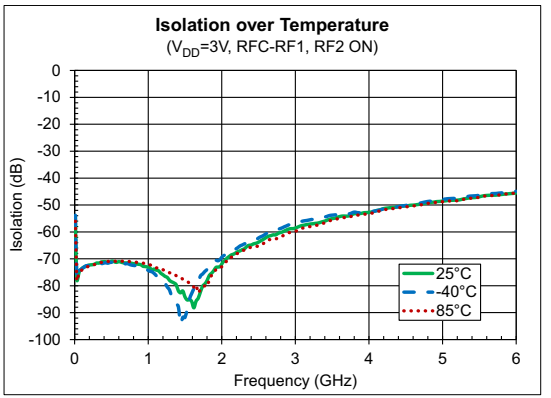






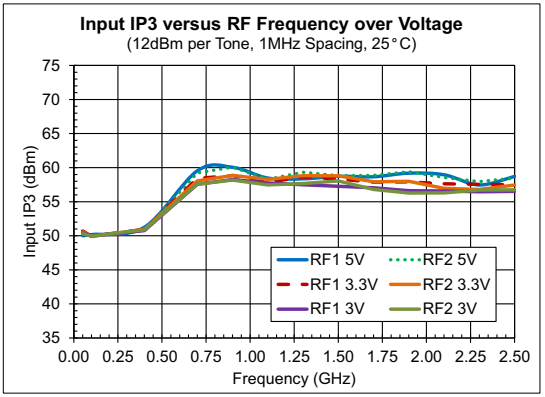


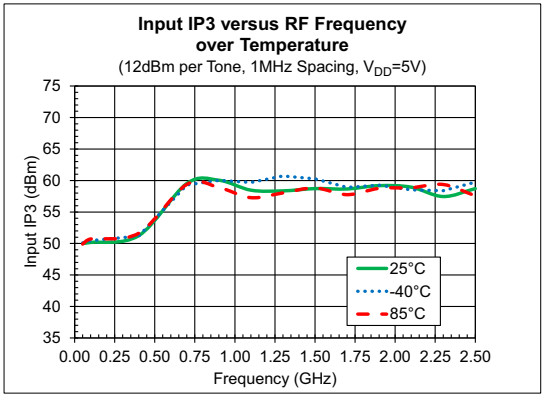


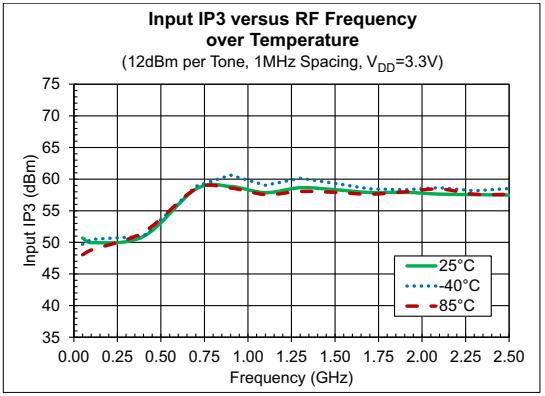


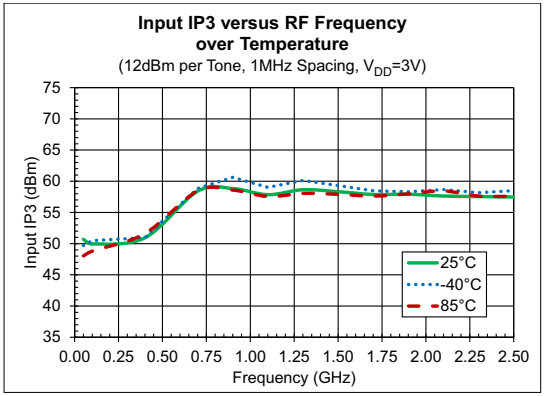
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

