

PXAC201202FC

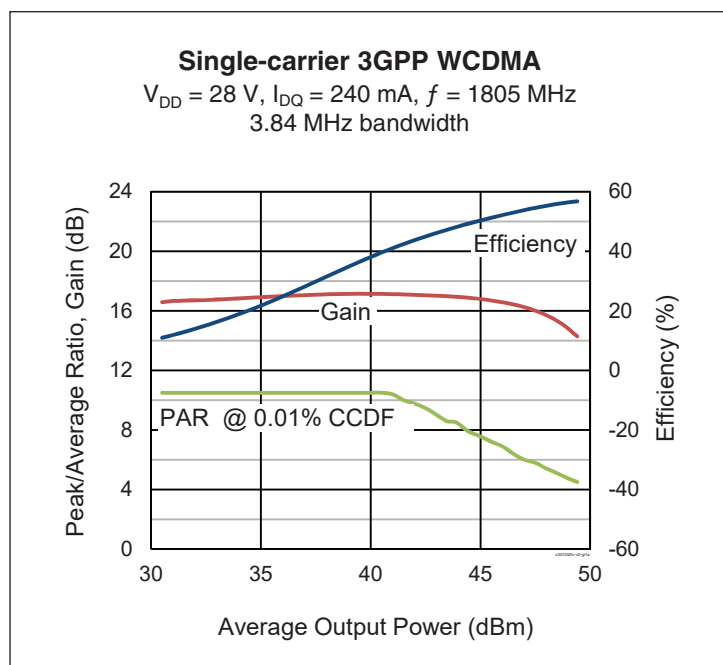
Thermally-Enhanced High Power RF LDMOS FET 120 W, 28 V, 1800 – 2200 MHz

Description

The PXAC201202FC is a 120-watt LDMOS FET for use in multi-standard cellular power amplifier applications in the 1800 to 2200 MHz frequency band. Its asymmetric and dual-path design make it ideal for Doherty amplifier designs. It features input and output matching, and a thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC201202FC
Package H-37248-4



Features

- Broadband internal matching
- Asymmetric Doherty design
 - Main: P1dB = 35 W Typ
 - Peak: P1dB = 80 W Typ
- CW performance in a Doherty configuration, 1805 MHz, 28 V
 - Output power = 100 W P1dB
 - Gain = 17.3 dB at 17.8 W Avg.
 - Efficiency = 46% at 17.8 W Avg.
- CW performance in a Doherty configuration, 2100 MHz, 28 V
 - Output power = 15.8 W Avg.
 - Gain = 15.5 dB
 - Efficiency = 46%
- Capable of handling 10:1 VSWR @ 28 V, 16 W (CW) output power
- Integrated ESD protection: Human Body Model, Class 1C (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Specifications, 1880 MHz

One-carrier WCDMA Characteristics (tested in Wolfspeed Doherty test fixture)

$V_{DD} = 28\text{ V}$, $V_{GS(peak)} = 1.4\text{ V}$, $I_{DQ} = 240\text{ mA}$, $P_{OUT} = 16\text{ W}$ average, $f = 1880\text{ MHz}$. 3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @0.01% probability on CCDF.

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|-----|-----|-----|------|
| Gain | G_{ps} | 16 | 17 | — | dB |
| Drain Efficiency | η_D | 43 | 46 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -29 | -26 | dBc |

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Specifications, 2140 MHz

One-carrier WCDMA Characteristics (not subject to production test—verified by design/characterization in Wolfspeed Doherty test fixture)

$V_{DD} = 28\text{ V}$, $V_{GS(\text{peak})} = 1.2\text{ V}$, $I_{DQ} = 240\text{ mA}$, $P_{OUT} = 16\text{ W}$ average, $f = 2140\text{ MHz}$. 3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @0.01% CCDF.

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|------|------|-----|------|
| Gain | G_{ps} | 16.0 | 16.5 | — | dB |
| Drain Efficiency | η_D | 39 | 42 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -29 | -27 | dBc |

DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|--|---------------------|-----|------|------|---------------|
| Drain-source Breakdown Voltage | $V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ mA}$ | $V_{(BR)DSS}$ | 65 | — | — | V |
| Drain Leakage Current | $V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1.0 | μA |
| | $V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 10.0 | μA |
| Gate Leakage Current | $V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1.0 | μA |
| On-state Resistance | (main) $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$ | $R_{DS(\text{on})}$ | — | 0.3 | — | Ω |
| | (peak) $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$ | $R_{DS(\text{on})}$ | — | 0.16 | — | Ω |
| Operating Gate Voltage | (main) $V_{DS} = 28\text{ V}$, $I_{DQ} = 242\text{ mA}$ | V_{GS} | 2.5 | 2.69 | 2.8 | V |
| | (peak) $V_{DS} = 28\text{ V}$, $I_{DQ} = 0\text{ A}$ | V_{GS} | 0.5 | 0.7 | 1.6 | V |

