

RFPA2025

Integrated Power Amplifier Module
2110MHz to 2170MHz

The RFPA2025 is a three-stage power amplifier (PA) designed for Small Cell Base Stations. Its broadband quadrature design has excellent output return loss and load tolerance. When used with DPD, the RFPA2025 delivers up to 28dBm LTE Downlink (CFR 8dB) with ACLR < -50dBc.



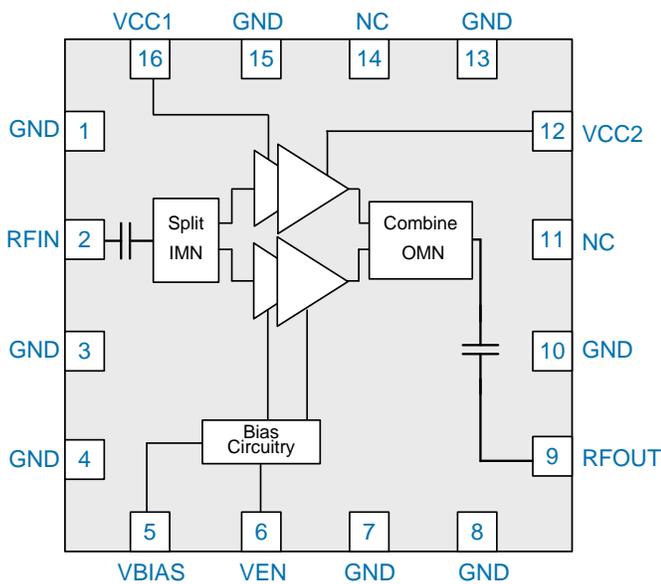
Package: Module, 16-pin,
5.0mm x 5.0mm x 1.175mm

Features

- $P_{OUT} = 28\text{dBm}$, 25% PAE, with 5V, 20MHz LTE DL, CFR 8dB
- ACLR < -50dBc with DPD
- 31dB Gain
- Integrated Matching to 50Ω
- Integrated DC Block Capacitors
- Broadband Quadrature Design
- Excellent Output Return Loss
- Covers 3GPP Downlink in Bands: 4(1)
- VSWR Tolerant, Load Insensitive

Applications

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



Functional Block Diagram

Ordering Information

RFPA2025SQ	Sample bag with 25 pieces
RFPA2025SR	7" Reel with 100 pieces
RFPA2025TR13	13" Reel with 2500 pieces
RFPA2025PCK-410	2110MHz to 2170MHz PCBA with 5-piece sample bag

Absolute Maximum Ratings

Parameter	Rating	Unit
DC Supply Voltage, V_{CC} ($P_{OUT} < 29\text{dBm}$, $V_{SWR} < 6:1$)	6	V_{DC}
Enable Control Logic, V_{EN}	+2.2	V_{DC}
Maximum CW RF Input Power into 50 Ω Load ($V_{CC} = 5.25\text{V}$)	+20	dBm
Operating Case Temperature	-40 to +85	$^{\circ}\text{C}$
Storage Temperature Range	-40 to +150	$^{\circ}\text{C}$
Moisture Sensitivity Level (260 $^{\circ}$ JEDEC J-STD-020)	MSL3	
Modulated (LTE-20MHz) Input Power 6:1 Output VSWR ($V_{CC} = 5.25$)	-4	dBm
ESD Rating, All Pins, HBM, JESD22-A114	1000	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