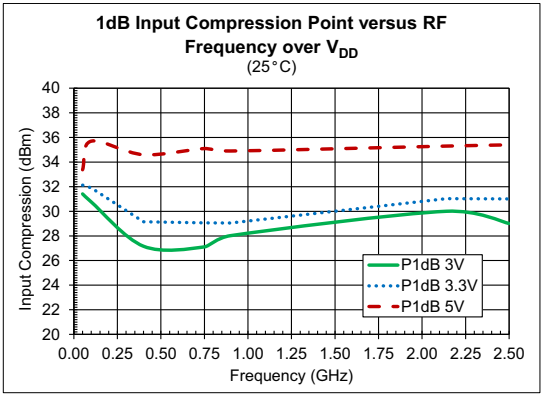
Typical Performance: Over Voltage and Temperature

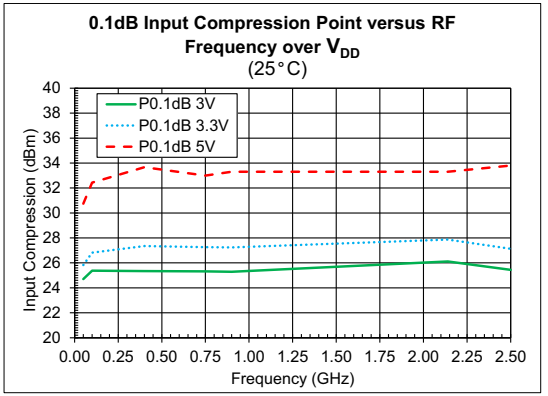




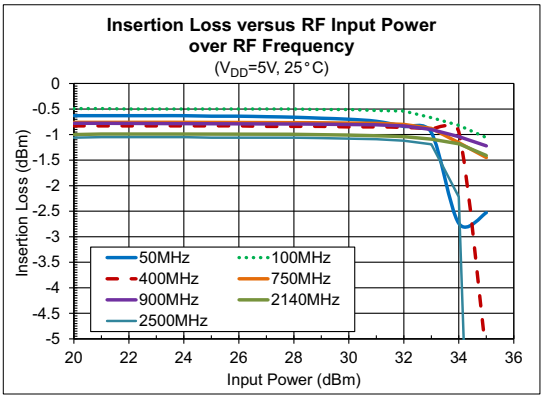


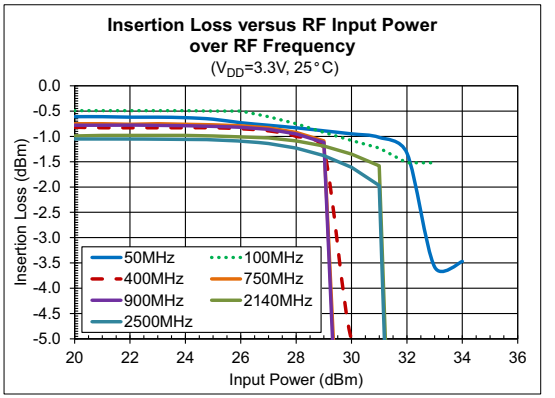


