

Product Description

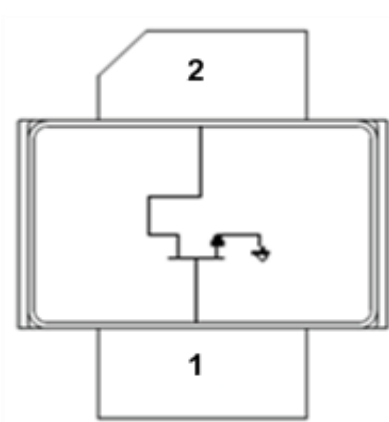
The QPD2195 is a discrete GaN on SiC HEMT which operates from 1.8-2.2 GHz. The device is a single stage pre-matched power amplifier transistor.

The QPD2195 can be used in Doherty architecture for the final stage of a base station power amplifier for macrocell high efficiency systems.

QPD2195 can deliver P_{3dB} of 400 W at +48 V operation.

RoHS compliant.

Functional Block Diagram



2 Lead NI780 Package

Product Features¹

- Operating Frequency Range: 1.8-2.2 GHz
- Operating Drain Voltage: +48 V
- Maximum Output Power (P_{3dB}): 400 W ⁽¹⁾
- Maximum Drain Efficiency: 75.4% ⁽¹⁾
- Efficiency-Tuned P3dB Gain: 19.1 dB ⁽¹⁾
- 2-lead, earless, ceramic flange NI780 package

Note 1: Load pull at 2110 MHz

Applications

- W-CDMA / LTE
- Macrocell Base Station, B3-B1
- Active Antenna

Ordering Information

| Part Number | Description |
|----------------|--------------------------------|
| QPD2195SR | Reel – 100 Pieces |
| QPD2195PCB4B01 | 1805-2170 MHz Evaluation Board |

Absolute Maximum Ratings

| Parameter | Value / Range |
|---|---------------|
| Gate Current (I_G) | -67 to 67 mA |
| Drain Voltage (V_D) | +55 V |
| Peak RF Input Power | 44 dBm |
| VSWR Mismatch, P1dB Pulse (10 % 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

| Parameter | Min | Typ | Max | Units |
|--------------------------------|-----|------|-----|-------|
| Gate Voltage (V_G) | | -2.8 | | V |
| Drain Voltage (V_D) | | 48 | | V |
| Quiescent Current (I_{DQ}) | | 720 | | mA |

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

RF Characterization

| Parameter | Conditions | Min | Typ | Max | Units |
|-------------------|------------|------|------|------|-------|
| Frequency Range | | 1805 | | 2170 | MHz |
| Quiescent Current | | | 720 | | mA |
| Linear Gain | | | 20.4 | | dB |
| P3dB | | | 56.3 | | dBm |
| Drain Efficiency | P3dB | | 70.1 | | % |

Test conditions unless otherwise noted: $V_D = +48$ V, $I_{DQ} = 720$ mA, T = 25°C, Pulsed CW (10% duty cycle, 100 μ s width) on Class AB single-ended EVB at 1880 MHz

