

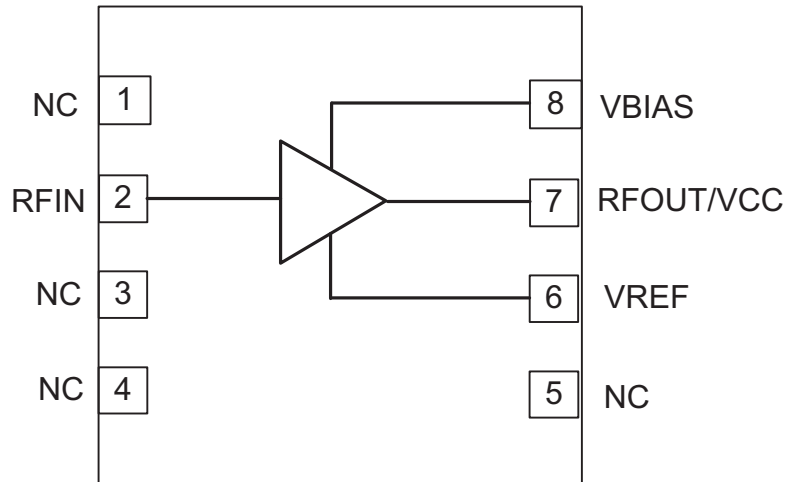


### Features

- High Linearity: OIP3 = 44dBm at 900MHz
- Low Noise: NF = 3.5dB at 900MHz
- Low DC Power: 5V, 90mA
- 400MHz to 2700MHz Operation

### Applications

- GaAs Pre-Driver for Base Station Amplifiers
- PA Stage for Commercial Wireless Infrastructure
- Class AB Operation for DCS, PCS, UMTS, and WiFi Transceiver Applications
- 2nd/3rd Stage LNA for Wireless Infrastructure



Functional Block Diagram

### Product Description

The RFPA1012 is a GaAs HBT linear power amplifier specifically designed for wireless infrastructure applications. Using a highly reliable GaAs HBT fabrication process, this high performance single-stage amplifier achieves ultra-high linearity over a broad frequency range. It also offers low noise figure making it an excellent solution for 2nd and 3rd stage LNAs.

### Ordering Information

RFPA1012SQ	Sample bag with 25 pieces
RFPA1012SR	7" Sample reel with 100 pieces
RFPA1012TR7	7" Reel with 2500 pieces
RFPA1012PCK-411	860MHz to 960MHz PCBA with 5-piece sample bag
RFPA1012PCK-412	2110MHz to 2170MHz PCBA with 5-piece sample bag

### Optimum Technology Matching® Applied

- |  |                                      |                                     |                                    |
|--|--------------------------------------|-------------------------------------|------------------------------------|
| <input checked="" type="checkbox"/> GaAs HBT | <input type="checkbox"/> SiGe BiCMOS | <input type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT  |
| <input type="checkbox"/> GaAs MESFET         | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS    | <input type="checkbox"/> BiFET HBT |
| <input type="checkbox"/> InGaP HBT           | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT     |                                    |

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## Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage ( $V_{CC}$ and $V_{BIAS}$ )	6.5	V
Reference Current ( $I_{REF}$ )	5	mA
DC Supply Current ( $I_C$ )	256	mA
CW Input Power, 2:1 Output VSWR	23	dBm
Output Load VSWR at P3dB	5:1	
Operating Junction Temperature ( $T_J$ )	160	°C
Operating Temperature Range ( $T_L$ )	-40 to +85	°C
Storage Temperature	-55 to +150	°C
ESD Rating: Human Body Model (HBM)	Class 1B	
Moisture Sensitivity Level	MSL 1	



**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.

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RFMD Green: RoHS compliant per EU Directive 2002/95/EC, 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.

