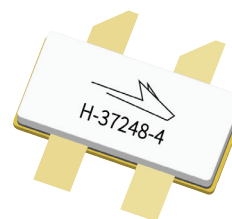


# PXAC200902FC

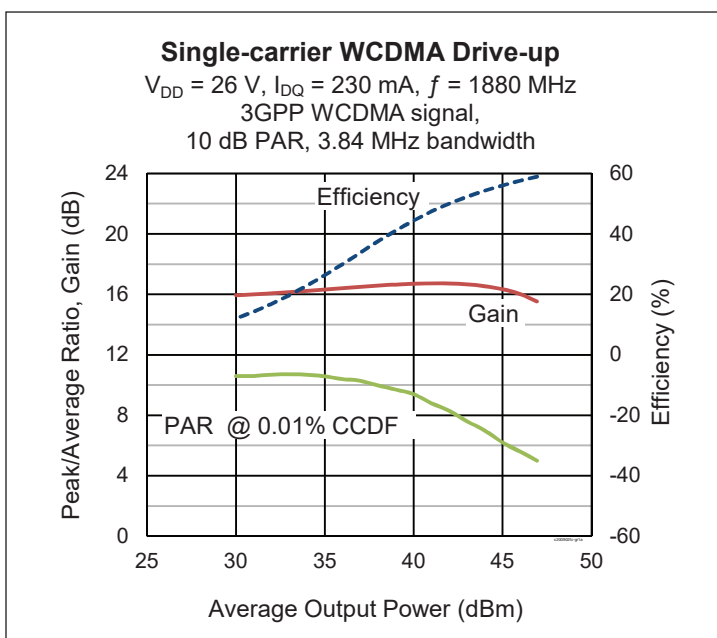
## Thermally-Enhanced High Power RF LDMOS FET 90 W, 28 V, 1805 – 2170 MHz

### Description

The PXAC200902FC is a 90-watt LDMOS FET with an asymmetric design intended for use in multi-standard cellular power amplifier applications in the 1805 to 2170 MHz frequency band. Features include dual path design, input and output matching, high gain and a thermally-enhanced push-pull package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC200902FC  
Package H-37248-4



### Features

- Broadband internal input and output matching
- Asymmetric Doherty design
  - Main: P1dB = 35 W Typ
  - Peak: P1dB = 55 W Typ
- Typical CW performance, 1920 MHz, 26 V,
  - Output power at P1dB = 50 W
  - Efficiency = 58%
  - Gain = 16.6 dB
- Capable of handling 10:1 VSWR @28 V, 90 W (CW) output power
- Integrated ESD protection
- ESD Rating: Human Body Model, Class 1C (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

### RF Characteristics

#### Single-carrier WCDMA Specifications (tested in Wolfspeed Doherty test fixture)

$V_{DD} = 26\text{ V}$ ,  $I_{DQ} = 230\text{ mA}$ ,  $V_{GS(peak)} = 1.3\text{ V}$ ,  $P_{OUT} = 15\text{ W avg}$ ,  $f = 1920\text{ MHz}$ , 3GPP WCDMA signal, 3.84 MHz channel bandwidth, 10 dB peak/average @ 0.01% CCDF

| Characteristic               | Symbol   | Min  | Typ   | Max   | Unit |
|------------------------------|----------|------|-------|-------|------|
| Gain                         | $G_{ps}$ | 16.5 | 17.2  | —     | dB   |
| Drain Efficiency             | $\eta_D$ | 45.0 | 50.3  | —     | %    |
| Adjacent Channel Power Ratio | ACPR     | —    | -27.0 | -25.5 | dBc  |