Maximum Ratings

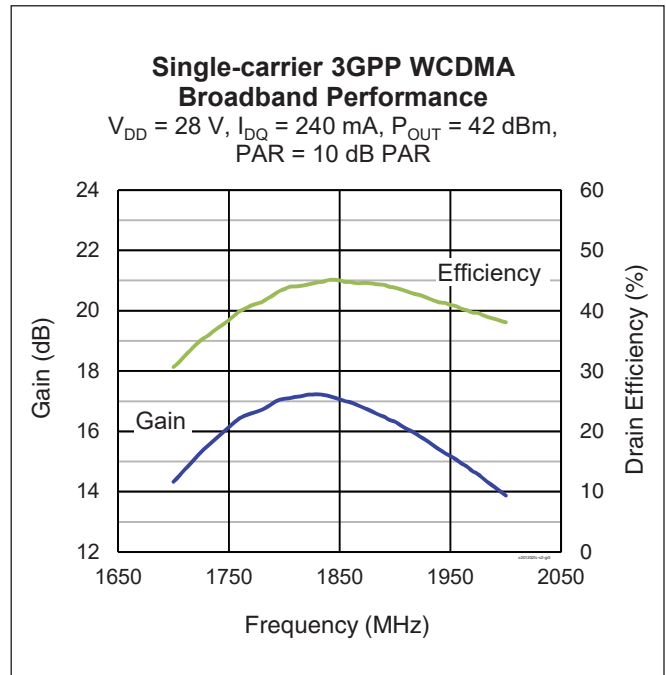
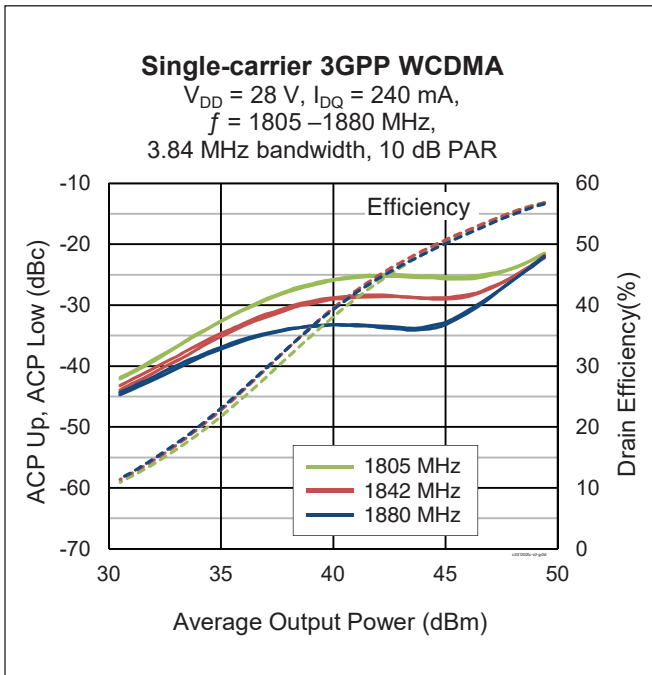
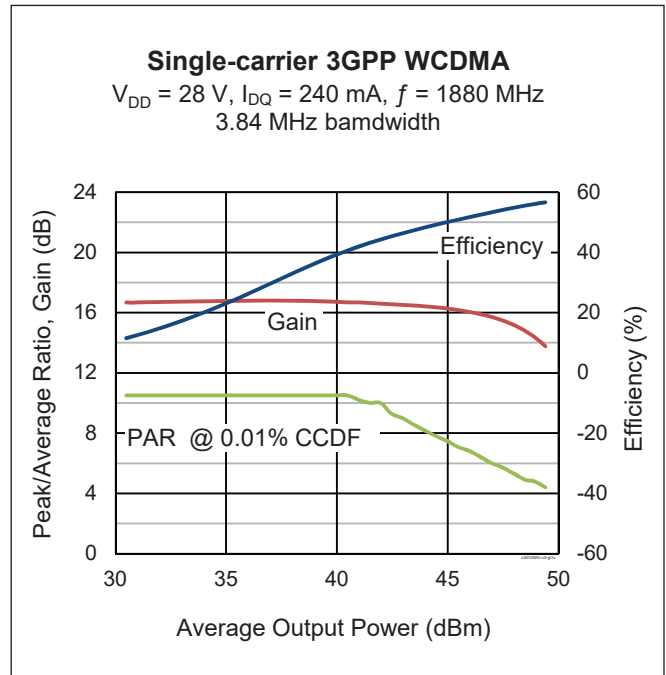
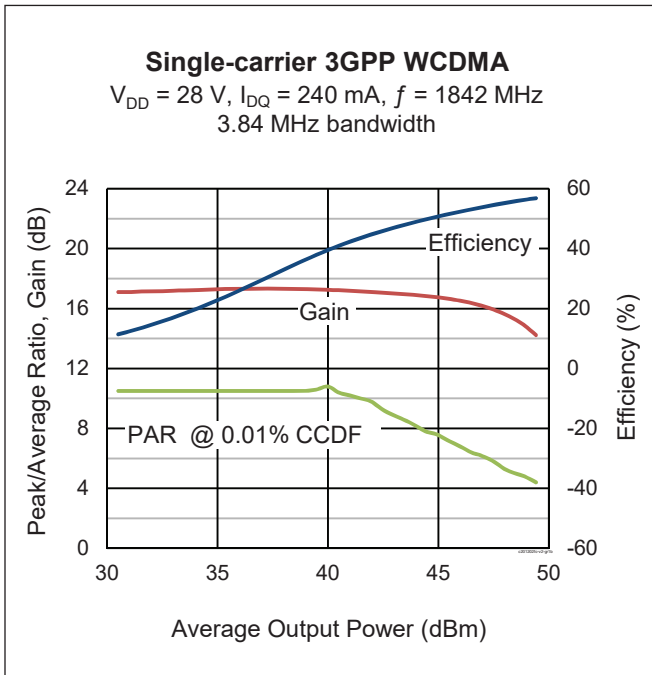
| Parameter | Symbol | Value | Unit |
|--|-----------------|-------------|----------------------|
| Drain-source Voltage | V_{DSS} | 65 | V |
| Gate-source Voltage | V_{GS} | -6 to +10 | V |
| Operating Voltage | V_{DD} | 0 to +32 | V |
| Junction Temperature | T_J | 225 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance ($T_{CASE} = 70^{\circ}\text{C}$, 100 W CW) | $R_{\theta JC}$ | 0.7 | $^{\circ}\text{C/W}$ |