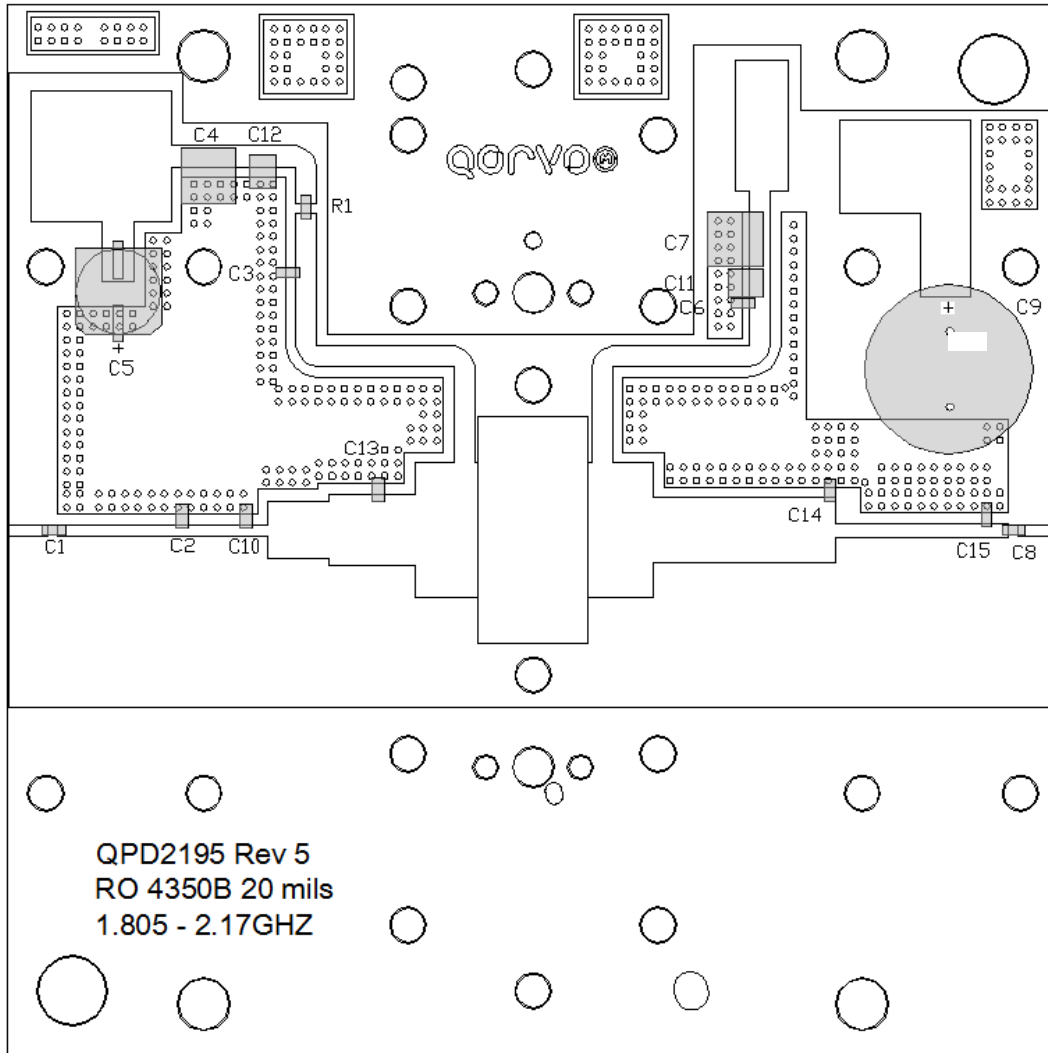
Thermal and Reliability Information

| Parameter | Test Conditions | Value | Units |
|--|---|-------|-------|
| Thermal Resistance, Peak IR Surface Temperature at Average Power (θ_{JC}) | $T_{CASE} = 85^\circ\text{C}$, $T_{CH} = 110^\circ\text{C}$, CW: $P_{DISS} = 60$ W, $P_{OUT} = 90$ W | 0.42 | °C/W |

Notes:

1. Thermal resistance measured to package backside.
2. Based on expected carrier amplifier efficiency of Doherty.
3. P_{OUT} assumes 20% peaking amplifier contribution of total average Doherty rated power.
4. Refer to the following document: [GaN Device Channel Temperature, Thermal Resistance, and Reliability Estimates](#)

