rfmd.com

RF1200

BROADBAND HIGH POWER SPDT SWITCH

Package Style: QFN, 6-pin, 2x2

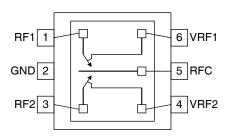


Features

- Low Frequency 2.5 GHz Operation
- Low Insertion Loss: 0.3dB at 1GHz
- High Isolation: 26dB at 1GHz
- Low Control Voltage: 2.6V to 5.0V
- Operation at 1.8V Control for Low Power Applications
- Excellent Harmonic Performance: -80dBc at 1GHz
- GaAs pHEMT Process

Applications

- Cellular Handset Applications
- Antenna Tuning Applications
- Multi-Mode GSM, WCDMA Applications
- IEEE802.11b/g WLAN Applications
- GSM/GPRS/EDGE Switch Applications
- Cellular Infrastructure Applications



Functional Block Diagram

Product Description

The RF1200 is a single-pole double-throw (SPDT) switch designed for general purpose switching applications which require very low insertion loss and high power handling capability. The RF1200 is ideally suited for battery operated applications requiring high performance switching with very low DC power consumption. The RF1200 features low insertion loss, low control voltage, high linearity, and very good harmonic characteristics. It is fabricated with $0.5 \mu m$ GaAs pHEMT process, and is packaged in a very compact 2 mmx 2 mm, 6-pin, leadless QFN package.

Ordering Information

RF1200 Broadband High Power SPDT Switch RF1200PCBA-410 Fully Assembled Evaluation Board

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	✓ GaAs pHEMT	☐ GaN HEM
GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ RF MEMS
InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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RF1200



Absolute Maximum Ratings

Parameter	Rating	Unit
Voltage	7.0	V
Maximum Input Power (OGHz to 2.5GHz)	+36	dBm
Operating Temperature	-30 to +85	°C
Storage Temperature	-35 to +100	°C



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 EUDirective 2002/95/EC (at time of this document revision).

