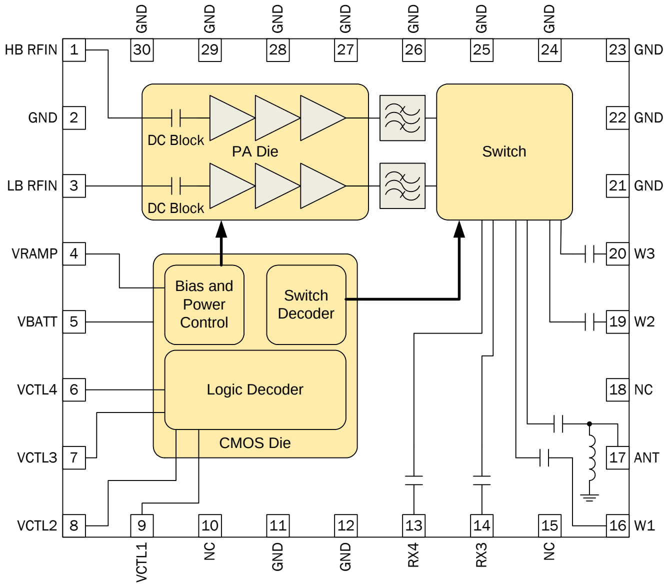
rfmd.com

RF3229

QUAD-BAND GMSK TXM,
2 RX AND 3 UMTS SWITCH PORTS

Package Style: Module, 7.00mmx6.00mmx1.00mm



Functional Block Diagram

Features

- Three High Linearity, Low Loss, UMTS Switch Ports
- UMTS Port to Port Isolation >20dB
- Improved Power Flatness Into VSWR Through Integrated 2.5A Current Limiter
- Low Harmonics Into VSWR
- Excellent Switching Spectrum over Extreme Conditions
- GSM850 Max PAE 41%
- EGSM900 Max PAE 38%
- DCS1800 Max PAE 38%
- PCS1900 Max PAE 40%
- All RF Ports Have Internal DC Blocking
- Drive Level 0dBm to 6dBm
- Proven *PowerStar*® Architecture

Applications

- Battery Powered 3G Handsets
- GSM850/EGSM900/DCS/PCS Products
- Multislot Class 12 Products (4TX, 4RX Timeslots)

Product Description

The RF3229 is a high-power, high-efficiency transmit module with integrated power control, an integrated pHEMT front end switch, and harmonic filtering functionality. This device is self-contained with 50Ω input and output terminals and no external matching circuits required. The device is designed for use as the last portion of the transmit chain in GMSK architectures in GSM850, EGSM900, DCS, and PCS handheld digital cellular equipment where UMTS pass-through ports are needed. The RF3229 high performance transmit module offers mobile handset designers a compact, easy-to-use, front-end solution for multi-mode, multi-band systems.

Ordering Information

RF3229	Quad-Band GMSK TXM, 2 RX and 3 UMTS Switch Ports
RF3229 SB	5-Piece Module Sample Pack
RF3229PCBA-410	Fully Assembled Evaluation Board

Optimum Technology Matching® Applied

☑ GaAs HBT
☐ GaAs MESFET
☐ InGaP HBT
☐ SiGe BiCMOS
☐ Si BiCMOS
☐ SiGe HBT
☑ GaAs pHEMT
☑ Si CMOS
☐ Si BJT
☐ GaN HEMT
☐ RF MEMS
☐ LDMOS

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage in Standby Mode	-0.5 to +6.0	V
Supply Voltage in Idle Mode	-0.5 to +6.0	V
Supply Voltage in Operating Mode (Operation time less than 100ms; $V_{RAMP} \leq 1.6V$)	-0.5 to +6.0	V
DC Continuous current during burst	2.8	A
VCTL 1 - 4	-0.5 to +3.0	V
Power Control Voltage (V_{RAMP})	-0.5 to +1.8	V
Input RF Power	+12	dBm
Duty Cycle with power reduction per 3GPP Power Profile 2	50	%
Output Load VSWR (See Ruggedness Specification)	20:1	
Operating Temperature	-30 to +85	°C
Storage Temperature	-55 to +150	°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 EU Directive 2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
General Operating Conditions					
Operating Temperature	-20	25	85	°C	Specified operating range.
V_{BATT} Supply Voltage	3.2	3.6	4.6	V	Specified operating range.
	3		4.8	V	Functional operating range.
V_{BATT} Supply Current					
Off State		0.1	10	uA	Mode=Standby
Antenna Switch Active (RX path)		60	150	uA	Mode=RXn (n=3, 4)
Antenna Switch Active (W path)		60	150	uA	Mode=Wn (n=1, 2, 3)
Transmit Mode with Current Limit		2300	2600	mA	Mode=TX LB, TX HB
V_{RAMP} Input					
GMSK Operation	0.2		1.6	V	V_{RAMP} voltage controls saturated power
Impedance	50kΩ		10pF		Worst Case is 50kΩ in Parallel with 5pF
VCTL 1-4					Logic control voltages
Logic Low Voltage	0	0	0.5	V	
Logic High Voltage	1.3	2.0	3.0	V	
Logic High Current		0.1	10	uA	
RF Input and Output Impedance		50		Ω	Pins 1, 3, 13, 14, 16, 17, 19, 20

Module Control Logic

Mode	VCTL1	VCTL2	VCTL3	VCTL4
Standby	0	0	0	0
TX LB	0	0	0	1
TX HB	0	0	1	1
RX3	1	X	1	1
RX4	1	X	1	0
W1	0	0	1	0
W2	0	1	0	0
W3	0	1	1	0

