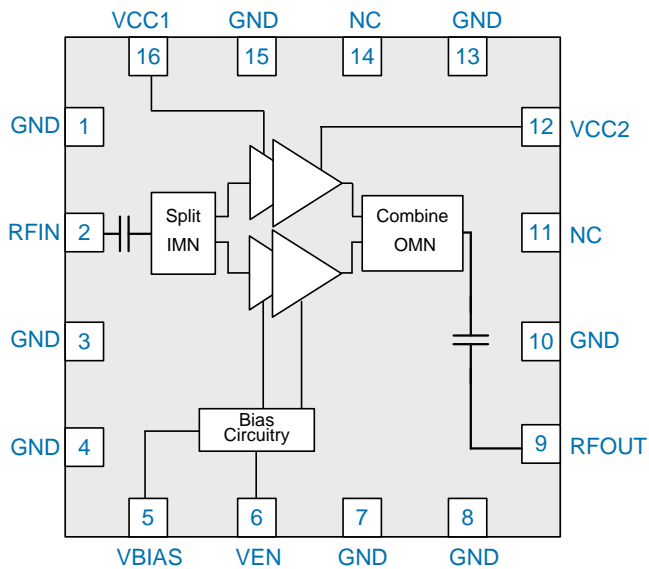# RFPA2005

Integrated Power Amplifier Module
1805MHz to 2170MHz

The RFPA2005 is a two-stage power amplifier (PA) designed for Small Cell Base Stations. Its broadband quadrature design supports usage in multiple bands with excellent output return loss and load tolerance. When used with DPD, the RFPA2005 delivers up to 24dBm LTE Downlink (CFR 8dB) with ACPR < -50dBc.

Package: Module, 16-pin, 5.0mm x 5.0mm x 1.175mm

Features

- P_{OUT} = 24dBm, 22% PAE, with 3.3V, 20MHz LTE DL, CFR 8dB
- ACPR < -50dBc with DPD
- 25dB Gain in Band 4(1)
- Integrated Matching to 50Ω
- Integrated DC Block Capacitors
- Broadband Quadrature Design
- Excellent Output Return Loss
- Covers 3GPP Downlink in Bands: 2(25), 3, 4(1)
- VSWR Tolerant, Load Insensitive

Applications

- Small Cell Base Stations
- Data Cards with Terminals
- Customer Premise Equipment

Functional Block Diagram

Ordering Information

RFPA2005SQ	Sample bag with 25 pieces
RFPA2005SR	7" Reel with 100 pieces
RFPA2005TR13	13" Reel with 2500 pieces
RFPA2005PCK-410	1805MHz to 2170MHz PCBA with 5-piece sample bag

DS141031

Absolute Maximum Ratings

Parameter	Rating	Unit
DC Supply Voltage, V_{CC1}, V_{CC2} (P_{OUT} <24dBm, VSWR < 5:1)	4.5	V_{DC}
Enable Control Logic, V_{EN}	+2.2	V_{DC}
CW Maximum RF Input Power into 50Ω Load (V_{CC} =3.3V)	+15	dBm
Storage Temperature Range	-40 to +150	°C
Moisture Sensitivity Level (260° JEDEC J-STD-020)	MSL3	
Modulated (WCDMA) Input Power 6:1 Output VSWR (V_{CC} =3.3V)	+10	dBm
ESD Rating, All Pins, HBM, JESD22-A114	2000	V
ESD Rating, All Pins, CDM, JESD22-C101	1000	V

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.

