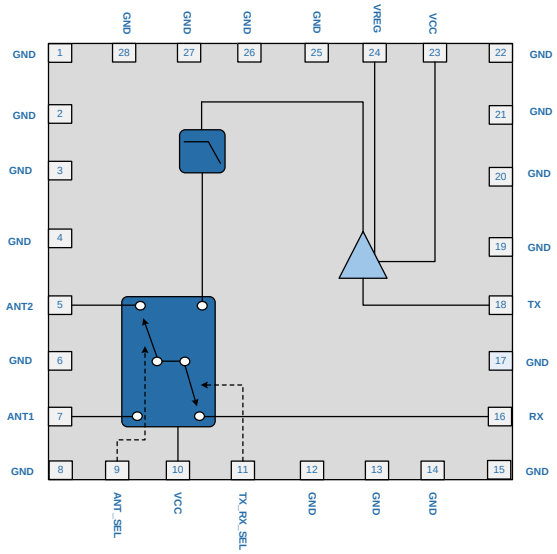
RF6599

915MHz Transmit/Receive Module

This module is intended for 915MHz AMR solutions. It provides separate ports for Rx and Tx paths and two ports on the output for connecting a diversity solution or a test port. The PA section provides a nominal output power of 26dBm.



Functional Block Diagram

Package: 28-pin,
5.5mm x 5.0mm

Features

- Tx Output Power: 26dBm
- Tx Gain: 14dB
- Rx Insertion Loss: 1dB
- Antenna Diversity Switch

Applications

- Wireless Automated Metering
- Wireless Alarm Systems
- Portable Battery Powered Equipment
- Smart Energy

Ordering Information

RF6599	ISM Band Transmit/Receive Module with Diversity Antenna Switch
RF6599PCBK-410	Fully assembled evaluation board w/5 piece bag

RF Micro Devices Inc. 7628 Thorndike Road, Greensboro, NC 27409-9421
For sales or technical support, contact RFMD at +1.336.678.5570 or customerservice@rfmd.com.

DS140130

Absolute Maximum Ratings

Parameter	Rating	Unit
Battery Voltage	5	V
RF Port Impedance	50	W
Operating Temperature	-30 to 70	°C
Storage Temperature	-40 to 85	°C
ESD, HBM (RF pins)	500	V
ESD, HBM (All pins)	500	V
ESD, CDN (RF pins)	500	V
ESD, CDM (all pins)	500	V
MSL	MSL 3	
Maximum Input Power to PA*	+20	dBm

*Maximum Input Power with a 50Ω Load

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

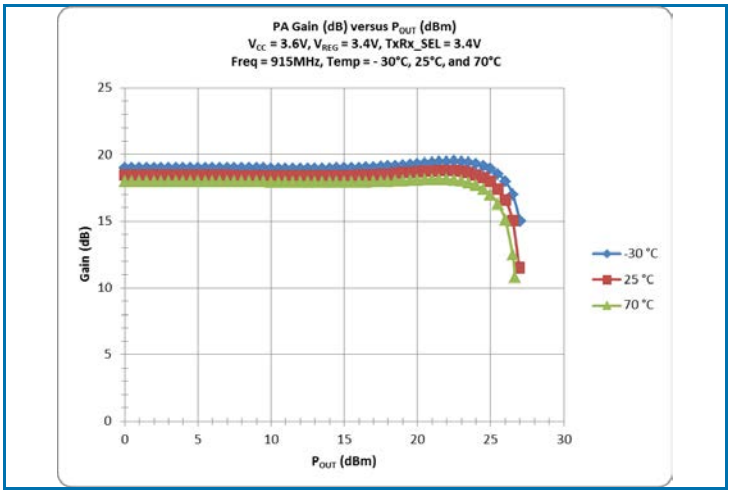
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Power Amplifier					**V_{CC} = 3.6V, TXRX_SEL = High, ANT_SEL = High or Low, V_{REG} = High, Temperature = 25°C**
Frequency Range	902	915	928	MHz	
CW Output Power	25.5	26		dBm	
Large Signal Gain, Min Supply Voltage	15.0	16.0		dB	V_{CC} = 3.3V, Temperature = -30°C
	13.0	15.5		dB	V_{CC} = 3.3V, Temperature = 25°C
	10.5	15.0		dB	V_{CC} = 3.3V, Temperature = 70°C
Large Signal Gain, Typ Supply Voltage	17.0	18.0		dB	V_{CC} = 3.6V, Temperature = -30°C
	16.5	17.0		dB	V_{CC} = 3.6V, Temperature = 25°C
	15.0	16.5		dB	V_{CC} = 3.6V, Temperature = 70°C
Large Signal Gain, Max Supply Voltage	18.5	19.0		dB	V_{CC} = 4.0V, Temperature = -30°C
	17.0	18.0		dB	V_{CC} = 4.0V, Temperature = 25°C
	16.0	17.0		dB	V_{CC} = 4.0V, Temperature = 70°C
Output Harmonic Levels					
2nd	-30			dBc	
3rd through 10th	-67			dBc	
Input Return Loss		10		dB	
Power Supply Voltage					
V_{CC}	3.3	3.6	4	V	
V_{REG}	3.1	3.4	3.8	V	V_{REG} = V_{CC} - 0.2V
Current					
Operating VCC		215	290	mA	V_{CC} = 3.6V, P_{OUT} = 26dBm
Operating VREG		3	4	mA	
Tx Idle Current		54	60	mA	V_{CC} = 3.6V, V_{REG} = 3.4V, ANT_SEL = TXRX_SEL = 3.4V at P_{OUT} = 0dBm
Module Leakage		0.2	0.5	mA	V_{CC} = 3.6V TXRX_SEL, ANT_SEL and V_{REG} = 0.0V

