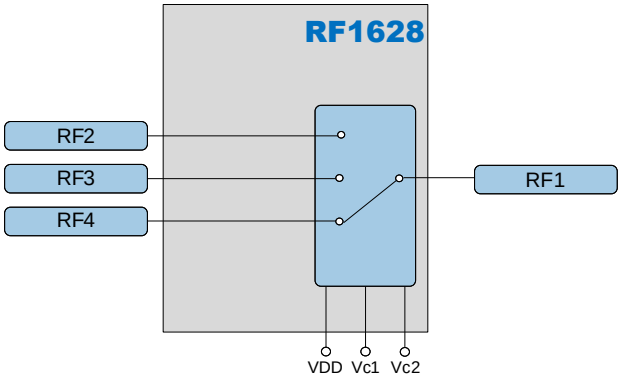
RF1628

SP3T SWITCH FOR 4G ROUTING & DIVERSITY APPLICATIONS

The RF1628 is a low loss, high isolation SP3T switch with performance optimized for 4G routing and diversity applications. The RF1628 is compatible with +1.35V control logic which is a key requirement for most cellular transceivers. The part is packaged in a compact 1.1mm x 1.1mm, 9-pin package, which allows for a small solution size and no need for external DC blocking capacitors unless DC is applied externally.



Functional Block Diagram

Package: 9 pin,
1.1mm x 1.1mm x 0.775mm

Features

- Broadband performance suitable for all cellular modulation schemes up to 2.7GHz
- Excellent insertion loss and isolation performance
- 0.5 dB Typ IL @ 2.7GHz
- Exceptional linearity performance ideal for CDMA, WCDMA applications
- Very low current consumption
- Very Compact 1.1mmx1.1mm module
- No External DC blocking Capacitors Required on RF Paths unless DC is applied externally

Applications

- 4G Routing and Diversity applications

Ordering Information

RF1628SB	Sample Bag with 5 pcs
RF1628SQ	Sample Bag with 25 pcs
RF1628SR	Sample Reel with 100 pcs
RF1628TR13	Standard 13” Reel with 5,000 pcs
RF1628PCK-410	Evaluation Board Kit

Absolute Maximum Ratings

Parameter	Rating	Unit
Power Supply (V_{DD})	4.5	V
Control Voltage (V_{C1}, V_{C2})	3.0	V
Maximum Input Power		
Momentary Infrequent Occurrence	+33.5 in 50Ω, 25°C +33.0 in 50Ω, 90°C +28.5 in 6:1, 90°C	dBm
Continuous Operation (CW/Peak)	+32.0 in 50Ω, 25°C +31.5 in 50Ω, 90°C +27.0 in 6:1, 90°C	dBm
Operating Temperature	-30 to +90	°C
Storage Temperature	-30 to +150	°C

Caution! ESD sensitive device.

RFMD Green: RoHS status based on EU Directive 2011/65/EU (at time of this document revision), halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

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.

Nominal Operating Parameters

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Overall					Nominal conditions unless otherwise stated. V_{DD} = 2.65V, Vctl High = 1.8V, Vctl Low = 0V, Temp = 25°C, 50Ω. All unused ports = 50Ω terminated
UMTS – Low Band					
Frequency Range					
	824		960	MHz	
Insertion Loss					
RF2 to RF1		0.30	0.42	dB	Frequency 824MHz to 960MHz
RF3 to RF1		0.30	0.42	dB	Frequency 824MHz to 960MHz
RF4 to RF1		0.30	0.42	dB	Frequency 824MHz to 960MHz
Isolation					
RF2 to RF3, RF2 to RF4, RF3 to RF4	28	38		dB	Frequency 824MHz to 960MHz; RF1 to RF4 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	20	39		dB	Frequency 824MHz to 960MHz; RF1 to RF3 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	31	38		dB	Frequency 824MHz to 960MHz; RF1 to RF2 active.
Harmonics					
RF2, RF3 or RF4 – RF1, $2F_o$		-78	-65	dBm	Pin=+26dBm, CW; Frequency 824MHz to 915MHz
RF2, RF3 or RF4 – RF1, $3F_o$		-73	-60	dBm	Pin=+26dBm, CW; Frequency 824MHz to 915MHz
RF2, RF3 or RF4 – RF1, up to 12.75GHz		-78	-69	dBm	Pin=+26dBm, CW; Frequency 824MHz to 915MHz
VSWR					
RF2, RF3 or RF4		1.3	1.5		Frequency 824MHz to 960MHz
RF1		1.3	1.5		Frequency 824MHz to 960MHz