## Recommended Operating Condition

Parameter	Specification			Unit
	Min	Typ	Max	
Operating Temperature Range	-40		+85	°C
Operating Junction Temperature			165	°C
Power Supply V_{CC1}, V_{CC2},	3.15	3.3	3.45	V
Power Supply Vbias	3.3	3.3	3.45	V

Nominal Operating Parameters

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Operating Frequency Range	1805		2170	MHz	
General Performance					
V_{EN} Range (Logic Low)	0		0.4	V	
V_{EN} Range (Logic High)	1.4		1.9	V	
V_{EN} Enable Current			0.2	mA	V_{EN} = 1.8V
Total Idle Current (I_{CQ})		135		mA	DC only, V_{CC1} = V_{CC2} = 3.3V, V_{BIAS} = 3.3V, V_{EN} = 1.8V
V_{BIAS} Current		5	9	mA	DC only, V_{EN} = 1.8V
DC Enable Time			7	µs	DC only, time from V_{EN} = high to stable idle current (90% of steady state value)
RF Rise / Fall Time			2	µs	P_{OUT} ≤ 24dBm, 90% of target, DC settled prior to RF
Electrical Performance: Band 4					**Unless otherwise specified; Temp = +25°C, V_{CC1}, V_{CC2} = +3.3V, $V_{Bias=}$+3.3V, V_{EN} = +1.8V, P_{OUT} = 24dBm, 2110MHz < F < 2170MHz, 50Ω system, 20MHz LTE DL with CFR 8dB**
Gain	25	26.5		dB	

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
ACLR1 – Adjacent Channel		-34	-33	dBc	Without DPD
ACLR2 – Alternate Channel		-53	-50	dBc	Without DPD
ACLR1_DPD		-50		dBc	With DPD
ACLR2_DPD		-60		dBc	With DPD
PA Current Drain		335		mA	P_{OUT} = +24dBm
Input Return Loss		-20		dB	Small signal S11, no external matching
Output Return Loss		-10		dB	Small signal S22, no external matching
Harmonics 2f0		-42		dBm	CW, P_{OUT} = +24dBm
Harmonics 3f0		-40		dBm	