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
GSM850 Band GMSK Parameters					Unless otherwise stated: All unused RF ports terminated in 50Ω, Input and Output=50Ω, Temperature=25°C, V_{BATT}=3.6V, Mode=TX LB, GSM timeslots≤2, P_{IN}=3dBm, V_{RAMP}=Max
Operating Frequency	824		849	MHz	
Input Power (P_{IN})	0	3	6	dBm	
Input VSWR			3:1	Ratio	V_{RAMP}=0.25V to 1.6V
Maximum Output Power (Nominal)	32.7	33.7		dBm	Temp=+25°C, V_{BATT}=3.6V
Maximum Output Power (Extreme)	30.7	31.7		dBm	P_{IN}=0dBm, Temp=+85°C, V_{BATT}=3.2V
Power Added Efficiency (Max Power)	36	41		%	
Power Added Efficiency (Rated Power)	32	37		%	P_{OUT}=32.7dBm
Peak Supply Current (Rated Power)	800	1400	1615	mA	P_{OUT}=32.7dBm
Peak Supply Current (Low Power)	70	120	160	mA	P_{OUT}=5dBm
Receive Band Noise Power					P_{OUT}≤32.7dBm, Bandwidth=100kHz
869MHz to 894MHz (CEL)		-88	-82	dBm	20MHz noise
1930MHz to 1990MHz (PCS)		-117	-90	dBm	Out of band noise
Harmonics					V_{RAMP}=V_{RAMP}RP
$2F_0$		-40	-33	dBm	
$3F_0$		-40	-33	dBm	
$4F_0$ to 12.75GHz		-40	-33	dBm	
Stability Under Load Mismatch (Spurious Emissions)			-36	dBm	Output Load VSWR=15:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Ruggedness Under Load Mismatch	No damage or permanent degradation to device				Output Load VSWR=20:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Forward Isolation 1		-48	-40	dBm	Mode=Standby, P_{IN}=Max, V_{RAMP}=Min
Forward Isolation 2		-28	-20	dBm	Mode=TX LB, P_{IN}=Max, V_{RAMP}=Min

Notes:
V_{RAMP}RP is defined as the V_{RAMP} voltage required to achieve 32.7dBm at V_{BATT}=3.6V, Temperature=25°C, P_{IN}=3dBm

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
GSM900 Band GMSK Parameters					**Unless otherwise stated:** All unused RF ports terminated in 50Ω, Input and Output $=50\Omega$, Temperature $=25°C$, $V_{BATT}=3.6V$, Mode=TX LB, GSM timeslots ≤ 2, $P_{IN}=3dBm$, V_{RAMP}=Max
Operating Frequency	880		915	MHz	
Input Power (P_{IN})	0	3	6	dBm	
Input VSWR			3:1	Ratio	$V_{RAMP}=0.25V$ to $1.6V$
Maximum Output Power (Nominal)	32.7	33.2		dBm	Temp=+25°C, $V_{BATT}=3.6V$
Maximum Output Power (Extreme)	30.7	31.2		dBm	$P_{IN}=0dBm$, Temp=+85°C, $V_{BATT}=3.2V$
Power Added Efficiency (Max Power)	33	38		%	
Power Added Efficiency (Rated Power)	32	36		%	$P_{OUT}=32.7dBm$
Peak Supply Current (Rated Power)	800	1435	1615	mA	$P_{OUT}=32.7dBm$
Peak Supply Current (Low Power)	70	120	160	mA	$P_{OUT}=5dBm$
Receive Band Noise Power					$P_{OUT}\leq 32.7dBm$, Bandwidth=100kHz
925MHz to 935MHz (EGSM)		-81	-78	dBm	10MHz noise
935MHz to 960MHz (EGSM)		-89	-83	dBm	20MHz noise
1805MHz to 1880MHz (DCS)		-117	-90	dBm	Out of band noise.
Harmonics					$V_{RAMP}=V_{RAMP}RP$
$2F_0$		-40	-33	dBm	
$3F_0$		-40	-33	dBm	
$4F_0$ to 12.75GHz		-40	-33	dBm	
Stability Under Load Mismatch (Spurious Emissions)			-36	dBm	Output Load VSWR=15:1, All phase angles, Temp=-20°C to +85°C, $V_{BATT}=3.2V$ to $4.6V$, $V_{RAMP}\leq V_{RAMP}RP$
Ruggedness Under Load Mismatch	No damage or permanent degradation to device				Output Load VSWR=20:1, All phase angles, Temp=-20°C to +85°C, $V_{BATT}=3.2V$ to $4.6V$, $V_{RAMP}\leq V_{RAMP}RP$
Forward Isolation 1		-48	-40	dBm	Mode=Standby, P_{IN}=Max, V_{RAMP}=Min
Forward Isolation 2		-28	-20	dBm	Mode=TX LB, P_{IN}=Max, V_{RAMP}=Min

Notes:
$V_{RAMP}RP$ is defined as the V_{RAMP} voltage required to achieve 32.7dBm at $V_{BATT}=3.6V$, Temperature=25°C, $P_{IN}=3dBm$