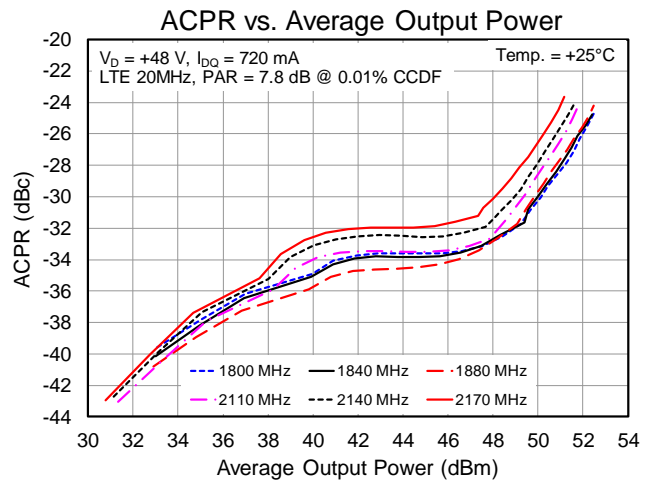
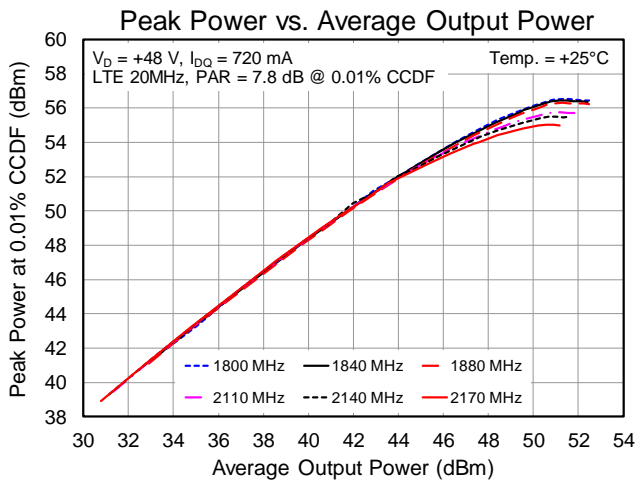
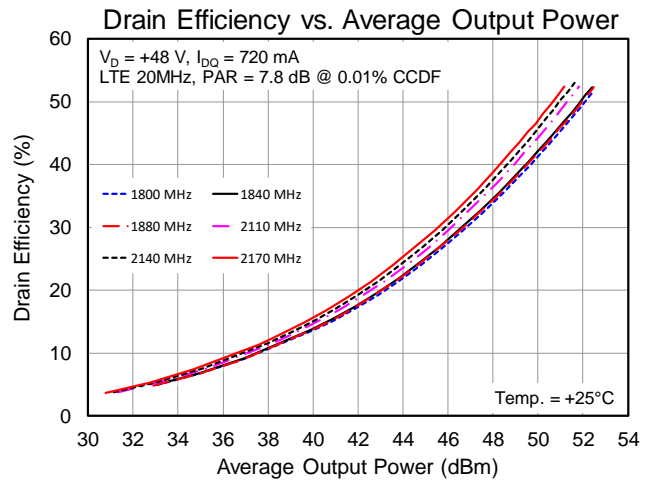
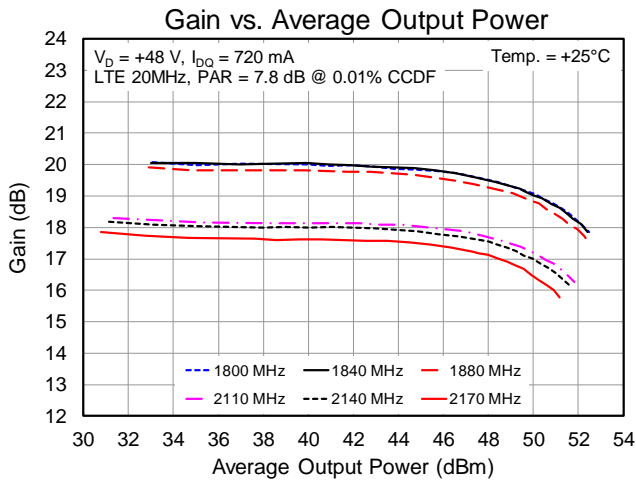
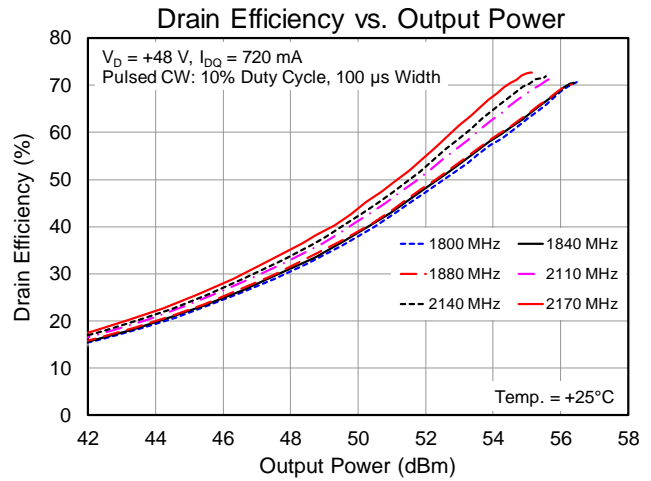
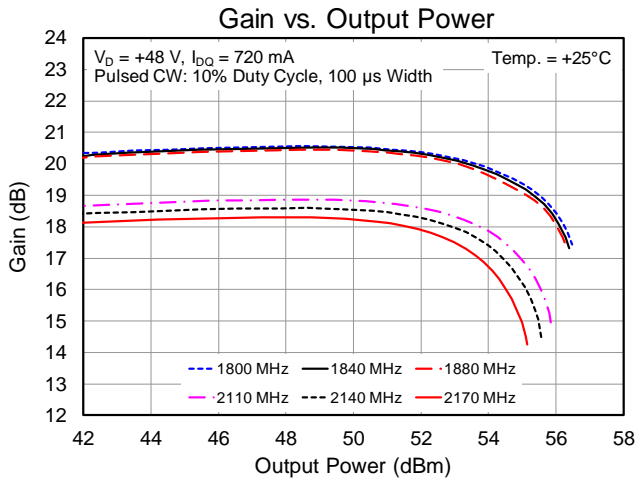
QPD2195PCB4B01 Layout



