

## Applications

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

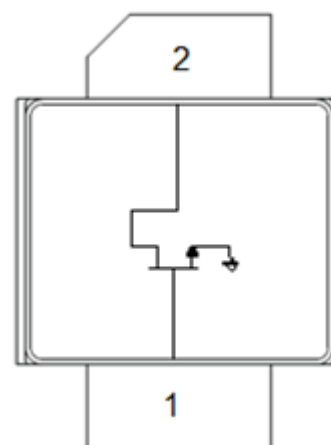


2 Lead NI400 Package

## 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 $\mu$ 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  $\mu\text{s}$  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  $\mu\text{s}$  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                |

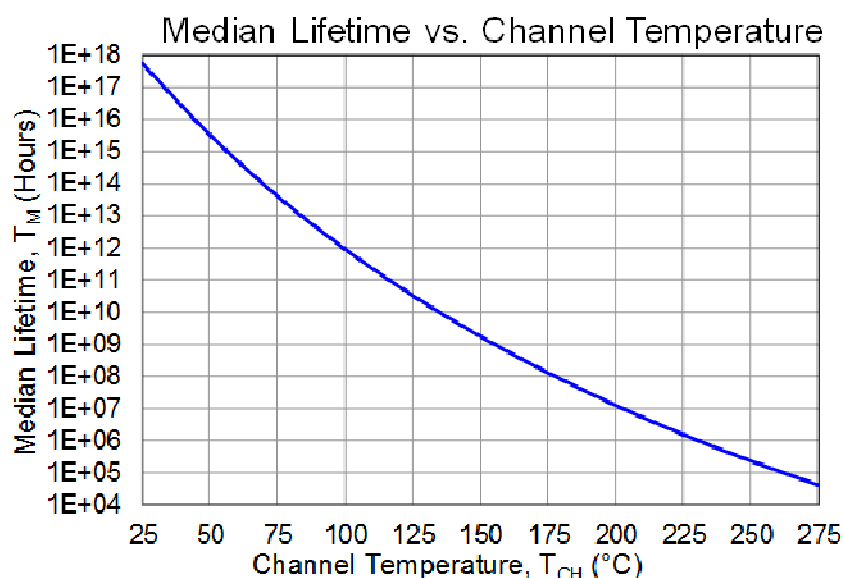
## Thermal Information

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

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.