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
DCS1800 Band GMSK Parameters					**Unless otherwise stated:** All unused RF ports terminated in 50Ω, Input and Output=50Ω, Temperature=25°C, V_{BATT}=3.6V, Mode=TX HB, GSM timeslots≤2, P_{IN}=3dBm, V_{RAMP}=Max
Operating Frequency	1710		1785	MHz	
Input Power (P_{IN})	0	3	6	dBm	
Input VSWR			3:1	Ratio	V_{RAMP}=0.25V to 1.6V
Maximum Output Power (Nominal)	30	31		dBm	Temp=+25°C, V_{BATT}=3.6V
Maximum Output Power (Extreme)	27.5	29		dBm	P_{IN}=0dBm, Temp=+85°C, V_{BATT}=3.2V
Power Added Efficiency (Max Power)	33	38		%	
Power Added Efficiency (Rated Power)	30	33		%	P_{OUT}=30.0dBm
Peak Supply Current (Rated Power)	450	830	930	mA	P_{OUT}=30.0dBm
Peak Supply Current (Low Power)	70	115	160	mA	P_{OUT}=0dBm
Receive Band Noise Power					P_{OUT}≤33.0dBm, Bandwidth=100kHz
925MHz to 960MHz (EGSM)		-102	-90	dBm	Out of band noise
1805MHz to 1880MHz (DCS)		-90	-78	dBm	20MHz noise
Harmonics					V_{RAMP}=V_{RAMP}RP
$2F_0$		-40	-33	dBm	
$3F_0$		-40	-33	dBm	
Other Harmonics, $4F_0$ to 12.75GHz		-40	-31	dBm	
Stability Under Load Mismatch (Spurious Emissions)			-36	dBm	Output Load VSWR=15:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Ruggedness Under Load Mismatch	No damage or permanent degradation to device				Output Load VSWR=20:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Forward Isolation 1		-58	-40	dBm	Mode=Standby, P_{IN}=Max, V_{RAMP}=Min
Forward Isolation 2		-25	-20	dBm	Mode=TX HB, P_{IN}=Max, V_{RAMP}=Min

Notes:
V_{RAMP}RP is defined as the V_{RAMP} voltage required to achieve 30.0dBm at V_{BATT}=3.6V, Temperature=25°C, P_{IN}=3dBm

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
PCS1900 Band GMSK Parameters					**Unless otherwise stated:** All unused RF ports terminated in 50Ω, Input and Output=50Ω, Temperature=25°C, V_{BATT}=3.6V, Mode=TX HB, GSM timeslots≤2, P_{IN}=3dBm, V_{RAMP}=Max
Operating Frequency	1850		1910	MHz	
Input Power (P_{IN})	0	3	6	dBm	
Input VSWR			3:1	Ratio	V_{RAMP}=0.25V to 1.6V
Maximum Output Power (Nominal)	30	31		dBm	Temp=+25°C, V_{BATT}=3.6V
Maximum Output Power (Extreme)	27.5	29		dBm	P_{IN}=0dBm, Temp=+85°C, V_{BATT}=3.2V
Power Added Efficiency (Max Power)	35	40		%	
Power Added Efficiency (Rated Power)	30	35		%	P_{OUT}=30.0dBm
Peak Supply Current (Rated Power)	450	790	930	mA	P_{OUT}=30.0dBm
Peak Supply Current (Low Power)	70	115	160	mA	P_{OUT}=0dBm
Receive Band Noise Power					P_{OUT}≤30.0dBm, Bandwidth=100kHz
869MHz to 894MHz (EGSM)		-106	-90	dBm	Out of band noise
1930MHz to 1990MHz (PCS)		-86	-78	dBm	20MHz noise
Harmonics					V_{RAMP}=V_{RAMP}RP
$2F_0$		-40	-33	dBm	
$3F_0$		-40	-33	dBm	
$6F_0$		-35	-30	dBm	
Other Harmonics, $4F_0$ to 12.75GHz		-40	-31	dBm	
Stability Under Load Mismatch (Spurious Emissions)			-36	dBm	Output Load VSWR=15:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Ruggedness Under Load Mismatch	No damage or permanent degradation to device				Output Load VSWR=20:1, All phase angles, Temp=-20°C to +85°C, V_{BATT}= 3.2V to 4.6V, V_{RAMP}≤V_{RAMP}RP
Forward Isolation 1		-58	-40	dBm	Mode=Standby, P_{IN}=Max, V_{RAMP}=Min
Forward Isolation 2		-25	-20	dBm	Mode=TX HB, P_{IN}=Max, V_{RAMP}=Min

Notes:
V_{RAMP}RP is defined as the V_{RAMP} voltage required to achieve 30.0dBm at V_{BATT}=3.6V, Temperature=25°C, P_{IN}=3dBm

