QPD1823

220 W, 48 V 1.8-2.4 GHz GaN RF Power Transistor

Applications

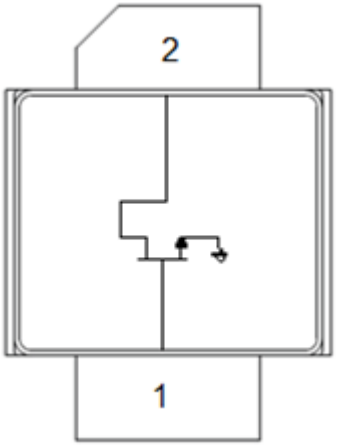
- W-CDMA / LTE
- Macrocell Base Station, Band 1 and Band 3
- Active Antenna
- General Purpose Applications

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°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)		–2.9		V
Drain Voltage (V_D)		48		V
Quiescent Current (I_{CQ})		360		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} = 360 mA, T = 25°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°C, Pulsed (10% duty cycle, 100 µs width)

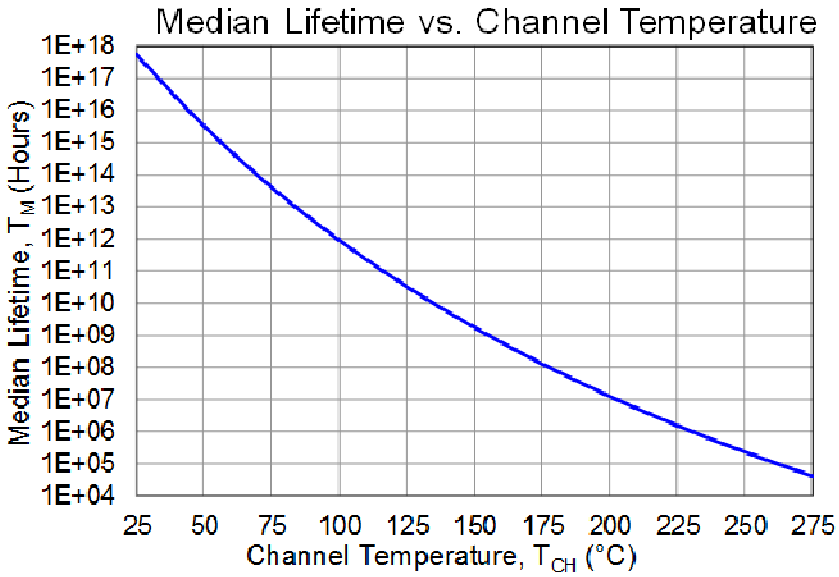
Frequency (MHz)	Source Impedance	Load Impedance	Gain @ P3dB (dB)	P3dB (dBm)	Drain Efficiency (%)
1800	7.13+j5.82	3.28+j1.19	21.12	52.32	77.42
1840	6.22+j5.03	3.16-j1.36	21.38	51.80	76.14
1880	4.16+j3.94	3.72-j1.30	21.37	52.12	75.13
2110	1.63-j1.40	6.43-j1.87	21.06	52.48	73.51
2140	2.16 – j1.42	5.67-j1.99	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°C, T_{CH} = 122°C CW: P_{DISS} = 29 W, P_{OUT} = 50 W	1.3	°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.