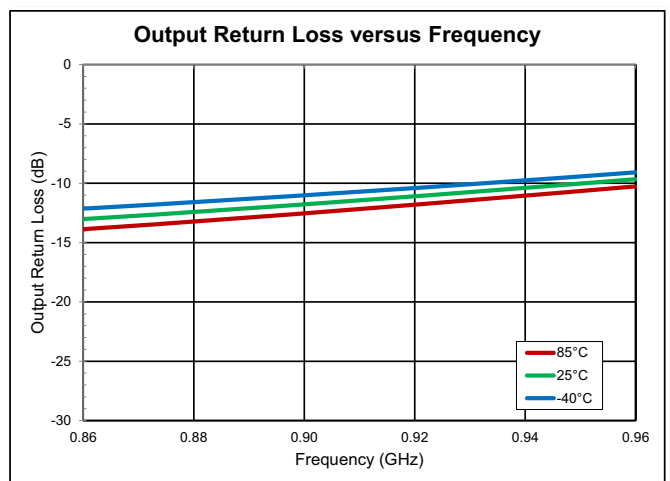
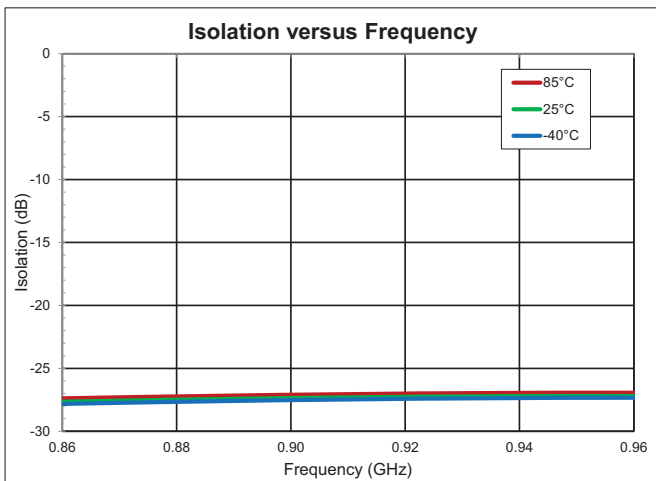
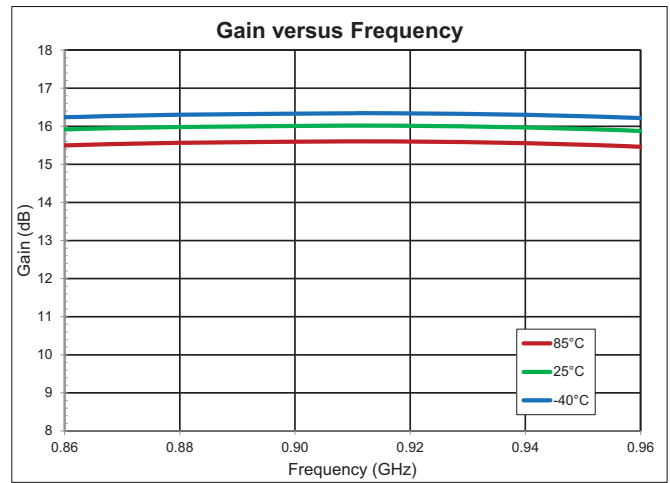
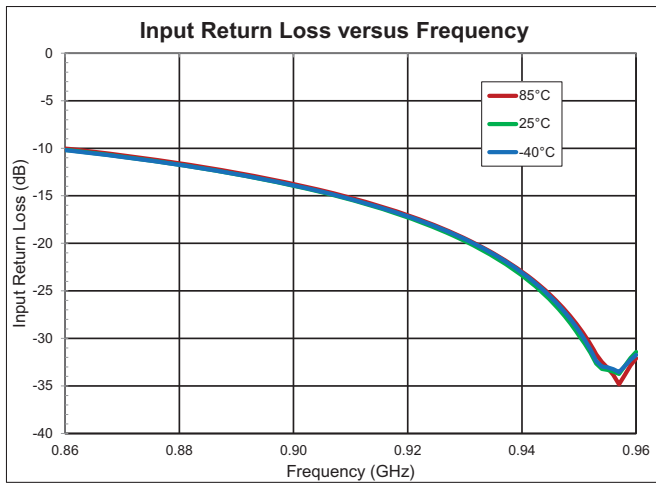
Notes: 1. The maximum ratings must all be met simultaneously.

2.  $P_{DISS} = P_{DC} + P_{RFIN} - P_{RFOUT}$

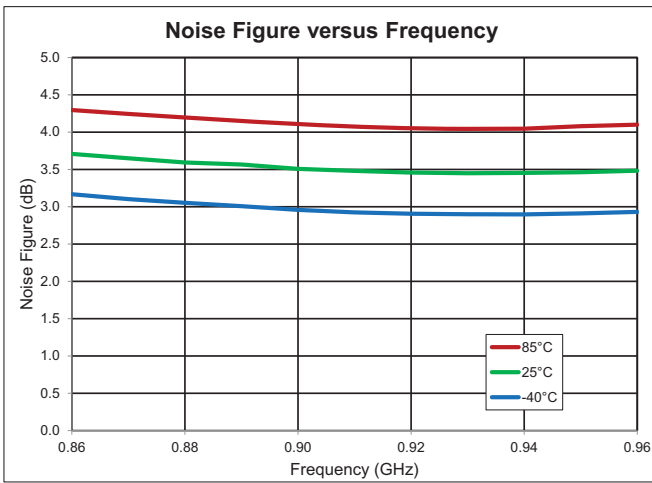
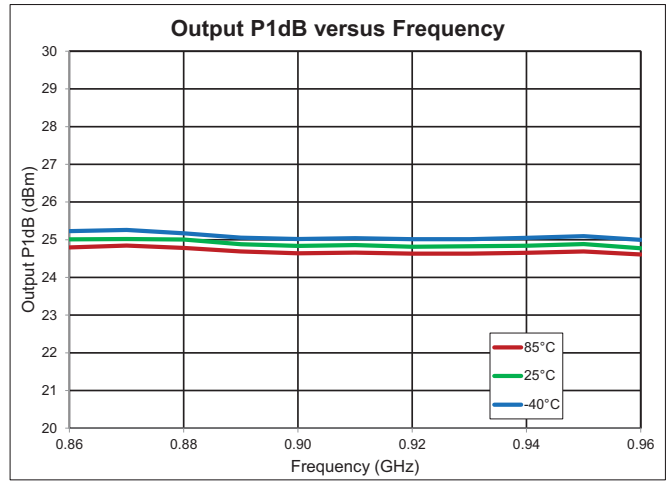
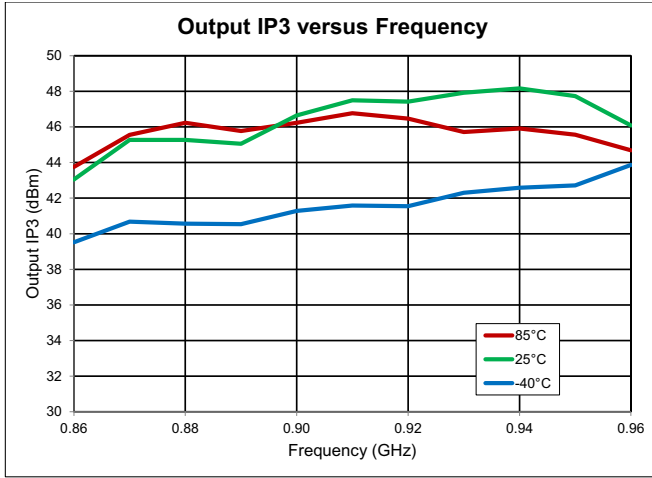
3.  $T_J = T_L + P_{DISS} * R_{TH}$

