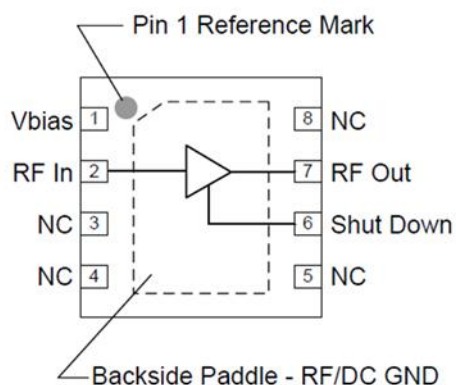


Product Description

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, 50Ω, 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 ⁶ 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, Δf=1 MHz	+30	+36		dBm
Noise Figure ¹			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}	VPD ≥ 1.17 V		140		μA
Thermal Resistance, θ _{JC}	channel to case		62		°C/W

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

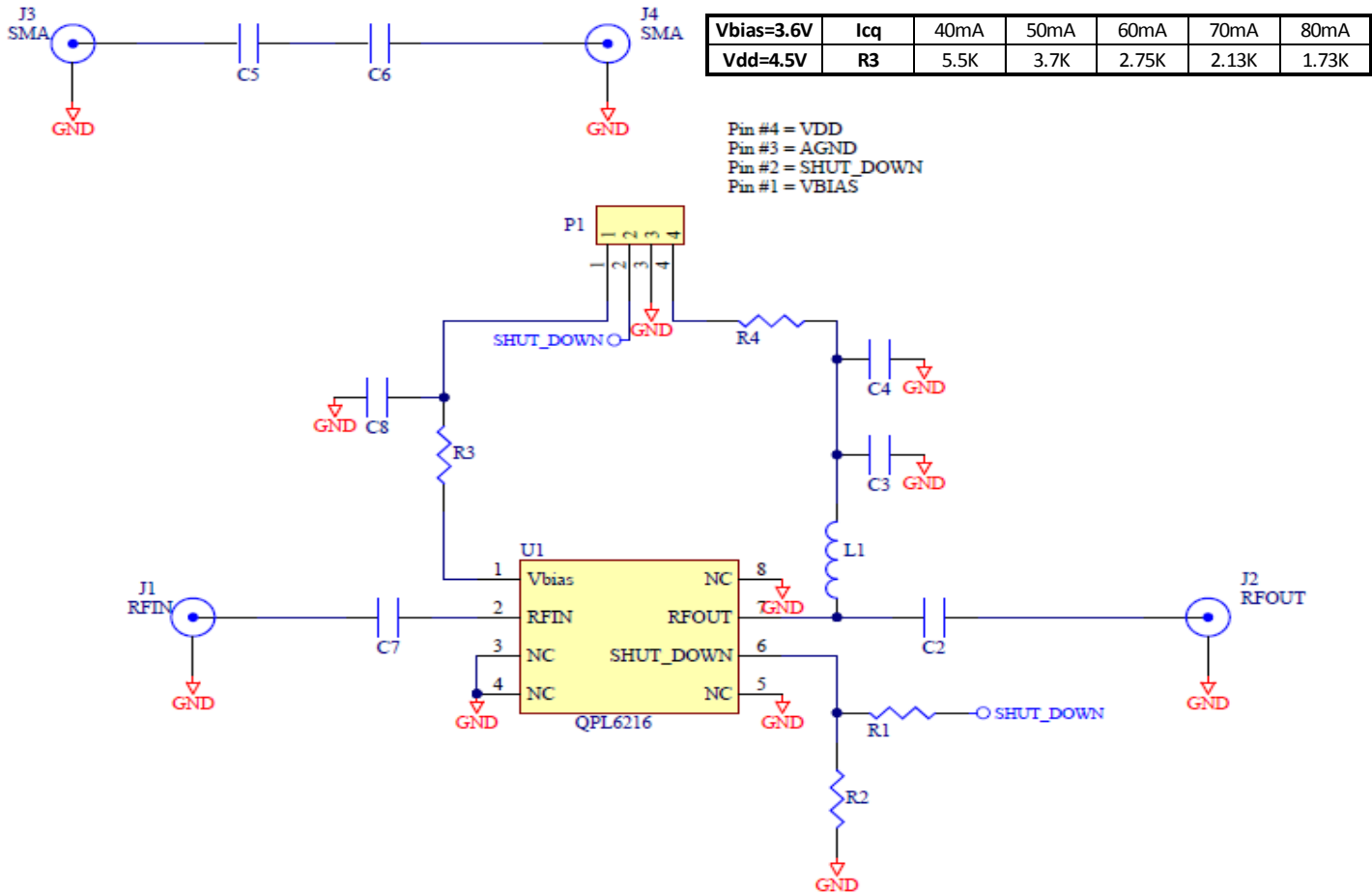
Note: 1) Noise Figure data has input trace loss de-embedded