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Overall (continued)					
UMTS – High Band					
Frequency Range					
	1710		2170	MHz	
Insertion Loss					
RF2 – RF1		0.45	0.57	dB	Frequency 1710MHz to 2170MHz
RF3 – RF1		0.45	0.57	dB	Frequency 1710MHz to 2170MHz
RF4 – RF1		0.45	0.57	dB	Frequency 1710MHz to 2170MHz
Isolation					
RF2 to RF3, RF2 to RF4, RF3 to RF4	21	38		dB	Frequency 1710MHz to 2170MHz; RF1 to RF4 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	13	29		dB	Frequency 1710MHz to 2170MHz; RF1 to RF3 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	24	29		dB	Frequency 1710MHz to 2170MHz; RF1 to RF2 active.
Harmonics					
RF2, RF3 or RF4 – RF1, $2F_o$		-77	-63	dBm	Pin = +26dBm, CW; Frequency 1710MHz to 1980MHz
RF2, RF3 or RF4 – RF1, $3F_o$		-67	-55	dBm	Pin = +26dBm, CW; Frequency 1710MHz to 1980MHz
RF2, RF3 or RF4 – RF1, up to 12.75GHz		-81	-72	dBm	Pin = +26dBm, CW; Frequency 1710MHz to 1980MHz
VSWR					
RF2, RF3 or RF4		1.3	1.5		Frequency 1710MHz to 2170MHz
RF1		1.3	1.5		Frequency 1710Mhz to 2170MHz
LTE – Low Band					
Frequency Range					
	704		787	MHz	B13/17
Insertion Loss					
RF2 to RF1		0.30	0.40	dB	Frequency 704MHz to 787MHz
RF3 to RF1		0.30	0.40	dB	Frequency 704MHz to 787MHz
RF4 to RF1		0.30	0.40	dB	Frequency 704MHz to 787MHz
Isolation					
RF2 to RF3, RF2 to RF4, RF3 to RF4	29	39		dB	Frequency 704MHz to 787MHz; RF4 to RF1 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	21	41		dB	Frequency 704MHz to 787MHz; RF3 to RF1 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	33	39		dB	Frequency 704MHz to 787MHz; RF2 to RF1 active.
Harmonics					
RF2, RF3 or RF4 – RF1, $2F_o$		-78	-66	dBm	Pin = +26dBm, CW; Frequency 704MHz to 787MHz
RF2, RF3 or RF4 – RF1, $3F_o$		-73	-62	dBm	Pin = +26dBm, CW; Frequency 704MHz to 787MHz
RF2, RF3 or RF4 – RF1, up to 12.75GHz		-78	-70	dBm	Pin = +26dBm, CW; Frequency 704MHz to 787MHz
VSWR					
RF2, RF3 or RF4		1.2	1.4		Frequency 704MHz to 787MHz
RF1		1.2	1.4		Frequency 704MHz to 787MHz