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>860MHz to 960MHz</b>					$V_{CC} = 5.0V, V_{REF} = 5.0V, I_{CQ} = 90mA, T = 25^\circ C$
Frequency	860		960	MHz	Evaluation Circuit
Gain (S21)		16		dB	
OIP3		44		dBm	6dBm/tone, tone spacing = 1MHz
P1dB		25		dBm	
Input Return Loss (S11)		16		dB	
Output Return Loss (S22)		11		dB	
Noise Figure		3.5		dB	$T = 25^\circ C$
<b>2110MHz to 2170MHz</b>					$V_{CC} = 5.0V, V_{REF} = 5.0V, I_{CQ} = 90mA, T = 25^\circ C$
Frequency	2110		2170	MHz	Evaluation Circuit
Gain (S21)		13.9		dB	
OIP3		42		dBm	6dBm/tone, tone spacing = 1MHz
P1dB		22.5		dBm	
Input Return Loss (S11)		11		dB	
Output Return Loss (S22)		11		dB	
Noise Figure		3.2		dB	$T = 25^\circ C$
<b>Power Supply</b>					
Operating Current (Quiescent)		90		mA	At $V_{CC} = 5.0V$
Operating Voltage ( $V_{CC}$ )		5.0	6.0	V	Max recommended collector voltage
Thermal Resistance ( $R_{TH}$ )		110		°C/W	At quiescent current, no RF
Power Down Current			10	µA	At $V_{REF} = 0V$

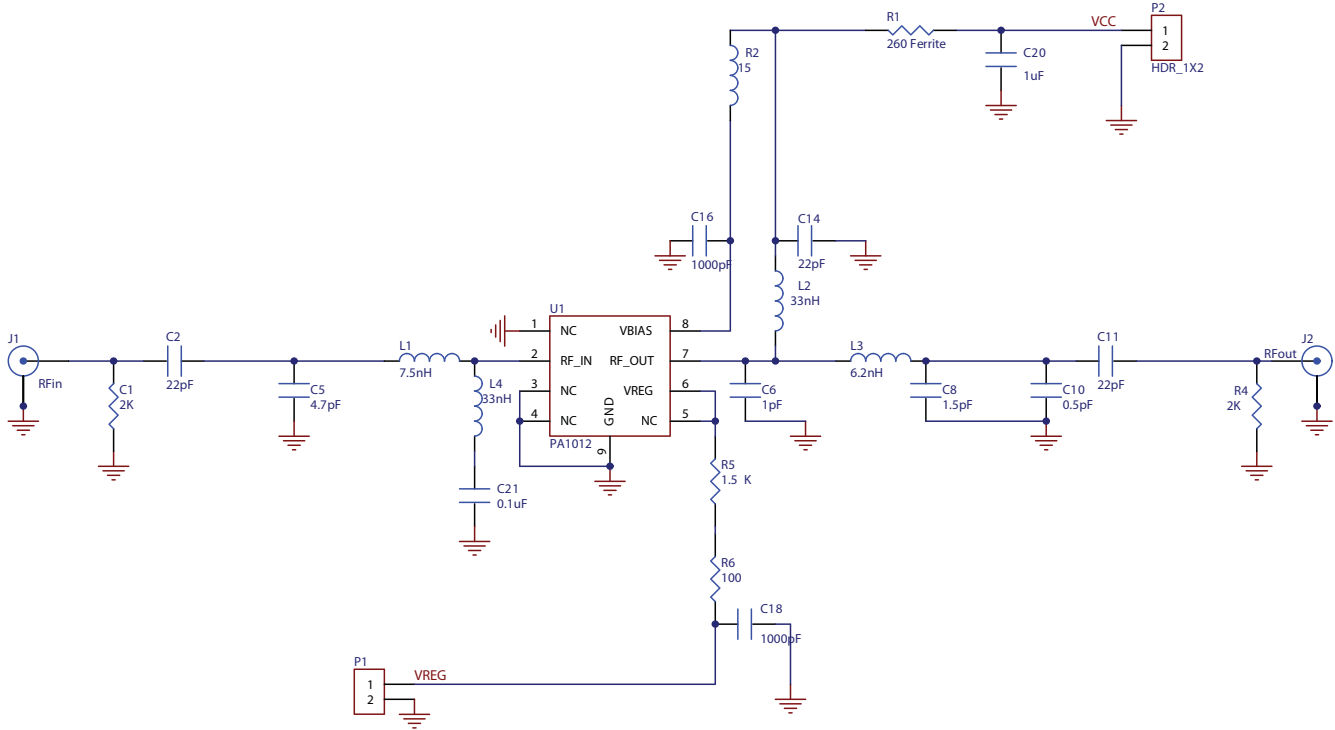
**Typical Performance**  
(860MHz to 960MHz Application Circuit)