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

## 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 (main & peak) | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$           | $I_{DSS}$     | —    | —    | 0.1  | $\mu\text{A}$ |
|                                     | $V_{DS} = 63\text{ V}, V_{GS} = 0\text{ V}$           | $I_{DSS}$     | —    | —    | 1.0  | $\mu\text{A}$ |
| Gate Leakage Current (main & peak)  | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$           | $I_{GSS}$     | —    | —    | 0.1  | $\mu\text{A}$ |
| On-State Resistance                 | (main) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$  | $R_{DS(on)}$  | —    | 0.22 | —    | $\Omega$      |
|                                     | (peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$  | $R_{DS(on)}$  | —    | 0.16 | —    | $\Omega$      |
| Operating Gate Voltage              | (main) $V_{DS} = 26\text{ V}, I_{DQ} = 230\text{ mA}$ | $V_{GS}$      | 2.15 | 2.65 | 3.15 | V             |
|                                     | (peak) $V_{DS} = 26\text{ V}, I_{DQ} = 0\text{ A}$    | $V_{GS}$      | 0.80 | 1.30 | 1.80 | V             |

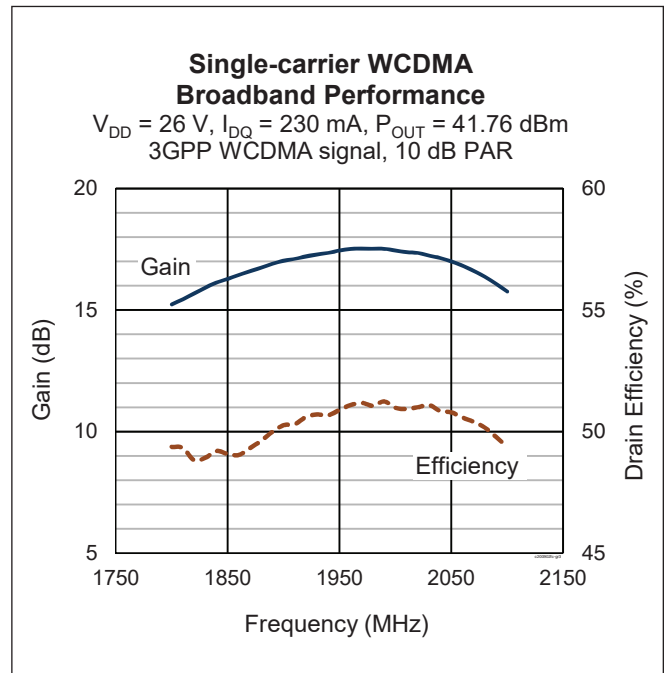
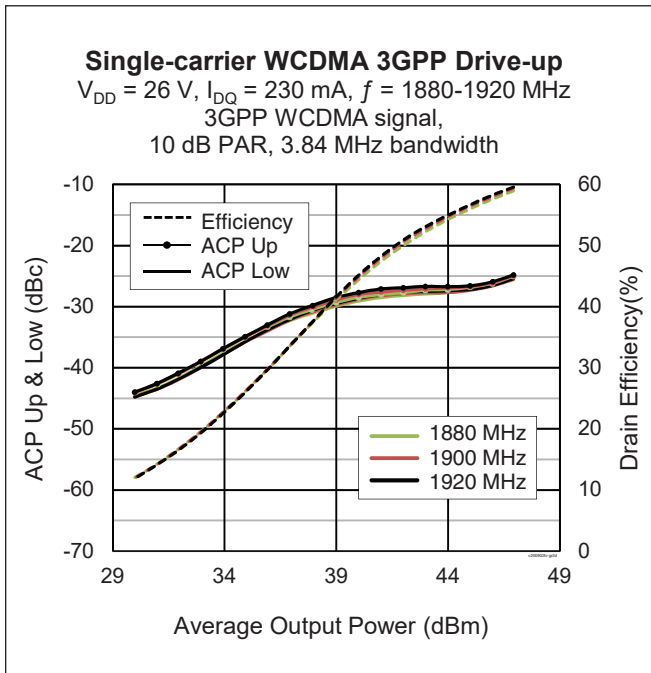
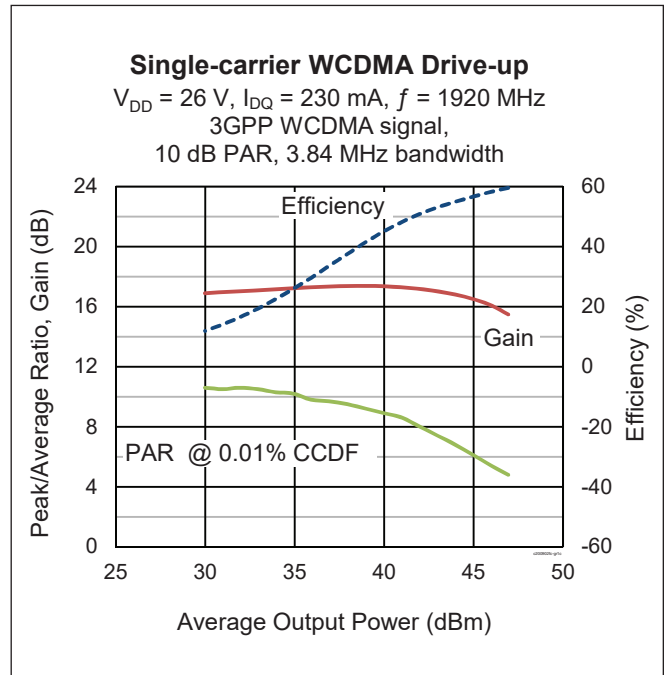
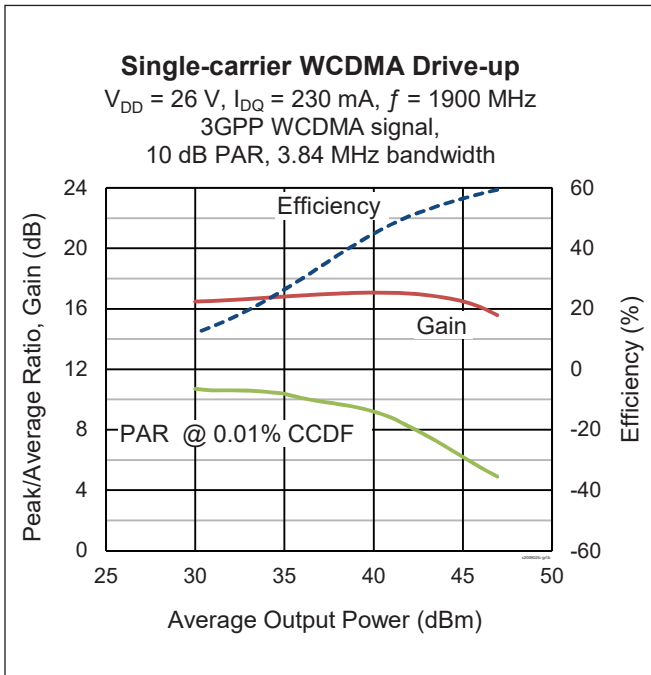
## Maximum Ratings

