

Applications

- W-CDMA / LTE
- Macrocell Base Station, Band 1 and Band 3
- Active Antenna
- General Purpose Applications

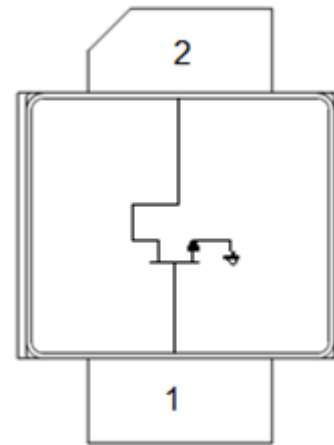


2 Lead NI400 Package

Product Features

- Operating Frequency Range: 1.8-2.4 GHz
- Operating Drain Voltage: 48 V
- Maximum Output Power (P_{SAT}): 227 W
- Maximum Drain Efficiency: 77.5%
- Efficiency-Tuned P3dB Gain: 21 dB
- 2-lead, earless, ceramic flange NI400 package

Functional Block Diagram



General Description

The QPD1823 is a discrete GaN on SiC HEMT which operates from 1.8-2.4 GHz. The device is a single stage matched power amplifier transistor.

The QPD1823 can be used in Doherty architecture for the final stage of a base station power amplifier for macrocell high efficiency systems.

QPD1823 can deliver P_{SAT} of 227 W at 48 V operation.

Lead-free and ROHS compliant.

Pin Configuration

| Pin No. | Label |
|-----------------|---------------|
| 1 | RF IN, V_G |
| 2 | RF OUT, V_D |
| Backside Paddle | RF/DC Ground |

Ordering Information

| Part No. | ECCN | Description |
|----------|-------|---------------------------------------|
| QPD1823 | EAR99 | 220 W, 1.8-2.4 GHz, GaN RF Transistor |

Absolute Maximum Ratings

| Parameter | Rating |
|---|------------------------------|
| Gate Voltage (V_G) | -10 V |
| Drain Voltage (V_D) | +55 V |
| Peak RF Input Power | 42 dBm |
| VSWR Mismatch, P1dB Pulse (20% duty cycle, 100 μ width), $T = 25^\circ\text{C}$ | 10:1 |
| Storage Temperature | -65 to +150 $^\circ\text{C}$ |

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 | | | $^\circ\text{C}$ |
| Gate Voltage (V_G) | | -2.9 | | V |
| Drain Voltage (V_D) | | 48 | | V |
| Quiescent Current (I_{CQ}) | | 360 | | mA |
| T_{CH} for $>10^6$ hours MTTF | | | 225 | $^\circ\text{C}$ |

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, $I_{DQ} = 360$ mA, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

| Frequency (MHz) | Source Impedance | Load Impedance | Gain @ P3dB (dB) | P3dB (dBm) | Drain Efficiency (%) |
|-----------------|------------------|----------------|------------------|------------|----------------------|
| 1800 | 7.13+j5.82 | 6.23-j1.20 | 19.63 | 53.53 | 65.55 |
| 1840 | 6.22+j5.03 | 6.72-j1.00 | 19.79 | 53.47 | 64.12 |
| 1880 | 4.16+j3.94 | 6.78-j1.24 | 20.18 | 53.40 | 65.09 |
| 2110 | 1.63-j1.40 | 8.62+j2.17 | 19.18 | 53.41 | 61.05 |
| 2140 | 2.16 - j1.42 | 7.89+j2.05 | 19.50 | 53.42 | 64.27 |
| 2170 | 2.05 - j1.99 | 6.97+j2.33 | 19.21 | 53.29 | 63.51 |

RF Characterization – Efficiency-Tuned Load Pull Performance

Test conditions unless otherwise noted: $V_D = 48$ V, $I_{DQ} = 360$ mA, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

| Frequency (MHz) | Source Impedance | Load Impedance | Gain @ P3dB (dB) | P3dB (dBm) | Drain Efficiency (%) |
|-----------------|------------------|----------------|------------------|------------|----------------------|
| 1800 | 7.13+j5.82 | 3.28+j1.19 | 21.12 | 52.32 | 77.42 |
| 1840 | 6.22+j5.03 | 3.16-j1.36 | 21.38 | 51.80 | 76.14 |
| 1880 | 4.16+j3.94 | 3.72-j1.30 | 21.37 | 52.12 | 75.13 |
| 2110 | 1.63-j1.40 | 6.43-j1.87 | 21.06 | 52.48 | 73.51 |
| 2140 | 2.16 - j1.42 | 5.67-j1.99 | 21.14 | 51.87 | 74.90 |
| 2170 | 2.05 - j1.99 | 6.08-j1.95 | 20.95 | 51.95 | 74.40 |