## Typical Performance (860MHz to 960MHz Application Circuit)



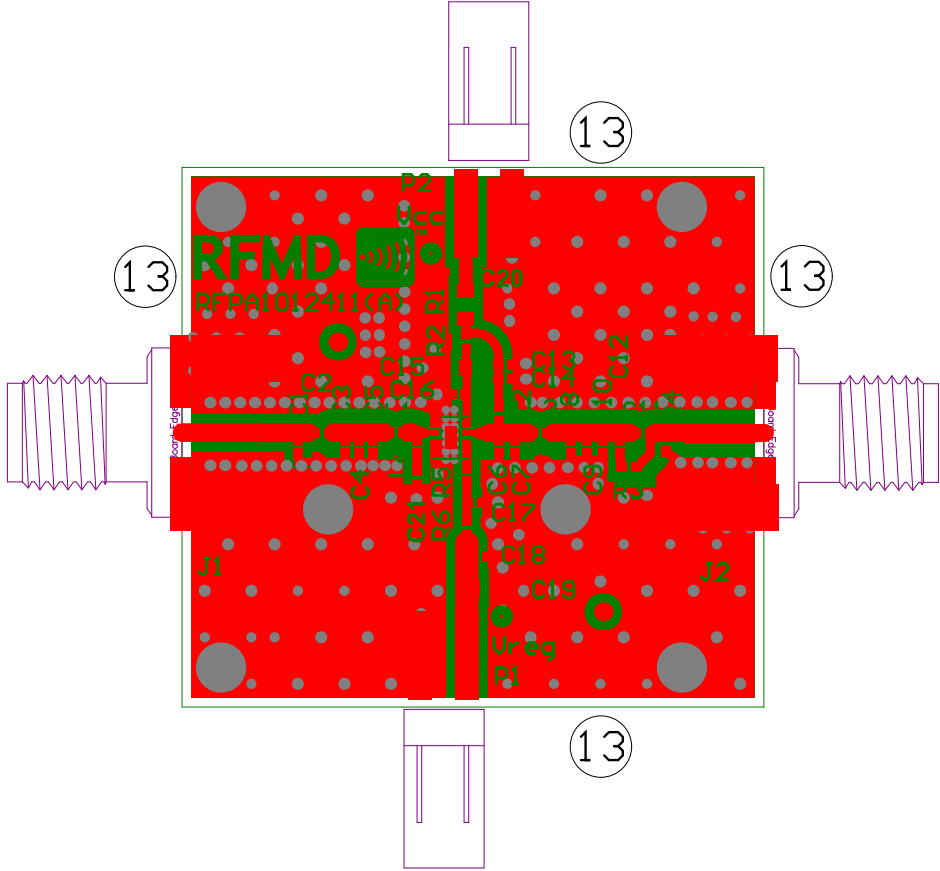
## Evaluation Board Schematic (860MHz to 960MHz Application Circuit)