QPD2195PCB4B01 Bill of Materials

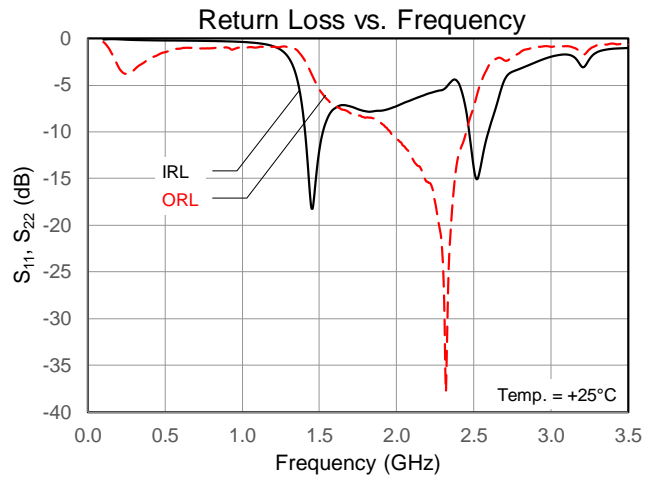
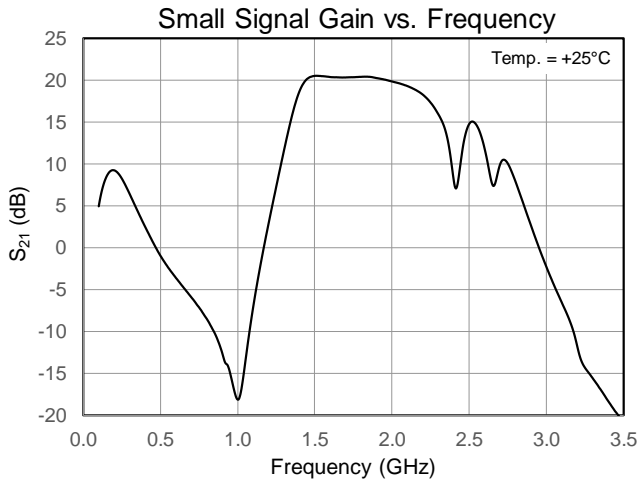
| Reference Des. | Value | Description | Manuf. | Part Number |
|----------------|--------|-------------------------------------|-----------|--------------------|
| C1, C3, C6, C8 | 33 pF | Capacitor, 33 pF, 5%, 250V | ATC | ATC800A330JT250X |
| C2 | 0.6 pF | Capacitor, 0.6 pF, +/- 0.1pF, 250V | ATC | ATC800A0R6BT250X |
| C10 | 0.2 pF | Capacitor, 0.2 pF, +/- 0.1pF, 250V | ATC | ATC800A0R2BT250X |
| C14, C15 | 0.4 pF | Capacitor, 0.4 pF, +/- 0.1pF, 250V | ATC | ATC800A0R4BT250X |
| C13 | 0.3 pF | Capacitor, 0.3 pF, +/- 0.1pF, 250V | ATC | ATC800A0R3BT250X |
| C11, C12 | 1.0 µF | Capacitor, 1 µF, 10%, 100V, X7R | MURATA | GRM32NR72A104KA01L |
| C4, C7 | 4.7 µF | Capacitor, 4.7 µF, 10%, 100V, X7R | MURATA | GRM55ER72A475KA01L |
| C5 | 100 µF | Capacitor, 100uF, 50V, +/-20%, SMD | Panasonic | EEE-1HA101UAP |
| C9 | 220 µF | Capacitor, 220uF, 100V, +/-20%, SMD | Panasonic | AFK227M2AR44T-F |
| R1 | 10 Ω | Resistor, 10 Ω, 5%, 0.25W, 1206 | Panasonic | ERJ-8ENF10R0V |

QPD2195PCB4B01 Performance Plots



Test conditions unless otherwise noted: $V_D = +48\text{ V}$, $I_{DQ} = 720\text{ mA}$, $T = 25^\circ\text{C}$, on Class AB single-ended EVB

QPD2195PCB4B01 Performance Plots



Test conditions unless otherwise noted: $V_D = +48\text{ V}$, $I_{BQ} = 720\text{ mA}$, $T = 25^\circ\text{C}$, on Class AB single-ended EVB

Power-Tuned Load Pull Performance

| Frequency (MHz) | Source Impedance | Load Impedance | Gain @ P3dB (dB) | P3dB (dBm) | Drain Efficiency (%) |
|-----------------|------------------|----------------|------------------|------------|----------------------|
| 1800 | 1.68 – j2.21 | 5.39 – j1.33 | 18.2 | 56.0 | 60.5 |
| 1840 | 1.34 – j2.45 | 5.39 – j1.33 | 18.1 | 56.1 | 62.7 |
| 1880 | 1.44 - j2.82 | 5.54 - j0.11 | 17.8 | 56.2 | 60.9 |
| 1990 | 1.51 – j3.72 | 5.79 + j1.48 | 17.4 | 56.0 | 60.4 |
| 2110 | 2.00 – j5.57 | 3.89 + j3.09 | 17.2 | 56.0 | 60.5 |
| 2140 | 2.48 – j6.14 | 3.67 + j3.42 | 16.7 | 56.0 | 59.5 |
| 2170 | 3.07 - j6.71 | 3.67 + j3.42 | 16.6 | 56.1 | 61.8 |
| 2200 | 3.38 – j7.21 | 3.11 + j3.04 | 16.6 | 55.9 | 58.5 |