Typical Performance: T = 25°C, V_{CC} = V_{BIAS} = 3.3V, V_{EN} = 1.8V unless otherwise noted
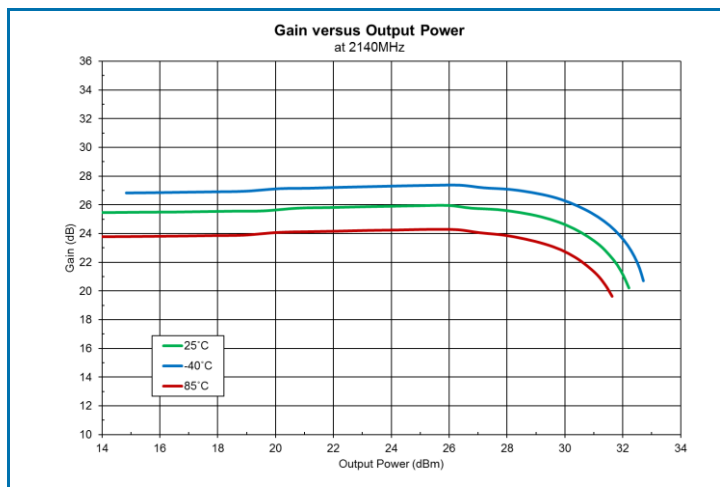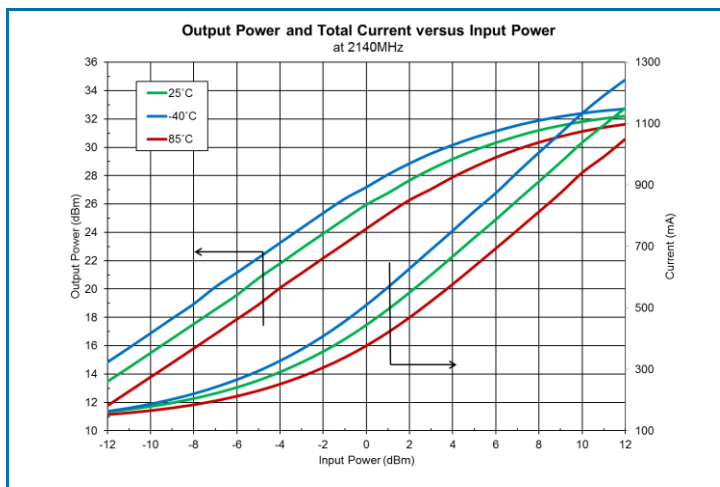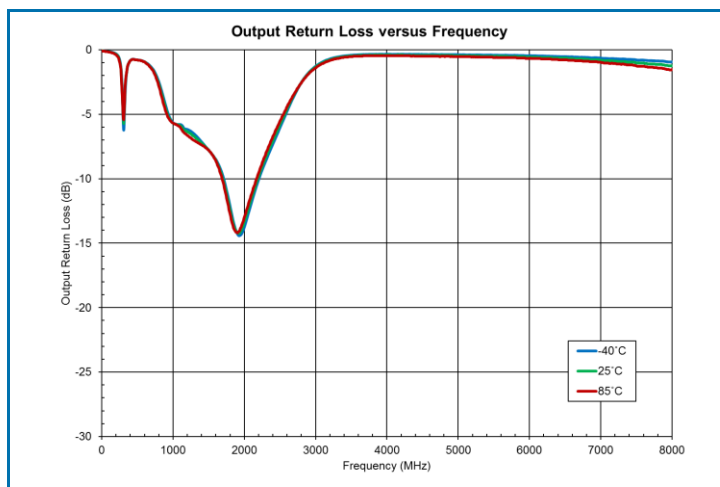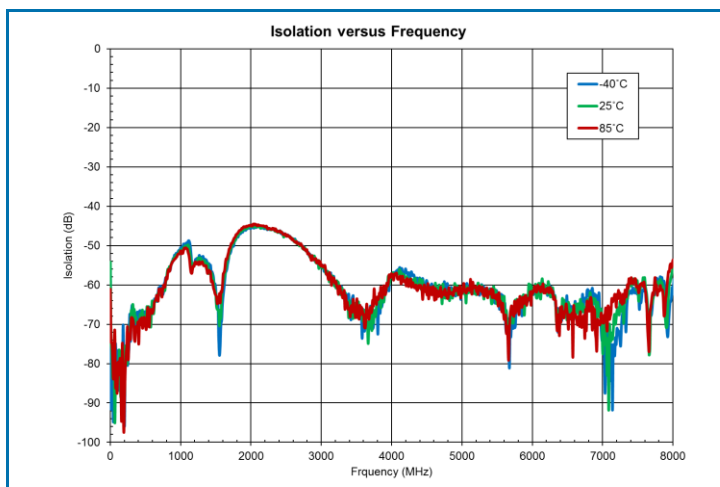