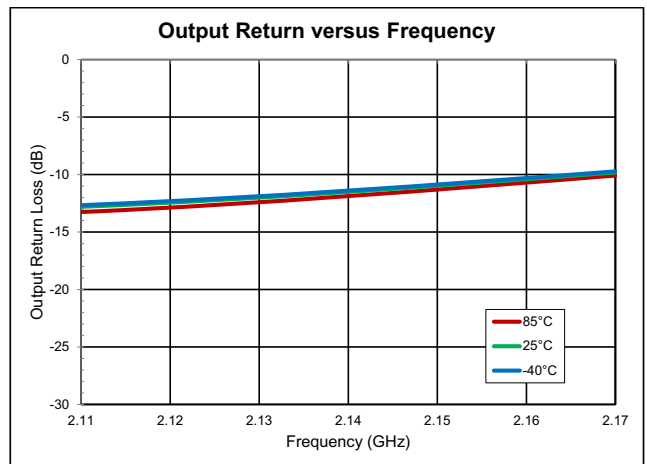
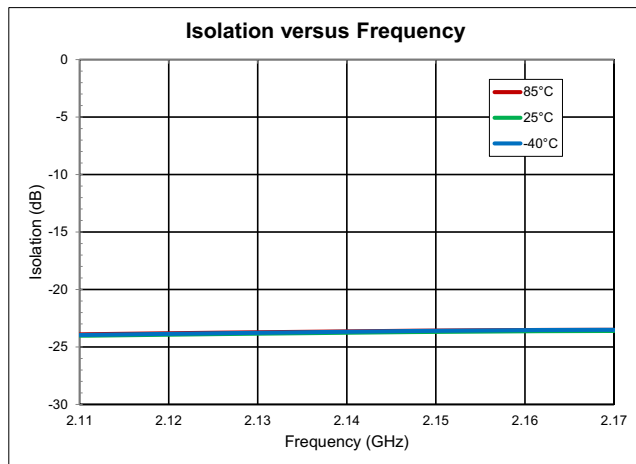
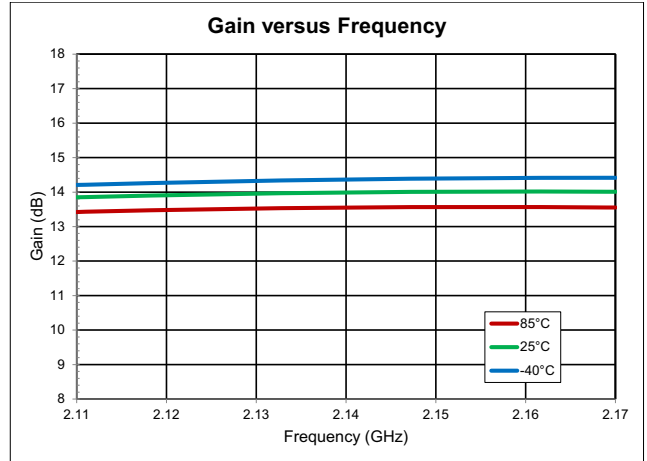
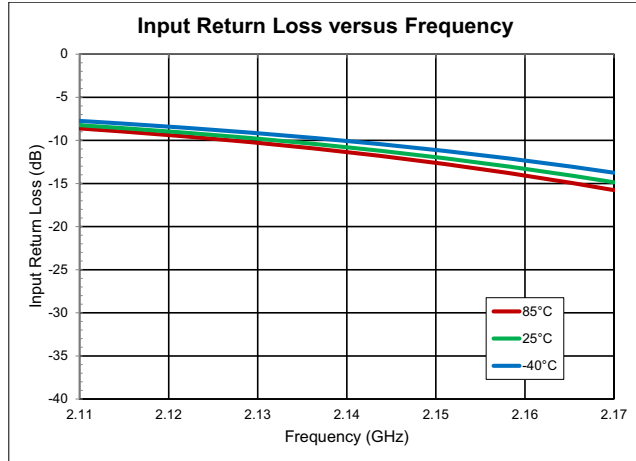
## Evaluation Board Build of Materials (BOM) (860MHz to 960MHz Application Circuit)

Description	Reference Designator	Manufacturer	Manufacturer's P/N
PCB, RFPA1012		RFMD	RFPA1012411(A)
RFPA1012 Evaluation Board	U1	RFMD	RFPA1012SB
CAP, 0.1µF, 10%, 16V, X7R, 0402	C21	Murata Electronics	GRM155R71C104KA88D
CAP, 1µF, 10%, 10V, X5R, 0402	C20	Murata Electronics	GRM155R61A105KE15D
CAP, 1000pF, 10%, 50V, X7R, 0402	C16, C18	Murata Electronics	GRM155R71H102KA01D
CAP, 0.5pF, +/-0.1pF, 50V, HI-Q, 0402	C10	Johanson Technology	500R07S0R5BV4SD
CAP, 22pF, 5%, 50V, HI-Q, 0402	C2, C11, C13	Johanson Technology	500R07S220JV4RD
CAP, 4.7pF, +/-0.25pF, 50V, HI-Q, 0402	C5	Johanson Technology	500R07S4R7CV4TD
CAP, 1.0pF, +/-0.1pF, 50V, HI-Q, 0402	C6	Johanson Technology	500R07S1R0BV4SD
CAP, 1.5pF, +/-0.25pF, 50V, HI-Q, 0402	C8	Johanson Technology	500R07S1R5CV4TD
IND, 7.5nH, +/-0.1nH, T/F, 0402	L1	Murata Electronics	LQP15MN7N5B02D
IND, 6.2nH, +/-0.1nH, T/F, 0402	L3	Murata Electronics	LQP15MN6N2B02D
IND, 33nH, 2%, T/F, 0402	L2, L4	Murata Electronics	LQP15MN33NG02D
FERRITE BEAD, 260Ω, 2A, 0603	R1	Murata Electronics	BLM18EG221SN1D
RES, 2K, 5%, 1/16W, 0402	C1, R4	Panasonic	ERJ2GEJ202
RES, 15Ω, 1%, 1/16W, 0402	R2	Panasonic	ERJ-2RKF15R0X
RES, 1.5K, 1%, 1/16W, 0402	R5	Panasonic	ERJ-2RKF1501X
RES, 100Ω, 1%, 1/10W, 0402	R6	Panasonic	ERJ-2RKF1000X
Do Not Place	C3-C4, C7, C9, C12, C14-C15, C17, C19, R3		