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Nin. Typ. Max. Temp=25°C, V _{CONTROL} =2.65V	Parameter	Specification			Unit	Condition	
New York	T didiffictor	Min.	Тур.	Max.	Offic	Condition	
RF>ANT 0.3 0.4 dB RF ON, 0.88 GHz RF>ANT 0.4 0.5 dB RF ON, 1.88 GHz RF>ANT 0.5 0.6 dB RF ON, 2.10 GHz RF>ANT 0.55 0.65 dB RF ON, 2.45 GHz RF>ANT 26 27 dB RF ON, 0.475 GHz to 0.625 GHz RF>ANT 25 26 dB RF ON, 0.475 GHz to 0.625 GHz RF>ANT 21 22 dB RF ON, 0.88 GHz RF>ANT 19 20 dB RF ON, 0.475 GHz to 0.625 GHz RF>ANT 19 20 dB RF ON, 2.10 GHz RF>ANT 17 18 dB RF ON, 2.45 GHz ALTOSIDE TO 0.625 GHZ RFON, 2.45 GHZ AB RF ON, 2.45 GHZ ALTOSIDE TO 0.625 GHZ RFON, 2.45 GHZ AB RF ON, 2.45 GHZ ALTOSIDE TO 0.625 GHZ AB RF ON, 2.45 GHZ AB RF ON, 2.45 GHZ AB RF ON, 2.45 GHZ AB AB RF ON, 2.45 GHZ AB AB AB						Temp=25°C, V _{CONTROL} =2.65V	
RF>ANT 0.4 0.5 dB RF ON, 1.88GHz RF>ANT 0.5 0.6 dB RF ON, 2.10GHz RF>ANT 0.55 0.65 dB RF ON, 2.45GHz RF>ANT 0.55 0.65 dB RF ON, 2.45GHz RF>ANT 26 27 dB RF ON, 0.475GHz to 0.625GHz RF>ANT 21 22 dB RF ON, 0.88GHz RF>ANT 19 20 dB RF ON, 2.10GHz RF>ANT 17 18 dB RF ON, 2.45GHz 0.475GHz to 0.625GHz Harmonics BR FON, 2.45GHz BR FON, 2.45GHz 0.475GHz to 0.625GHz Harmonics BR FON, 2.45GHz BR FON, 2.45GHz 0.475GHz to 0.625GHz Harmonics BR FON, 2.45GHz BR FON, 2.45GHz 0.475GHz to 0.625GHz Harmonics PN=10dBm, 0.475GHz to 0.625GHz, 2f ₀ , VCONTROL = 4.5V 0.86Lz to 1GHz Harmonics BR FON, 2.45GHz PN=31.5dBm, 0.475GHz to 0.625GHz, 2f ₀ , VCONTROL = 4.5V 0.86Lz to 1GHz Harmonics BR FON, 2.45GHz PN=31.5dBm, 1.9GHz, 2f ₀ 1.7GHz	Insertion Loss						
RF>ANT 0.5 0.6 dB RF ON, 2.10GHz RF>ANT 0.55 0.65 dB RF ON, 2.45GHz RF>ANT 26 27 dB RF ON, 0.475GHz to 0.625GHz RF>ANT 25 26 dB RF ON, 0.475GHz to 0.625GHz RF>ANT 21 22 dB RF ON, 2.10GHz RF>ANT 19 20 dB RF ON, 2.10GHz RF>ANT 17 18 dB RF ON, 2.45GHz A475GHz to 0.625GHz Harmonics Harmonics PIN=10dBm, 0.475GHz to 0.625GHz, 2f _Q , VCONTROL = 4.5V Second Harmonic -132 -105 dBc PIN=10dBm, 0.475GHz to 0.625GHz, 2f _Q , VCONTROL = 4.5V O.8GHz to 1GHz Harmonics -132 -105 dBc PIN=10dBm, 0.475GHz to 0.625GHz, 2f _Q , VCONTROL = 4.5V O.8GHz to 1GHz Harmonics -132 -105 dBc PIN=31.5dBm, 0.845Hz, 2f _Q O.8GHz to 1GHz Harmonics -75 dBc PIN=31.5dBm, 0.88GHz, 2f _Q 1.7GHz to 2.0GHz Harmonics -80 dBc PIN=31.5dBm, 1.9GHz, 2f _Q 1.7GH	RF>ANT		0.3	0.4	dB	RF ON, 0.88GHz	
RF>ANT 0.55 0.65 dB RF ON, 2.45 GHz RF>ANT (solation) RF>ANT 26 27 dB RF ON, 0.475 GHz to 0.625 GHz RF>ANT 25 26 dB RF ON, 0.88 GHz RF>ANT 21 22 dB RF ON, 2.10 GHz RF>ANT 19 20 dB RF ON, 2.45 GHz AFSANT 17 18 dB RF ON, 2.45 GHz 0.475 GHz to 0.625 GHz Harmonics 4 -103 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5 V Third Harmonic -132 -105 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5 V 0.8GHz to 1 GHz Harmonics -132 -105 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5 V 0.8GHz to 1 GHz Harmonic -80 dBc P _{IN} =34.5 dBm, 0.88 GHz, 2f ₀ Third Harmonic -80 dBc P _{IN} =34.5 dBm, 0.88 GHz, 2f ₀ Third Harmonic -80 dBc P _{IN} =31.5 dBm, 1.9 GHz, 2f ₀ 1.7GHz to 2.0 GHz Harmonics -80 dBc P _{IN} =31.5 dBm, 1.9	RF>ANT		0.4	0.5	dB	RF ON, 1.88GHz	