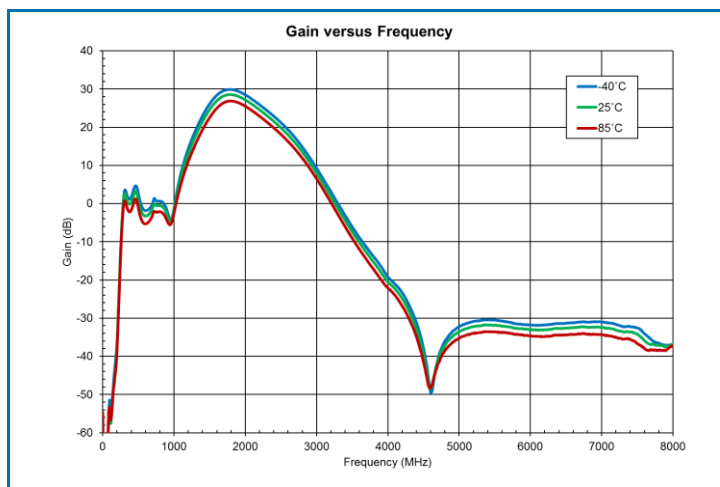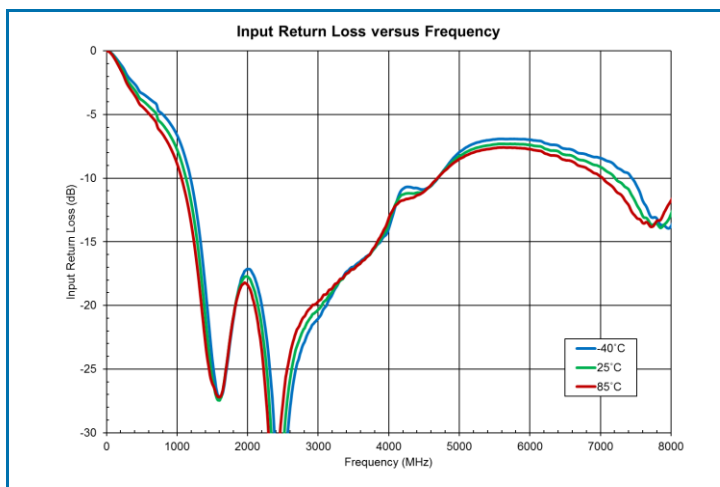
## Typical Performance: T = 25°C, V_{CC} = V_{BIAS} = 3.3V, V_{EN} = 1.8V unless otherwise noted
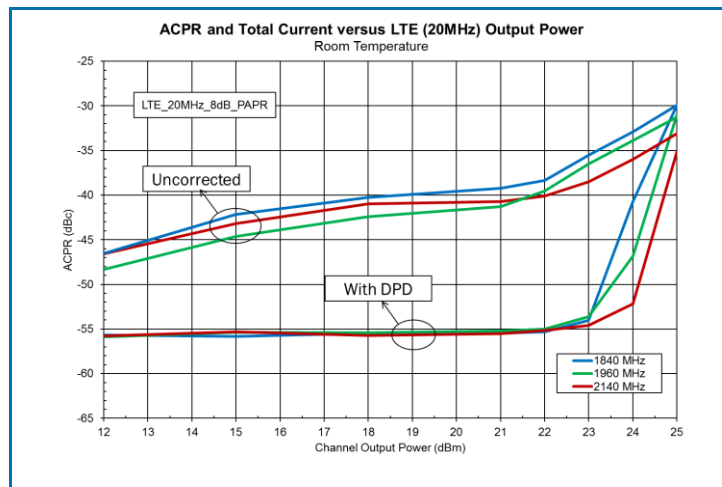