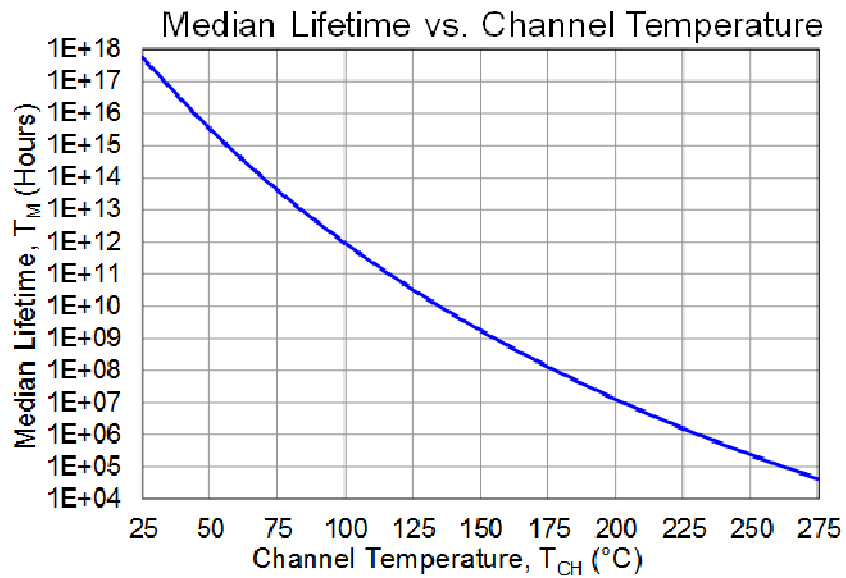
Thermal Information

| Parameter | Conditions | Value | Units |
|---|--|-------|---------------|
| Thermal Resistance at Average Power (θ_{JC}) | $T_{CASE} = 85^{\circ}C$, $T_{CH} = 122^{\circ}C$ CW: $P_{DISS} = 29 W$, $P_{OUT} = 50 W$ | 1.3 | $^{\circ}C/W$ |

Notes:

1. Thermal resistance measured to package backside.
2. Based on expected carrier amplifier efficiency of Doherty.
3. Pout assumes 20% peaking amplifier contribution of total average Doherty rated power.