Ordering Information

| Type and Version | Order Code | Package and Description | Shipping |
|----------------------|----------------------|---|----------------------|
| PXAC201202FC V2 R0 | PXAC201202FC-V2-R0 | H-37248-4, ceramic open-cavity, earless | Tape & Reel, 50 pcs |
| PXAC201202FC V2 R250 | PXAC201202FC-V2-R250 | H-37248-4, ceramic open-cavity, earless | Tape & Reel, 250 pcs |

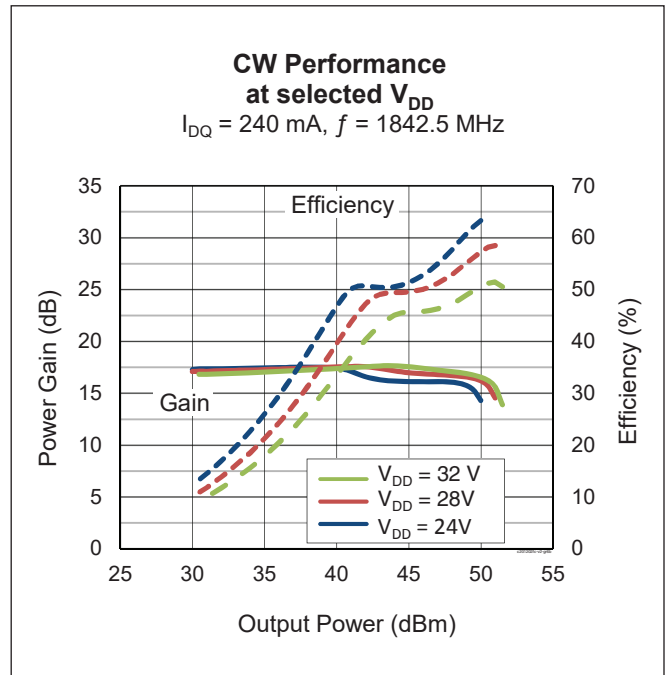
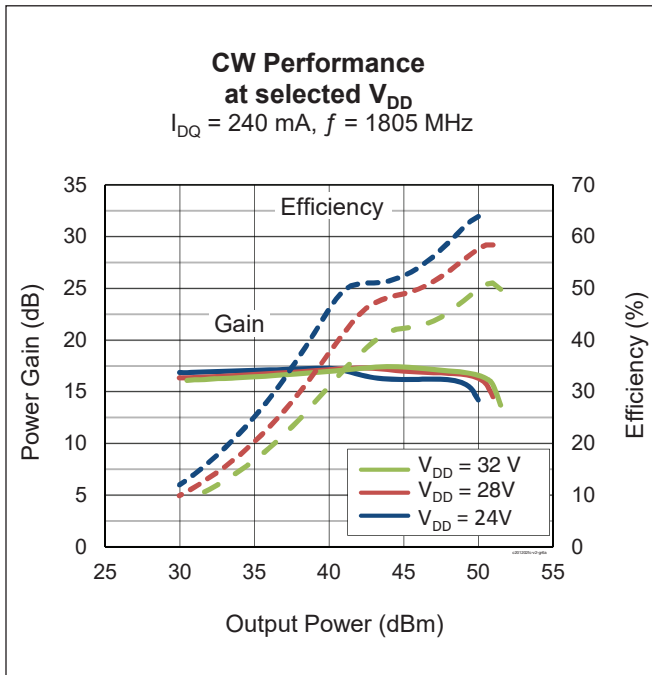
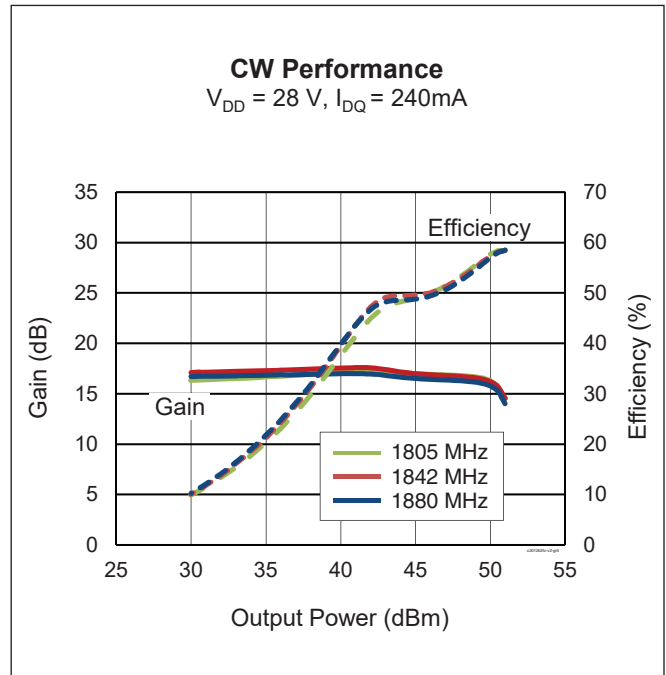
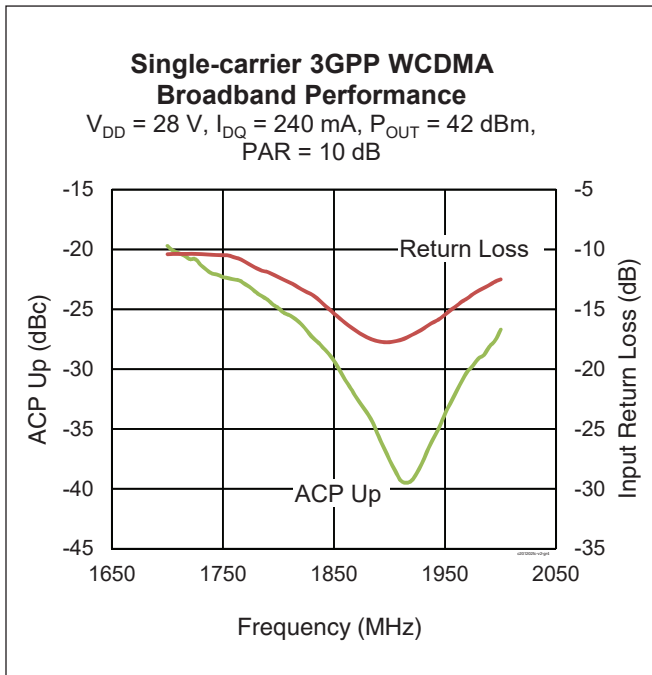


Typical Performance (data taken in an Wolfspeed test fixture)



