QPD0030

45 W, DC to 4 GHz 48V GaN RF Power Transistor

Applications

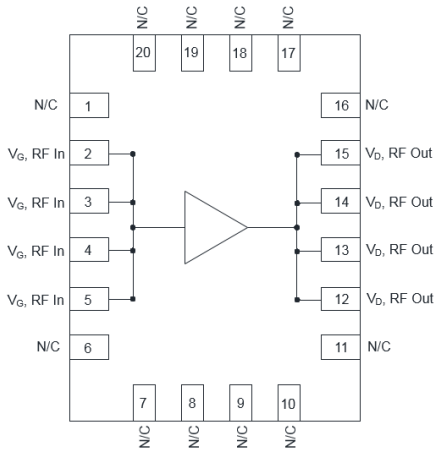
- W-CDMA / LTE
- Macrocell Base Station Driver
- Microcell Base Station
- Small Cell Final Stage
- Active Antenna
- General Purpose Applications

20 Pin 3x4mm QFN

Product Features

- Operating Frequency Range: DC to 4 GHz
- Operating Drain Voltage: 48 V
- Maximum Output Power (P_{SAT}): 49 W
- Maximum Drain Efficiency: 72.5%
- Efficiency-Tuned P3dB Gain: 21.7 dB
- Surface Mount Plastic Overmold package

Functional Block Diagram



General Description

The QPD0030 is a wide band over-molded QFN discrete power amplifier. The device is a single stage unmatched power amplifier transistor.

The QPD0030 can be used in Doherty architecture for the final stage of a base station power amplifier for small cell, microcell, and active antenna systems. The QPD0030 can also be used as a driver in a macrocell base station power amplifier.

The wide bandwidth of the QPD0030 makes it suitable for many differenct applications from DC to 4 GHz. QPD0030 can deliver P_{SAT} of 49 W at 48 V operation.

Lead-free and ROHS compliant.

Pin Configuration

Pin No.	Label
2, 3, 4, 5	RF IN, V_G
12, 13, 14, 15	RF OUT, V_D
1, 6-11, 16-20	N/C
Backside Paddle	RF/DC Ground

Ordering Information

Part No.	ECCN	Description
QPD0030	EAR99	45W DC to 4 GHz

Absolute Maximum Ratings

Parameter	Rating
Gate Voltage (V_G)	–10 V
Drain Voltage (V_D)	+55 V
Maximum RF Input Power	33 dBm
VSWR Mismatch, P1dB Pulse (20% duty cycle, 100 µ width), T = 25°C	10:1
Storage Temperature	−65 to +150 °C

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Operating Temperature	–40			°C
Gate Voltage (V_G)		–2.5		V
Drain Voltage (V_D)		48		V
Quiescent Current (I_{CQ})		90		mA
T_{CH} for >10^6 hours MTTF			225	°C

Electrical performance is measured under conditions noted in the electrical specifications table. Specifications are not guaranteed over all recommended operating conditions.

RF Characterization – Power-Tuned Load Pull Performance

Test conditions unless otherwise noted: V_D = 48 V, I_{DQ} = 85 mA, T = 25°C, pulsed CW (10% duty cycle, 100 µs width), and fixed second harmonic for optimal efficiency.

Frequency (MHz)	Source Impedance	Load Impedance	2nd Harmonic Load Impedance	Gain @ P3dB (dB)	P3dB (dBm)	Drain Efficiency (%)
1800	22.34 – j5.34	9.30 + j4.15	24.43 + j43.11	21.66	46.90	60.28
2000	26.00 + j1.18	7.55 + j5.63	24.43 + j43.11	21.26	46.51	62.51
2200	18.40 + j2.92	7.04 + j4.47	10.09 + j26.02	19.52	46.88	56.35
2500	19.94 + j0.77	6.62 + j3.94	6.85 + j18.79	18.41	46.78	59.38
2600	18.47 – j0.83	5.26 + j2.94	5.89 + j15.91	17.60	46.83	55.53

RF Characterization – Efficiency-Tuned Load Pull Performance

Test conditions unless otherwise noted: V_D = 48 V, I_{DQ} = 85 mA, T = 25°C, pulsed CW (10% duty cycle, 100 µs width), and fixed second harmonic for optimal efficiency.