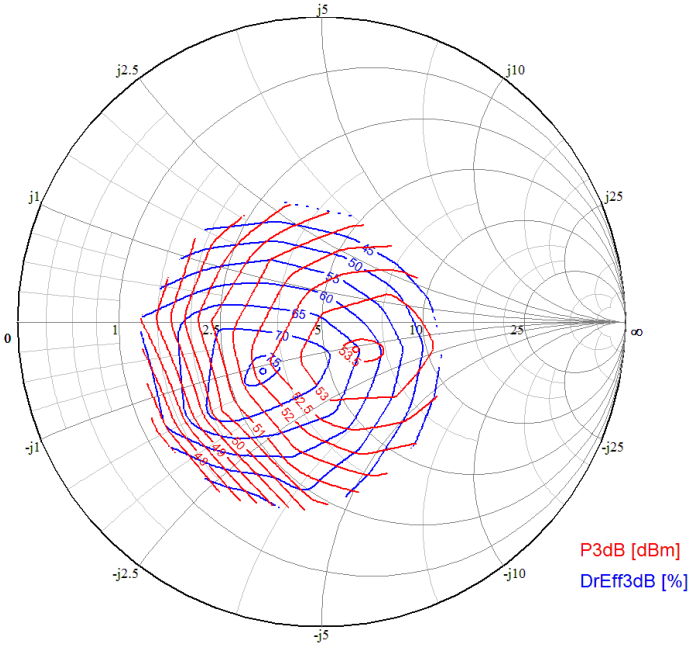
Median Lifetime



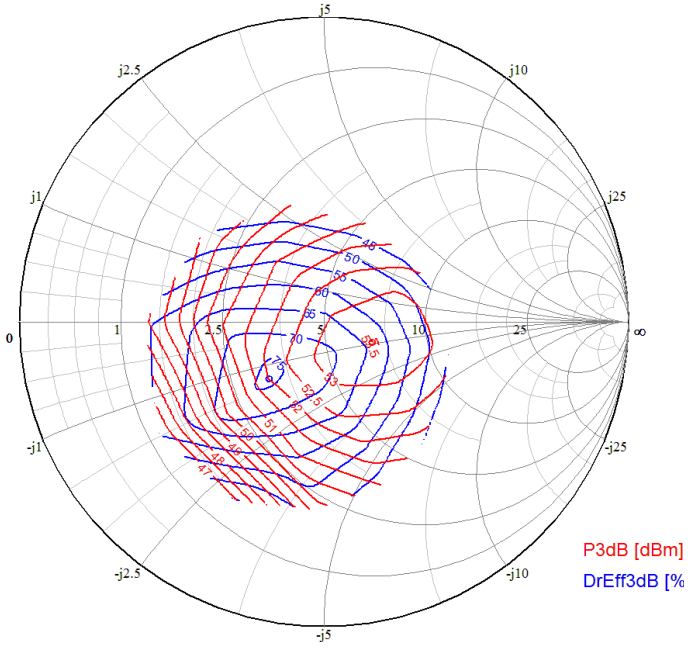
Load Pull Plots

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

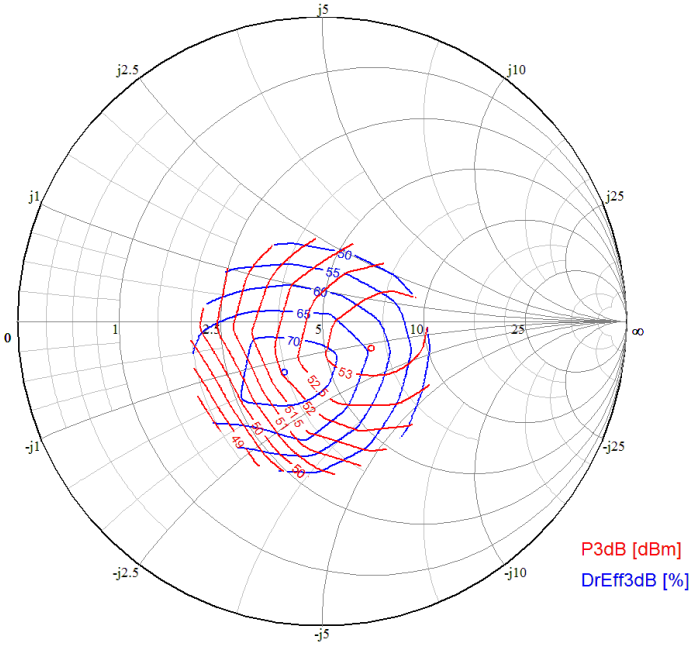
Load Pull at 1.8 GHz



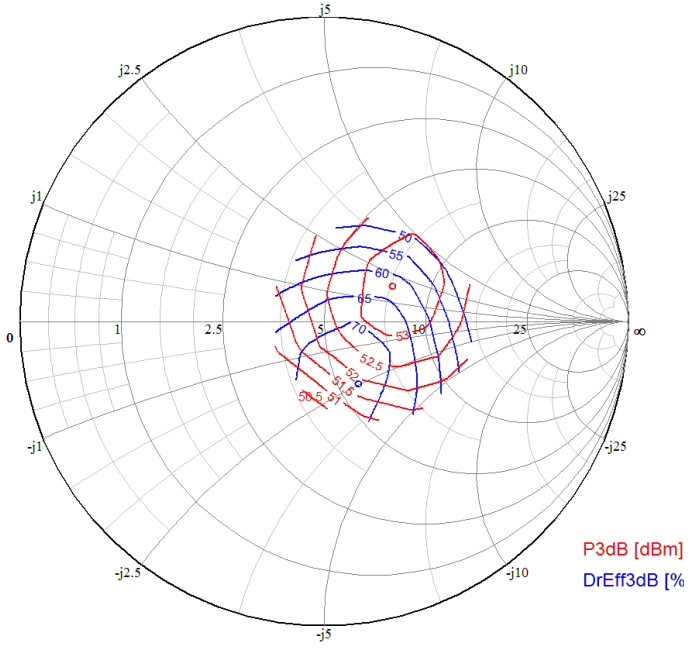
