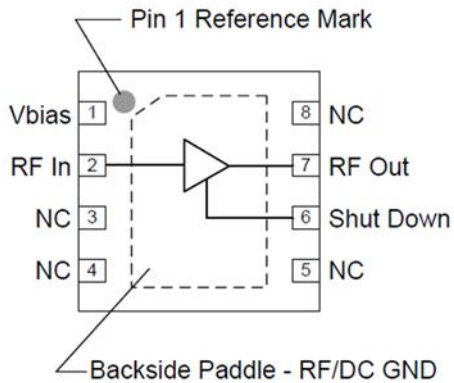


## Product Description

The QPL6216 is a high linearity, ultra-low noise gain block amplifier in a small 2x2 mm surface-mount package. At 2332 MHz, the amplifier typically provides +36 dBm OIP3. The amplifier does not require any negative supplies for operation and can be biased from positive supply rails from 3.3 to 5.25 V. The device is housed in a lead-free/green/RoHS-compliant industry-standard 2x2 mm package.

The QPL6216 uses a high performance E-pHEMT process. The low noise amplifier contains an internal active bias to maintain high performance over temperature.

## Functional Block Diagram



Package: DFN, 8-pin  
2.0mm x 2.0mm x 0.85mm

## Feature Overview

- High Gain device – Typical value 15.5dB
- Ultra-low noise figure, 0.45 dB NF at 2332 MHz
- High linearity, +36 dBm Output IP3
- High input power ruggedness, >22 dBm PIN, MAX
- Unconditionally stable
- Externally controlled Icq with Vbias
- Integrated shutdown control pin
- 3.3-5.25 V positive supply voltage: -Vgg not required

## Applications

- SDARS Active Antenna

## Ordering Information

PART NUMBER	DESCRIPTION
QPL6216SB	5 PIECE SAMPLE BAG
QPL6216SQ	25 PIECE SAMPLE BAG
QPL6216SR	100 PIECE 7" REEL
QPL6216TR7	2500 PIECE 7" REEL
QPL6216PCK-01	EVALUATION BOARD + 5 PC SAMPLE BAG

Standard T/R Size = 2500 pieces on a reel

## Absolute Maximum Ratings

PARAMETER	RATING	UNITS
Storage Temperature	-65 to 150°	C
Supply Voltage ( $V_{DD}$ )	+7	V
RF Input Power, CW, 50 $\Omega$ , T = 25°C	+22	dBm

## Recommended Operating Conditions

PARAMETER	MIN	TYP	MAX	UNITS
Supply Voltage ( $V_{DD}$ )	+3.3	+4.5	+5.25	V
Bias Voltage ( $V_{bias}$ )	+3.3	+3.6	+5.25	V
TCASE	-40		+105	°C
TJ (for >10 <sup>6</sup> hours MTTF)			+190	°C