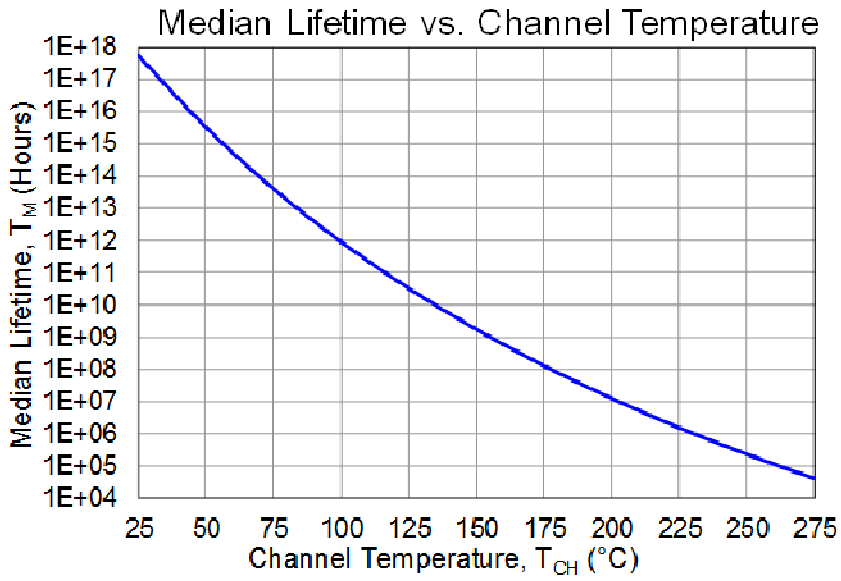
Frequency (MHz)	Source Impedance	Load Impedance	2nd Harmonic Load Impedance	Gain @ P3dB (dB)	P3dB (dBm)	Drain Efficiency (%)
1800	22.34 – j5.34	8.37 + j12.72	24.43 + j43.11	23.85	45.29	72.53
2000	26.00 + j1.18	7.47 + j10.34	24.43 + j43.11	22.72	45.37	70.46
2200	18.40 + j2.92	5.05 + j10.28	10.09 + j26.02	22.07	45.17	71.92
2500	19.94 + j0.77	4.22 + j8.18	6.85 + j18.79	20.07	45.21	71.35
2600	18.47 – j0.83	4.22 + j8.17	5.89 + j15.91	19.81	44.99	71.84

Thermal Information

Parameter	Conditions	Value	Units
Thermal Resistance at Average Power (θ_{JC})	T_{CASE} = 105°C, T_{CH} = 150°C CW: P_{DISS} = 11.4 W, P_{OUT} = 2.5 W	3.9	°C/W
Thermal Resistance at Peak Power (θ_{JC})	T_{CASE} = 105°C, T_{CH} = 225°C CW: P_{DISS} = 26.5 W, P_{OUT} = 39.8 W	4.5	°C/W

Notes:
1. Thermal resistance measured to package backside.