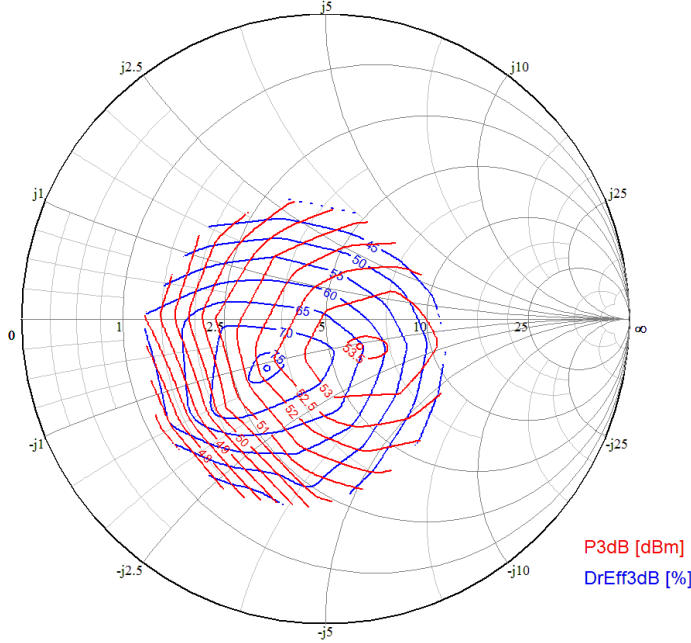
Median Lifetime



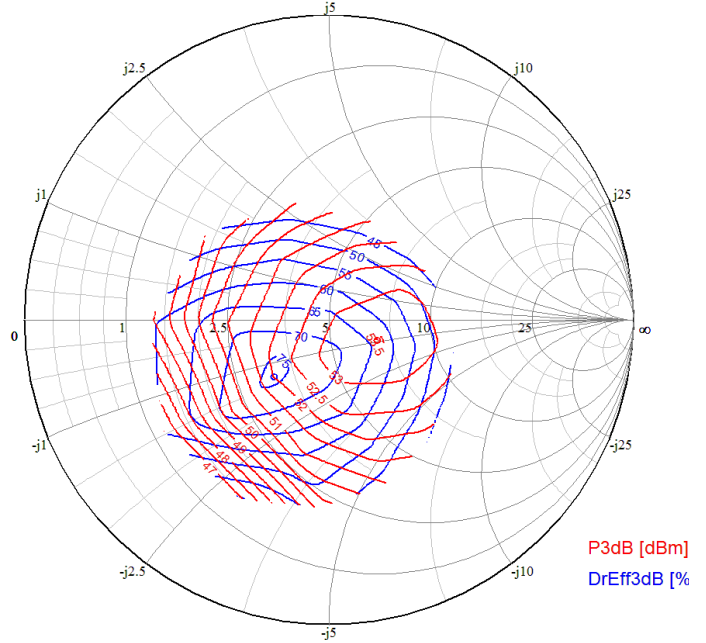
Load Pull Plots

Test conditions unless otherwise noted: $V_D = 48\text{ V}$, $I_{CQ} = 360\text{ mA}$, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