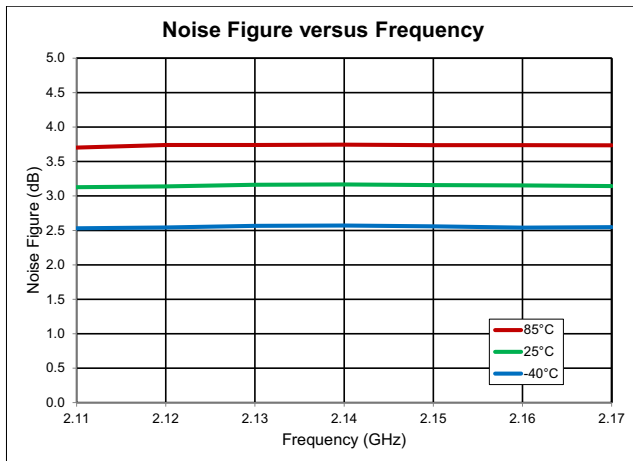
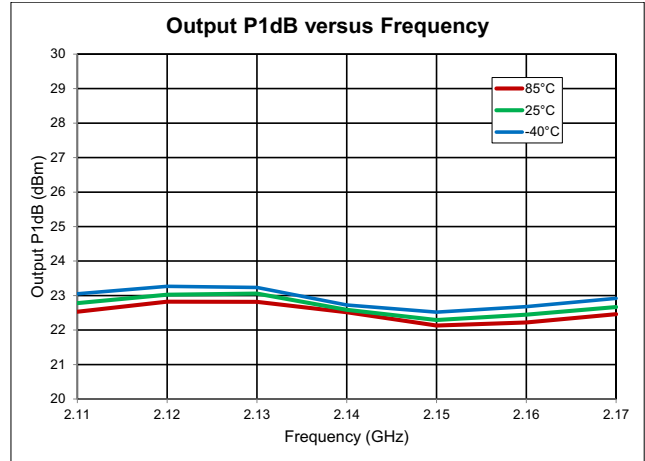
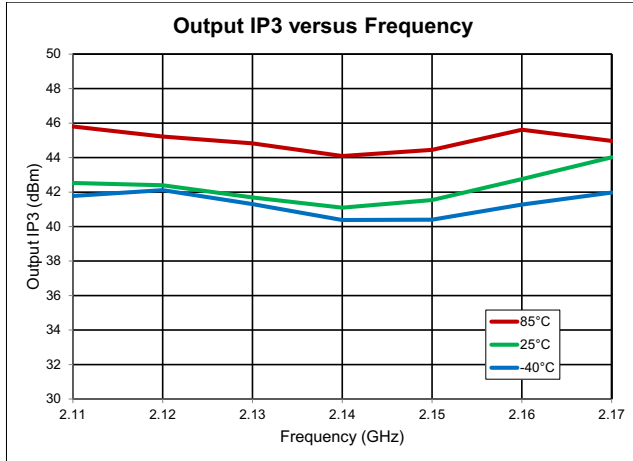
## Evaluation Board Assembly Drawing (860MHz to 960MHz Application Circuit)