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RF>ANT 26 27 dB RF ON, 0.475 GHz to 0.625 GHz RF>ANT 25 26 dB RF ON, 0.88 GHz RF>ANT 21 22 dB RF ON, 1.88 GHz RF>ANT 19 20 dB RF ON, 2.45 GHz RF>ANT 17 18 dB RF ON, 2.45 GHz A.475 GHz to 0.625 GHz Harmonics Second Harmonic -114 -103 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5V Third Harmonic -132 -105 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5V Second Harmonic -80 dBc P _{IN} =10 dBm, 0.475 GHz to 0.625 GHz, 2f ₀ , V _{CONTROL} =4.5V Third Harmonic -80 dBc P _{IN} =34.5 dBm, 0.88 GHz, 2f ₀ Third Harmonic -75 dBc P _{IN} =34.5 dBm, 0.88 GHz, 2f ₀ Third Harmonic -80 dBc P _{IN} =31.5 dBm, 1.9 GHz, 2f ₀ Third Harmonic -90 dBc P _{IN} =31.5 dBm, 1.9 GHz, 2f ₀ Third Harmonic -90 dBc P _{IN} =31.5 dBm, 1.9 GHz, 3f ₀	RF>ANT		0.55	0.65	dB	RF ON, 2.45 GHz	
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RF>ANT	RF>ANT	21	22		dB	RF ON, 1.88 GHz	
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Second Harmonic Second Har	0.475GHz to 0.625GHz						
No	Harmonics						
VCONTROL = 4.5 V	Second Harmonic		-114	-103	dBc		
Second Harmonic -80 dBc P _{IN} =34.5dBm, 0.88GHz, 2f ₀ Third Harmonic -75 dBc P _{IN} =34.5dBm, 0.88GHz, 3f ₀ 1.7 GHz to 2.0 GHz Harmonics Becond Harmonic -80 dBc P _{IN} =31.5dBm, 1.9GHz, 2f ₀ Second Harmonic -80 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ 2.45 GHz Harmonics -90 dBc P _{IN} =31.5dBm, 1.9GHz, 2f ₀ Third Harmonic -90 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ IMD Due to Out-of-Band Blocker Blocker Blocker AdBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss -105 dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz	Third Harmonic		-132	-105	dBc		
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Second Harmonic -80 dBc P _{IN} =31.5dBm, 1.9GHz, 2f ₀ Third Harmonic -80 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ 2.45 GHz Harmonics -90 dBc P _{IN} =31.5dBm, 1.9GHz, 2f ₀ Third Harmonic -90 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ IMD Due to Out-of-Band Blocker Blocker dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss 4090MHz	Third Harmonic		-75		dBc	P _{IN} =34.5dBm, 0.88GHz, 3f ₀	
Third Harmonic -80 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ 2.45 GHz Harmonics Second Harmonic -90 dBc P _{IN} =31.5dBm, 1.9GHz, 2f ₀ Third Harmonic -90 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ IMD Due to Out-of-Band Blocker RF>ANT -105 dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss	1.7GHz to 2.0GHz Harmonics						
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Third Harmonic -90 dBc P _{IN} =31.5dBm, 1.9GHz, 3f ₀ IMD Due to Out-of-Band Blocker Blocker dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz	2.45 GHz Harmonics						
IMD Due to Out-of-Band Blocker dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss Port Return Loss	Second Harmonic		-90		dBc	P _{IN} =31.5dBm, 1.9GHz, 2f ₀	
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Blocker dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz RF Port Return Loss -105 dBm P _{IN} =20dBm @ 1950MHz, P _{BLOCK} =-15dBm @ 4090MHz	IMD Due to Out-of-Band						
RF Port Return Loss 4090 MHz	Blocker						
	RF>ANT		-105		dBm		
RF>ANT 15 dB 0.5 GHz to 2.5 GHz	RF Port Return Loss						
	RF>ANT		15		dB	0.5GHz to 2.5GHz	





