

## Applications

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

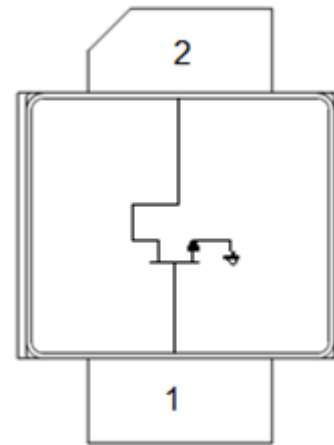


2 Lead NI400 Package

## 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

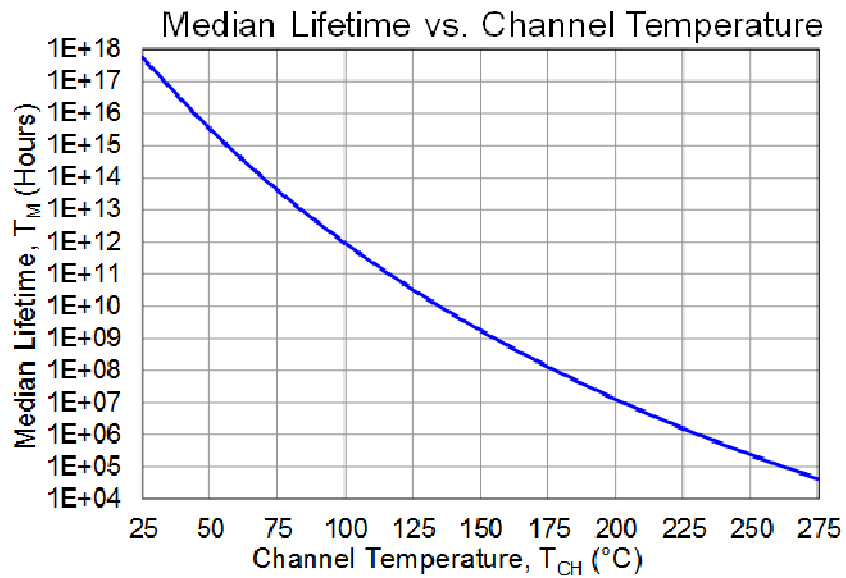
**Thermal Information**

Parameter	Conditions	Value	Units
Thermal Resistance at Average Power ( $\theta_{JC}$ )	$T_{CASE} = 85^{\circ}C$ , $T_{CH} = 122^{\circ}C$ 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.

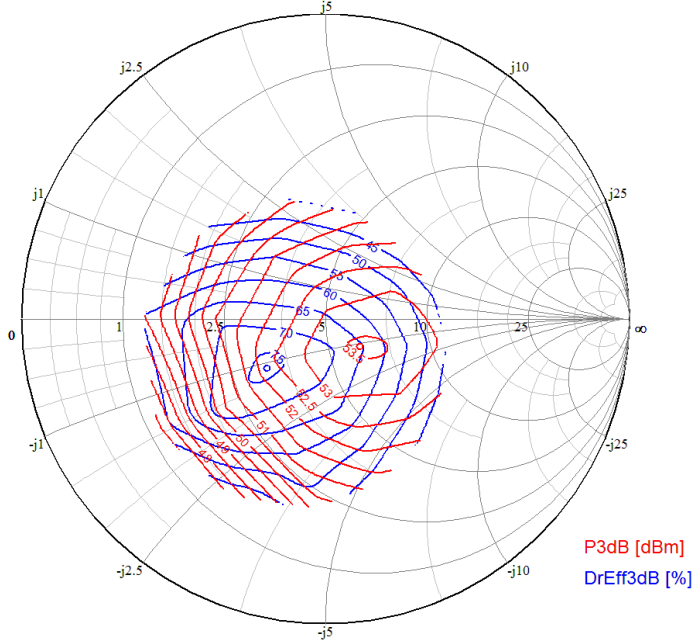
**Median Lifetime**



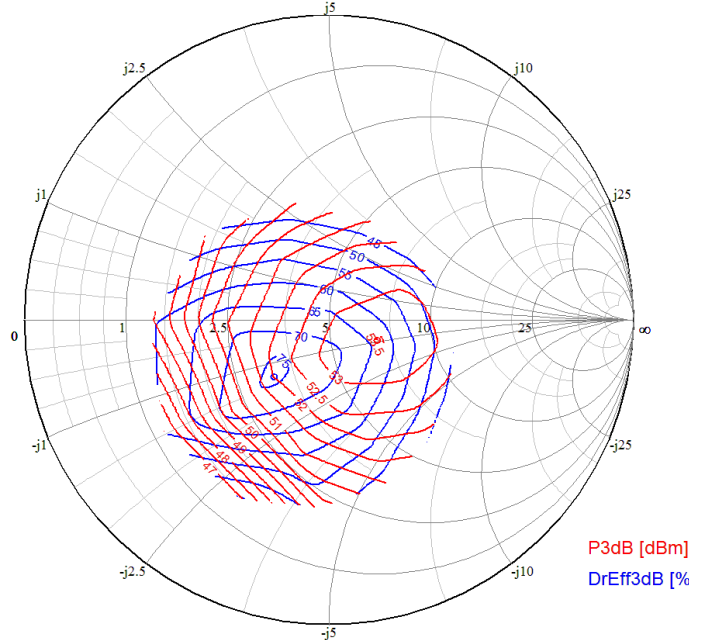
**Load Pull Plots**

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  $\mu\text{s}$  width)