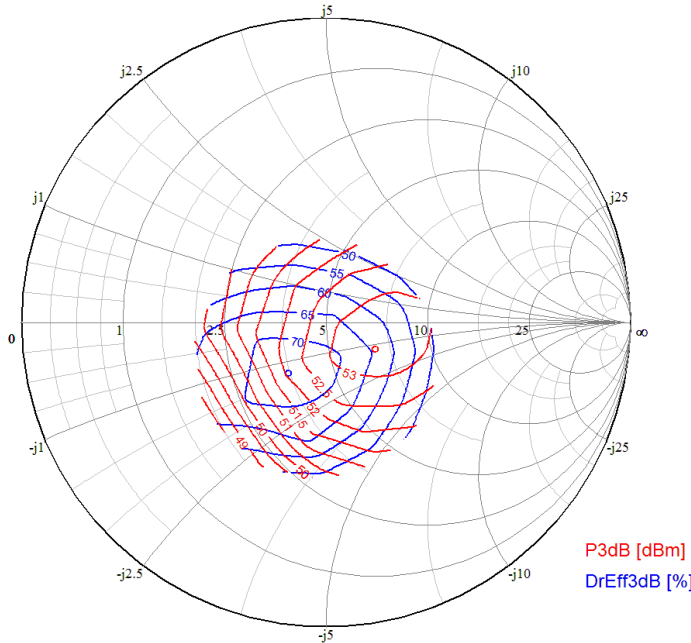
Load Pull at 1.8 GHz



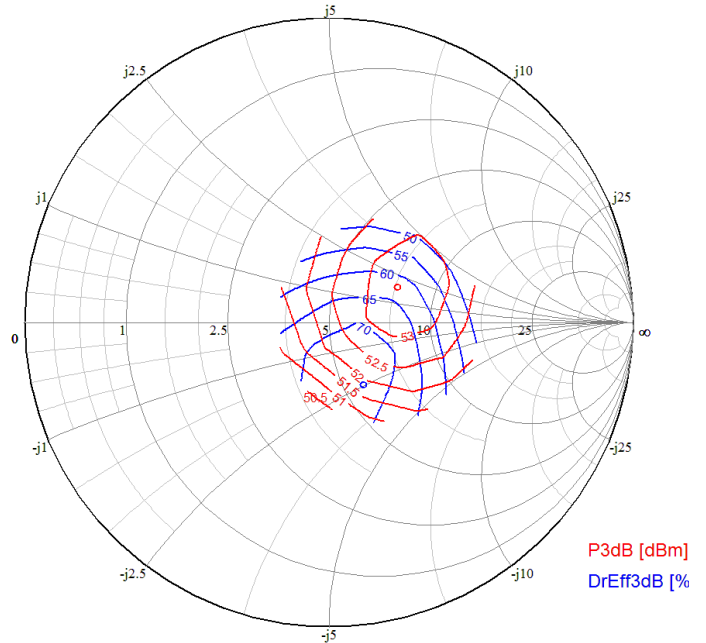
Load Pull at 1.84 GHz



Load Pull at 1.88 GHz



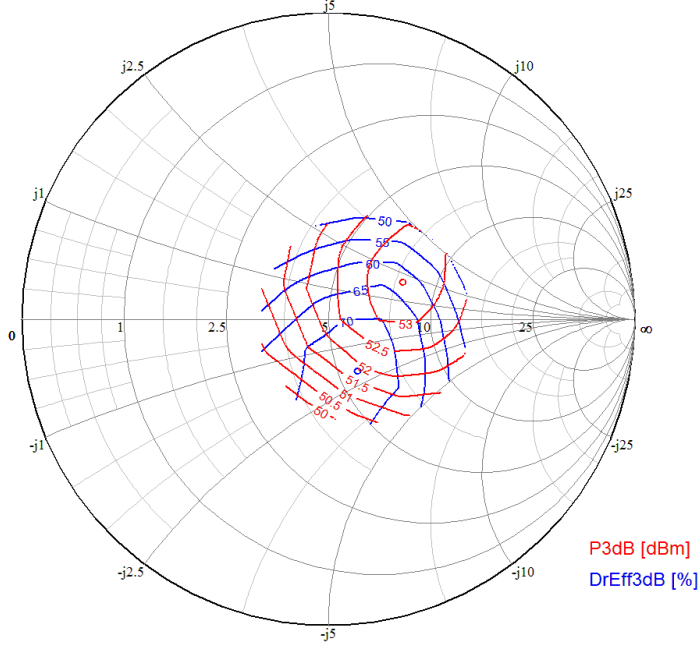
Load Pull at 2.11 GHz



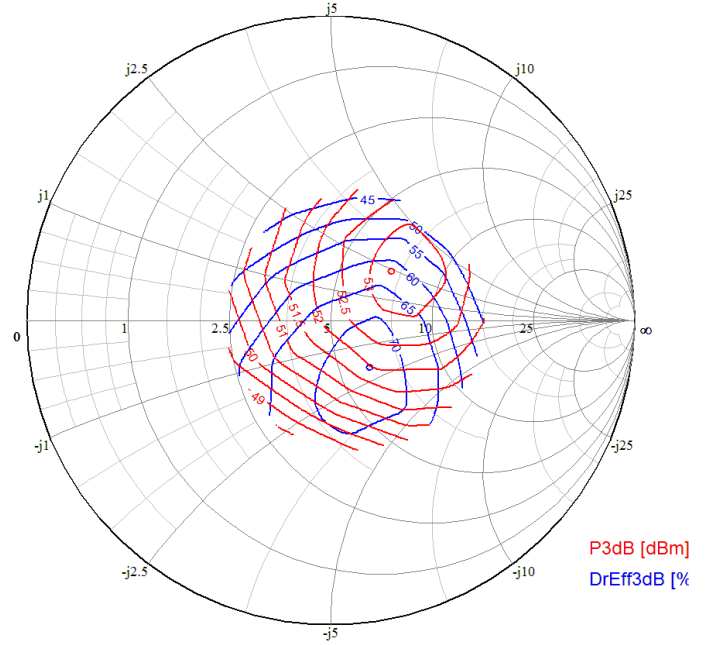
Load Pull Plots

Test conditions unless otherwise noted: $V_{G1} = -2.9$ V, $V_{D1} = 48$ V, $I_{CQ1} = 360$ mA, $T = 25^{\circ}\text{C}$, Pulsed (10% duty cycle, 100 μs width)