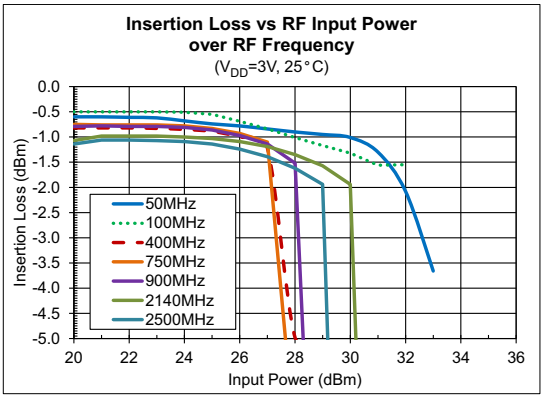


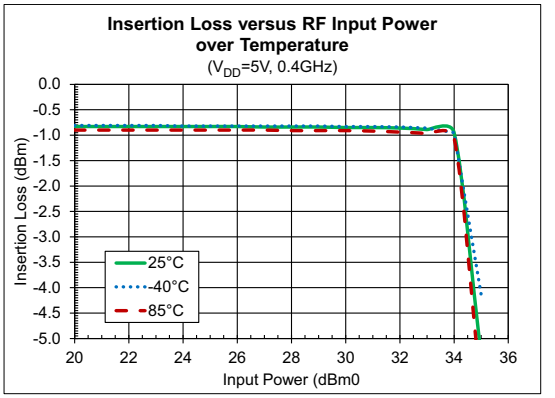


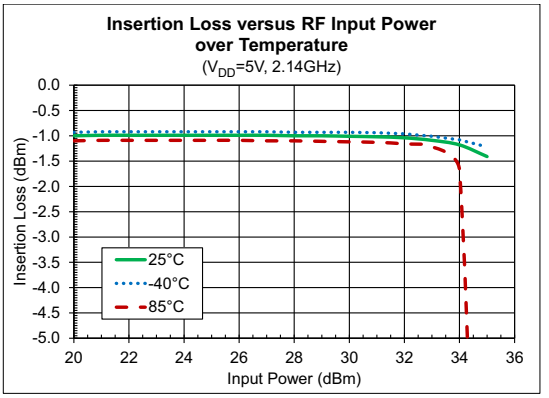
Typical Performance: T=25°C, V_{DD} = 5V unless otherwise noted