## Electrical Specifications at +25°C

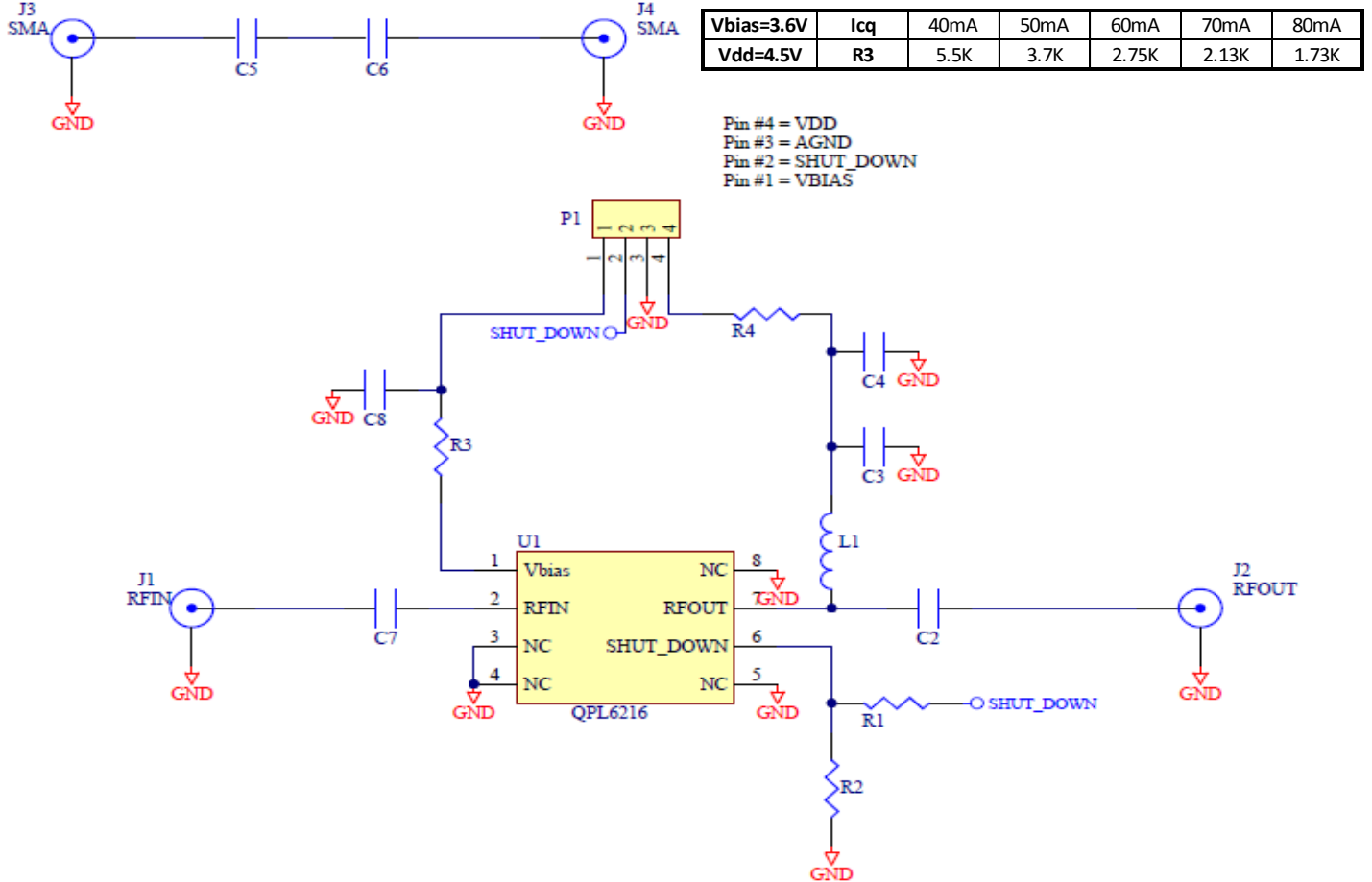
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operational Frequency Range		2320	2332	2345	MHz
Gain		14.0	15.5	16.5	dB
Input Return Loss			9		dB
Output Return Loss			15		dB
Output P1dB		+18.0	+22.5		dBm
Output IP3	$P_{out}=+2$ dBm/tone, $\Delta f=1$ MHz	+30	+36		dBm
Noise Figure <sup>1</sup>			0.45	0.65	dB
Power Shutdown Control (Pin 6)	On state	0		0.63	V
	Off state (Power down)	1.17	1.8	$V_{DD}$	V
Current, $I_{DD}^2$	On state	45	60	75	mA
	Off state (Power down)		3	4	mA
Shutdown pin current, $I_{SD}$	$V_{PD} \geq 1.17$ V		140		$\mu$ A
Thermal Resistance, $\theta_{jc}$	channel to case		62		°C/W

Test conditions unless otherwise noted:  $V_{DD} = +4.5V$ ,  $V_{bias} = +3.6V$ , Temp = +25°C, 50  $\Omega$  system