| 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 Main ( $T_{CASE} = 70^{\circ}\text{C}, 26\text{ V}, I_{DQ} = 230\text{ mA}, 15\text{ W CW}$ ) | $R_{\theta JC}$  | 1.75            | $^{\circ}\text{C/W}$ |
|  | Peak ( $T_{CASE} = 70^{\circ}\text{C}, 26\text{ V}, V_{GS} = 1.3\text{ V}, 41\text{ W CW}$ ) | $R_{\theta JC}$ | 0.76                 |

## Ordering Information

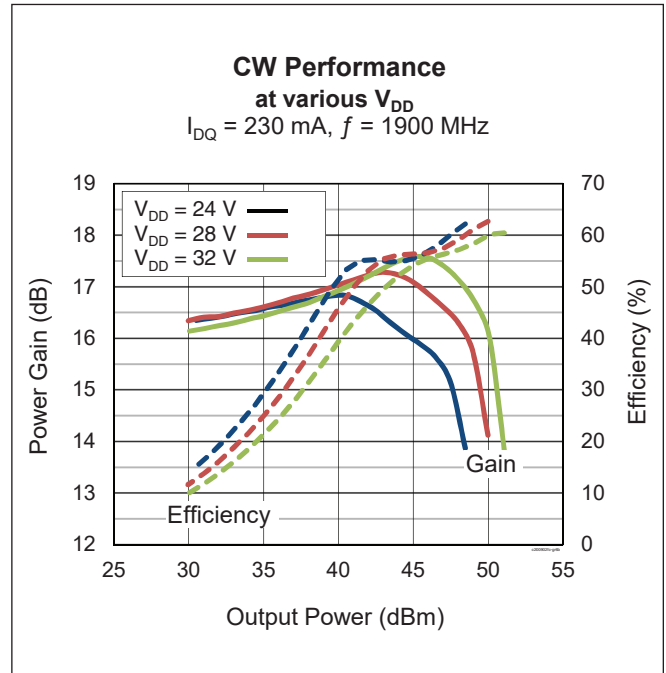
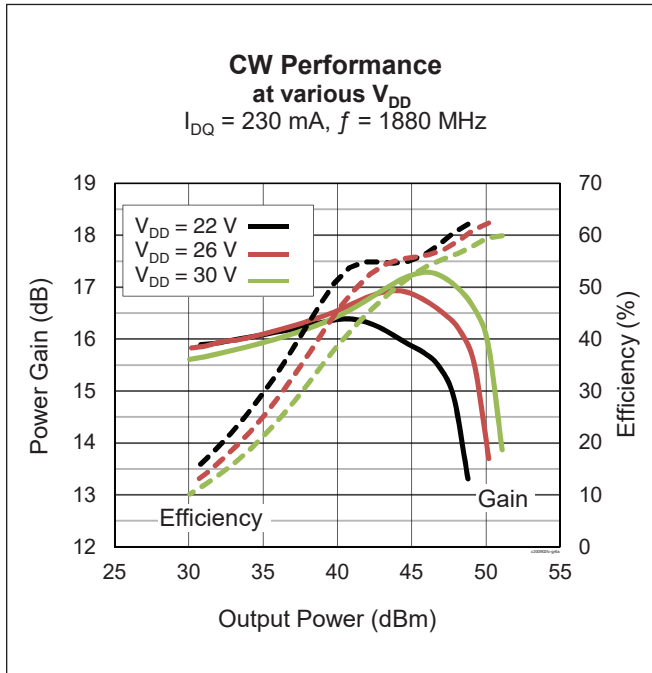
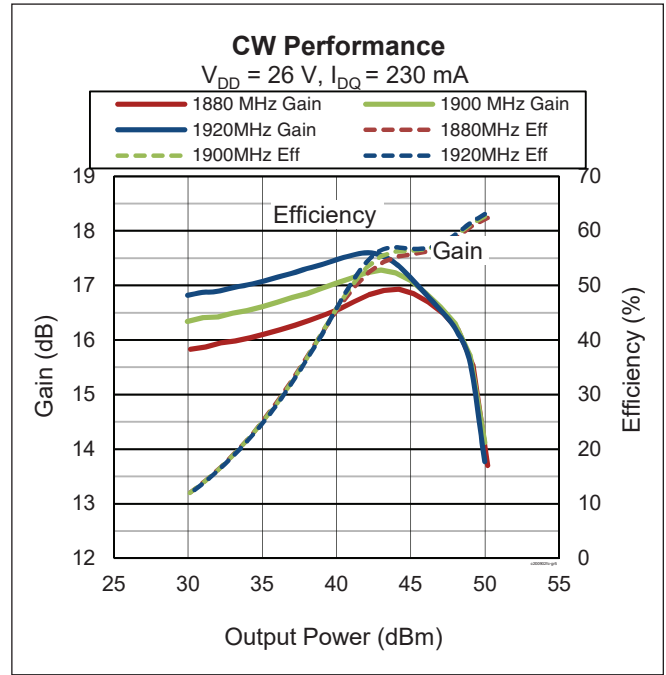
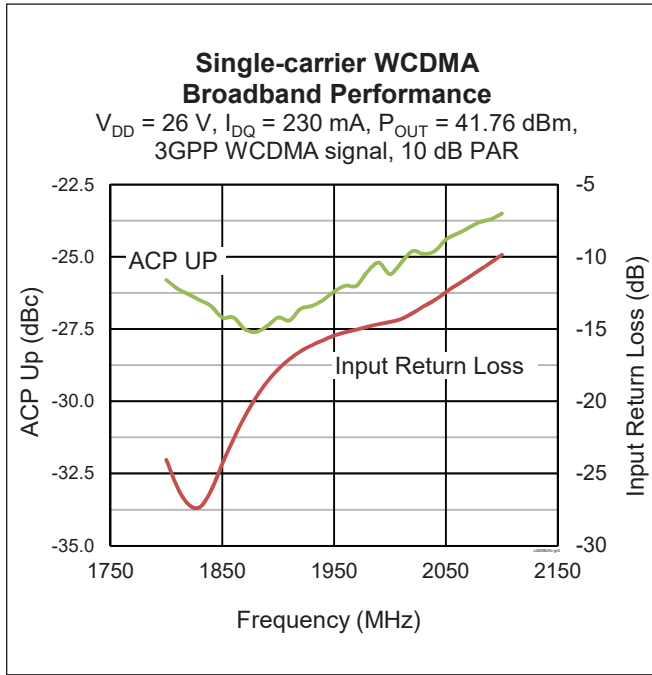
| Type and Version   | Order Code         | Package and Description                                  | Shipping             |
|--------------------|--------------------|--|----------------------|
| PXAC200902FC V1 R0 | PXAC200902FC-V1-R0 | H-37248-4, ceramic open cavity push-pull, earless flange | Tape & Reel, 50 pcs  |
| PXAC200902FC V1 R2 | PXAC200902FC-V1-R2 | H-37248-4, ceramic open cavity push-pull, earless flange | Tape & Reel, 250 pcs |