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Overall (continued)					
LTE – High Band					
Frequency Range					
	2300		2690	MHz	
Insertion Loss					
RF2 to RF1		0.50	0.70	dB	Frequency 2300MHz to 2690MHz
RF3 to RF1		0.50	0.70	dB	Frequency 2300MHz to 2690MHz
RF4 to RF1		0.50	0.70	dB	Frequency 2300MHz to 2690MHz
Isolation					
RF2 to RF3, RF2 to RF4, RF3 to RF4	18	24		dB	Frequency 2300MHz to 2690MHz; RF4 to RF1 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	12	26		dB	Frequency 2300MHz to 2690MHz; RF3 to RF1 active.
RF2 to RF3, RF2 to RF4, RF3 to RF4	22	26		dB	Frequency 2300MHz to 2690MHz; RF2 to RF1 active.
Harmonics					
RF2, RF3 or RF4 – RF1, $2F_O$		-78	-64	dBm	Pin = +26dBm, CW, 2570MHz
RF2, RF3 or RF4 – RF1, $3F_O$		-67	-54	dBm	Pin = +26dBm, CW, 2570MHz
RF2, RF3 or RF4 – RF1, up to 12.75GHz		-78	-67	dBm	Pin = +26dBm, CW, 2570MHz
VSWR					
RF2, RF3 or RF4		1.5	1.6		2300MHz to 2690MHz
RF1		1.5	1.6		2300MHz to 2690MHz
IMD2 (ANT to RF1/2/3/4)					
Low Band (B8)		-120	-116	dBm	F1 = 897.5MHz at +21dBm, F2 = 1840MHz at -15dBm, RX = 942.5MHz
High Band (B2)		-120	-116	dBm	F1 = 1880MHz at +21dBm, F2 = 3840MHz at -15dBm, RX = 1960MHz
Low Band (C2K, B5)		-118	-115	dBm	F1 = 824MHz at +21dBm, F2 = 1693MHz at -15dBm, RX = 869MHz
High Band (C2K)		-120	-116	dBm	F1 = 1850MHz at +21dBm, F2 = 3780MHz at -15dBm, RX = 1930MHz
IMD3 (ANT to RF1/2/3/4)					
Low Band (B8)		-120	-115	dBm	F1 = 897.5MHz at +21dBm, F2 = 852.5MHz at -15dBm, RX = 942.5MHz
High Band (B2)		-118	-113	dBm	F1 = 1880MHz at +21dBm, F2 = 1800MHz at -15dBm, RX = 1960MHz
DC Control and Electrical Spec					
V_{DD} - Switch Supply Voltage	2.5	2.65	4.0	V	
V_{DD} Supply Current		83	130	µA	Active Mode
V_{c1}, V_{c2} (Control Voltage) high	1.35	1.8	2.8	V	
V_{c1},V_{c2} (Control Voltage) Low	0	0	0.45	V	
V_{c1}, V_{c2} Current		0.5	1.0	µA	
Switching Speed		2	5	µs	10% to 90% RF

Control Logic

Mode	V_{C1}	V_{C2}
RF1-RF3	0	1
RF1-RF2	1	0
RF1-RF4	1	1

Power-Up, Power-down sequence

Power–up Sequence:

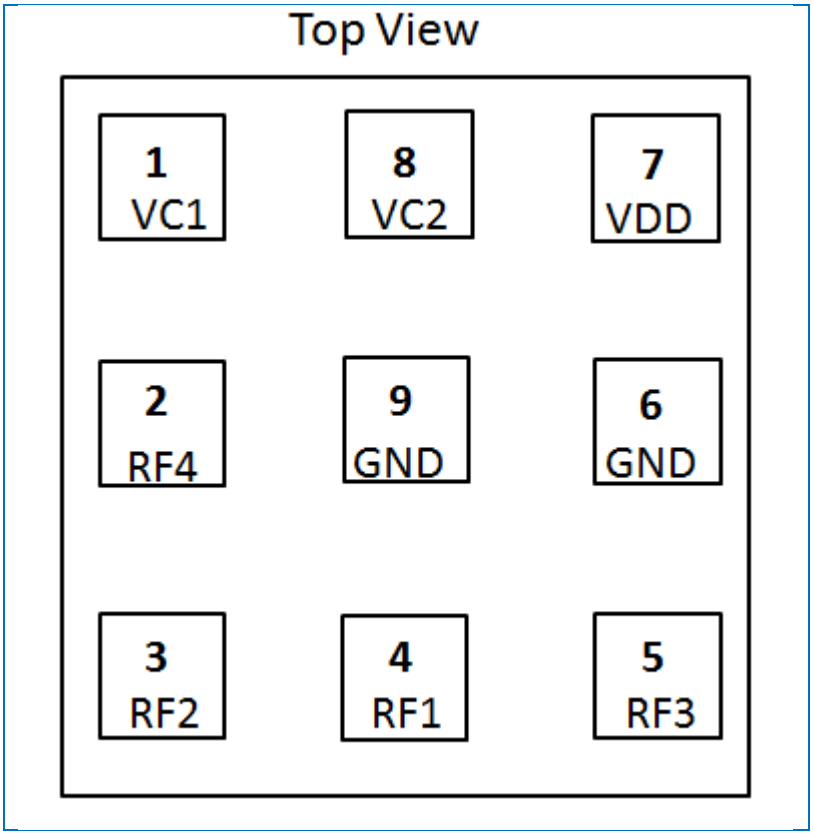
1) Apply V_{DD}
2) Apply V_{C1}, V_{C2}
3) Apply RF

Power-Down Sequence: The Power-down sequence is in the opposite order of the Power-up Sequence.

Not Following the power ON/OFF sequence could cause damage to the switch and may affect the long-term reliability of the device.