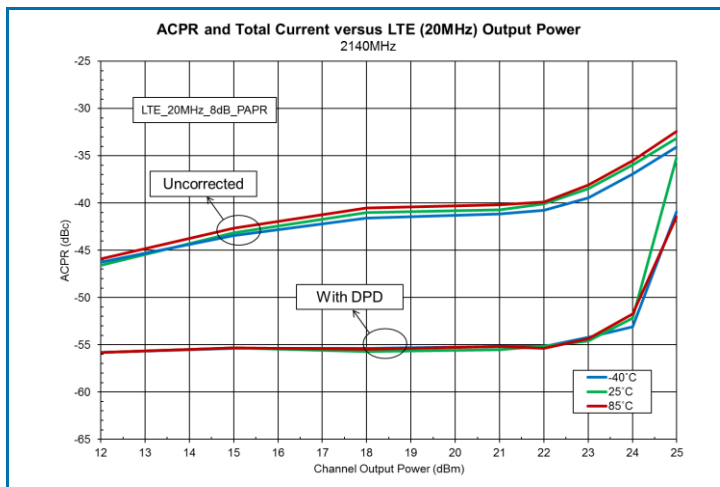
Evaluation Board Schematic 2110MHz to 2170MHz (B4) Application Circuit
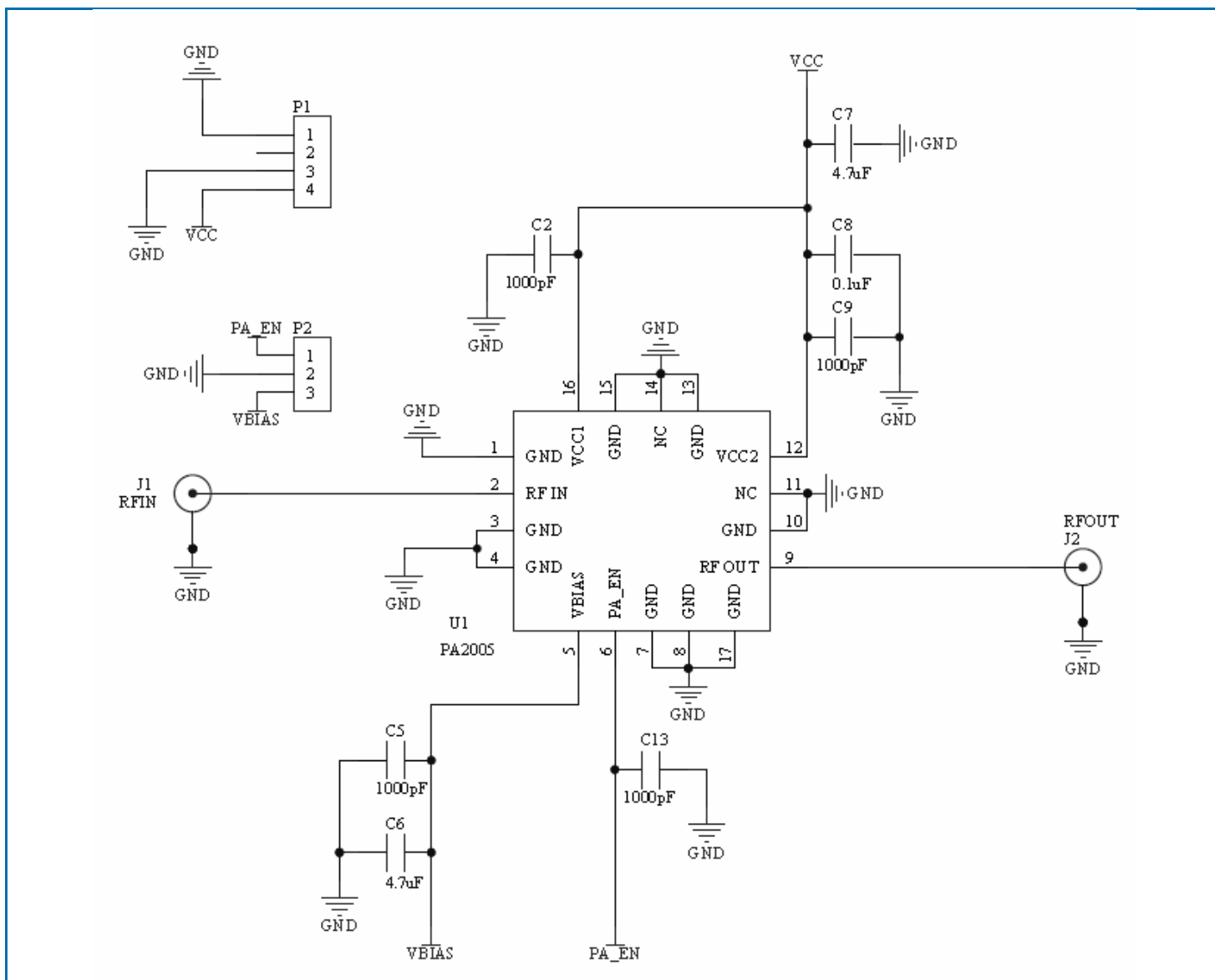
Evaluation Board Bill of Materials (BOM) 2110MHz to 2170MHz Application Circuit