**Typical Performance**  
(2110MHz to 2170MHz Application Circuit)

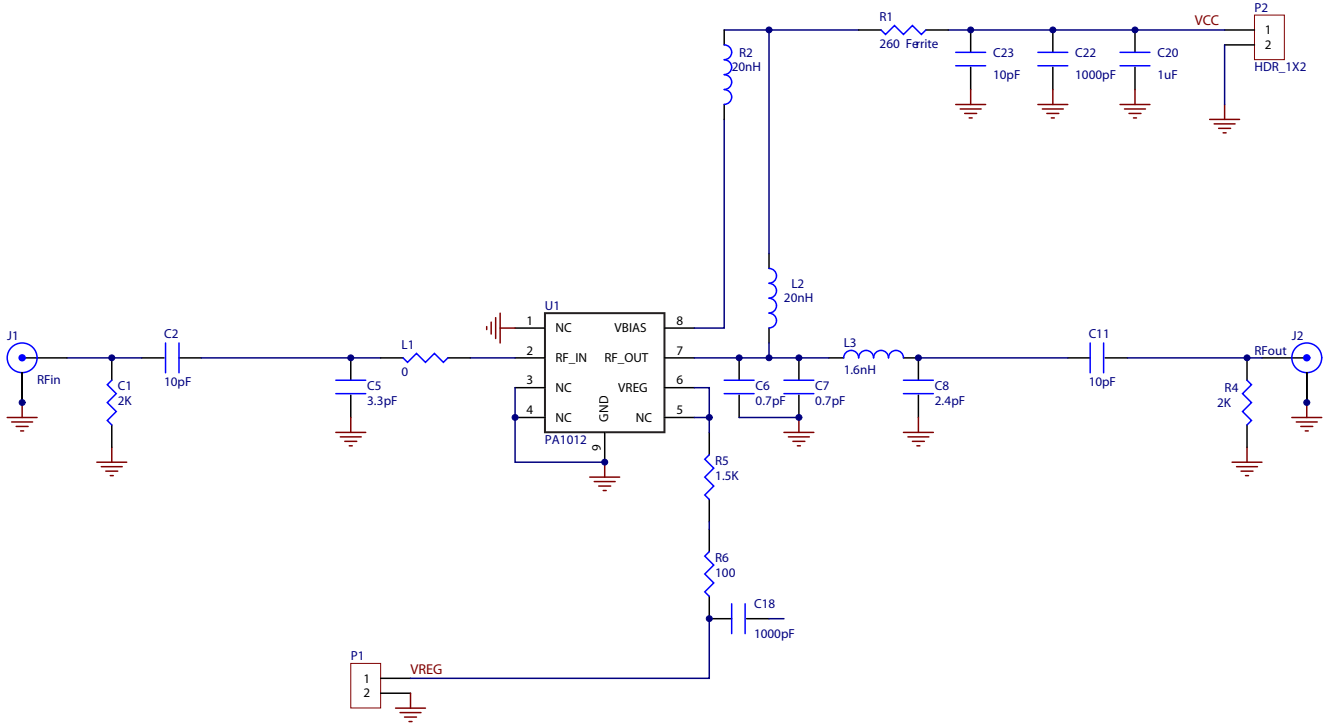


## Typical Performance (2110MHz to 2170MHz Application Circuit)





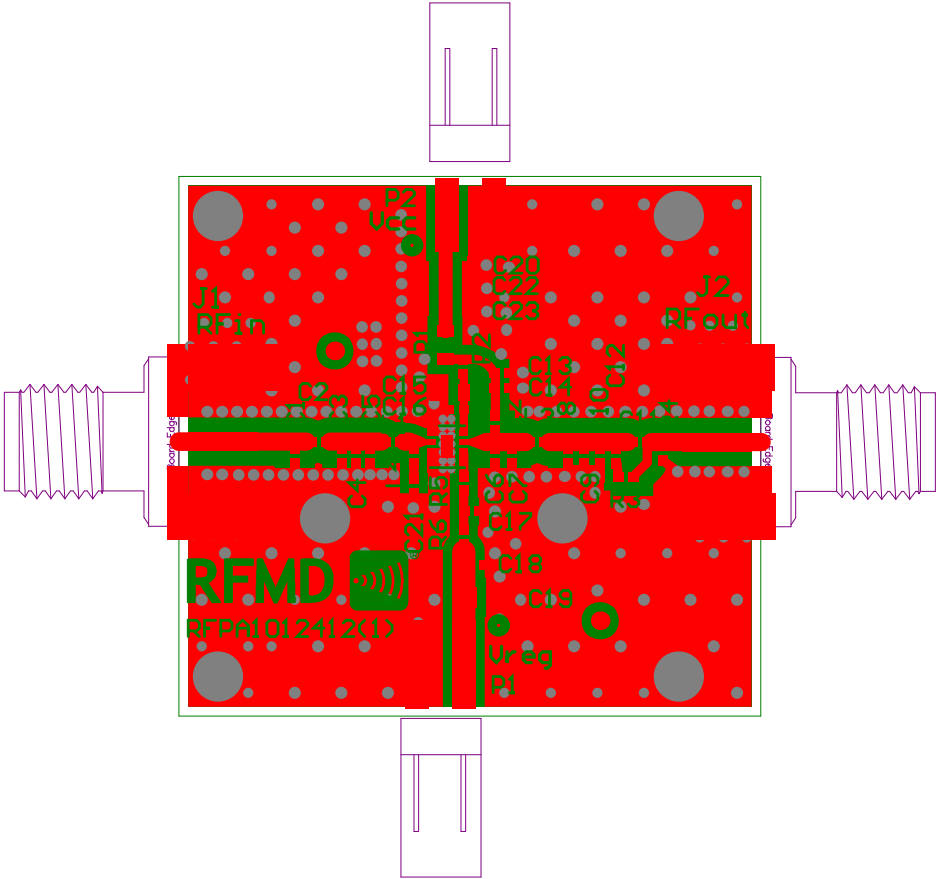
**Evaluation Board Schematic**  
(2110MHz to 2170MHz Application Circuit)



**Evaluation Board Build of Materials (BOM)**  
(2110MHz to 2170MHz Application Circuit)

Description	Reference Designator	Manufacturer	Manufacturer's P/N
PCB, PA1012-412		Merix Corporation	RFPA1012-412(A)
PA1012	U1	RFMD	RFPA1012SB
CAP, 10pF, 5%, 50V, COG, 0402	C2, C11, C23	Johanson Technology	500R07S100JV4TD
CAP, 3.3pF, +/-0.1pF, 50V, HI-Q, 0402	C5	Johanson Technology	500R07S3R3BV4TD
CAP, 0.7pF, +/-0.1pF, 50V, HI-Q, 0402	C6-C7	Johanson Technology	500R07SOR7BV4TD
CAP, 2.4pF, +/-0.1pF, 50V, HI-Q, 0402	C8	Johanson Technology	500R07S2R4BV4TD
CAP, 1000pF, 10%, 50V, X7R, 0402	C18, C22	Murata Electronics	GRM155R71H102KA01E
CAP, 1uF, 10%, 16V, X7R, 0603	C20	Murata Electronics	GRM188R71C105KA12D
RES, 0Ω, 0402	L1	Kamaya, Inc	RMC1/16SJPTH
IND, 20nH, 5%, W/W, 0402	L2, R2	Coilcraft, Inc	0402CS-20NXJLW
IND, 1.6nH, +/-0.1nH, T/F, 0402	L3	Murata Electronics	LQP15MN1N6B02D
FER, BEAD, 220Ω, 2A, 0603	R1	Murata Electronics	BLM18EG221SN1D
RES, 2K, 5%, 1/16W, 0402	C1, R4	Panasonic Industrial Co.	ERJ-2GEJ202
RES, 1.5K, 1%, 1/16W, 0402	R5	Panasonic Industrial Co.	ERJ-2RKF1501X
RES, 100Ω, 1%, 1/10W, 0402	R6	Panasonic Industrial Co.	ERJ-2RKF1000X
CONN, HDR, ST, PLRZD, 2-PIN, 0.100"	P1-P2	ITW Pancon	MPSS100-2-C
CONN, SMA, END LNCH, FLT, 0.062"	J1-J2	Emerson Network Power	142-0701-821
DNP	C3-C4, C9-C10, C12-C17, C19, C21, L4, R3		