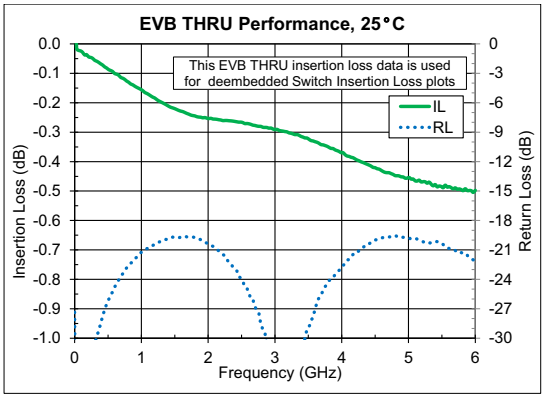








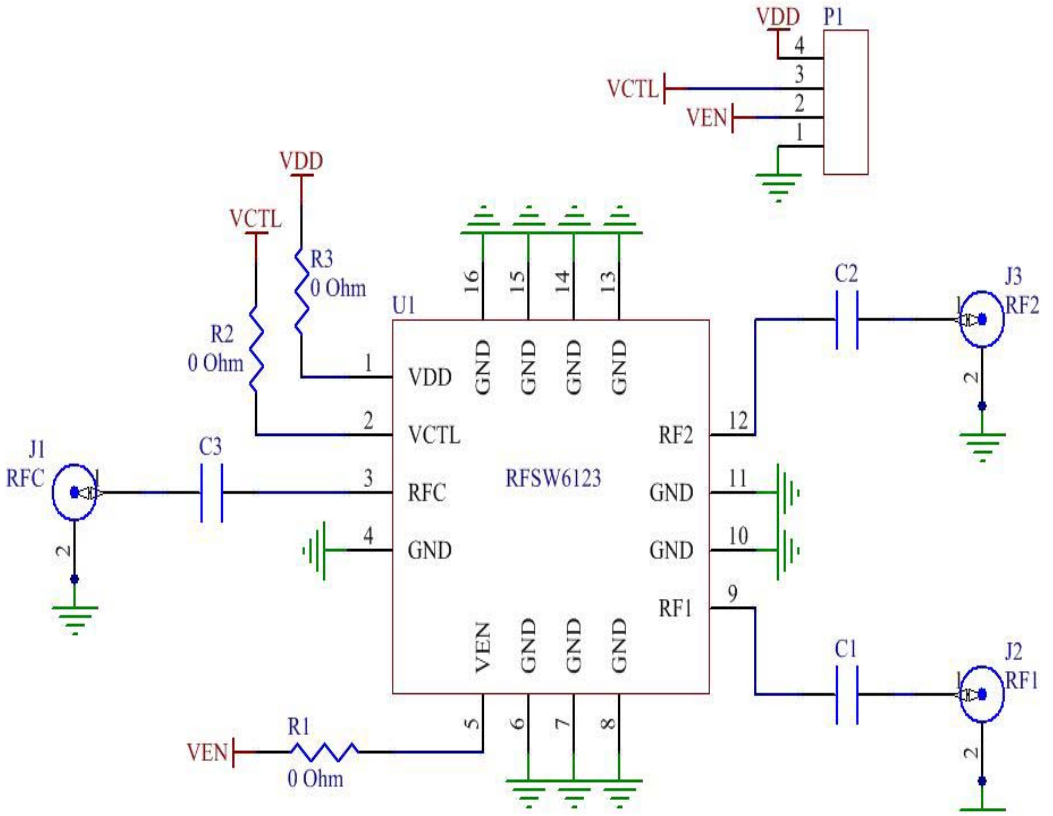




7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Evaluation Board Schematic

50MHz to 1000MHz Application Circuit



Evaluation Board Bill of Materials (BOM)

50MHz to 1000MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
CAP, 1000pF, 10%, 50V, X7R, 0402	C1-C3	Murata Electronics	GRM155R71H102KA01D
*Do not place	C4-C6		
RES, 0Ω, 0402	R1-R3	Kamaya, Inc.	RMC1/16SJPTH
*Do not place	L1-L3		
Switch Evaluation PCB	PCB	Kamaya, Inc.	SW6124-A
CONN, SMA, End Launch, 26.5GHz, 0.068	J1-J3	Gigalane Co, LTD	PSF-S01-008
CONN, HDR, ST. PLRZD, 4-Pin, 0.100"	P1	ITW Pancon	MPSS100-4-C
SPDT RF Switch	U1	RFMD	

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Evaluation Board Bill of Materials (BOM)

1000MHz to 3000MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
CAP, 100pF, 5%, 50V, C0G, 0402	C1-C3	Murata Electronics	GRM1555C1H101JA01D
*Do not place	C4-C6		
RES, 0Ω, 0402	R1-R3	Kamaya, Inc.	RMC1/16SJPTH
*Do not place	L1-L3		
Switch Evaluation PCB	PCB	Kamaya, Inc.	SW6124-A
CONN, SMA, End Launch, 26.5GHz, 0.068	J1-J3	Gigalane Co, LTD	PSF-S01-008
CONN, HDR, ST. PLRZD, 4-Pin, 0.100"	P1	ITW Pancon	MPSS100-4-C
SPDT RF Switch	U1	RFMD	