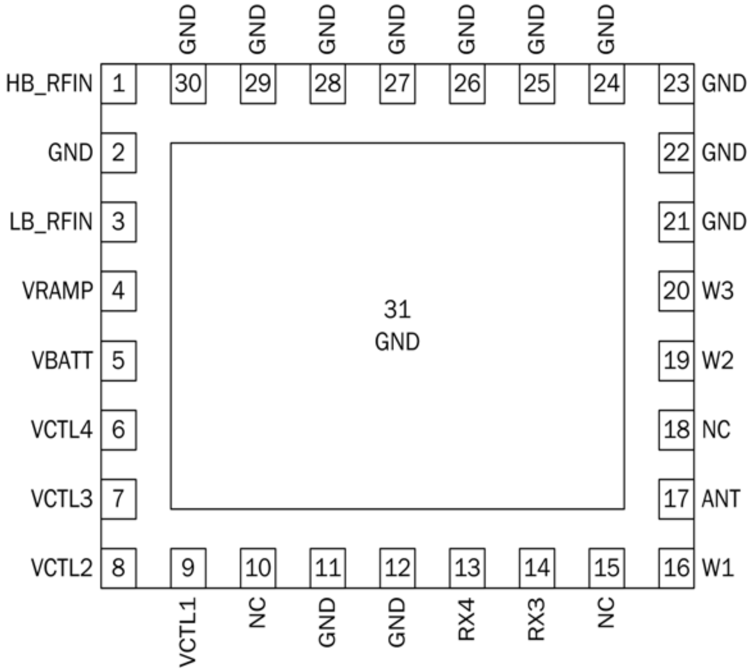
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Antenna Switch					Unless otherwise stated: All unused RF ports terminated in 50Ω, Input and Output=50Ω, Temperature=25°C, V_{BATT}=3.6V, Mode=(See Module Control Logic), GSM timeslots≤2
Operating Frequency Range 1	824		960	MHz	
Operating Frequency Range 2	1710		1910	MHz	
Operating Frequency Range 3	1920		2170	MHz	
Input Power W1, W2, W3			32	dBm	
Input Power RX3, RX4			13	dBm	
Input VSWR			1.6:1	Ratio	
Insertion Loss					Corrected for Evaluation Board loss
W1 - W3 ports (824MHz to 960MHz)		0.7	1.0	dB	Freq=824MHz to 960MHz
W1 - W3 ports (1710MHz to 1910MHz)		1.1	1.5	dB	Freq=1710MHz to 1910MHz
W1 - W3 ports (1920MHz to 2170MHz)		1.2	1.5	dB	Freq=1920MHz to 2170MHz
RX3 - RX4 ports (869MHz to 960MHz)		1.0	1.3	dB	Freq =869MHz to 960MHz
RX3 - RX4 ports (1805MHz to 1880MHz)		1.2	1.7	dB	Freq=1805MHz to 1880MHz
RX3 - RX4 ports (1930MHz to 1990MHz)		1.3	1.7	dB	Freq=1930MHz to 1990MHz
Isolation/Leakage					
Leakage LBTX to RX port		-5	5	dBm	GMSK transmit at rated power
Leakage HBTX to RX port		-5	5	dBm	GMSK transmit at rated power
Leakage LBTX to W port		10	12	dBm	GMSK transmit at rated power
Leakage HBTX to W port		5	12	dBm	GMSK transmit at rated power
Isolation LB W port to RX port	26	38		dB	Freq=824MHz to 915MHz
Isolation HB W port to RX port	26	35		dB	Freq=1710MHz to 1980MHz
Isolation LB W port to W port	20	24		dB	Freq=824MHz to 915MHz
Isolation HB W port to W port	20	24		dB	Freq=1710MHz to 1980MHz
Harmonics UMTS Ports					
Harmonics LB $2F_0$		-60	-45	dBm	P_{IN}=28dBm CW, F_0=824MHz to 915MHz
Harmonics LB $3F_0$		-58	-45	dBm	P_{IN}=28dBm CW, F_0=824MHz to 915MHz
Harmonics LB $4F_0$ to 12.75GHz		-73	-45	dBm	P_{IN}=28dBm CW, F_0=824MHz to 915MHz
Harmonics HB $2F_0$		-60	-45	dBm	P_{IN}=28dBm CW, F_0=1710MHz to 1980MHz
Harmonics HB $3F_0$		-70	-45	dBm	P_{IN}=28dBm CW, F_0=1710MHz to 1980MHz
Harmonics HB $4F_0$ to 12.75GHz		-72	-45	dBm	P_{IN}=28dBm CW, F_0=1710MHz to 1980MHz

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Antenna Switch, cont.					**Unless otherwise stated:** All unused RF ports terminated in 50Ω, Input and Output=50Ω, Temperature=25°C, V_{BATT}=3.6V, Mode=(See Module Control Logic), GSM timeslots≤2
Intermodulation Products (Linearity) UMTS Ports					F_0=20dBm signal on UMTS port, F_{INT}=-15dBm signal on ANT port, frequency=(F_{IM}-m*F_0)/n, F_{IM}=Spur signal within RX band, created by intermod product, measured at UMTS port
IMD2 (F_0=824MHz to 915MHz)		-110	-97	dBm	F_0=824MHz to 915MHz, F_{INT}=(F_{IM}-1*F_0)/1, (F_{IM}-(-1)*F_0)/1
IMD3 (F_0=824MHz to 915MHz)		-115	-97	dBm	F_0=824MHz to 915MHz, F_{INT}=(F_{IM}-2*F_0)/-1, (F_{IM}-(-2)*F_0)/1
IMD2 (F_0=1710MHz to 1980MHz)		-115	-97	dBm	F_0=1710MHz to 1980MHz, F_{INT}=(F_{IM}-1*F_0)/1, (F_{IM}-(-1)*F_0)/1
IMD3 (F_0=1710MHz to 1980MHz)		-108	-97	dBm	F_0=1710MHz to 1980MHz, F_{INT}=(F_{IM}-2*F_0)/-1, (F_{IM}-(-2)*F_0)/1