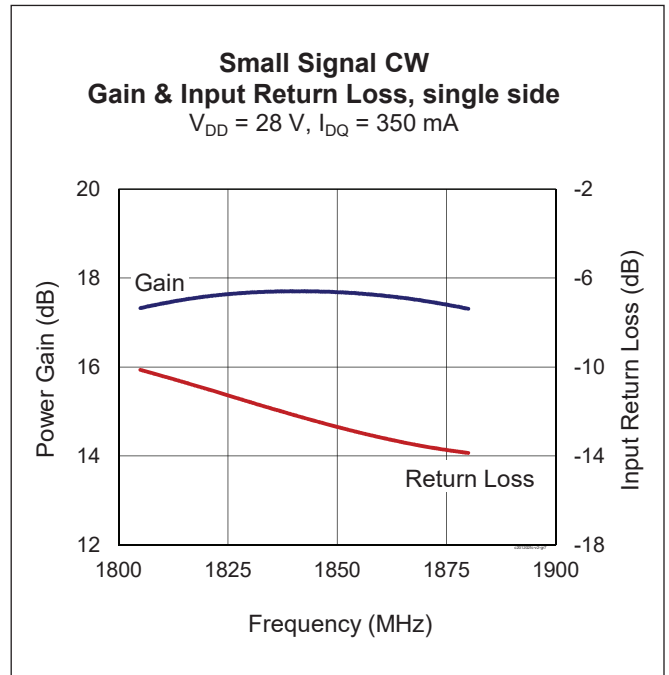
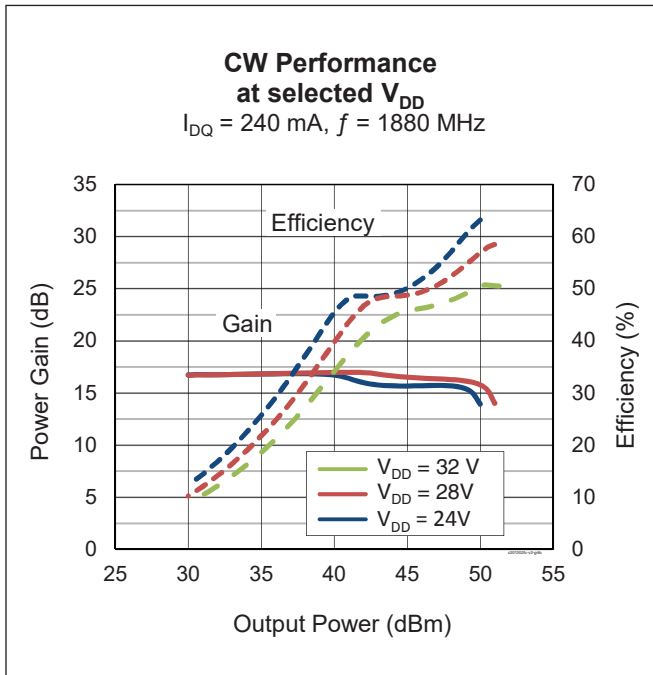


Typical Performance (cont.)





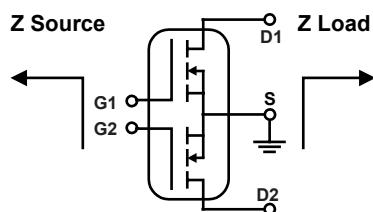
Typical Performance (cont.)



See next page for load pull performance



Load Pull Performance



Main side pulsed CW signal: 160 μ sec, 10% duty cycle; 28 V, 250 mA

| Class AB | | P _{1dB} | | | | | P _{1dB} | | | | |
|------------|-----------------------------|-----------------------------|-----------|------------------------|----------------------|---------|-----------------------------|-----------|------------------------|----------------------|---------|
| | | Max Output Power | | | | | Max PAE | | | | |
| Freq [MHz] | Z _s [Ω] | Z _l [Ω] | Gain [dB] | P _{OUT} [dBm] | P _{OUT} [W] | PAE [%] | Z _l [Ω] | Gain [dB] | P _{OUT} [dBm] | P _{OUT} [W] | PAE [%] |
| 1810 | 3.92 – j12.74 | 8.74 – j8.12 | 19.55 | 46.79 | 47.75 | 53.6 | 14.51 – j15.32 | 21.55 | 45.00 | 31.65 | 62.1 |
| 1840 | 4.13 – j12.84 | 8.56 – j7.87 | 19.43 | 46.58 | 45.50 | 52.3 | 15.46 – j14.87 | 21.52 | 44.81 | 30.28 | 61.3 |
| 1880 | 4.54 – j14.31 | 8.66 – j8.19 | 19.37 | 46.92 | 49.20 | 55.3 | 18.77 – j12.73 | 21.53 | 45.05 | 31.98 | 65.2 |