## Evaluation Board Assembly Drawing (2110MHz to 2170MHz Application Circuit)

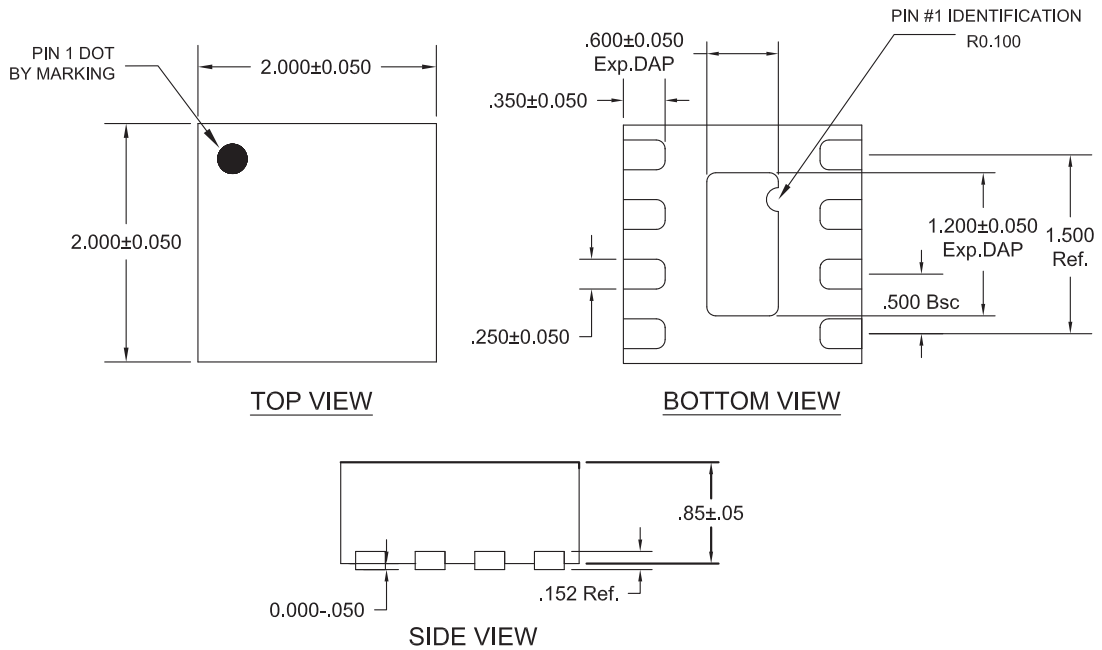


**Pin Description Table**

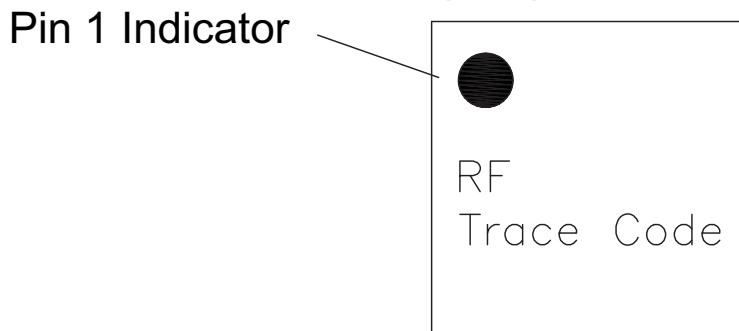
Pin	Name	Description
1	NC	No Internal Connection
2	RF IN	RF input. External DC block is required.
3	NC	No Internal Connection
4	NC	No Internal Connection
5	NC	No Internal Connection
6	VREF	Control input to the active bias circuit to set $I_{CQ}$ . Can be used as a power-down pin.
7	RF OUT/VCC	RF output, device collector.
8	VBIAS	Supply voltage for the active bias circuit.
EPAD	GND	DC and RF ground. Must be soldered to EVB ground plane over a bed of vias for thermal and RF performance.

**Package Drawing**

Dimensions in inches (millimeters)



**Branding Diagram**



YYWW = date code where YY = year, WW = week. Trace Code = lot code assigned by packaging supplier.