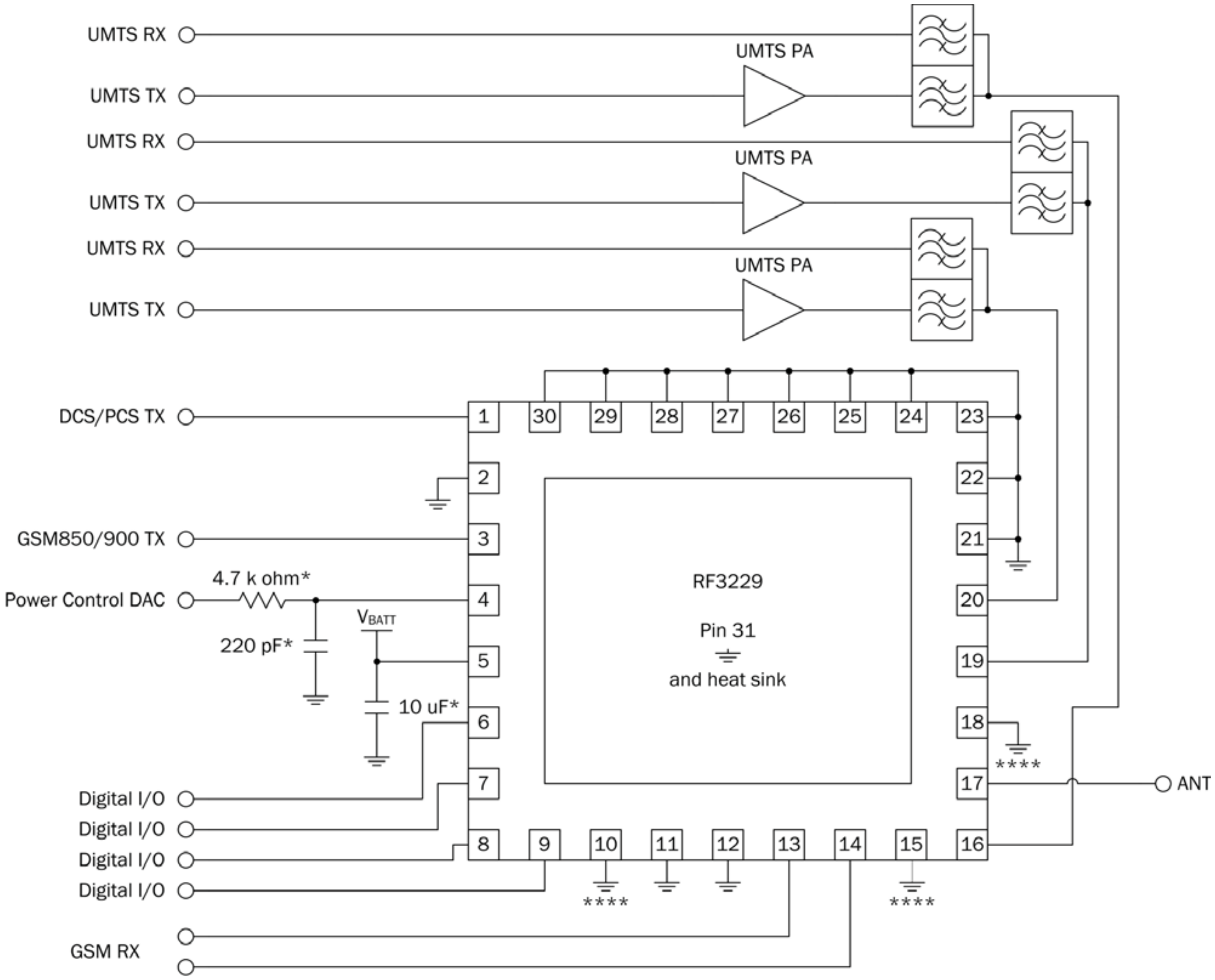
Pin	Function	Description
1	HB_RFIN	RF input to the high band power amplifier. DC blocked inside the module.
2	GND	Ground.
3	LB_RFIN	RF input to the low band power amplifier. DC blocked inside the module.
4	VRAMP	The voltage on this pin controls the output power by varying the internally regulated collector voltage on the amplifiers. This is a high bandwidth input so filter considerations for performance must be addressed externally.
5	VBATT	Main DC power supply for all circuitry in the module. Traces to this pin will have high current pulses during transmit operation. Proper decoupling and routing to handle this condition should be observed.
6	VCTL4	Digital Control Signal. Binary logic on VCTL1-4 sets module operating state.
7	VCTL3	Digital Control Signal. Binary logic on VCTL1-4 sets module operating state.
8	VCTL2	Digital Control Signal. Binary logic on VCTL1-4 sets module operating state.
9	VCTL1	Digital Control Signal. Binary logic on VCTL1-4 sets module operating state.
10	NC	No internal connection defined. Pin can be grounded on PCB.
11	GND	Ground.
12	GND	Ground.
13	RX4	Receive port 4. GSM receive port. DC blocked inside the module.
14	RX3	Receive port 3. GSM receive port. DC blocked inside the module.
15	NC	No internal connection defined. Pin can be grounded on PCB.
16	W1	UMTS Transmit and Receive port 1. DC blocked inside the module.
17	ANT	Antenna Port. 50Ω matched input/output port for RF signals going to or from the antenna.
18	NC	No internal connection defined. Pin can be grounded on PCB.
19	W2	UMTS Transmit and Receive port 2. DC blocked inside the module.
20	W3	UMTS Transmit and Receive port 3. DC blocked inside the module.
21	GND	Ground.
22	GND	Ground.
23	GND	Ground.
24	GND	Ground.
25	GND	Ground.
26	GND	Ground.
27	GND	Ground.
28	GND	Ground.
29	GND	Ground.
30	GND	Ground.
31	GND	Ground. Main thermal heat sink for module.