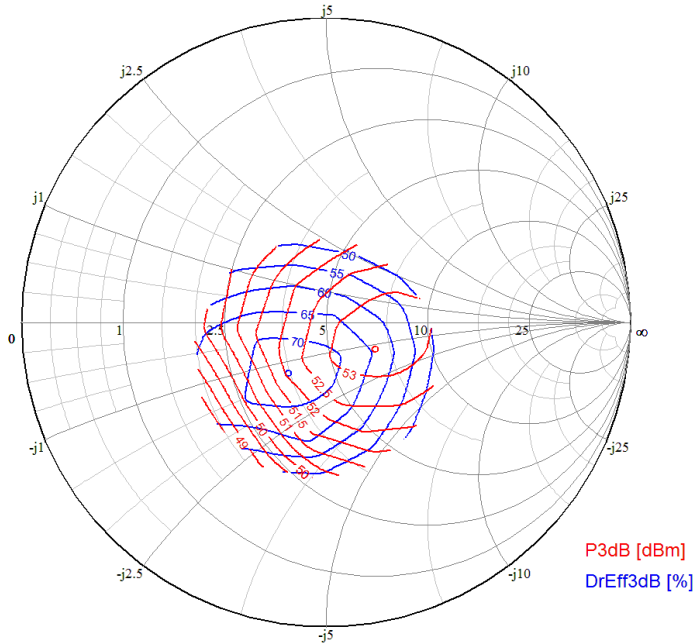
Load Pull at 1.8 GHz



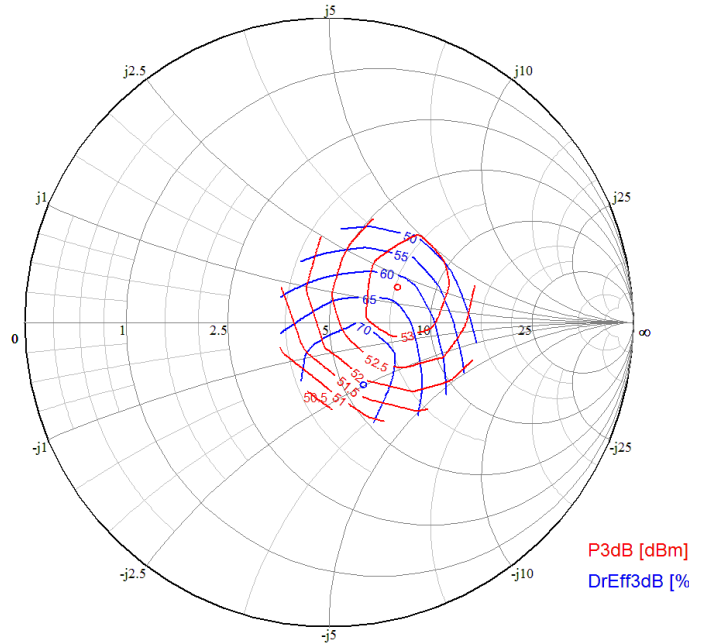
Load Pull at 1.84 GHz



Load Pull at 1.88 GHz



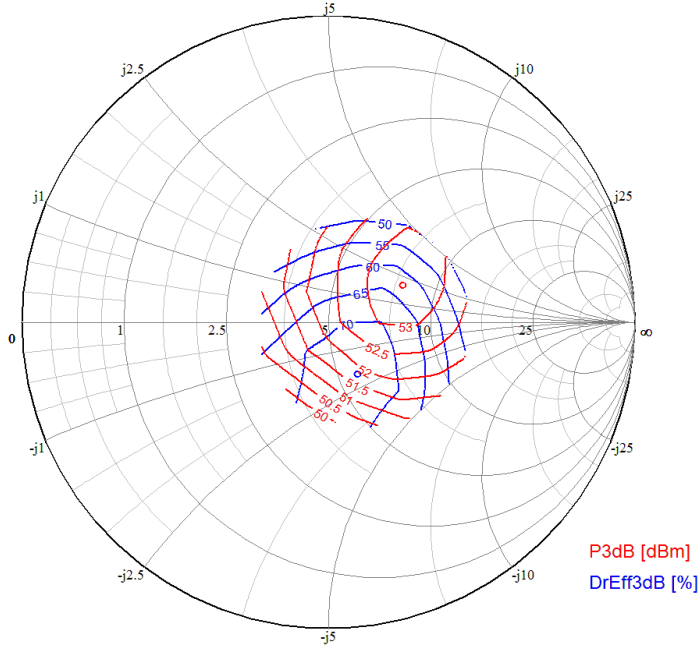
Load Pull at 2.11 GHz



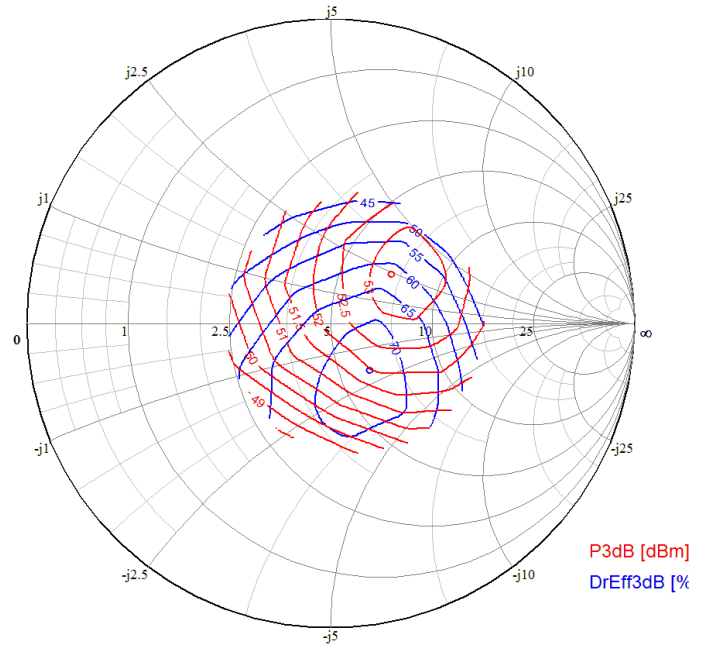
### Load Pull Plots

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