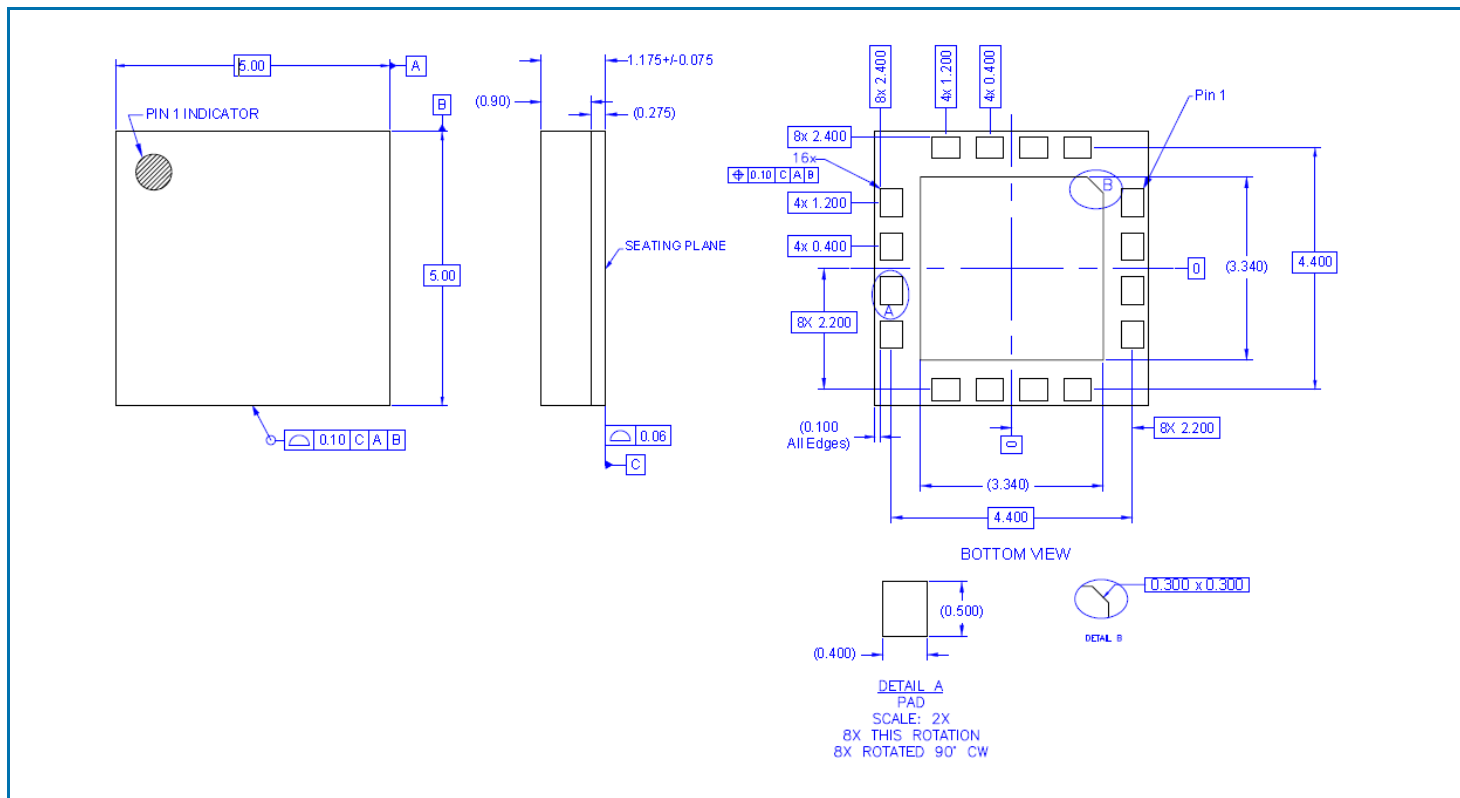| Description	Reference Designator	Manufacturer	Manufacturer's P/N
RFPA2005, RFPA0805 Evaluation Board		Dynamic Details (DDI) Toronto	RFPA0805-410 (A)
2110MHz to 2170MHz Integrated PA Module	U1	RFMD	RFPA2005
CAP, 4.7µF, 20%, 10V, X7R, 1206	C6, C7	Taiyo Yuden (USA), Inc.	CE LMK316 B7475ML-7
CAP, 1000pF, 10%, 50V, X7R, 0402	C2, C5, C9, C13	Murata Electronics	GRM155R71H102KA01D
CAP, 0.1µF, 10%, 16V, X7R, 0402	C8	Murata Electronics	GRM155R71C104KA88D
CONN, SMA, END, LAUNCH, 0.068"	J1-J2	Gigalane Co., Ltd.	PAF-S05-008
CON, HDR, St, PLRZD, 4-PIN, 0.100"	P1	ITW Pancon	MPSS100-4-C
CONN, HDR, ST, PLRZD, 3-PIN, 0.100"	P2	ITW Pancon	MPSS100-3-C