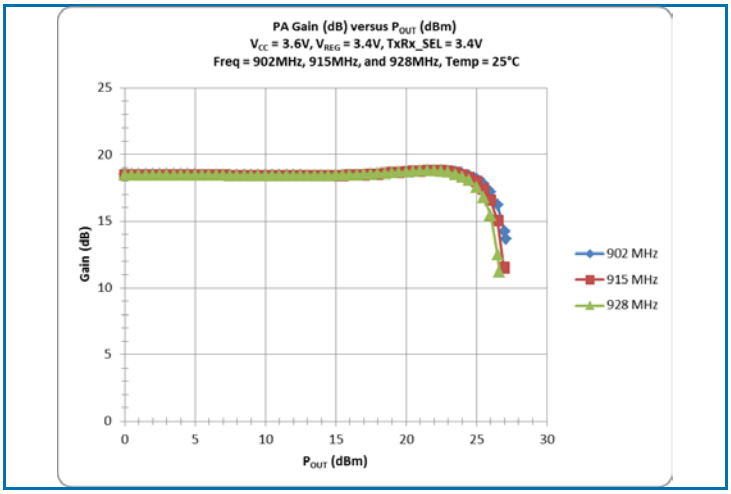
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Rx Path					**V_{CC} = 3.6V, TXRX_SEL = Low, ANT_SEL = High or Low, V_{REG} = High**
Frequency Range	902	915	928	MHz	
Insertion Loss		1	1.3	dB	
Input IP3	12	18		dBm	
Input Return Loss	10			dB	
Output Return Loss	10			dB	
Current					
ANT1		80		mA	ANT_SEL = High, V_{REG} = Low, TXRX_Sel = Low
Power Down Mode, ANT2		1.2		mA	ANT_SEL = Low, V_{REG} = Low, TXRX_Sel = Low
Antenna Switch and Logic					
Isolation	20			dB	Any used port to any unused port
Logic Voltage High	3.1	3.4	3.8	V	All Logic I/O's, VCC to 0.2V
Logic Voltage Low	0	0.2		V	All Logic I/O's
Logic Current, High		85	120	mA	All Logic I/O's