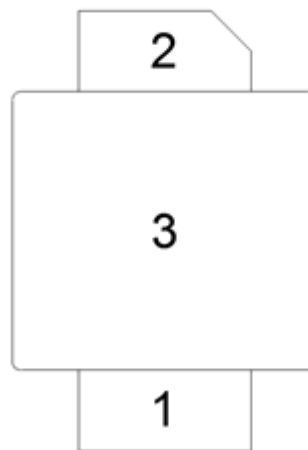
Load Pull at 2.17 GHz



**Pin Configuration and Description**



TOP VIEW

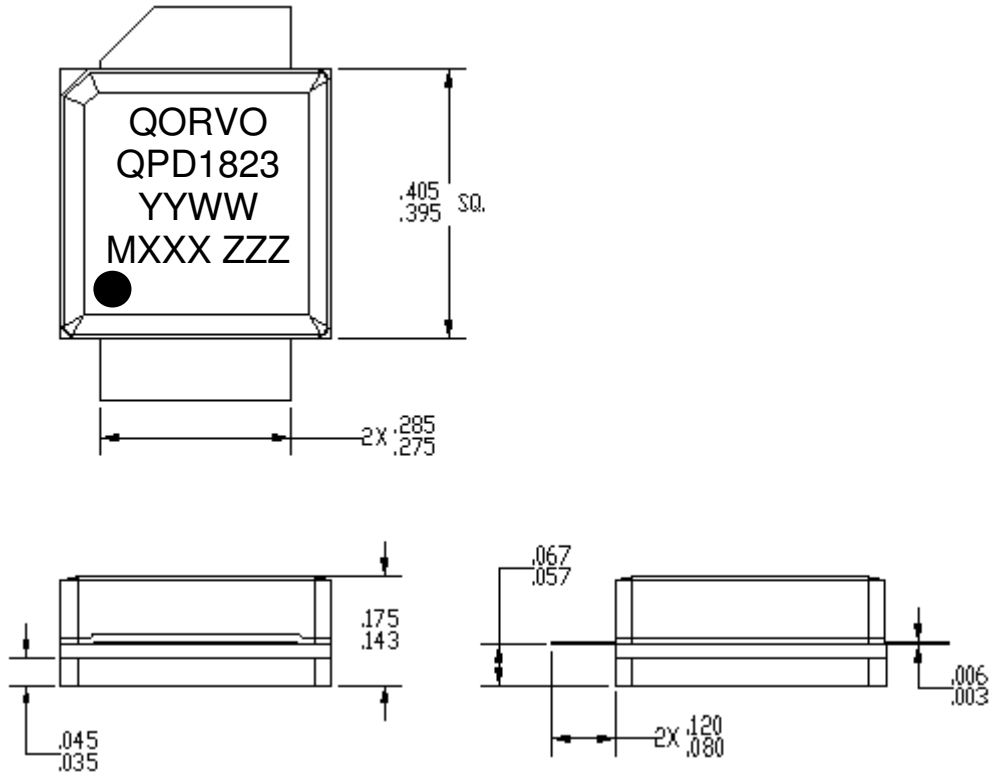


BOTTOM VIEW

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 (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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