Load Pull at 1.84 GHz



Load Pull at 1.88 GHz



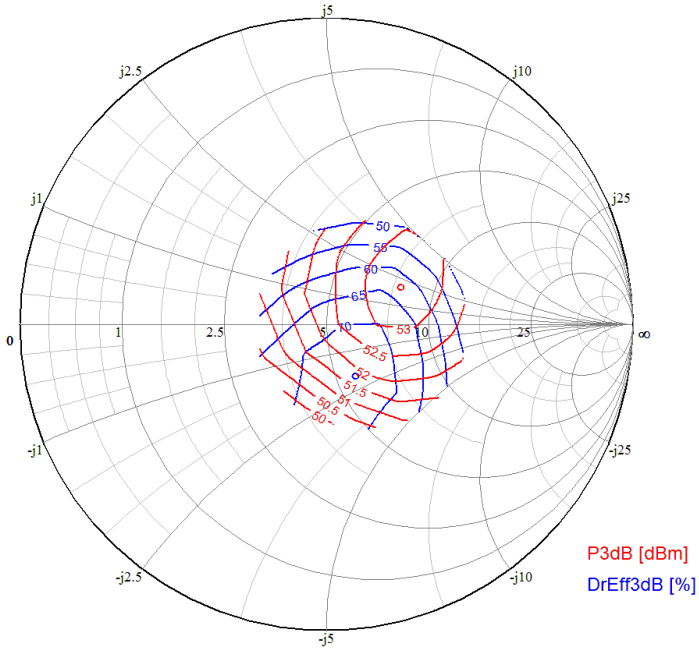
Load Pull at 2.11 GHz



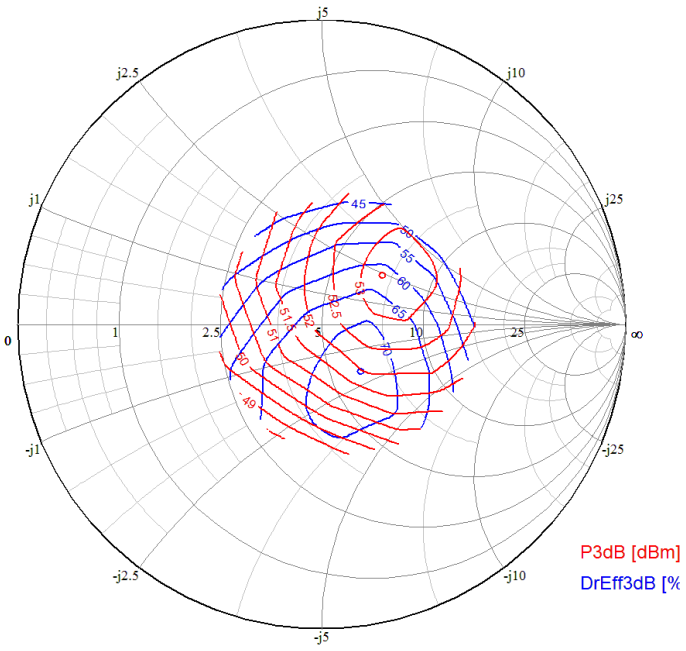
Load Pull Plots

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

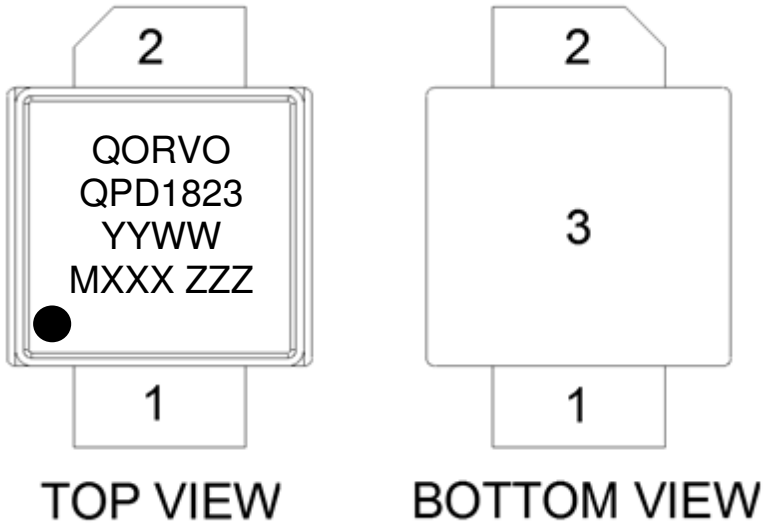
Load Pull at 2.14 GHz