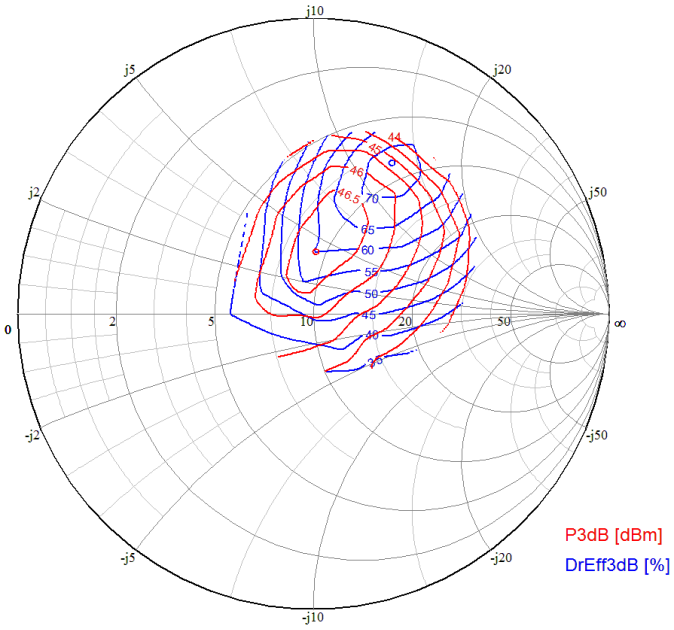
Median Lifetime



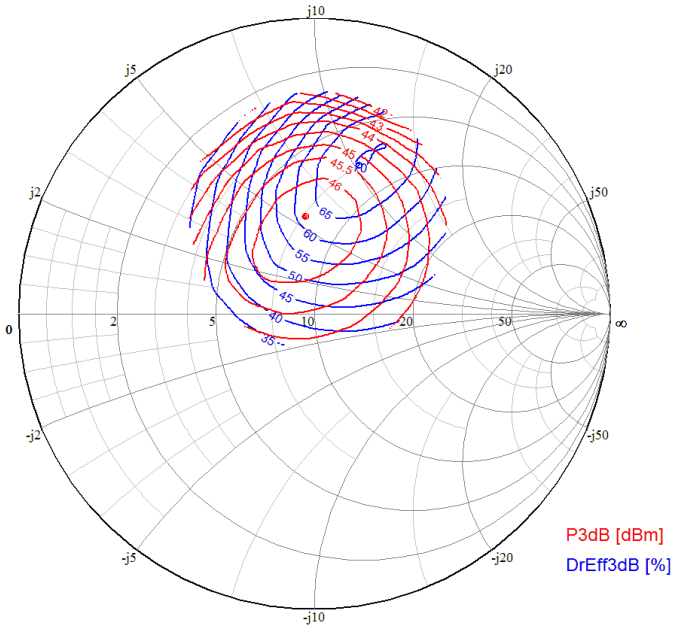
Load Pull Plots

Test conditions unless otherwise noted: V_D = 48 V, I_{CQ} = 85 mA, T = 25°C, pulsed CW (10% duty cycle, 100 µs width), and fixed second harmonic for optimal efficiency.