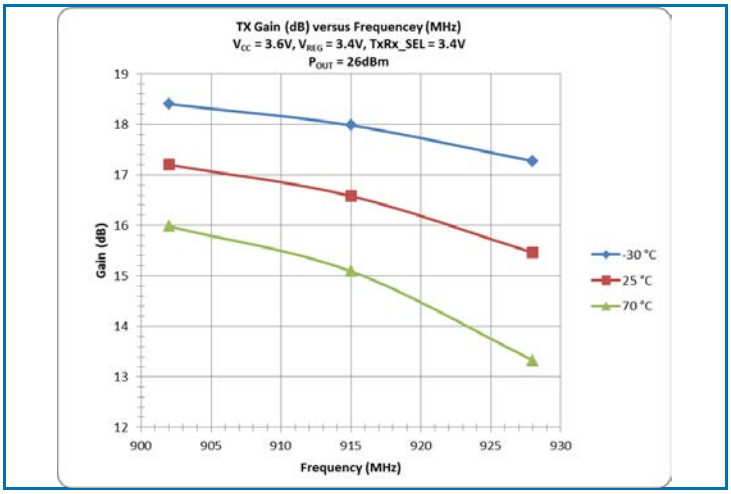
Module Logic Truth Table

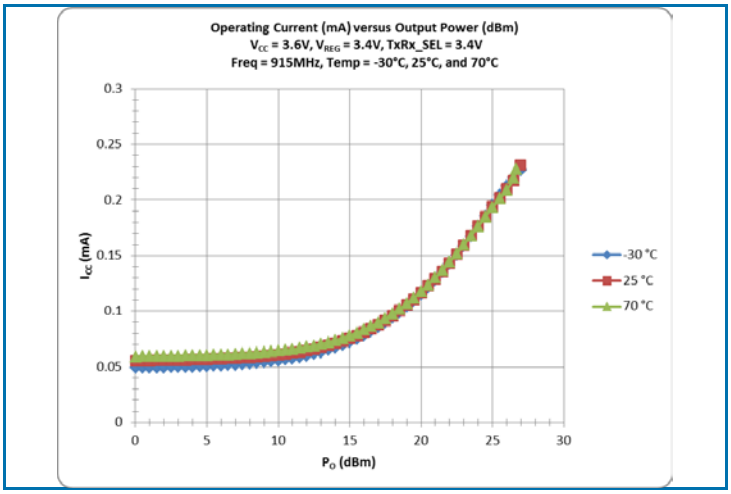
Operating Mode	ANT_SEL	TXRX_SEL
TX - ANT1	HIGH	HIGH
TX - ANT2	LOW	HIGH
RX - ANT1	HIGH	LOW
RX - ANT2	LOW	LOW