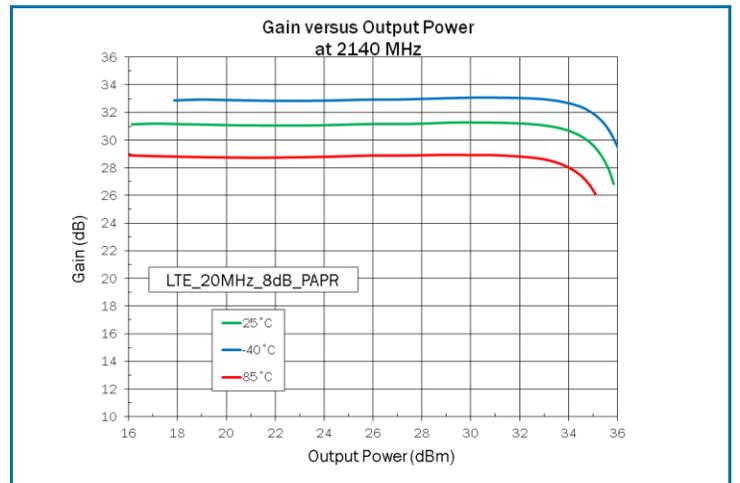
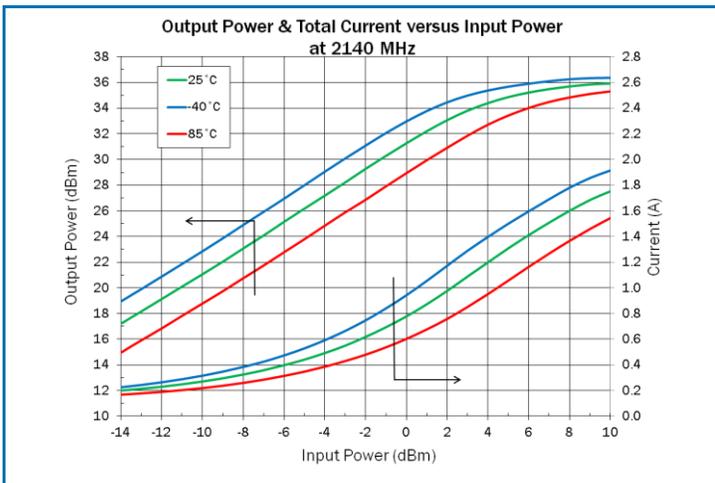
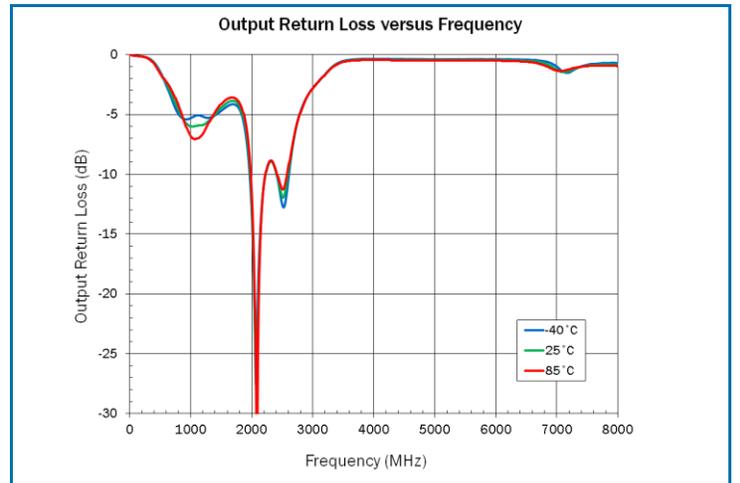
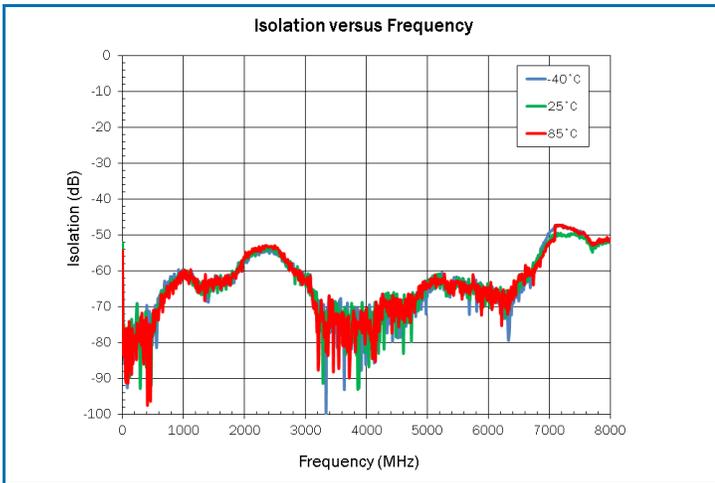
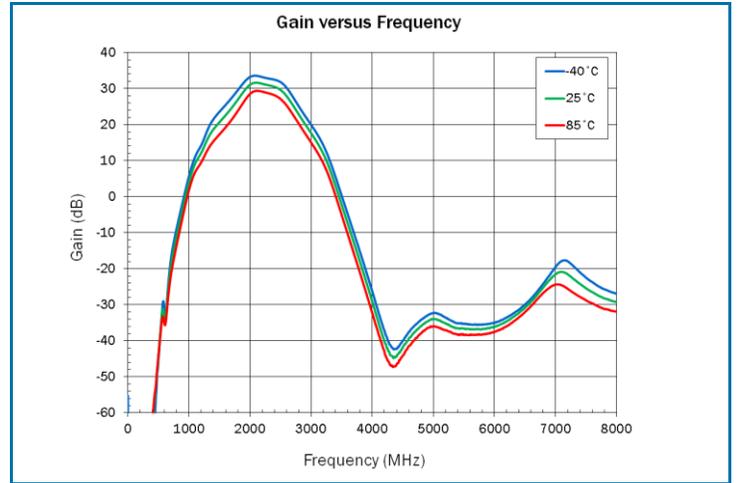
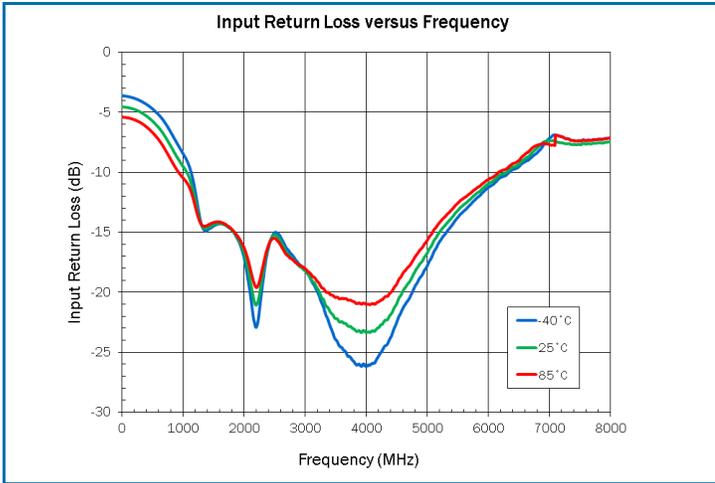
Parameter	Specification			Unit
	Min	Typ	Max	
Operating Temperature Range	-40		+85	$^{\circ}\text{C}$
Operating Junction Temperature			165	$^{\circ}\text{C}$
Power Supply V_{CC1} , V_{CC2} , V_{BIAS}	4.75	5	5.25	V