Pin Out

Top Down View

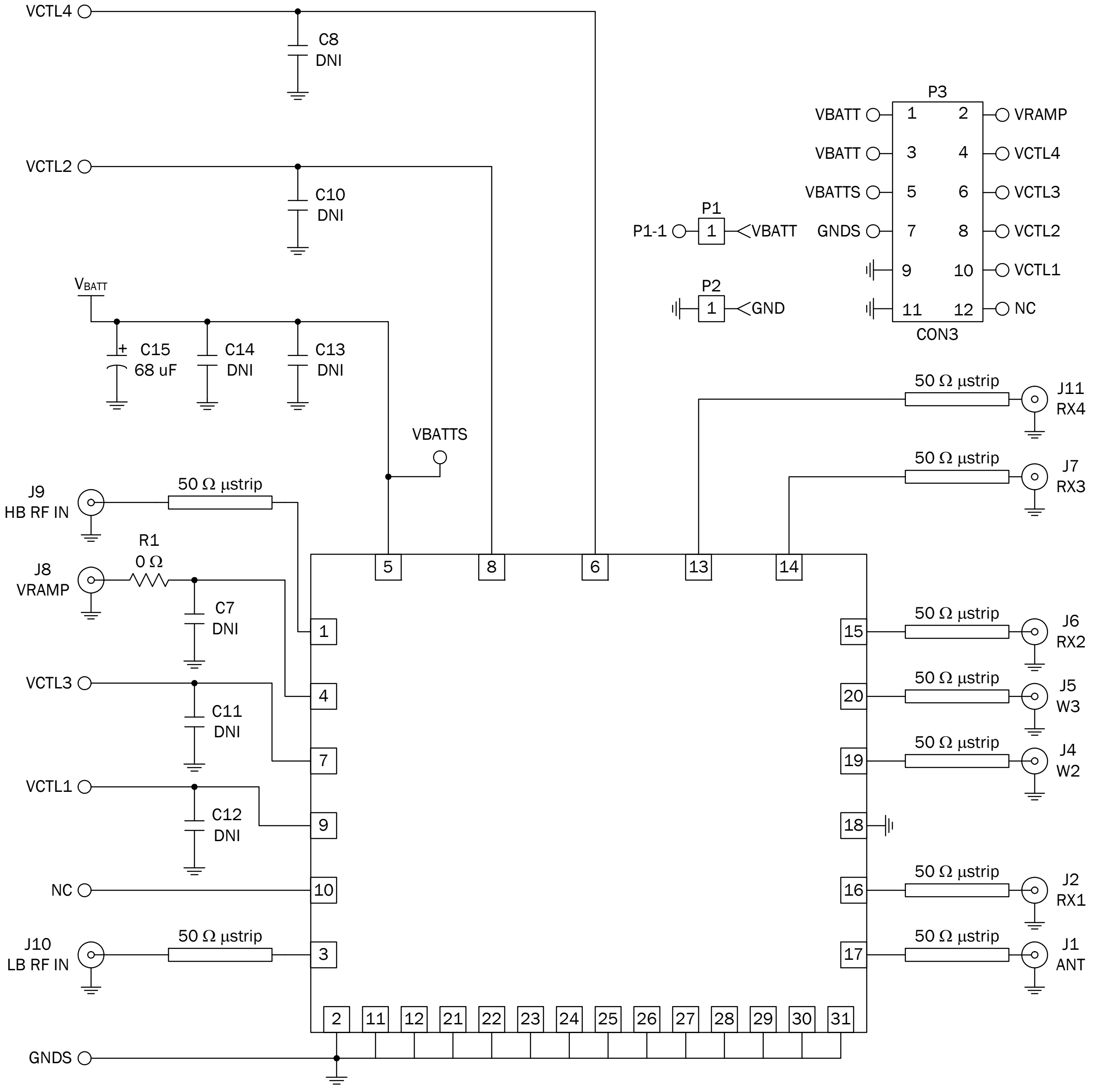


Application Schematic



Notes:
* Suggested values only. Actual requirements will vary with application.
**All RF paths should be designed as 50 ohm microstrip or stripline.
***Harmonic power from the high band amplifier near 11GHz is influenced by board layout and antenna impedance. Any matching components applied to the ANT port should be configured as a low pass filter to attenuate frequencies well above the normal GSM and UMTS transmit and receive signals.
****NC pins on this module can be connected to ground.