Test conditions unless otherwise noted: $V_D = +48$ V, $I_{DQ} = 720$ mA, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

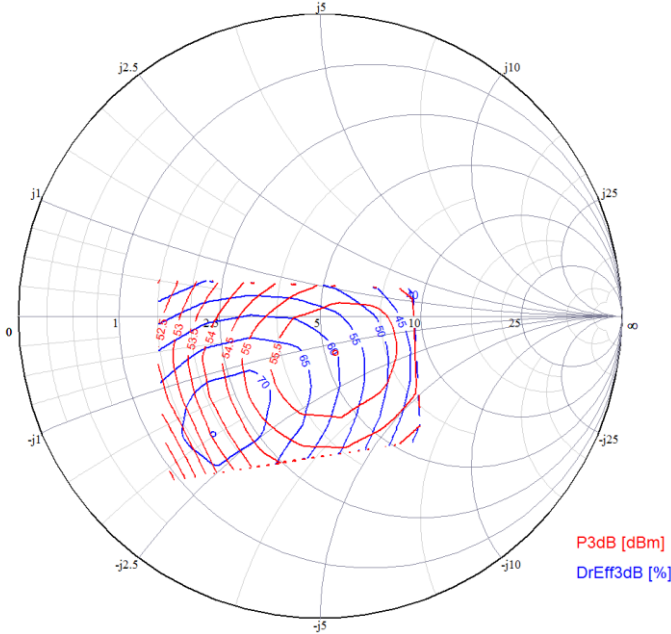
Efficiency-Tuned Load Pull Performance

| Frequency (MHz) | Source Impedance | Load Impedance | Gain @ P3dB (dB) | P3dB (dBm) | Drain Efficiency (%) |
|-----------------|------------------|----------------|------------------|------------|----------------------|
| 1800 | 1.68 – j2.21 | 1.79 – j1.97 | 20.3 | 53.5 | 72.6 |
| 1840 | 1.34 – j2.45 | 1.79 – j1.97 | 20.2 | 53.2 | 73.3 |
| 1880 | 1.44 - j2.82 | 1.79 - j1.97 | 19.9 | 53.1 | 73.9 |
| 1990 | 1.51 – j3.72 | 3.10 – j1.88 | 19.4 | 53.9 | 74.1 |
| 2110 | 2.00 – j5.57 | 4.36 – j2.15 | 19.1 | 53.2 | 75.4 |
| 2140 | 2.48 – j6.14 | 4.40 – j2.03 | 18.8 | 53.0 | 75.5 |
| 2170 | 3.07 - j6.71 | 5.70 - j2.55 | 18.4 | 53.0 | 77.4 |
| 2200 | 3.38 – j7.21 | 6.74 – j1.27 | 18.4 | 53.6 | 75.5 |

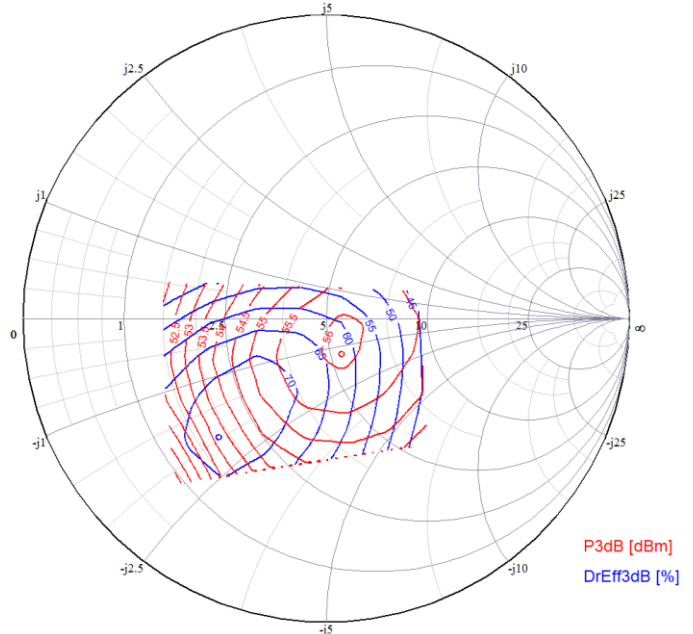
Test conditions unless otherwise noted: $V_D = +48$ V, $I_{DQ} = 720$ mA, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