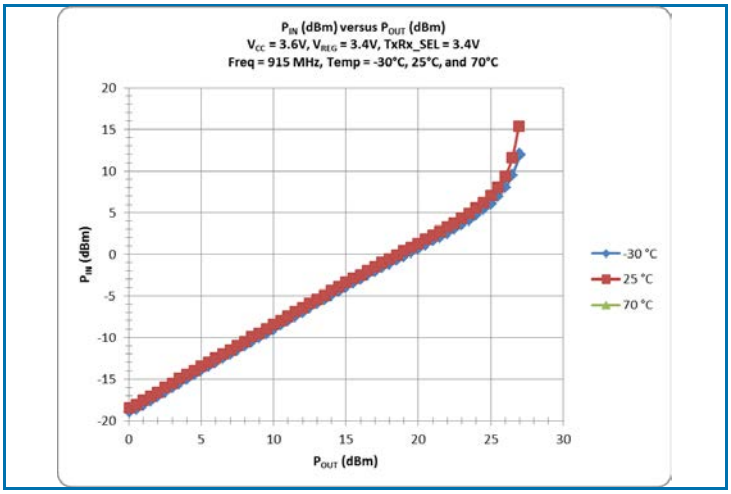
Typical Performance

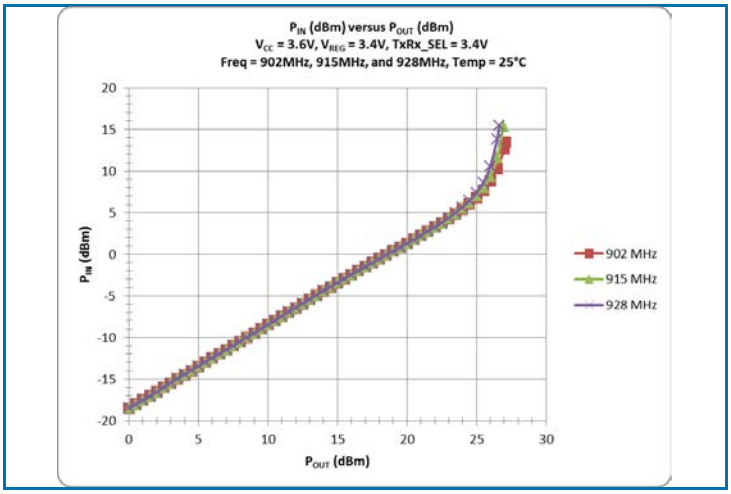


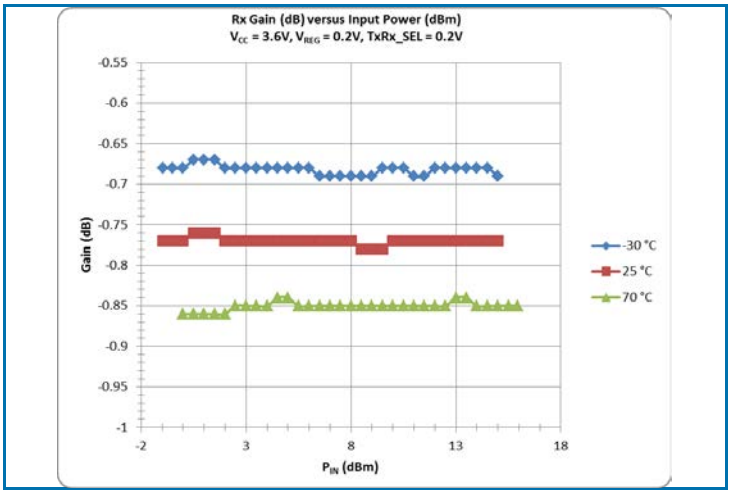