Pin Out

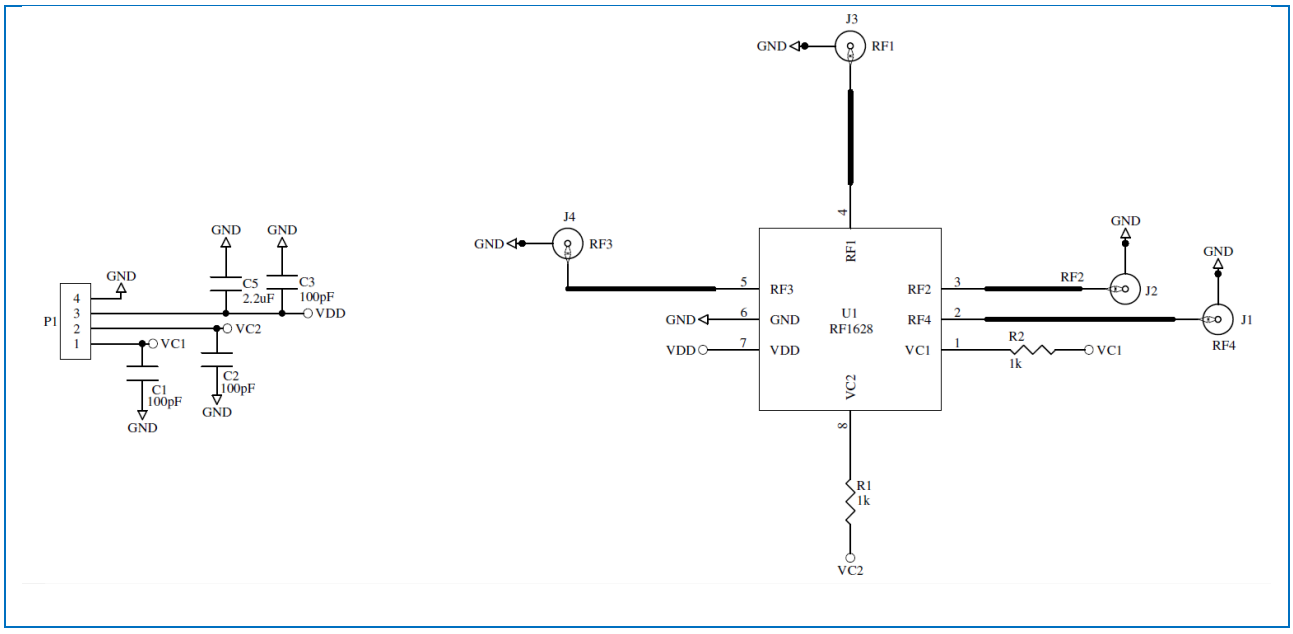
TOP VIEW



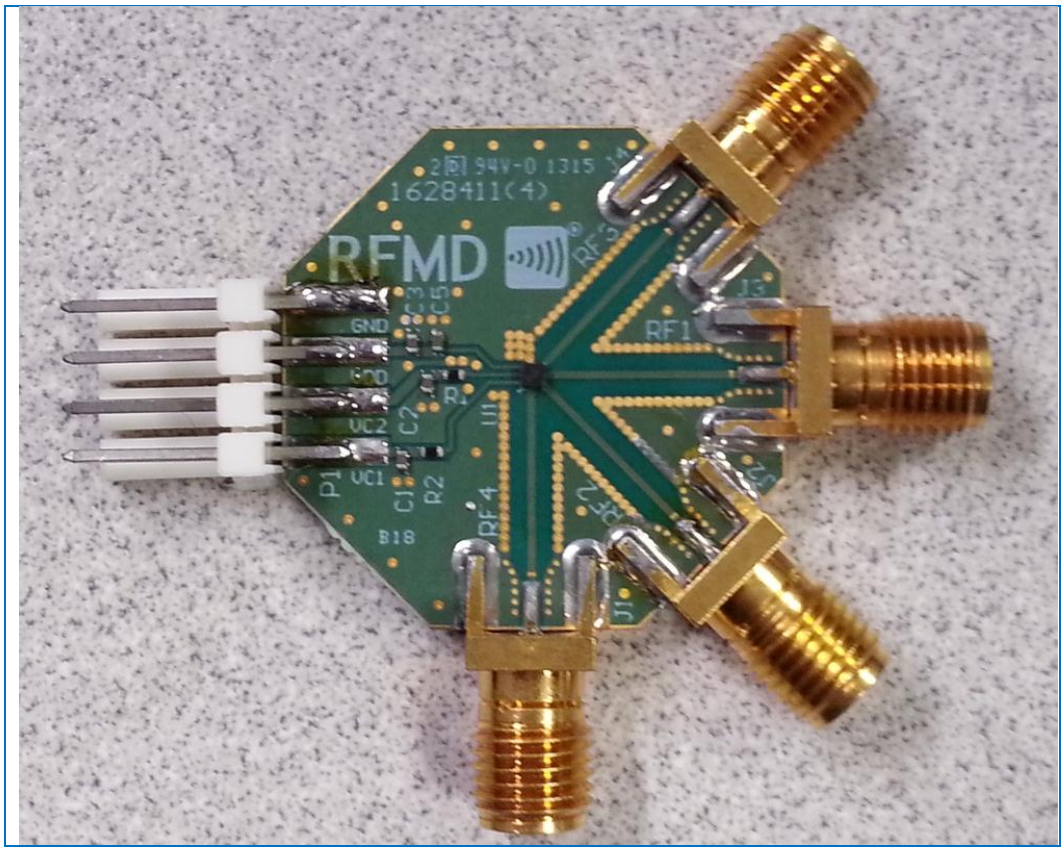
Pin-out Description

Pin	Function	Description
1	VC1	Switch logic control input
2	RF4	RF port
3	RF2	RF port
4	RF1	Antenna (Common port)
5	RF3	RF port
6	GND	Ground
7	VDD	Supply Voltage
8	VC2	Switch logic control input
9	GND	Ground