2) I_{CQ} set by external 2.75K resistor



QPL6216
High-Linearity SDARS LNA

Application Schematic

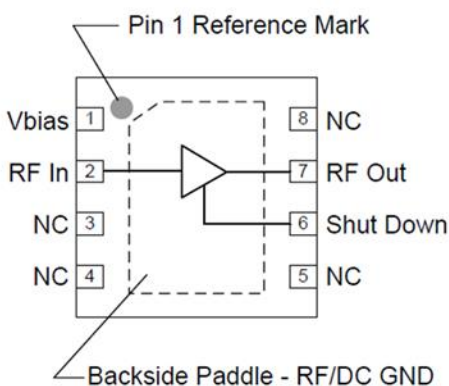


Vbias=3.6V	Icq	40mA	50mA	60mA	70mA	80mA
Vdd=4.5V	R3	5.5K	3.7K	2.75K	2.13K	1.73K

Pin #4 = VDD
Pin #3 = AGND
Pin #2 = SHUT_DOWN
Pin #1 = VBIAS

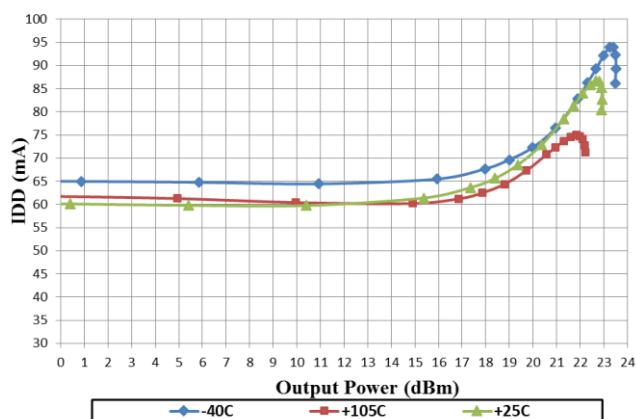
Qty	Ref Des	Description	UOM
1	U1	SDARS	EA
1		PCB, QPL6216	EA
5	C2,C5,C6,C7,C8	CAP, 100pF, 5%, 50V, C0G, 0402	EA
1	C3	CAP, 1000pF, 10%, 50V, X7R, 0402	EA
1	C4	CAP, 1uF, 10%, 6.3V, X7R, 0402	EA
1	R1	RES, 0 OHM, 5%, 1/10W, 0402	EA
1	R4	RES, 3.3 OHM, 5%, 1/16W, 0402	EA
1	R3	RES, 2.7K, 5%, 1/16W, 0402	EA
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

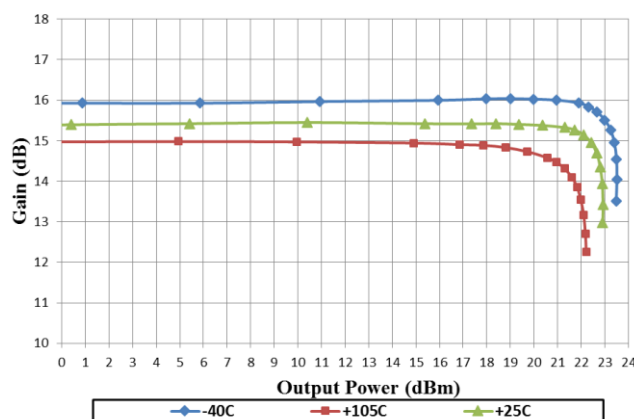


Pin No.	Label	Description
1	Vbias	Sets the Icq bias point for the device.
2	RF In	RF Input pin. A DC Block is required.
6	Shut Down	A high voltage ($>1.17V$) turns off the device. If the pin is pulled to ground or driven with a voltage less than $0.63V$, then the device will operate under LNA ON state.
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.