Evaluation Board Assembly Drawing 2110MHz to 2170MHz Application Circuit
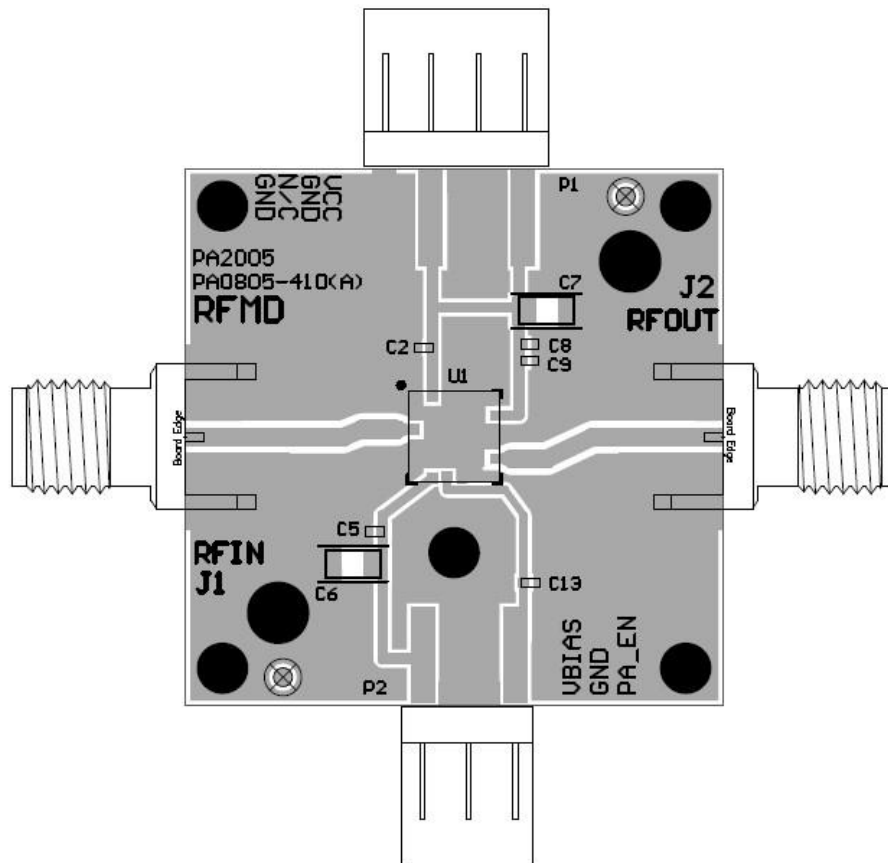
Pin Names and Descriptions

Pin	Name	Description
1	GND	Ground connection
2	RFIN	RF Input; internally matched to 50Ω
3	GND	Ground connection
4	GND	Ground connection
5	VBIAS	Input Bias Voltage; this pin requires a regulated supply to maintain nominal bias current
6	VEN	Enable
7	GND	Ground connection
8	GND	Ground connection
9	RFOUT	RF Output; internally matched to 50Ω
10	GND	Ground connection
11	NC	Not connected
12	VCC2	Output stage collector supply voltage
13	GND	Ground connection
14	NC	Not connected, OPEN Circuit in the Module
15	GND	Ground connection
16	VCC1	Driver stage collector supply voltage
PKG BASE	GND	Ground connection; the back side of the package should be connected to the ground plan though as short of a connection as possible, PCB vias under the device are recommended.

Package Outline and Branding Drawing (Dimensions in millimeters)

Package Outline and Branding Drawing (Dimensions in millimeters)

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