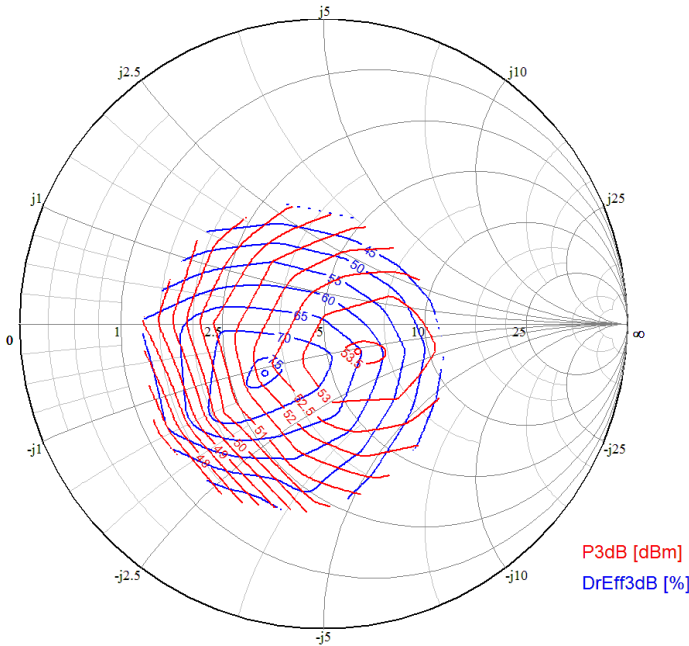
## Median Lifetime



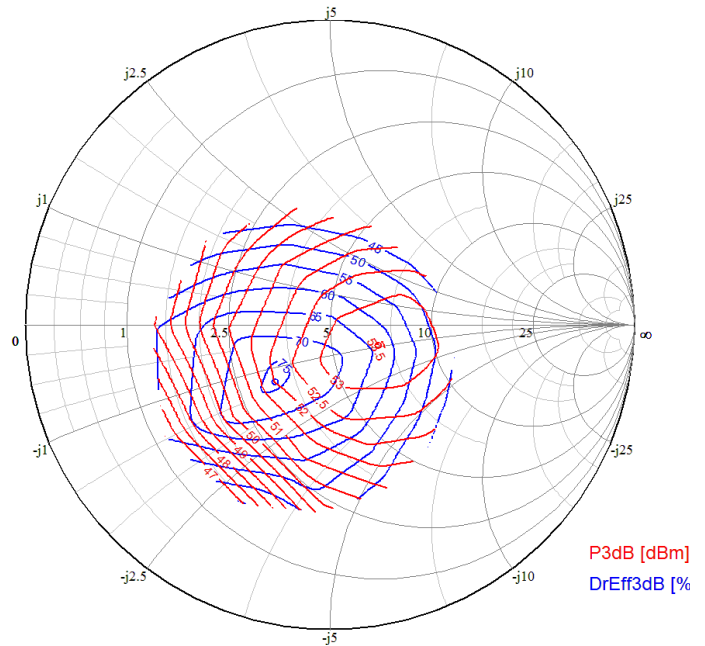
## Load Pull Plots

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

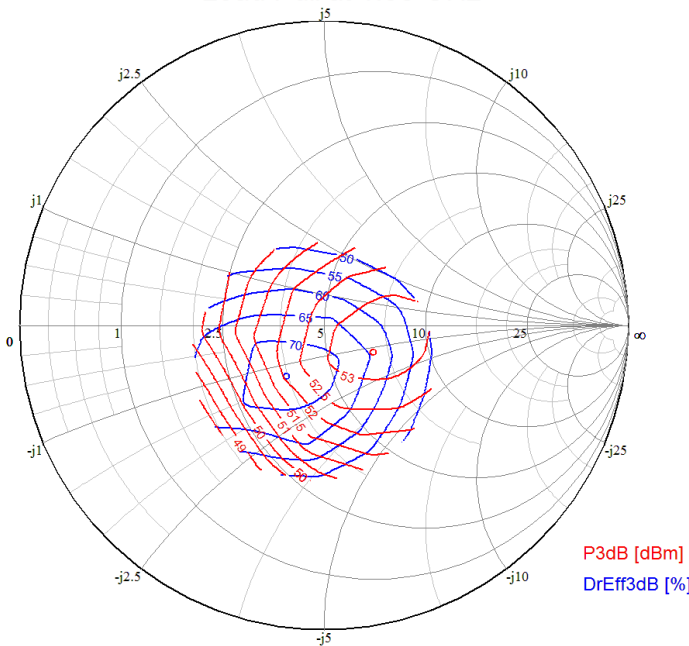
Load Pull at 1.8 GHz



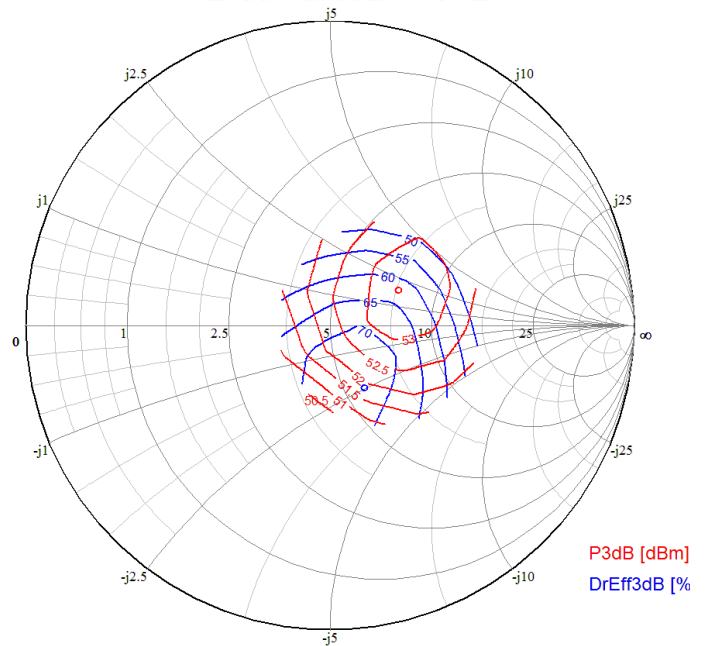