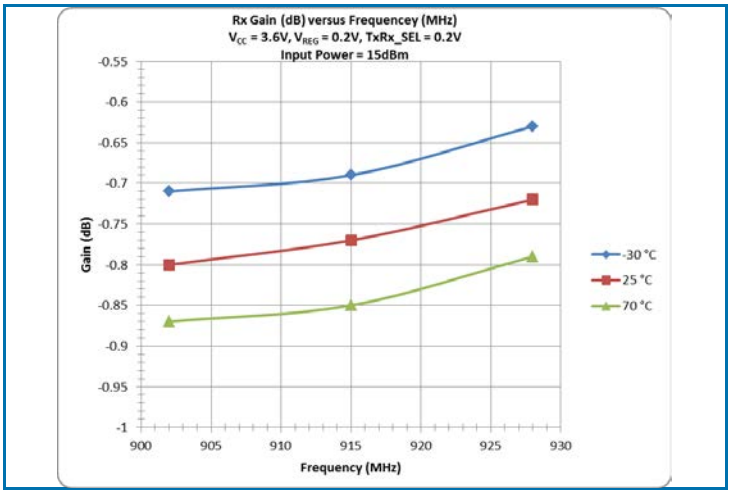


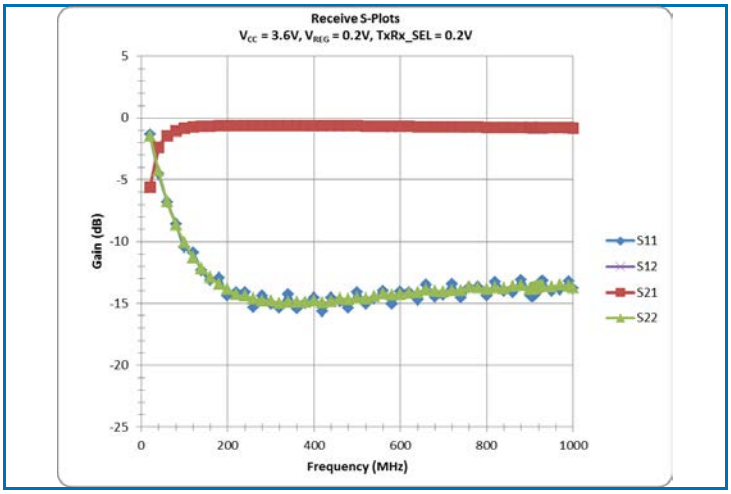


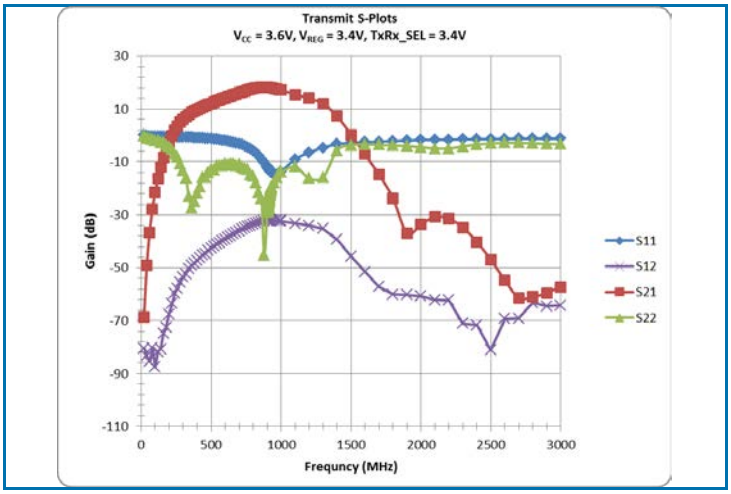




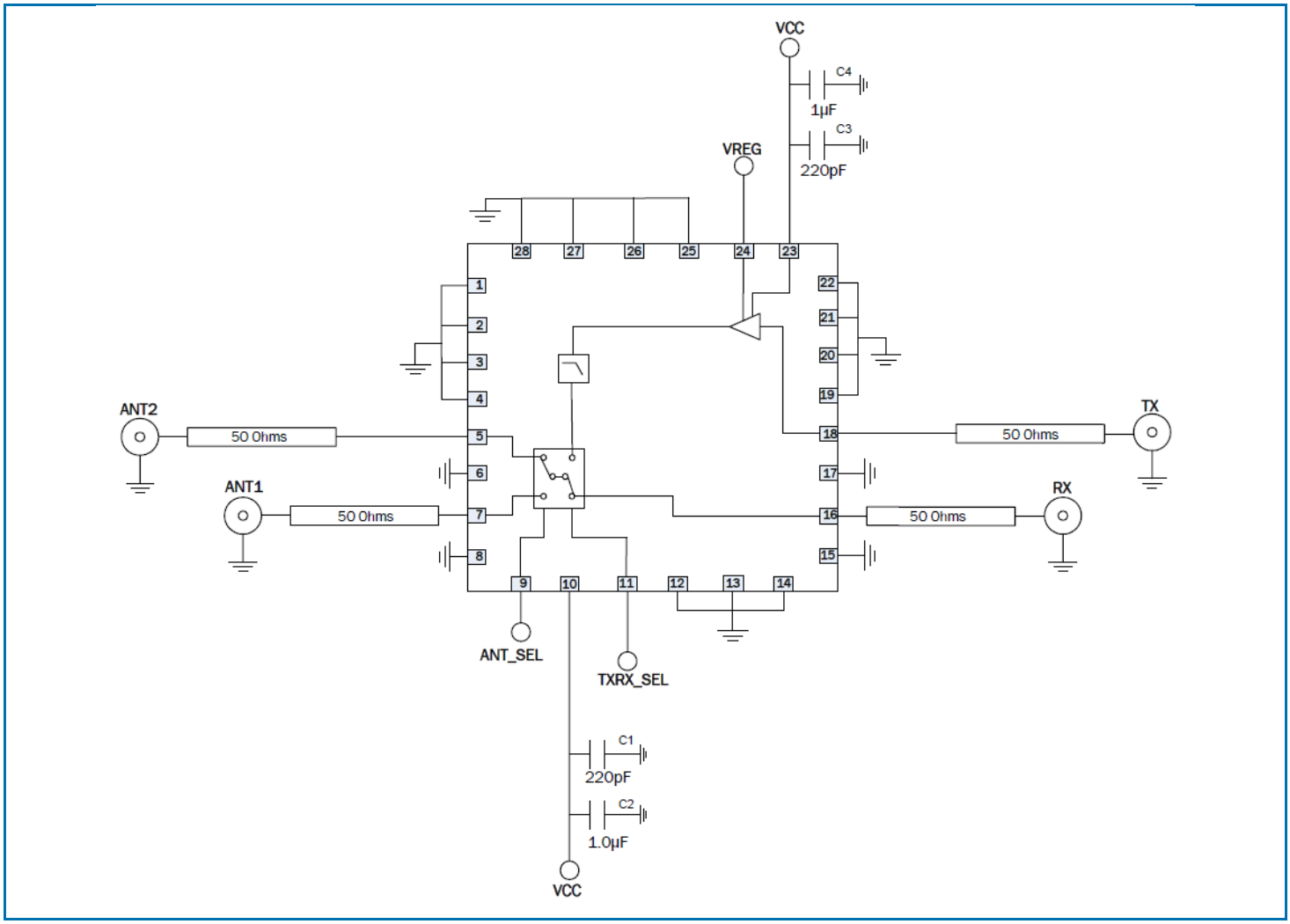