**Typical Performance** (data taken in a production Doherty test fixture)

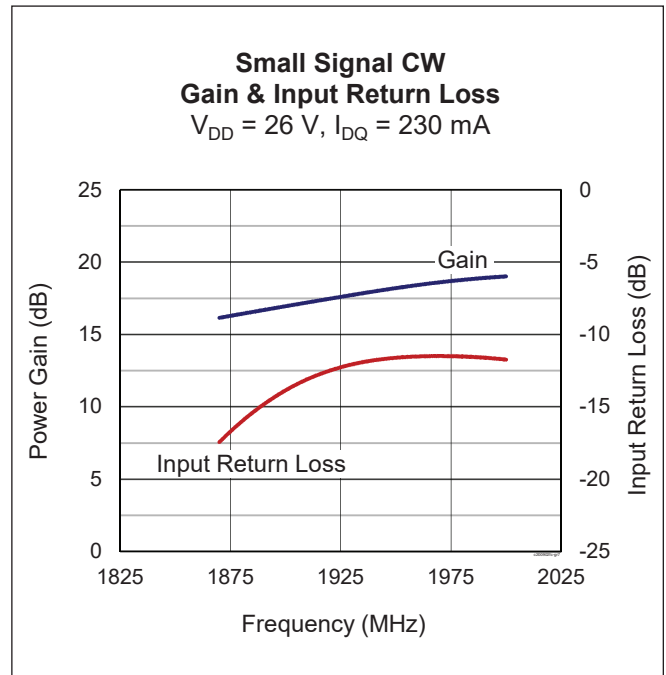
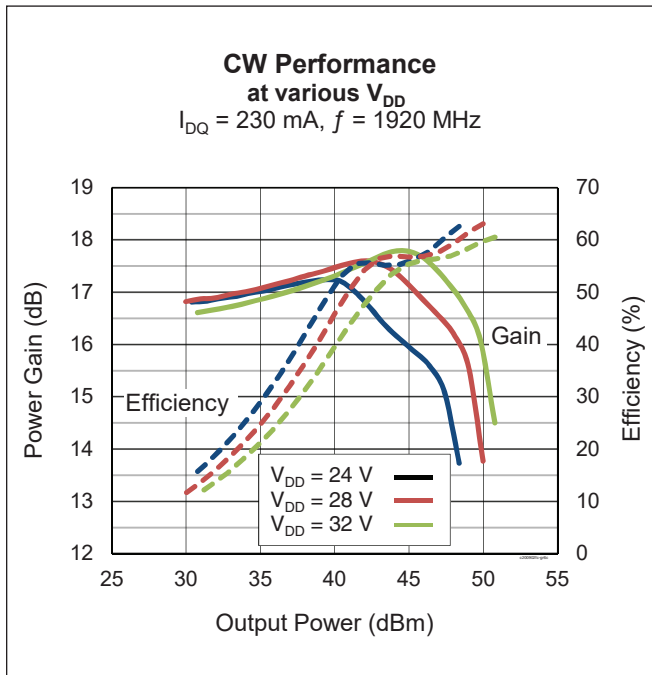