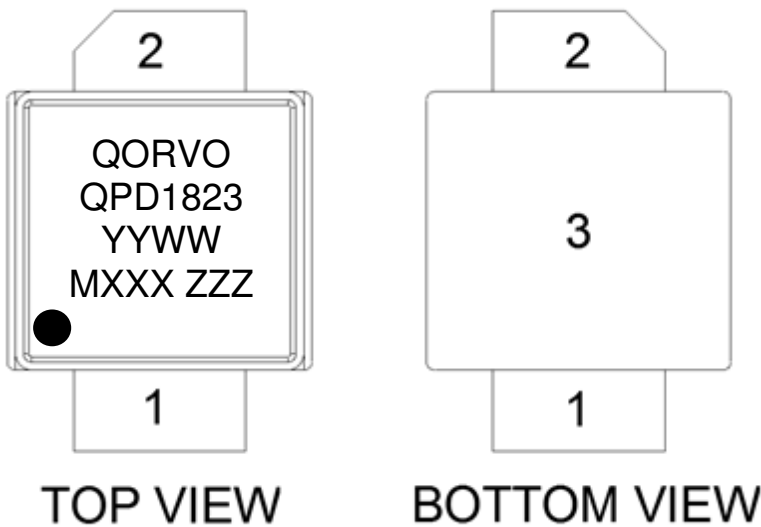
Load Pull at 2.14 GHz



Load Pull at 2.17 GHz



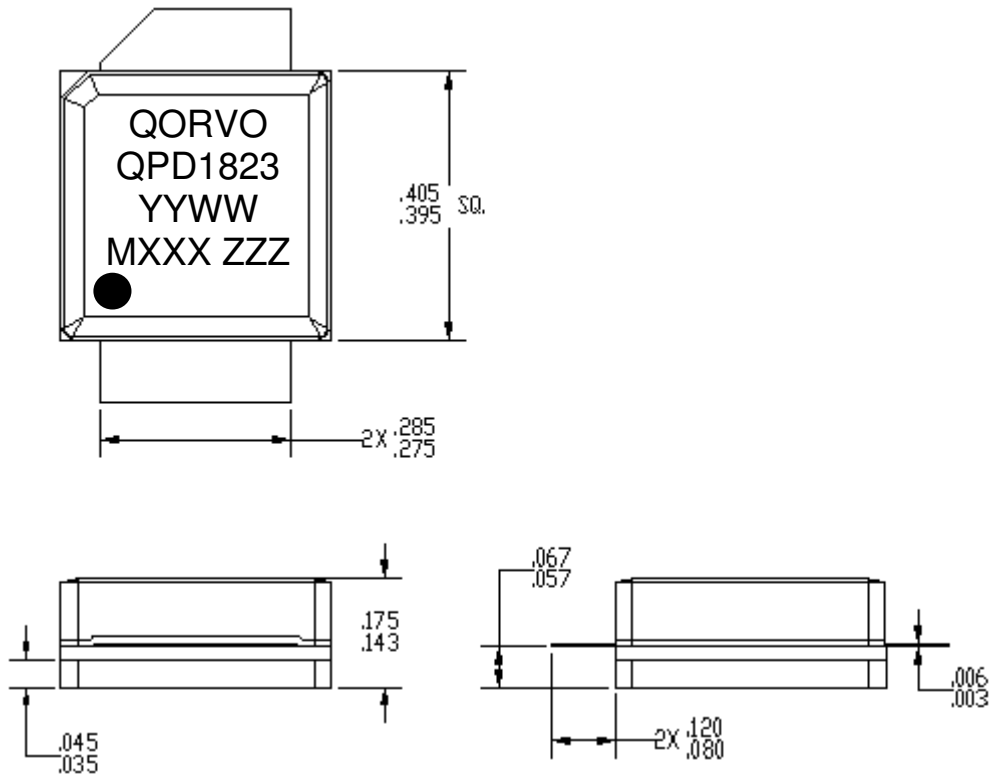
Pin Configuration and Description



| Pin No. | Label | Description |
|---------------------|---------------|-----------------------|
| 1 | RF IN, V_G | RF Input, Gate Bias |
| 2 | RF OUT, V_D | RF Output, Drain Bias |
| 3 (Backside Paddle) | RF/DC GND | RF/DC Ground |

Package Marking and Dimensions

Marking: Product Name – QPD1823
 Year/Week Code– YYWW
 Production Lot Number – MXXX
 Serial Number – ZZZ



- 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: TBD

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

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) 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@qorvo.com

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