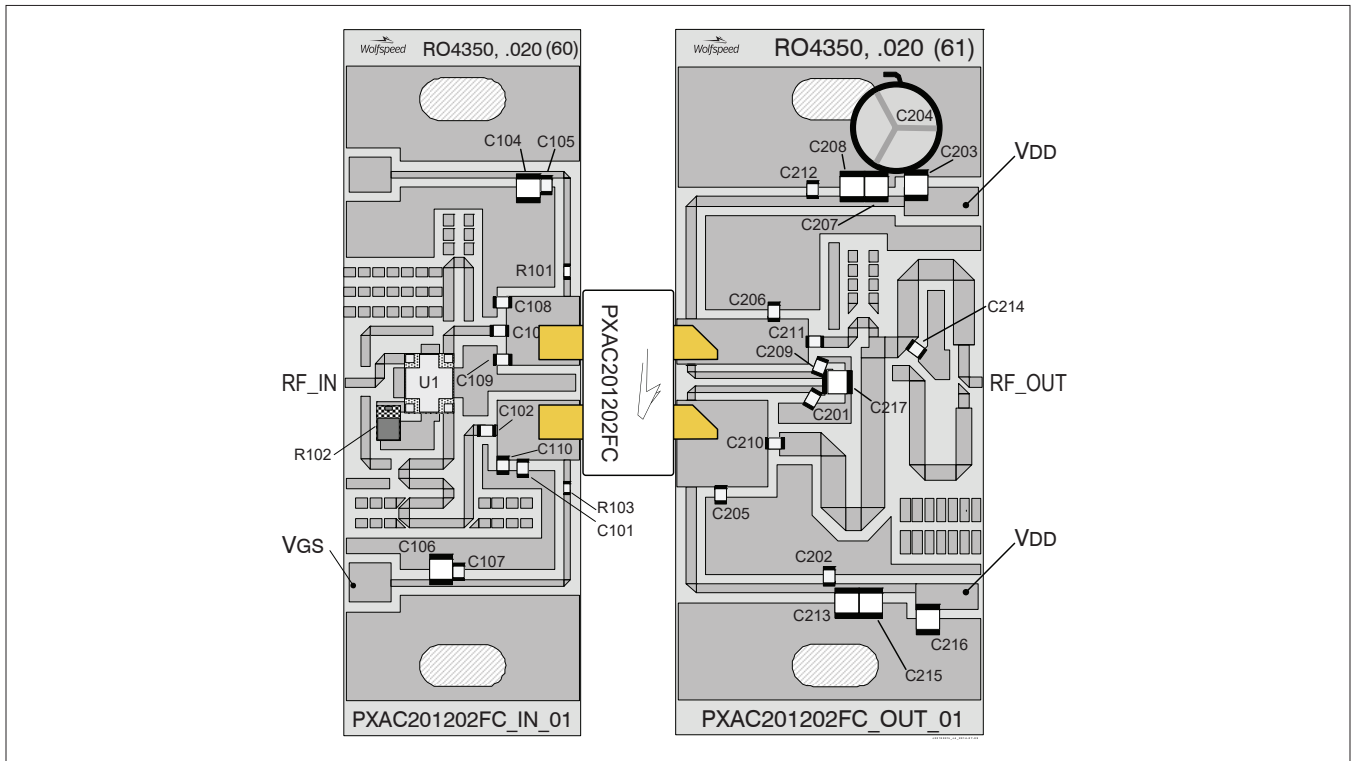
Peak side pulsed CW signal: 160 μ sec, 10% duty cycle; 28 V, 540 mA

| Class AB | | P _{1dB} | | | | | P _{1dB} | | | | |
|------------|-----------------------------|-----------------------------|-----------|------------------------|----------------------|---------|-----------------------------|-----------|------------------------|----------------------|---------|
| | | Max Output Power | | | | | Max PAE | | | | |
| Freq [MHz] | Z _s [Ω] | Z _l [Ω] | Gain [dB] | P _{OUT} [dBm] | P _{OUT} [W] | PAE [%] | Z _l [Ω] | Gain [dB] | P _{OUT} [dBm] | P _{OUT} [W] | PAE [%] |
| 1810 | 3.75 – j8.61 | 2.62 – j5.15 | 18.47 | 49.89 | 97.50 | 48.3 | 4.96 – j7.28 | 20.92 | 48.49 | 70.63 | 59.9 |
| 1840 | 3.69 – j8.66 | 2.99 – j4.99 | 19.05 | 49.85 | 96.61 | 51.0 | 5.17 – j6.42 | 20.80 | 48.71 | 74.30 | 59.2 |
| 1880 | 5.57 – j9.39 | 3.09 – j5.13 | 19.31 | 50.12 | 102.8 | 50.1 | 6.31 – j6.59 | 21.34 | 48.55 | 71.61 | 63.2 |