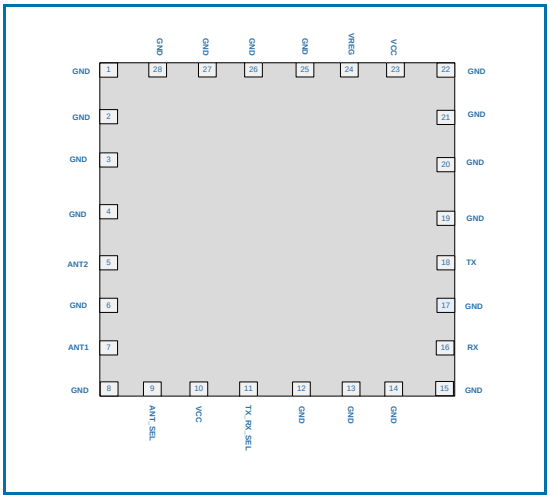




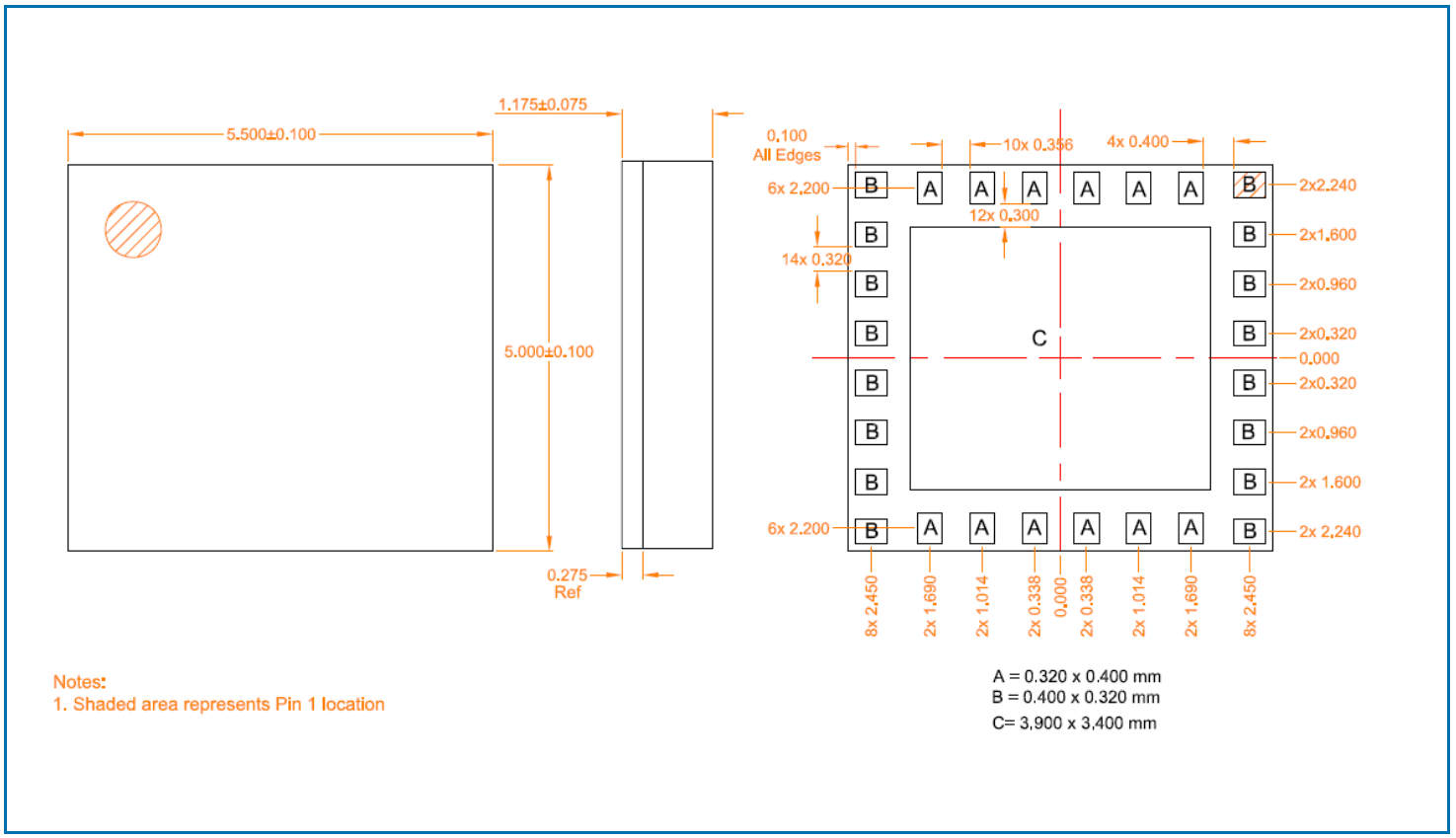
Evaluation Board Schematic 500MHz to 1000MHz Application Circuit