Nominal Operating Parameters

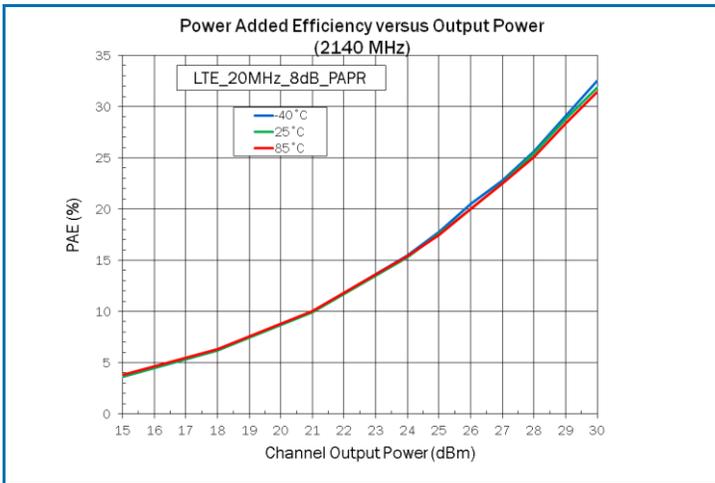
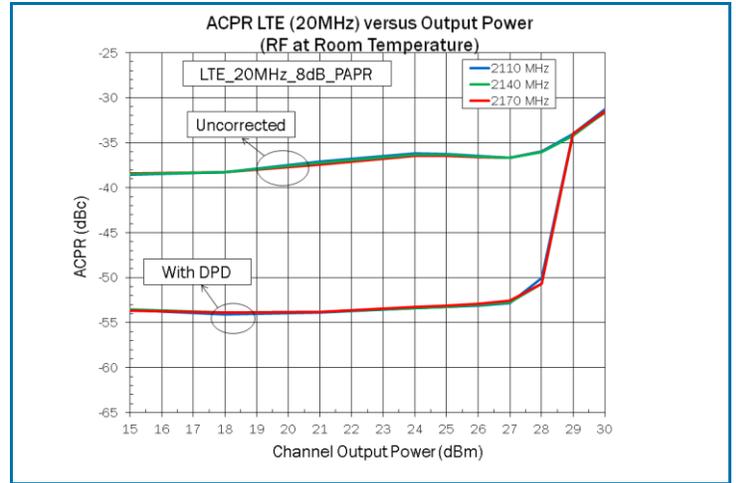
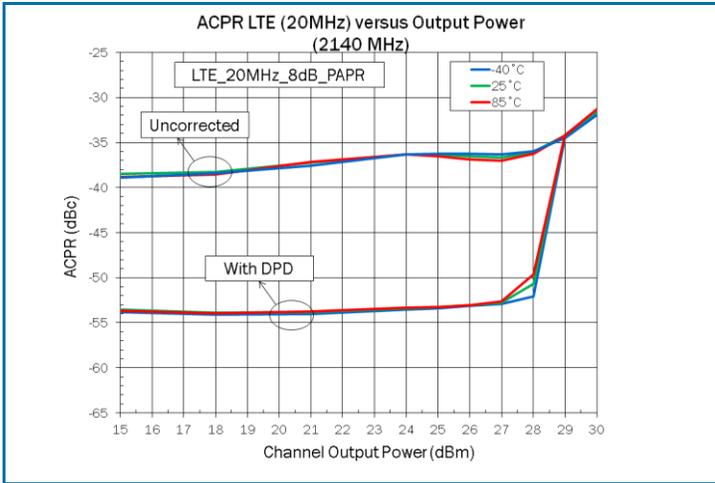
Parameter	Specification			Unit	Condition
	Min	Typ	Max		
General Performance					
Operating Frequency Range	2110		2170	MHz	
Power Supply V_{CC1} , V_{CC2}		5		V	
Bias Supply V_{BIAS}		5		V	
V_{EN} Range (Logic Low)	0		0.4	V	
V_{EN} Range (Logic High)	1.35		2.0	V	
V_{EN} Enable Current			0.2	mA	$V_{EN} = 1.8\text{V}$
Total Idle Current (I_{CQ})		135		mA	DC only, $V_{CC1} = V_{CC2} = V_{BIAS} = 5\text{V}$, $V_{EN} = 1.8\text{V}$
V_{BIAS} Current		7		mA	DC only, $V_{EN} = 1.8\text{V}$
DC Enable Time			7	μs	DC only, time from $V_{EN} = \text{high}$ to stable idle current (90% of steady state value)
RF Rise / Fall Time			2	μs	$P_{OUT} \leq 28\text{dBm}$, 90% of target, DC settled prior to RF
Thermal Resistance (R_{TH})		29.5		$^{\circ}\text{C}/\text{W}$	Junction-to-backside of IC