Load Pull at 1.84 GHz



Load Pull at 1.88 GHz



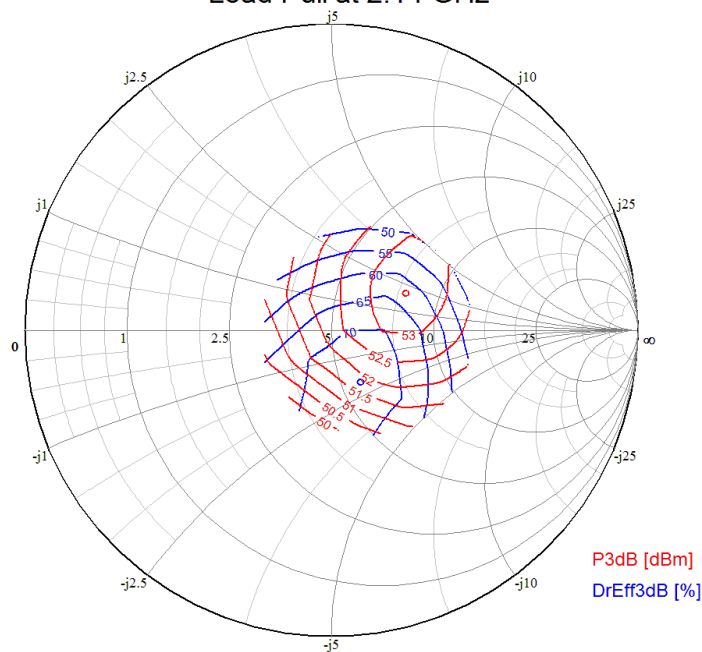
Load Pull at 2.11 GHz



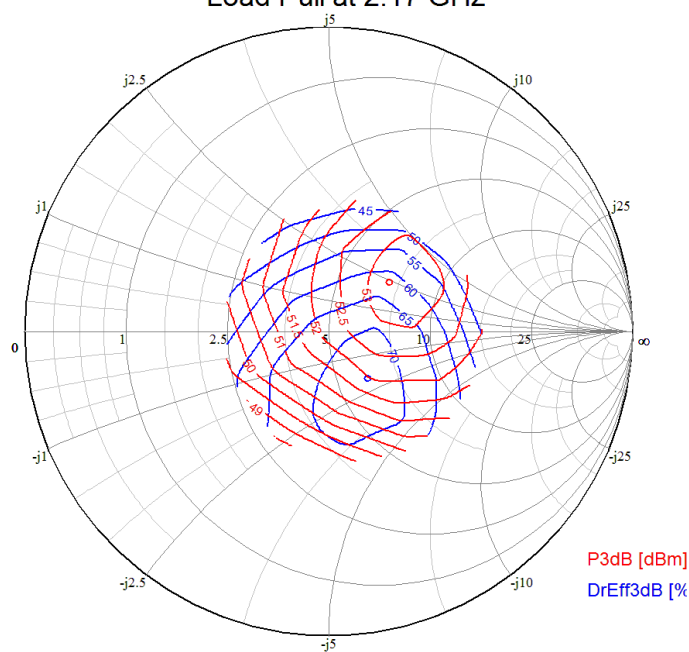
## Load Pull Plots

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  $\mu\text{s}$  width)