Reference Circuit, 1880 MHz

| | |
|--|--|
| DUT | PXAC201202FC V2 |
| Reference Circuit Part No. | LTA/PXAC201202FC V2 |
| PCB | Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ |
| Find Gerber files for this reference fixture on the Wolfspeed Web site at (www.wolfspeed.com/RF) | |

Reference Circuit (cont.)



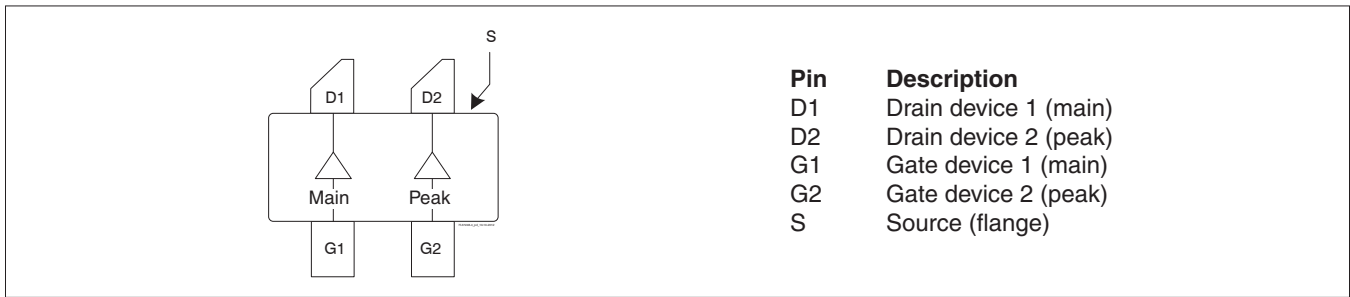
Reference circuit assembly diagram (not to scale)

Component Information

| Component | Description | Manufacturer | P/N |
|--|---------------------------|------------------------------------|------------------|
| Input | | | |
| C101 | Chip capacitor, 2.2 pF | ATC | ATC600F2R2CW250T |
| C102, C105, C107 | Chip capacitor, 18 pF | ATC | ATC600F180JW250T |
| C103 | Chip capacitor, 1.5 pF | ATC | ATC600F1R5CW250T |
| C104, C106 | Capacitor, 10 μF, 50 V | Taiyo Yuden | UMK325C7106MM-T |
| C108 | Chip capacitor, 0.3 pF | ATC | ATC600F0R3CW250T |
| C109, C110 | Chip capacitor, 0.3 pF | ATC | ATC600F0R3CW250T |
| R101, R103 | Resistor, 10 Ohm | Panasonic Electronic Components | ERJ-3GEYJ |
| R102 | Resistor, 50 Ohm | Anaren | RFP060120A15Z50 |
| U1 | Hybrid coupler, 5 dB, 90° | Anaren | X3C19P1-05S |
| Output | | | |
| C201, C202, C209, C210, C211, C212 | Chip capacitor, 18 pF | ATC | ATC600F180JW250T |
| C203, C207, C208, C213, C215, C216, C217 | Capacitor, 10 μF, 50 V | Taiyo Yuden | UMK325C7106MM-T |
| C204 | Capacitor, 220 μF, 50 V | Cornell Dubilier Electronics (CDE) | SK221M050ST |
| C205 | Chip capacitor, 1.8 pF | ATC | ATC600F1R8CW250T |
| C206 | Chip capacitor, 0.3 pF | ATC | ATC600F0R3CW250T |
| C214 | Chip capacitor, 0.5 pF | ATC | ATC600F0R5CW250T |