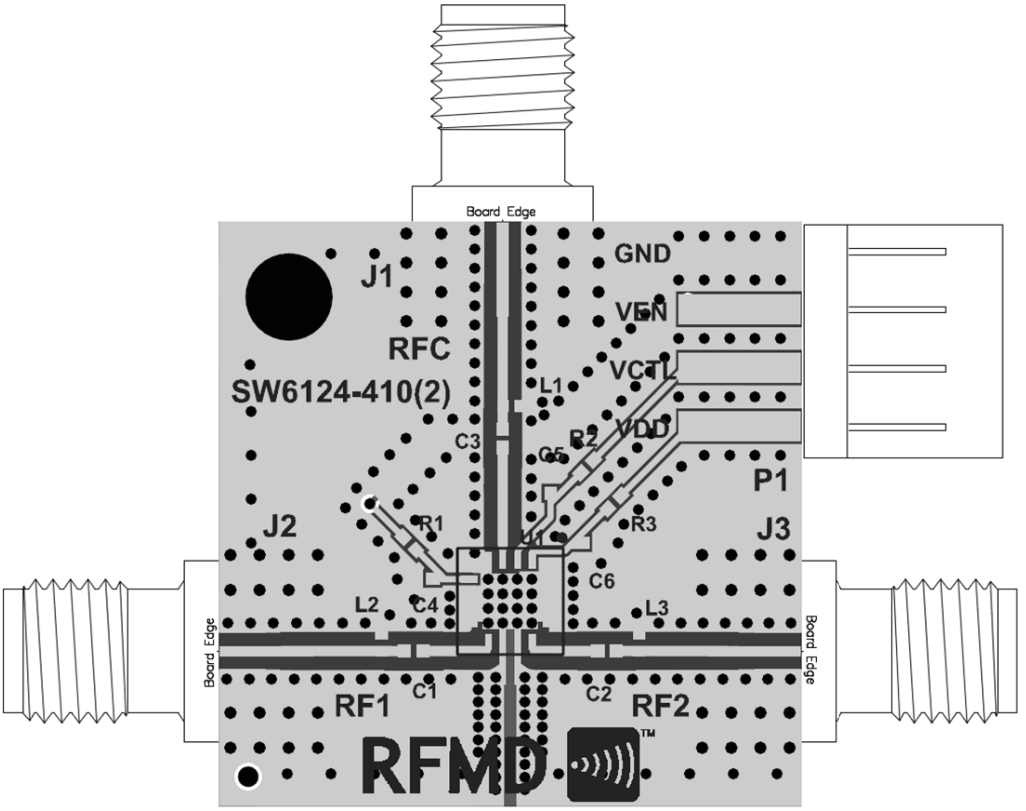
Evaluation Board Bill of Materials (BOM)

3000MHz to 6000MHz Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
CAP, 10pF, 5%, 50V, C0G, 0402	C1-C3	Murata Electronics	GRM1555C1H100JA01
*Do not place	C4-C6		
RES, 0Ω, 0402	R1-R3	Kamaya, Inc.	RMC1/16SJPTH
*Do not place	L1-L3		
Switch Evaluation PCB	PCB	Kamaya, Inc.	SW6124-A
CONN, SMA, End Launch, 26.5GHz, 0.068	J1-J3	Gigalane Co, LTD	PSF-S01-008
CONN, HDR, ST. PLRZD, 4-Pin, 0.100"	P1	ITW Pancon	MPSS100-4-C
SPDT RF Switch	U1	RFMD	

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Evaluation Board Assembly Drawing



Pin Names and Description

Pin	Name	Description
1	Vdd	Supply Voltage
2	Vctl	Logic Control Input
3	RFC	RF Common Port - external DC block required
4	NC	No Internal Connection
5	Ven	Enable Control Input
6	NC	No Internal Connection
7	NC	No Internal Connection
8	NC	No Internal Connection
9	RF1	RF Port 1 - external DC block required
10	NC	No Internal Connection
11	NC	No Internal Connection
12	RF2	RF Port 2 - external DC block required
13	NC	No Internal Connection
14	NC	No Internal Connection
15	NC	No Internal Connection
16	NC	No Internal Connection
EPAD	GND	RF & DC Ground. Must be soldered to EVB ground plane over a bed of vias.

Note: RFMD recommends that the NC pins be grounded on the EVB to maximize isolation.