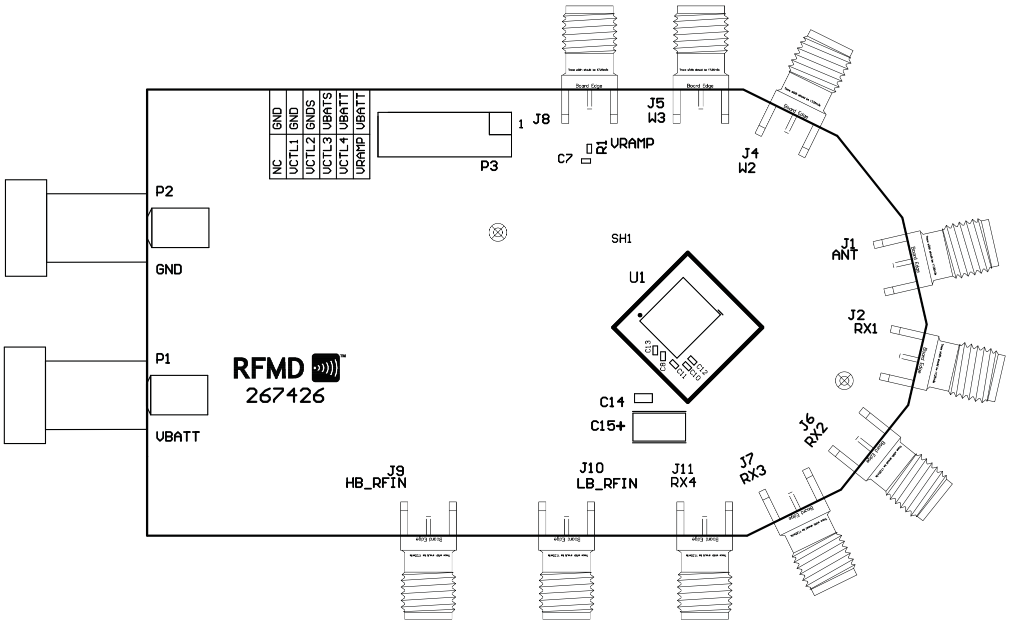
Evaluation Board Schematic



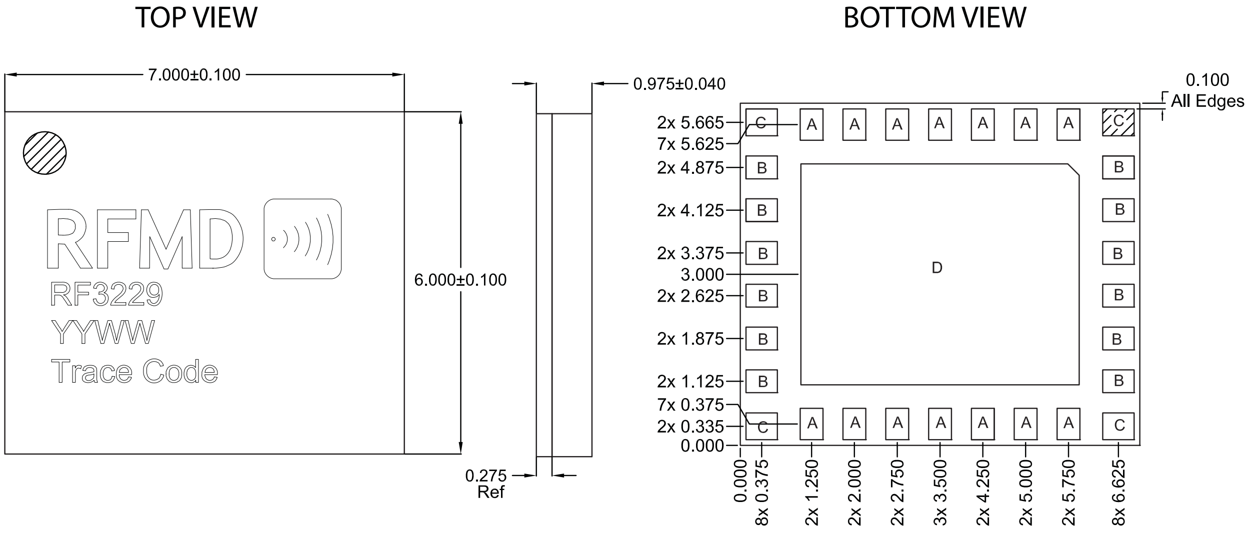
Evaluation Board Layout

Board Size 3.5" x 2.0"

Board Thickness 0.042", Board Material RO4003 Top Layer, FR-4 Core and Bottom Layer



Package Drawing



A = 0.400 x 0.550 mm Typ
B = 0.550 x 0.400 mm Typ
C = 0.550 x 0.470 mm
D = 4.875 x 3.875 mm

PCB Design Requirements

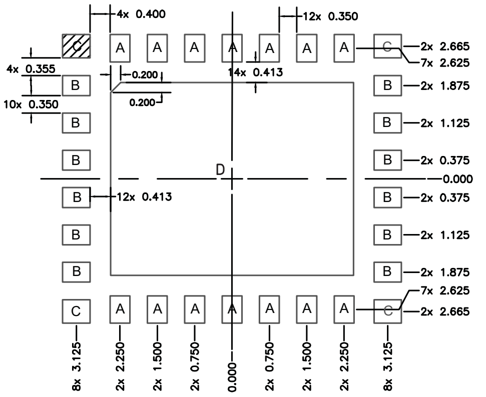
PCB Surface Finish

The PCB surface finish used for RFMD's qualification process is electroless nickel, immersion gold. Typical thickness is 2 μinch to 5 μinch gold over 180 μinch nickel.