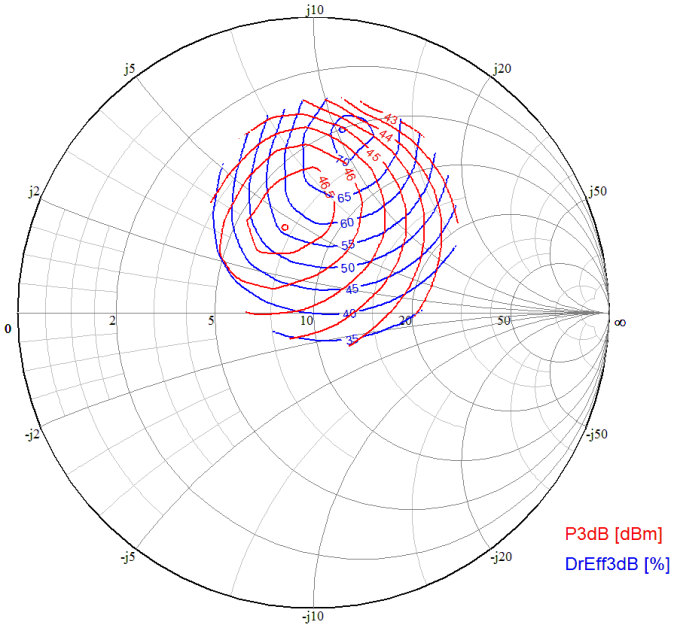
Load Pull at 1.8 GHz



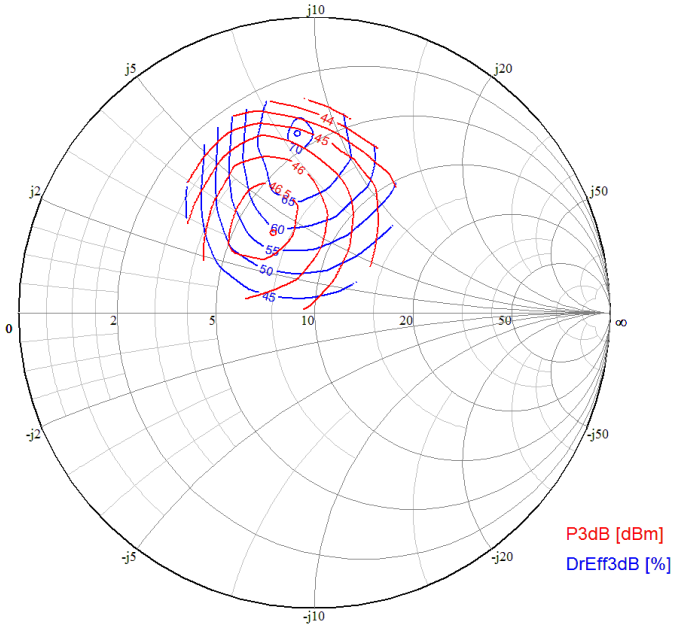
Load Pull at 2 GHz



Load Pull at 2.2 GHz

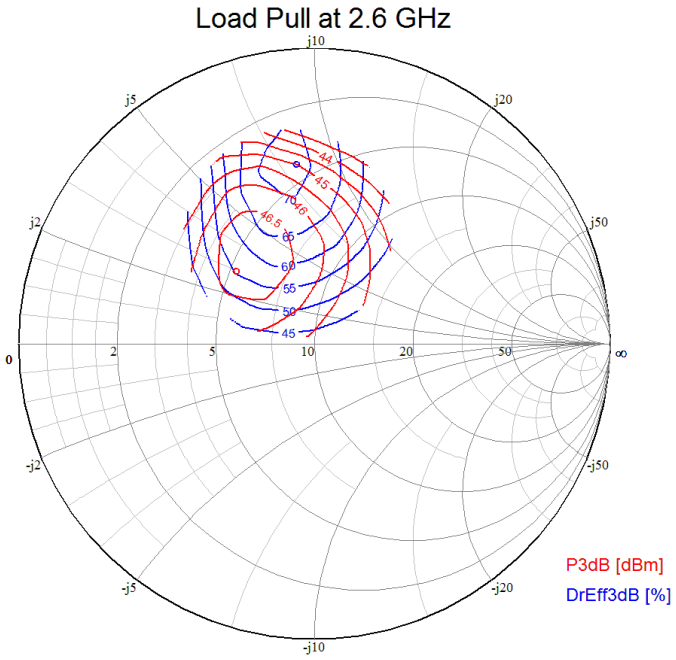


Load Pull at 2.5 GHz

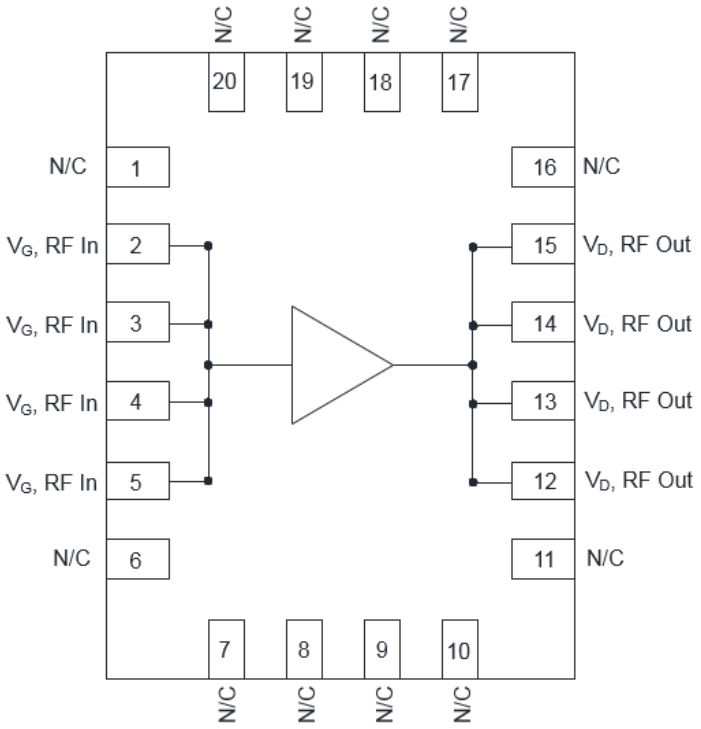


Load Pull Plots

Test conditions unless otherwise noted: V_D = 48 V, I_{CQ} = 85 mA, T = 25°C, pulsed CW (10% duty cycle, 100 µs width), and fixed second harmonic for optimal efficiency.



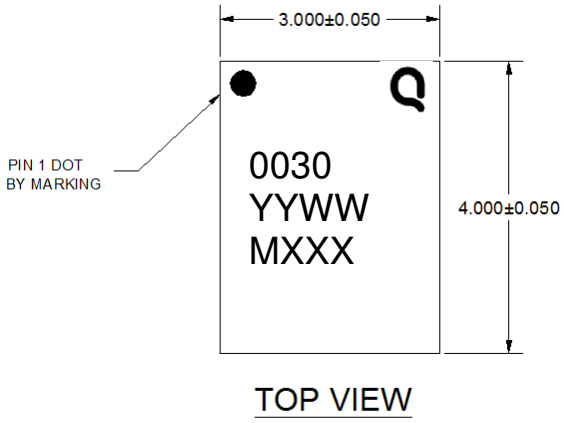
Pin Configuration and Description



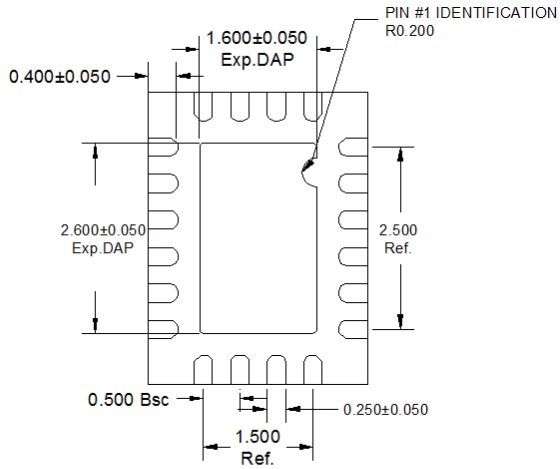
Pin No.	Label	Description
2, 3, 4, 5	RF IN, V_G	RF Input, Gate Bias
1, 6, 7, 8, 9, 10, 11, 16, 17, 18, 19, 20	N/C	No Connection
12, 13, 14, 15	RF OUT, V_D	RF Output, Drain Bias
Backside Paddle	RF/DC GND	RF/DC Ground

Package Marking and Dimensions

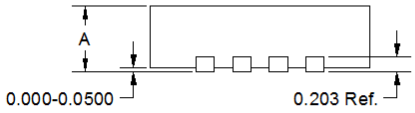
Marking: Product Name – 0030
Year, Work Week Assembly Code – YYWW
Assembly Number – MXXX



TOP VIEW



BOTTOM VIEW



SIDE VIEW

		QFN
A	MAX.	0.900
	NOM.	0.850
	MIN.	0.800

Notes:
1. All dimensions are in inches. Angles are in degrees.
2. Exposed metallization is NiAu plated.

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Class: TBD
Volt. Range: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JS-001-2012

ESD Class: TBD
Range: TBD
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101F

MSL Rating

MSL Rating: Level 3
Test: 260 °C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

ECCN

US Department of Commerce EAR99

Solderability

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

Contact plating: NiAu

RoHS Compliance

This part is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.triquint.com **Tel: 877-800-8584**
Email: customer.support@qorvo.com

For information about the merger of RFMD and TriQuint as Qorvo: **Web:** www.qorvo.com

For technical questions and application information: **Email:** btsapplications@tqs.com

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