Parameter	Specification		Unit	Condition		
	Min.	Тур.	Max.	UIIIL	Condition	
Input Power at 0.1dB						
Compression Point						
	37			dBm	0.88 GHz	
	34			dBm	1.88GHz	
Switching Speed						
			5	us		

Note: Parameters hold at 25 °C and V_{CONTROL} = 2.65 V.

Switch Control Settings

	Control	Signals	Signal Paths		
·	VRF1 VRF2		RF1-RFC	RF2-RFC	
Valid States	1	0	ON	OFF	
	0	1	OFF	ON	
Invalid States	0	0	Indeterminate State*		
	1	1	Indeterminate State*		

0: Logic level low, 0V~0.2V

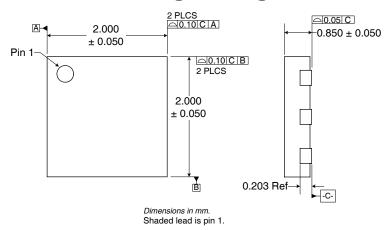
1: Logic level high, 2.6V~5.0V

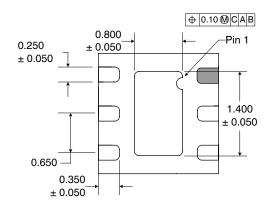
Note: In indeterminate states, both signal paths are ON with degraded performance.



Pin	Function	Description	Interface Schematic
1	RF1	First RF connection.	
2	GND	Ground.	
3	RF2	Second RF connection.	
4	VRF2	Second RF control.	
5	RFC	Common RF connection.	
6	VRF1	First RF control.	
Pkg	GND		
Base			

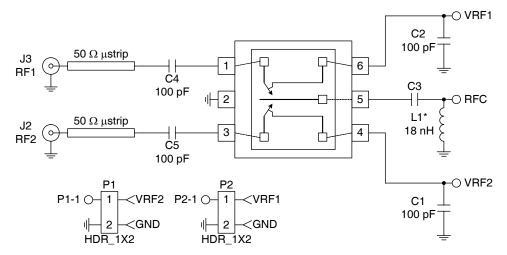
Package Drawing







Evaluation Board Schematic

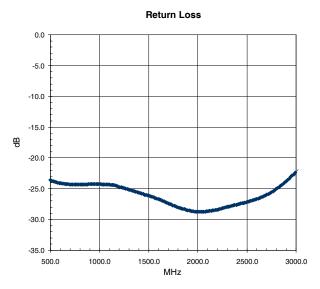


*L1 is optional for IEC61000-4-2 ESD protection.

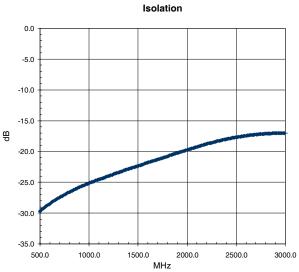


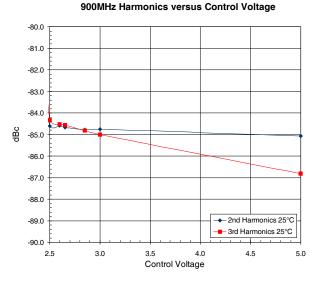
Typical Performance

Temp=25°C, V_{CONTROL}=2.65V

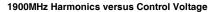


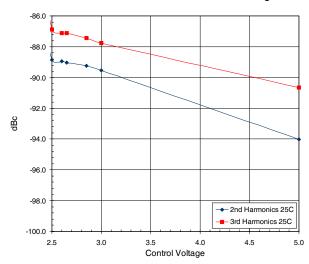












RoHS* Banned Material Content

RoHS Compliant: Yes

Package total weight in grams (; 0.01

Compliance Date Code: N/A

Bill of Materials Revision: 1200240A.5

Pb Free Category: e3

Bill of Materials	Parts Per Million (PPM)						
Dill of Materials	Pb	Cd	Hg	Cr VI	PBB	PBDE	
Die	0	0	0	0	0	0	
Molding Compound	0	0	0	0	0	0	
Lead Frame	0	0	0	0	0	0	
Die Attach Epoxy	0	0	0	0	0	0	
Wire	0	0	0	0	0	0	
Solder Plating	0	0	0	0	0	0	

This RoHS banned material content declaration was prepared solely on information, including analytical data, provided to RFMD by its suppliers, and applies to the Bill of Materials (BOM) revision noted above.

^{*} DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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