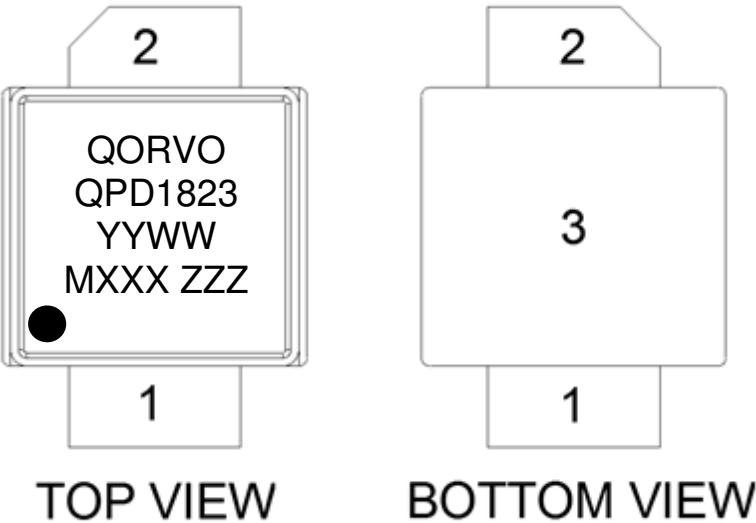
Load Pull at 2.14 GHz



Load Pull at 2.17 GHz



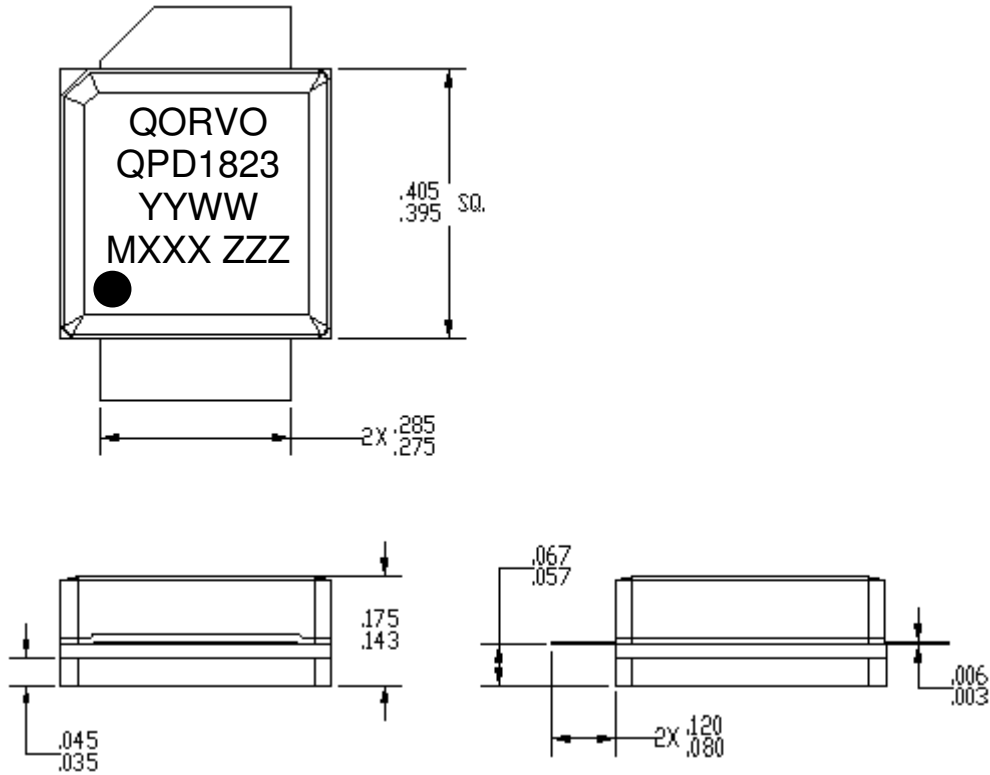
Pin Configuration and Description



| Pin No.             | Label                  | Description           |
|---------------------|------------------------|-----------------------|
| 1                   | RF IN, V <sub>G</sub>  | RF Input, Gate Bias   |
| 2                   | RF OUT, V <sub>D</sub> | 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 (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free

## Contact Information

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

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

Tel: 877-800-8584

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

For information about the merger of RFMD and TriQuint as Qorvo:

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

For technical questions and application information:

Email: [btsapplications@qorvo.com](mailto:btsapplications@qorvo.com)

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