Load Pull Plots

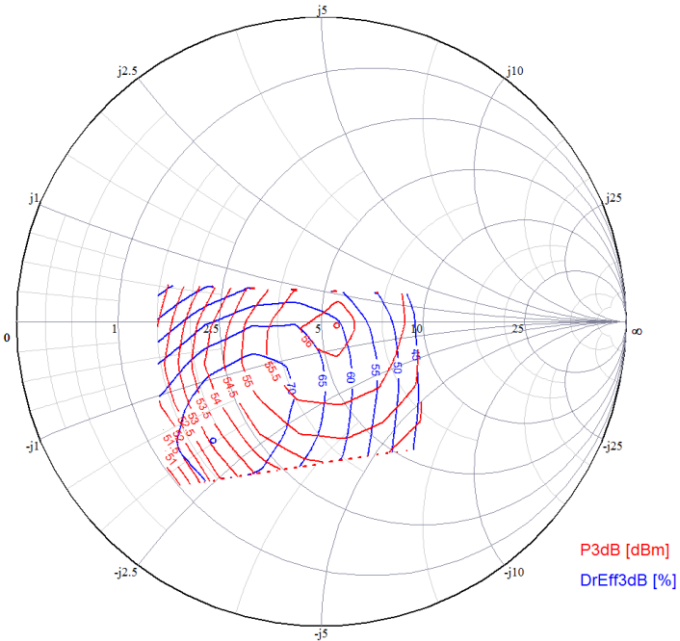
Load Pull at 1.8 GHz



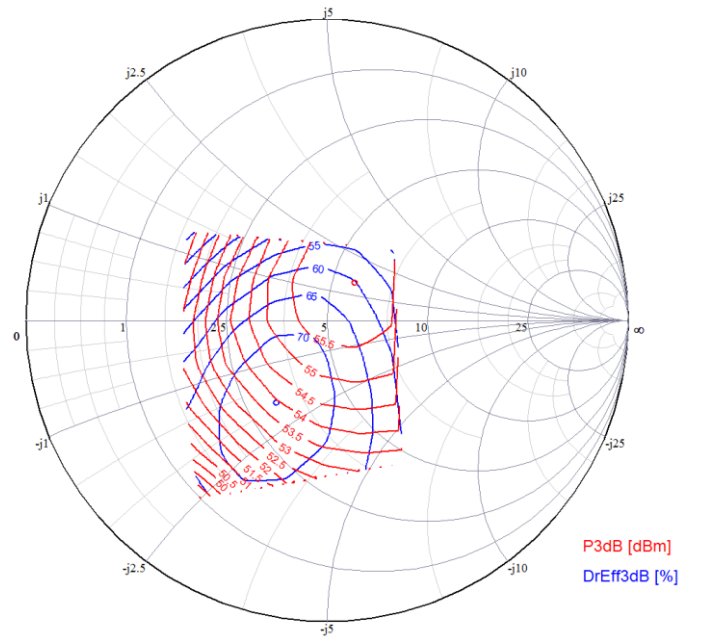
Load Pull at 1.84 GHz



Load Pull at 1.88 GHz



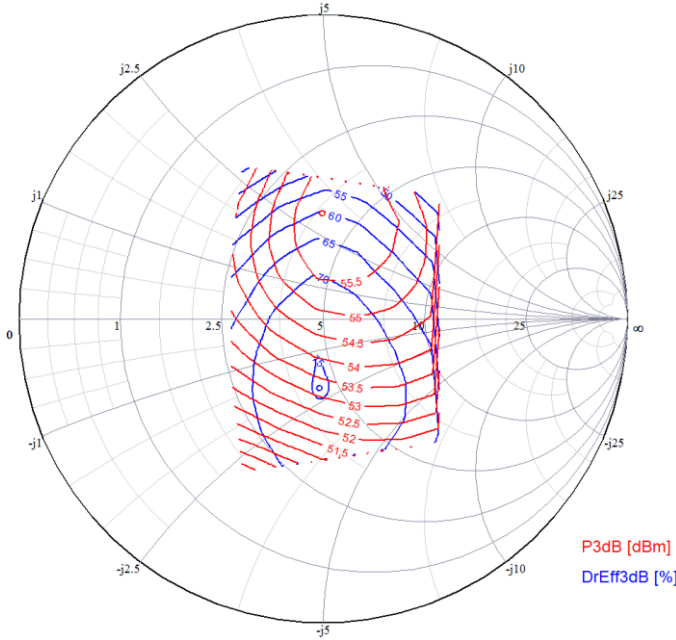
Load Pull at 1.99 GHz



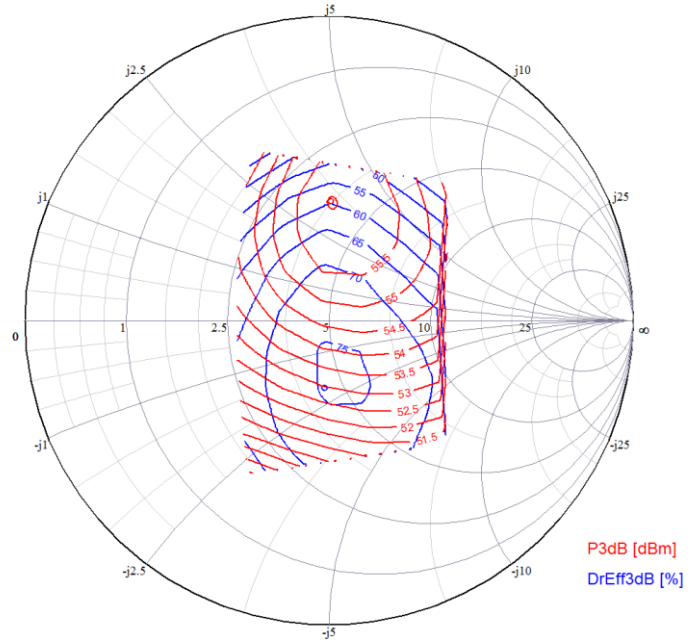
Test conditions unless otherwise noted: $V_D = +48$ V, $I_{DQ} = 720$ mA, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