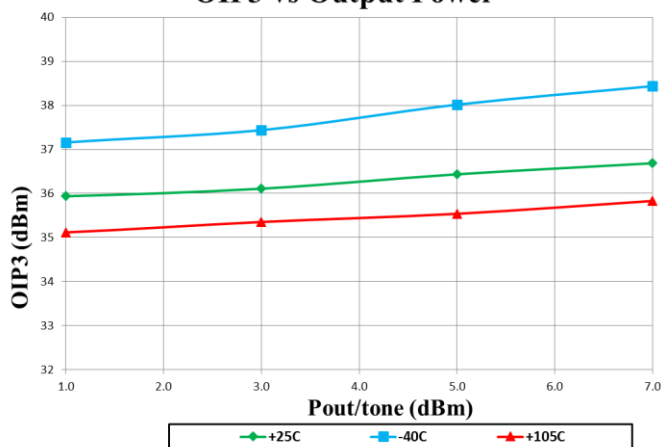
IDD vs. Output Power



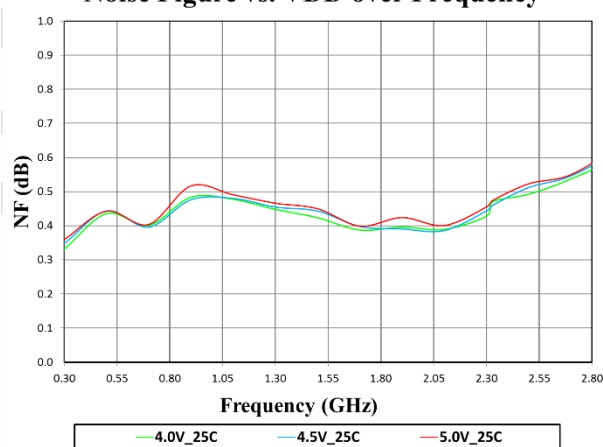
Gain vs. Output Power



OIP3 vs Output Power



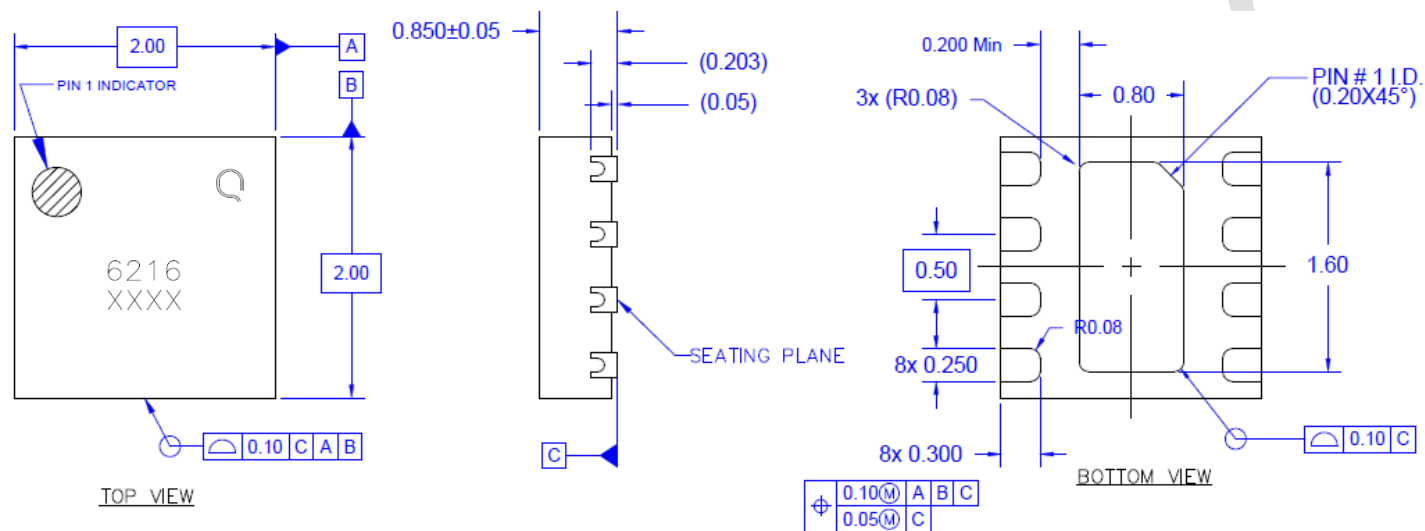
Noise Figure vs. VDD over Frequency



Mechanical Information

Marking: Part number – 6216

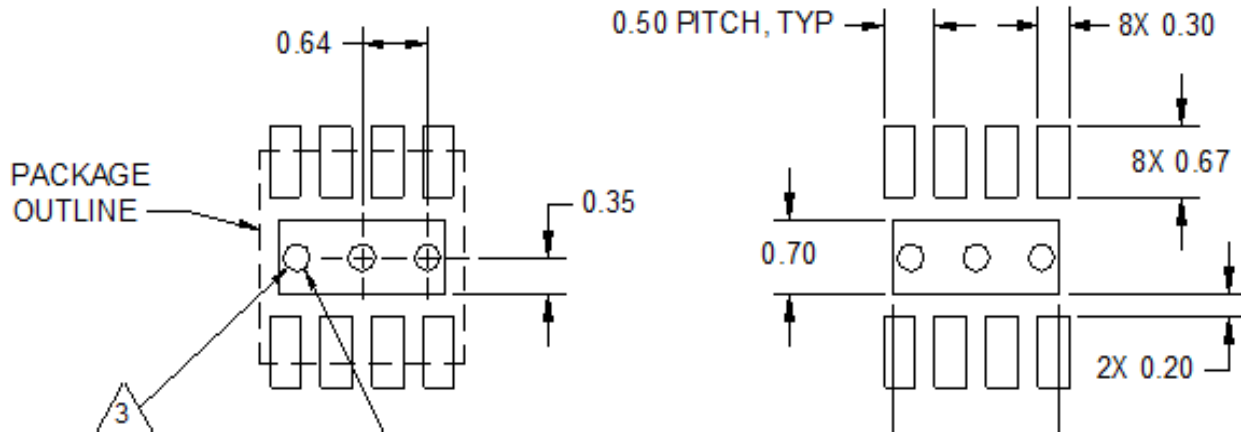
Trace Code – XXXX



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 ≥ 500 V to < 1000 V
Test: Human Body Model (HBM)
Standard: JS-001

ESD Rating: Class C3

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

MSL Rating

MSL Rating: Level 2

Test: 260°C convection reflow

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

Solderability

Compatible with both lead-free (260°C max. reflow temperature) and tin/lead (245°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

Email: customer.support@qorvo.com

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