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
Electrical Performance: Band 4					Unless Otherwise Specified; Temp = +25°C, V_{CC} = +5.0V, V_{EN} = +1.8V, P_{OUT} = 28dBm, 2110MHz < F < 2170MHz, 50Ω system, 20MHz LTE DL with CFR 8dB
Gain		31		dB	
ACLR1 – Adjacent Channel		-34		dBc	Without DPD
ACLR2 – Alternate Channel		-50		dBc	Without DPD
ACLR1_DPD		-50.5		dBc	With DPD
ACLR2_DPD		-58		dBc	With DPD
PA Current Drain		500		mA	
PAE		25.2		%	With DPD
Input Return Loss		-20		dB	Small signal S11, no external matching
Output Return Loss		-13		dB	Small signal S22, no external matching
Harmonics 2f0		-40		dBm	
Harmonics 3f0		-38		dBm	
Noise Figure		5.2		dB	Temp = +25°C, V _{CC} = +5V, V _{EN} = +1.8V

Typical Performance: $V_{CC} = V_{BIAS} = 5V$, $V_{EN} = 1.8V$ unless otherwise noted



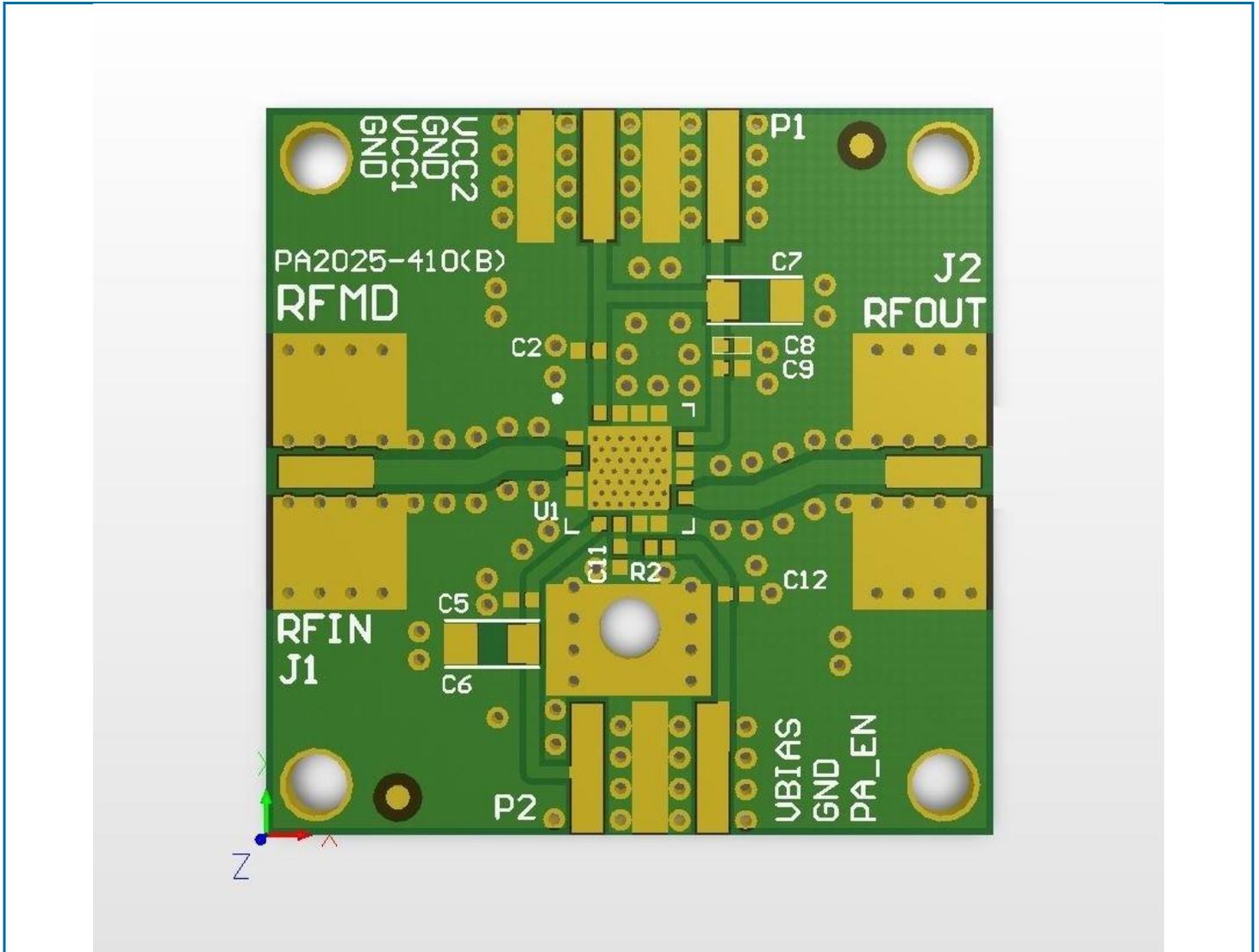
Typical Performance: $V_{CC} = V_{BIAS} = 5V$, $V_{EN} = 1.8V$ unless otherwise noted



Evaluation Board Bill of Materials (BOM) 2110MHz to 2170MHz (Band 4) Application Circuit

Description	Reference Designator	Manufacturer	Manufacturer's P/N
RFPA2025 Evaluation Board		Viasystems Technologies Corp	PA2025-410(B)
2110MHz to 2170MHz Integrated PA Module	U1	RFMD	RFPA2025
CAP, 1000pF, 10%, 50V, X7R, 0402	C2, C5, C9, C12	Murata Electronics	GRM155R71H102KA01D
CAP, 4.7μF, 20%, 10V, X7R, 1206	C6-C7	Taiyo Yuden (USA), Inc.	CE LMK316 B7475ML-T
CAP, 0.1μF, 10%, 16V, X7R, 0402	C8	Murata Electronics	GRM155R71C104KA88D
CAP, 22pF, 5%, 50V, C0G, 0402	C11	Murata Electronics	GRM1555C1H220JA01D
RES, 0 OHM, 0402 KAMAYA	R1	Kamaya, Inc	RMC1/16SJPTH
RES, 1K, 5%, 1/16W, 0402	R2	Kamaya, Inc	RMC1/16S-102JTH
CONN, MSA, END, LAUNCH, 0.068"	J1-J2	Gigalane Co., LTD.	PA-S05-008
CONN, 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

Assembly Drawing



Pin Names and Descriptions

Pin	Name	Description
1	GND	Ground connection
2	RF _{IN}	RF Input; Internally matched to 50Ω
3	GND	Ground connection
4	GND	Ground connection
5	V _{BIAS}	Input Bias Voltage; This pin requires a regulated supply to maintain nominal bias current
6	V _{EN}	Enable
7	GND	Ground connection
8	GND	Ground connection
9	RF _{OUT}	RF Output; Internally matched to 50Ω
10	GND	Ground connection
11	NC	Not connected
12	V _{CC2}	Output stage collector supply voltage
13	GND	Ground connection
14	NC	Not connected , OPEN Circuit in the module
15	GND	Ground connection
16	V _{CC1}	Drive stage collector supply voltage
PKG BASE	GND	Ground connection; The back side of the package should be connected to the ground plane though as short of a connection as possible, PCB vias under the device are recommended.

Package Outline (Dimensions in millimeters)