Note: 1) Noise Figure data has input trace loss de-embedded

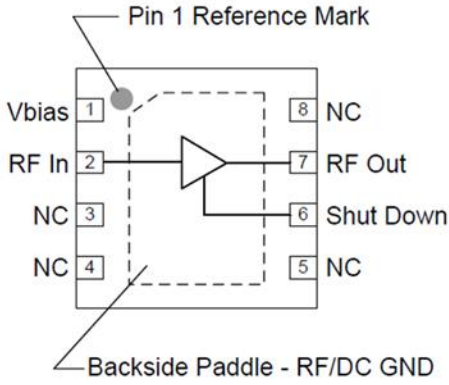
2)  $I_{cq}$  set by external 2.75K resistor

### Application Schematic



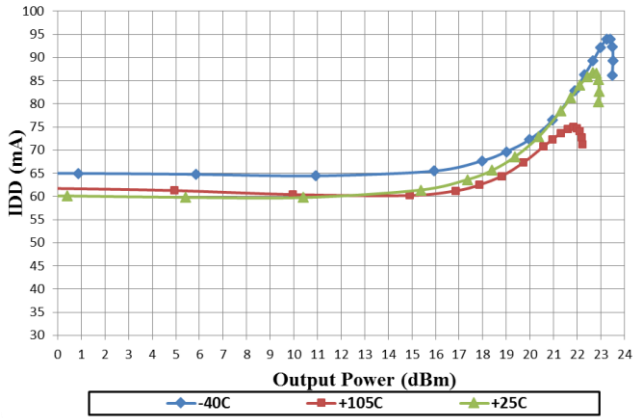
Qty	Ref Des	Description	UOM
1	U1	SDARS	EA
1		PCB, QPL6216	EA
5	C2,C5,C6,C7,C8	CAP, 100pF, 5%, 50V, C0G, 0402	EA
1	C3	CAP, 1000pF, 10%, 50V, X7R, 0402	EA
1	C4	CAP, 1uF, 10%, 6.3V, X7R, 0402	EA
1	R1	RES, 0 OHM, 5%, 1/10W, 0402	EA
1	R4	RES, 3.3 OHM, 5%, 1/16W, 0402	EA
1	R3	RES, 2.7K, 5%, 1/16W, 0402	EA
1	R2	RES, 20K, 5%, 1/16W, 0402	EA
1	L1	IND, 18nH, 5%, M/L, 0402	EA
1	P1	CONN, HDR, ST, PLRZD, 4-PIN, 0.100"	EA
4	J1,J2,J3,J4	ConnSMA Female PCB Edge Mount	EA

## Pin Configuration and Description

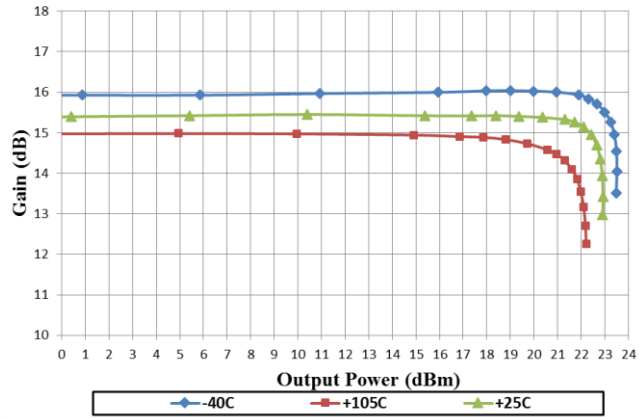


Pin No.	Label	Description
1	Vbias	Sets the Icq bias point for the device.
2	RF In	RF Input pin. A DC Block is required.
6	Shut Down	A high voltage (>1.17V) turns off the device. If the pin is pulled to ground or driven with a voltage less than 0.63V, then the device will operate under LNA ON state.
7	RF Out / DCBias	RF Output pin. DC bias will also need to be injected through a RF bias choke/inductor for operation.
3, 4, 5, 8	NC	No electrical connection. Provide grounded land pads for PCB mounting integrity.
Backside Paddle	RF/DC GND	RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance; see PCB Mounting Pattern for suggested footprint.