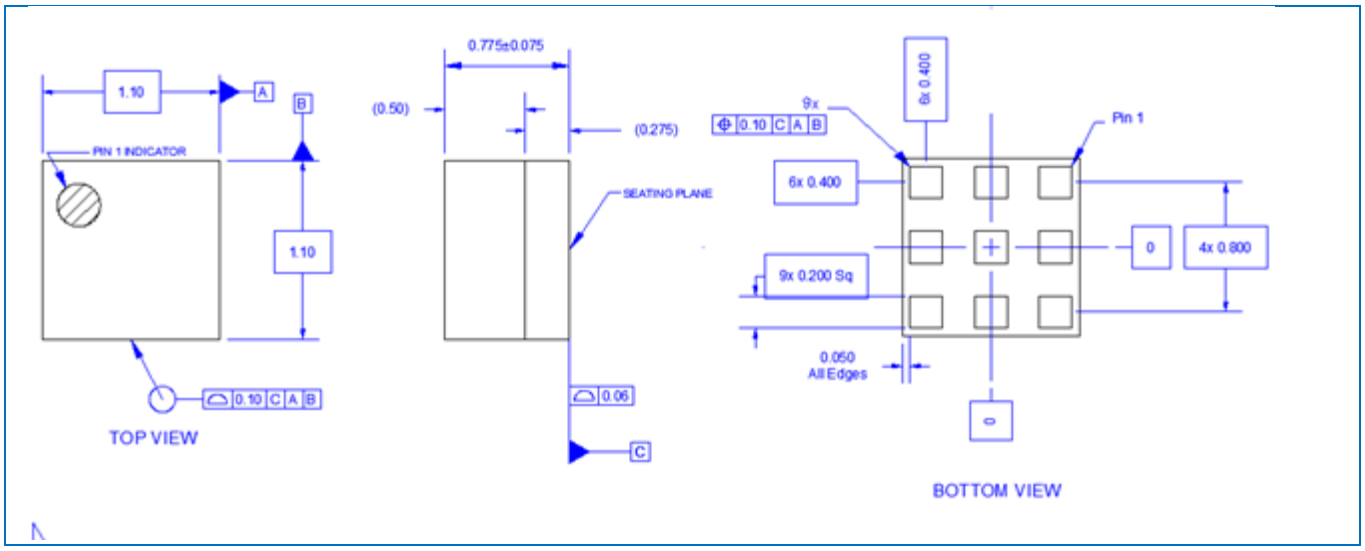
Evaluation Board Schematic



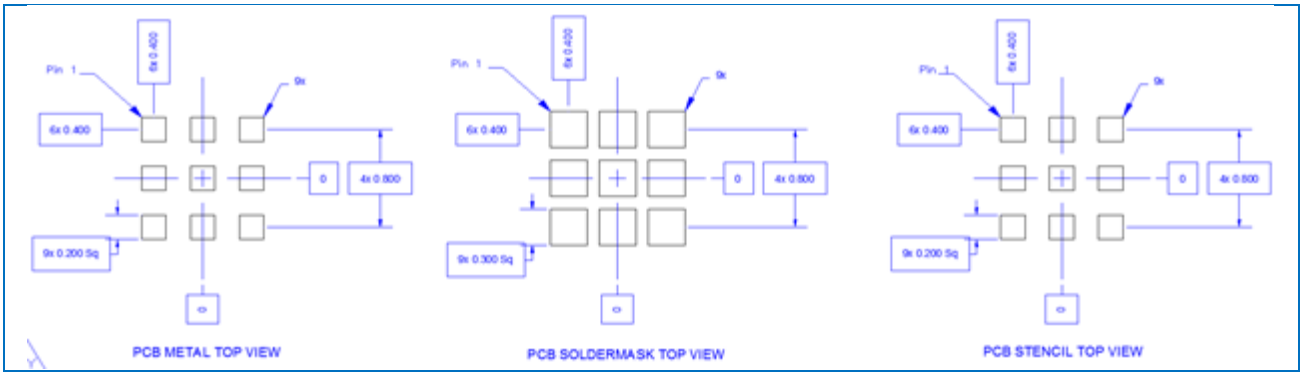
Evaluation Board



Package Outline



PCB Metal, Solder, and Stencil Patterns



Revision History

Revision	Release Date	Description
A	December 2013	Initial Release