Load Pull at 2.17 GHz



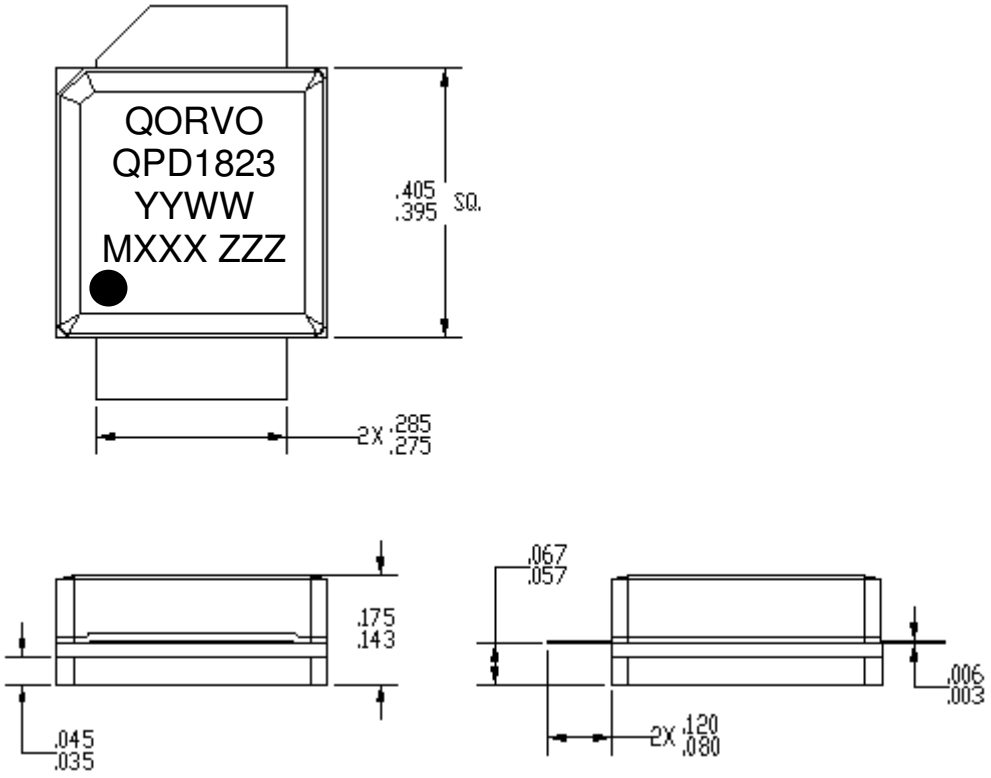
Pin Configuration and Description



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 ($C_{15}H_{12}Br_4O_2$) 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@qorvo.com

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