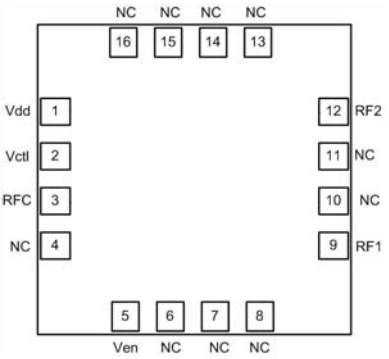
Truth Table

Control Input		Signal Path State	
Vctl	Ven	RFC-RF1	RFC-RF2
0	0	OFF	ON
1	0	ON	OFF
0	1	OFF	OFF
1	1	OFF	OFF

"0" = 0V to 0.8V
"1" = 2.0V to V_{DD}
V_{DD} = 3.0V to 5.0V, must be applied for all valid states

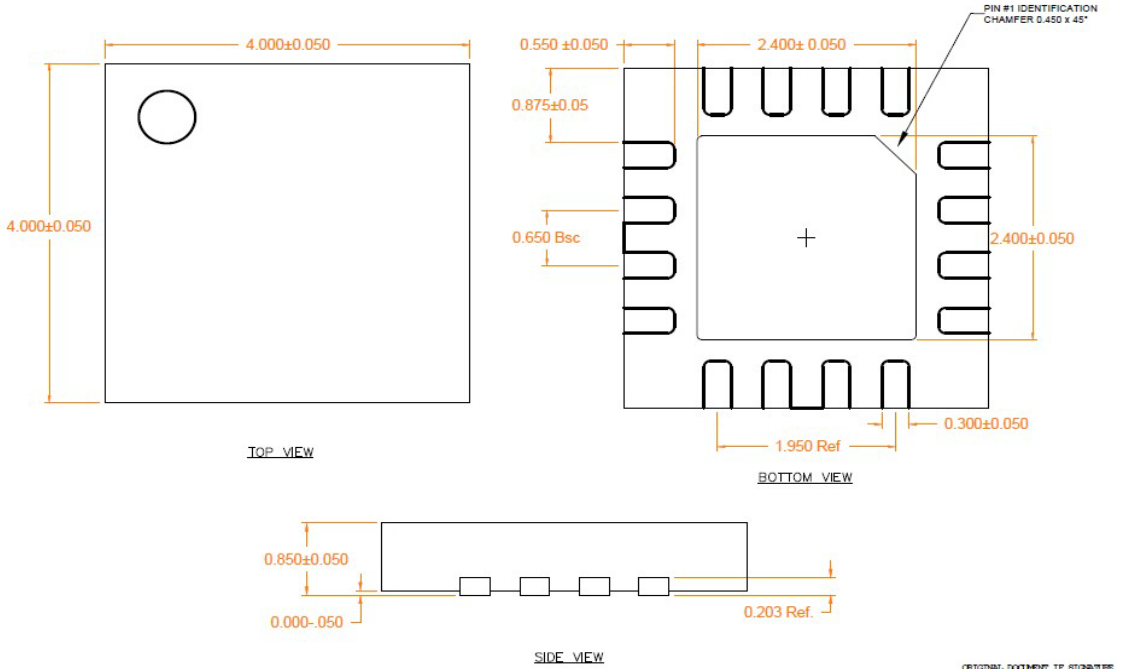
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.

Pin Out

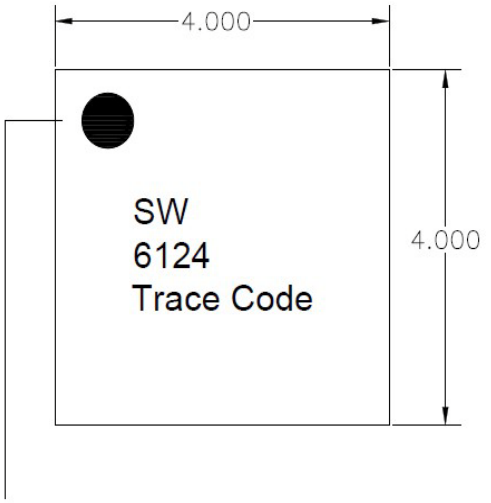


Package Outline Drawing

(Dimensions in millimeters)



Branding Diagram



Pin 1 Indicator

Trace Code to be assigned by SubCon

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at **(+1) 336-678-5570** or **customerservice@rfmd.com**.