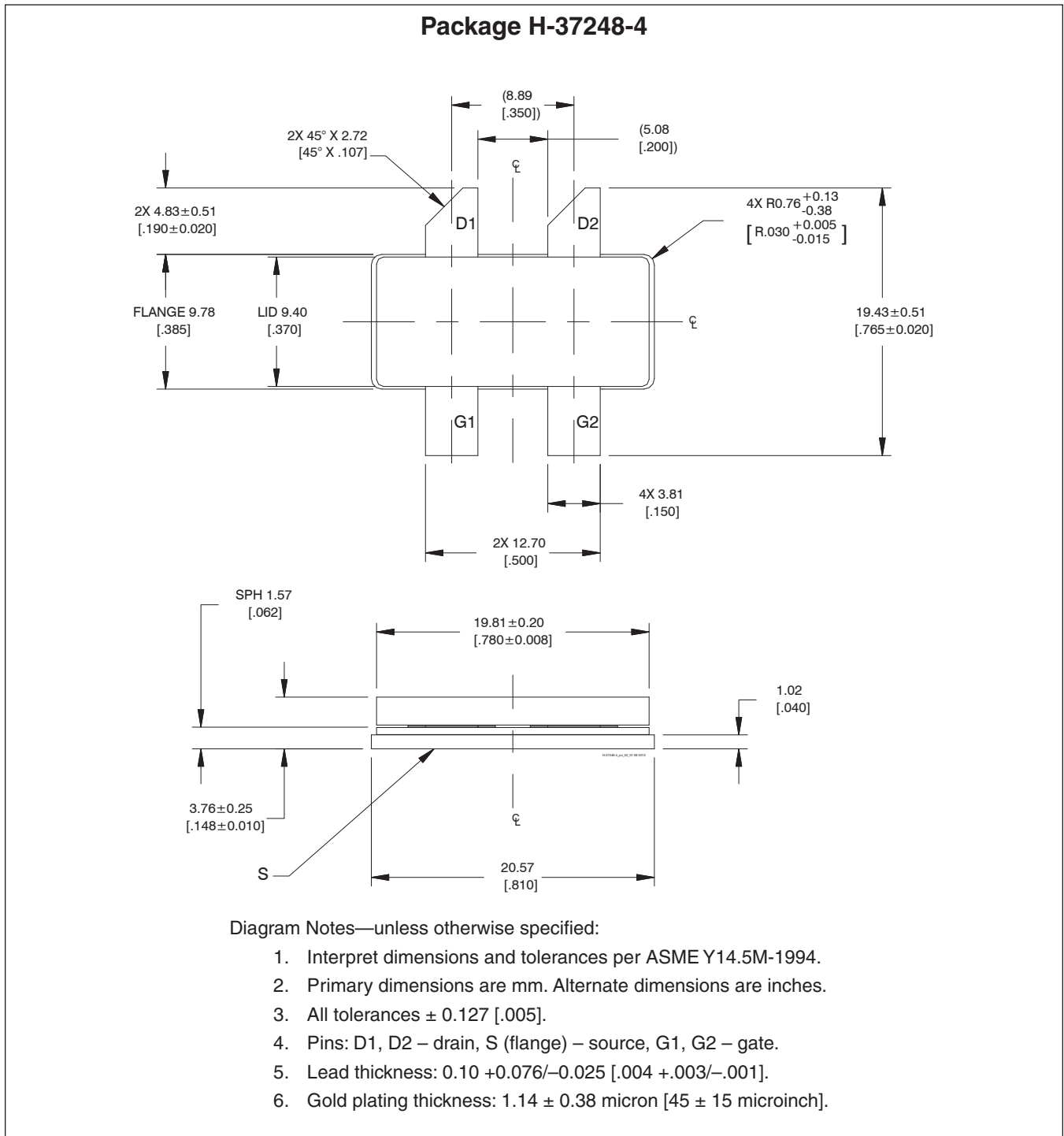


Pinout Diagram (top view)



See next page for package mechanical specifications

Package Outline Specifications



Revision History

| Revision | Date | Data Sheet Type | Page | Subjects (major changes in comparison with previous revision) |
|----------|------------|-----------------|------------|---|
| 01 | 2014-02-06 | Advance | All | New product, proposed only. |
| 02 | 2014-03-07 | Production | All | Data Sheet reflects released product specifications, including reference circuit and performance information. |
| 03 | 2014-03-12 | Production | 1, 2, 3, 6 | (1) Add features, update graph. (2) Update Operating Gate Voltage. (3) Update two graphs. (6) Add Load Pull tables. |
| 04 | 2014-06-27 | Production | All | Product now V2. |
| 04.1 | 2014-08-25 | Production | 7 | Assembly diagram: position of C201 changed. |
| 05 | 2014-08-25 | Production | 2 | RF Specifications at 2140 MHz: values updated. |
| 05.1 | 2016-06-22 | Production | 2 | Updated ordering information |
| 06 | 2018-06-29 | Production | All | Converted to Wolfspeed Data Sheet |

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Notes

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