Pin Out

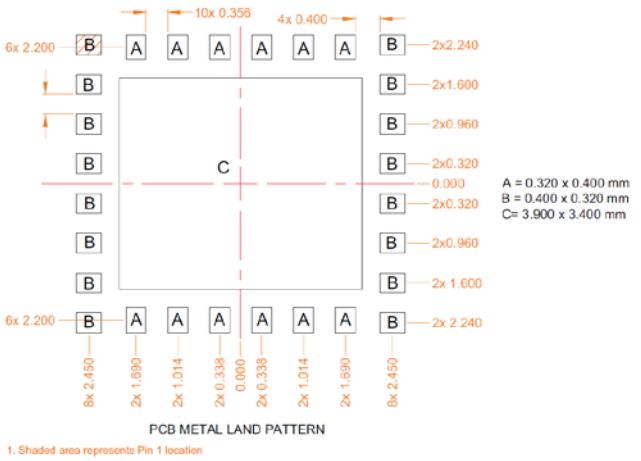


Package Outline and Branding Drawing



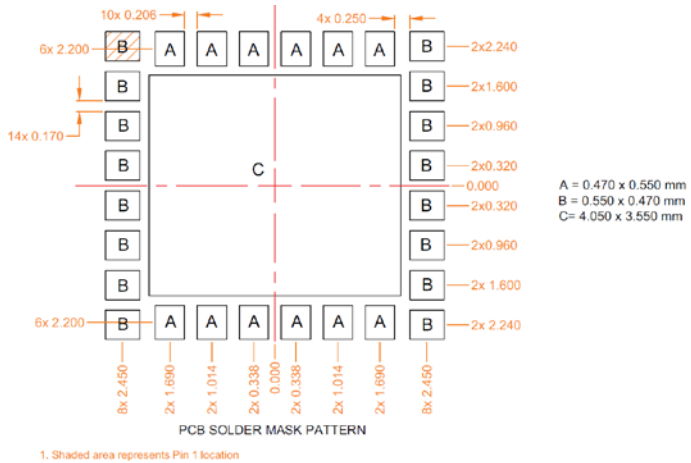
All units in µm

PCB Patterns



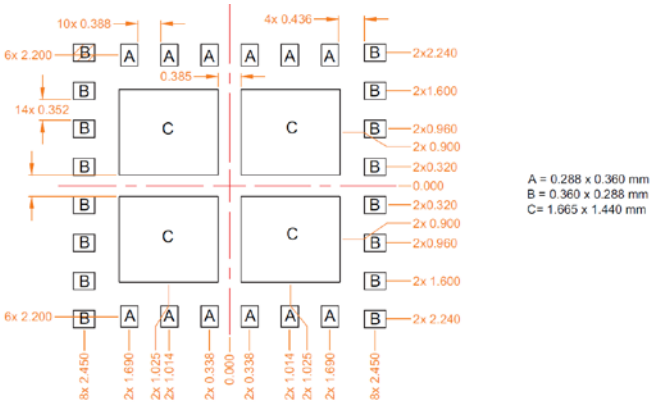
PCB METAL LAND PATTERN

1. Shaded area represents Pin 1 location



PCB SOLDER MASK PATTERN

1. Shaded area represents Pin 1 location



PCB STENCIL PATTERN

1. Shaded area represents Pin 1 location

Pin Names and Descriptions

Pin	Name	Description
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	ANT2	Antenna 2 Output/Input
6	GND	Ground
7	ANT1	Antenna 1 Output/Input
8	GND	Ground
9	ANT_SEL	Antenna Selection Control Line
10	VCC	Diversity Switch Supply Voltage
11	TXRX_SEL	Transmit or Receive Selection Control Lone
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	GND	Ground
16	RX	Receive Port
17	GND	Ground
18	TX	Transmit Port
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	VCC	Power Amplifier Supply Voltage
24	VREG	Power Amplifier Supply Voltage
25	GND	Ground
26	GND	Ground
27	GND	Ground
28	GND	Ground
29	GND	Center Ground Flag