Load Pull Plots

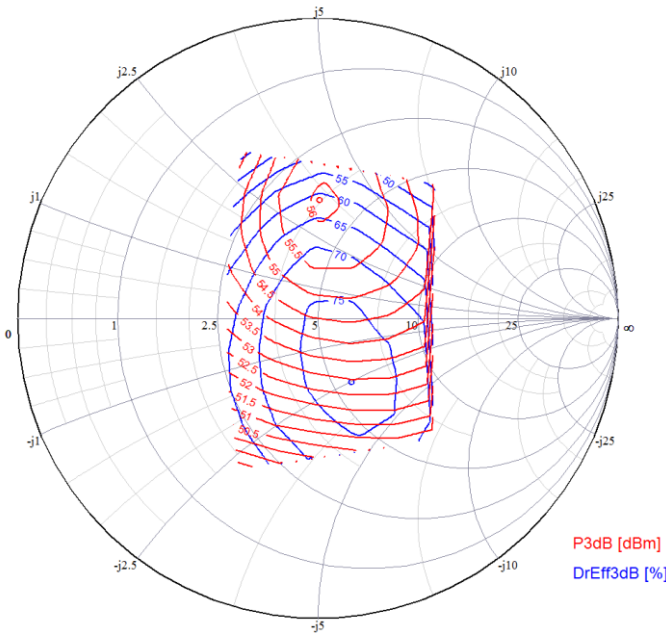
Load Pull at 2.11 GHz



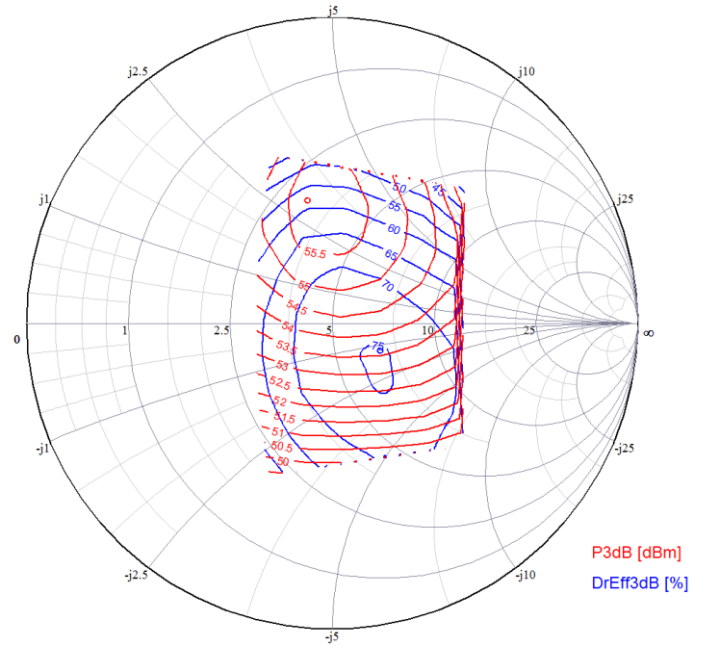
Load Pull at 2.14 GHz



Load Pull at 2.17 GHz

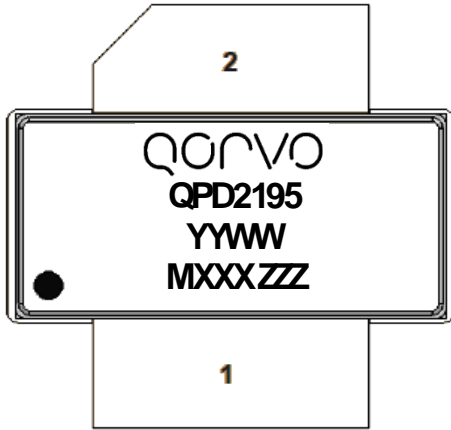


Load Pull at 2.2 GHz

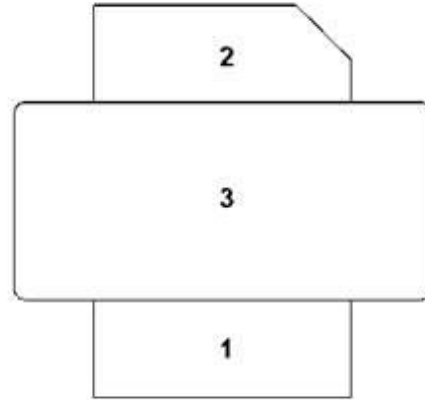


Test conditions unless otherwise noted: $V_D = +48\text{ V}$, $I_{DQ} = 720\text{ mA}$, $T = 25^\circ\text{C}$, Pulsed (10% duty cycle, 100 μs width)

Pin Configuration



TOP VIEW



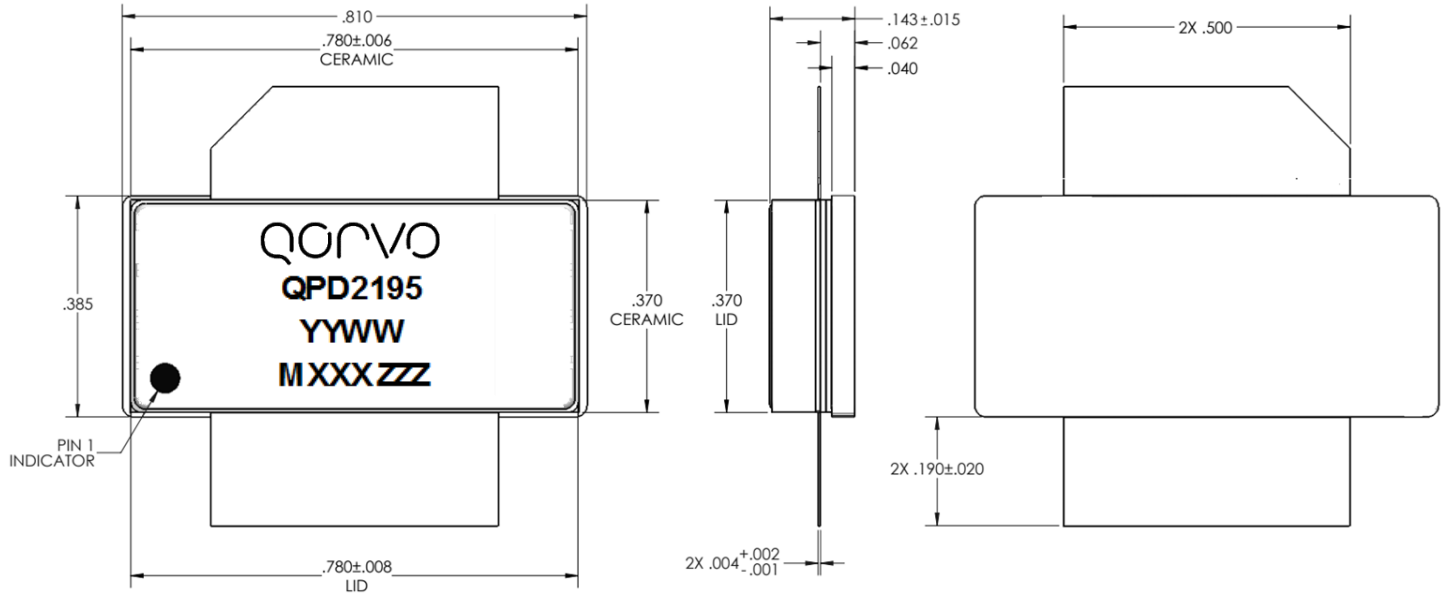
BOTTOM VIEW

Pin Description

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

Package Marking and Dimensions

Marking: Qorvo Logo
 Part Number – QPD2195
 Date Code – YYWW
 Production Lot Number – MXXX
 Serial Number – ZZZ



Notes: Unless Otherwise Specified;

1. Material:
 Package Base: Metal/Ceramic
 Package Lid: Ceramic
 Lead: Alloy 42
2. Package exposed metal base and leads are NiAu plated. Au thickness is minimum 60 μin .
3. Part is epoxy sealed.
4. Part meets industry NI780 footprint.
5. Body dimensions do not include lid shift or epoxy run out, which can be up to 0.020 per side.
6. Dimensions are in inches. General tolerance is ± 0.005 .

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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