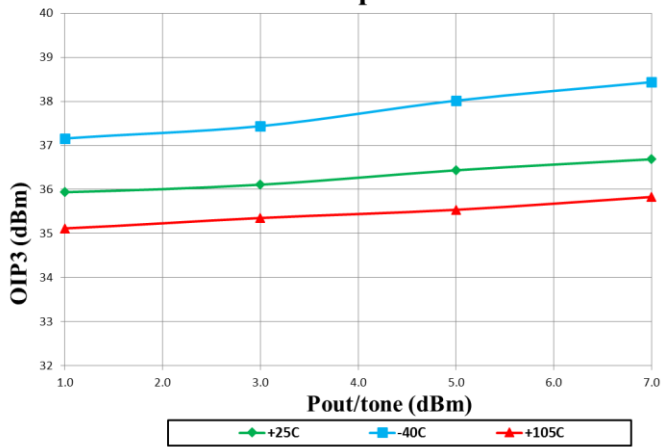
### IDD vs. Output Power



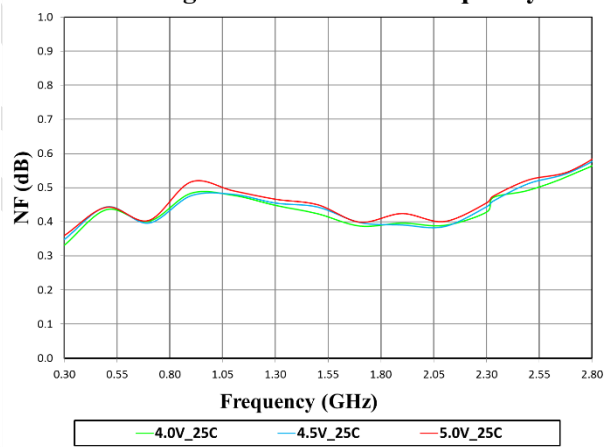
### Gain vs. Output Power



### OIP3 vs Output Power



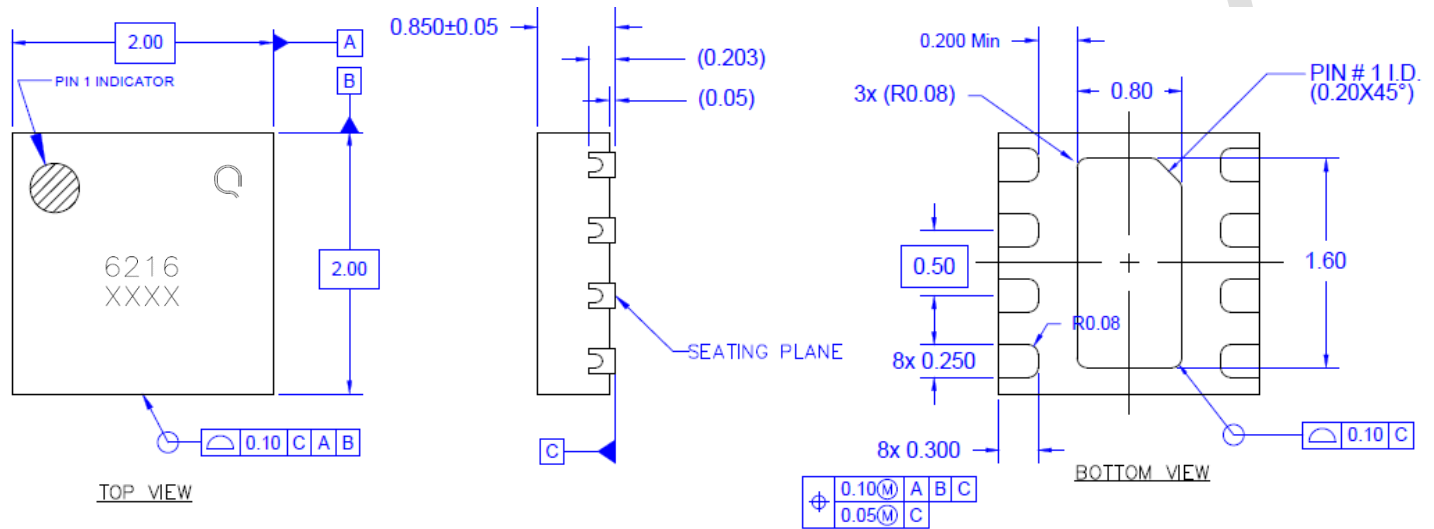
### Noise Figure vs. VDD over Frequency



### Mechanical Information

Marking: Part number – 6216

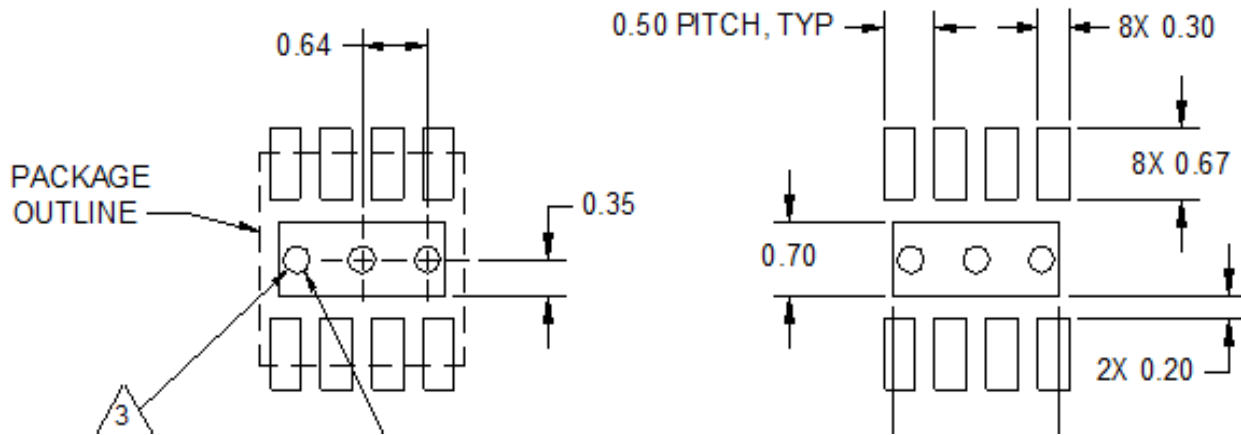
Trace Code – XXXX



#### NOTES:

1. All dimensions are in millimeters. Angles are in degrees.
2. Except where noted, this part outline conforms to JEDEC standard MO-220, Issue E (Variation VGGC) for thermally enhanced plastic very thin fine pitch quad flat no lead package (QFN).
3. Dimension and tolerance formats conform to ASME Y14.4M-1994.
4. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

### PCB Mounting Pattern



#### NOTES:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.10").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

## Product Compliance Information

### ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 1B

Value: Passes  $\geq 500$  V to  $< 1000$  V  
Test: Human Body Model (HBM)  
Standard: JS-001

ESD Rating: Class C3

Value: Passes  $\geq 1000$  V to  $< 2000$  V  
Test: Charged Device Model (CDM)  
Standard: JS-002

### MSL Rating

MSL Rating: Level 2

Test:  $260^{\circ}\text{C}$  convection reflow

Standard: JEDEC Standard IPC/JEDEC J-STD-020

### Solderability

Compatible with both lead-free ( $260^{\circ}\text{C}$  max. reflow temperature) and tin/lead ( $245^{\circ}\text{C}$  max. reflow temperature) soldering processes.

Package contact plating: NiPdAu

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

### RoHS Compliance

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ( $\text{C}_{15}\text{H}_{12}\text{Br}_4\text{O}_2$ ) Free
- PFOS Free

## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Tel: 1-844-890-8163

Web: [www.qorvo.com](http://www.qorvo.com)

Email: [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

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