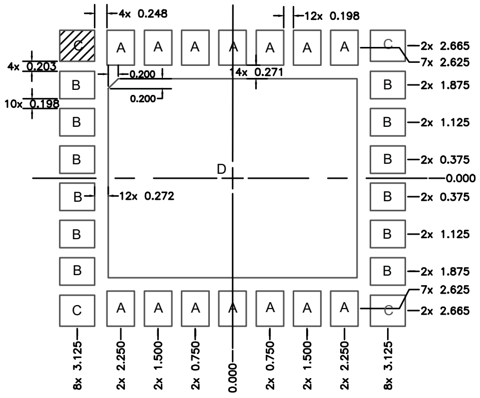
PCB Land Pattern Recommendation

PCB land patterns for RFMD components are based on IPC-7351 standards and RFMD empirical data. The pad pattern shown has been developed and tested for optimized assembly at RFMD. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

PCB Metal Land and Solder Mask Pattern



A = 0.400 x 0.550 mm
B = 0.550 x 0.400 mm
C = 0.550 x 0.470 mm
D = 4.875 x 3.875 mm



A = 0.552 x 0.702 mm
B = 0.702 x 0.552 mm
C = 0.702 x 0.622 mm
D = 5.005 x 4.005 mm

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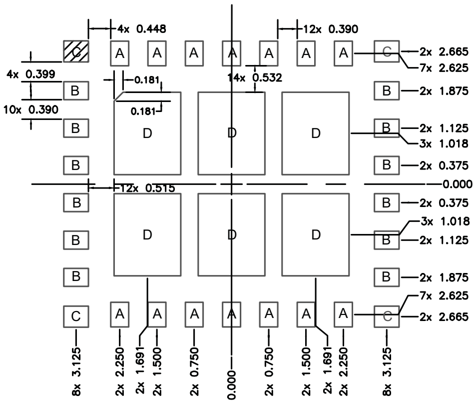
PCB Stencil Pattern



A = 0.360 x 0.495 mm
B = 0.495 x 0.360 mm
C = 0.495 x 0.423 mm
D = 1.343 x 1.654 mm

Tape and Reel

Carrier tape basic dimensions are based on EIA 481. The pocket is designed to hold the part for shipping and loading onto SMT manufacturing equipment, while protecting the body and the solder terminals from damaging stresses. The individual pocket design can vary from vendor to vendor, but width and pitch will be consistent.

Carrier tape is wound or placed onto a shipping reel either 330mm (13 inches) in diameter or 178mm (7 inches) in diameter. The center hub design is large enough to ensure the radius formed by the carrier tape around it does not put unnecessary stress on the parts.

Prior to shipping, moisture sensitive parts (MSL level 2a-5a) are baked and placed into the pockets of the carrier tape. A cover tape is sealed over the top of the entire length of the carrier tape. The reel is sealed in a moisture barrier ESD bag with the appropriate units of desiccant and a humidity indicator card, which is placed in a cardboard shipping box. It is important to note that unused moisture sensitive parts need to be resealed in the moisture barrier bag. If the reels exceed the exposure limit and need to be rebaked, most carrier tape and shipping reels are not rated as bakeable at 125°C. If baking is required, devices may be baked according to section 4, table 4-1, of Joint Industry Standard IPC/JEDEC J-STD-033.

The table below provides information for carrier tape and reels used for shipping the devices described in this document.

Tape and Reel

RFMD Part Number	Reel Diameter Inch (mm)	Hub Diameter Inch (mm)	Width (mm)	Pocket Pitch (mm)	Feed	Units per Reel
RF3229TR13	13 (330)	4 (102)	16	8	Single	2500
RF3229TR7	7 (178)	2.4 (61)	16	8	Single	750

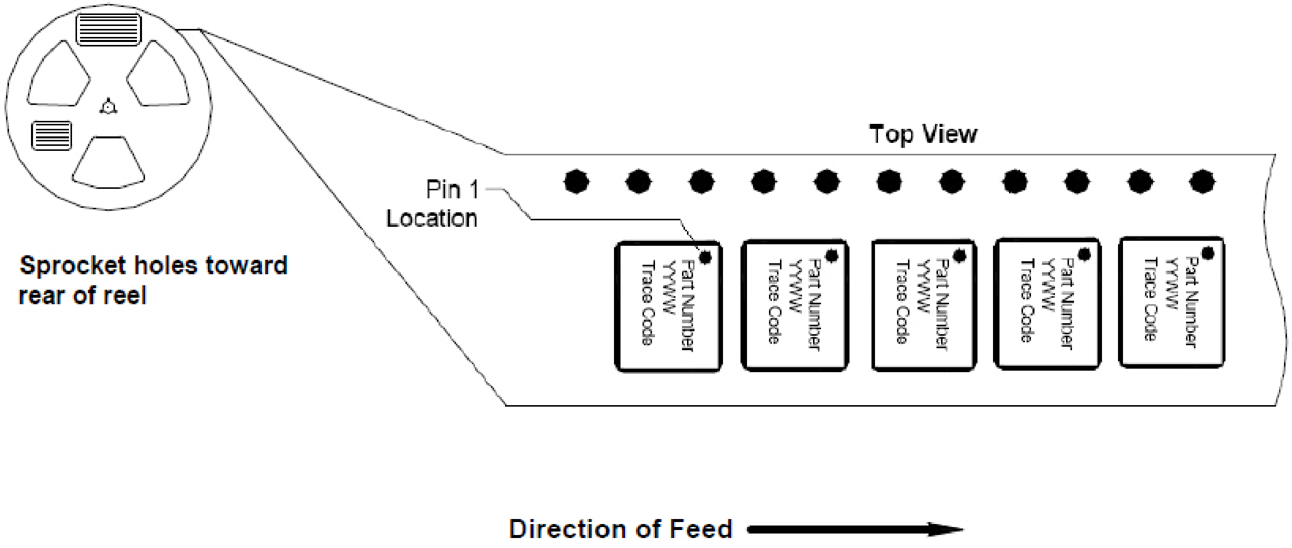


Figure 2. 7mmx6mm (Carrier Tape Drawing with Part Orientation)