**Typical Performance (cont.)**



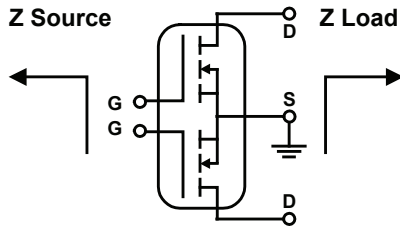
**Typical Performance (cont.)**



See next page for load pull information



### Load Pull Performance



**Main side load pull, pulsed CW signal:** 160  $\mu$ s, 10% duty cycle,  $V_{DD} = 28$  V,  $I_{DQ} = 230$  mA

| Class AB   |                             | P <sub>1dB</sub>            |           |                        |                      |         |                             |           |                        |                      |         |  |
|------------|-----------------------------|-----------------------------|-----------|------------------------|----------------------|---------|-----------------------------|-----------|------------------------|----------------------|---------|--|
|            |                             | Max Output Power            |           |                        |                      |         | Max PAE                     |           |                        |                      |         |  |
| Freq [MHz] | Z <sub>s</sub> [ $\Omega$ ] | Z <sub>l</sub> [ $\Omega$ ] | Gain [dB] | P <sub>OUT</sub> [dBm] | P <sub>OUT</sub> [W] | PAE [%] | Z <sub>l</sub> [ $\Omega$ ] | Gain [dB] | P <sub>OUT</sub> [dBm] | P <sub>OUT</sub> [W] | PAE [%] |  |
| 1880       | 8.89 – j15.56               | 6.31 – j9.65                | 19.5      | 46.76                  | 47.4                 | 57.3    | 12.29 – j4.78               | 21.8      | 44.96                  | 31.3                 | 68.5    |  |
| 1900       | 9.25 – j15.69               | 5.47 – j10.96               | 18.8      | 46.4                   | 43.7                 | 49.8    | 12.17 – j5.25               | 21.9      | 44.62                  | 29                   | 64.1    |  |
| 1920       | 12.83 – j18.84              | 6.42 – j10.7                | 19.5      | 46.6                   | 45.7                 | 55.7    | 11.76 – j4.27               | 22.0      | 44.6                   | 28.8                 | 66.5    |  |

**Peak side load pull, pulsed CW signal:** 160  $\mu$ s, 10% duty cycle,  $V_{DD} = 28$  V,  $I_{DQ} = 280$  mA

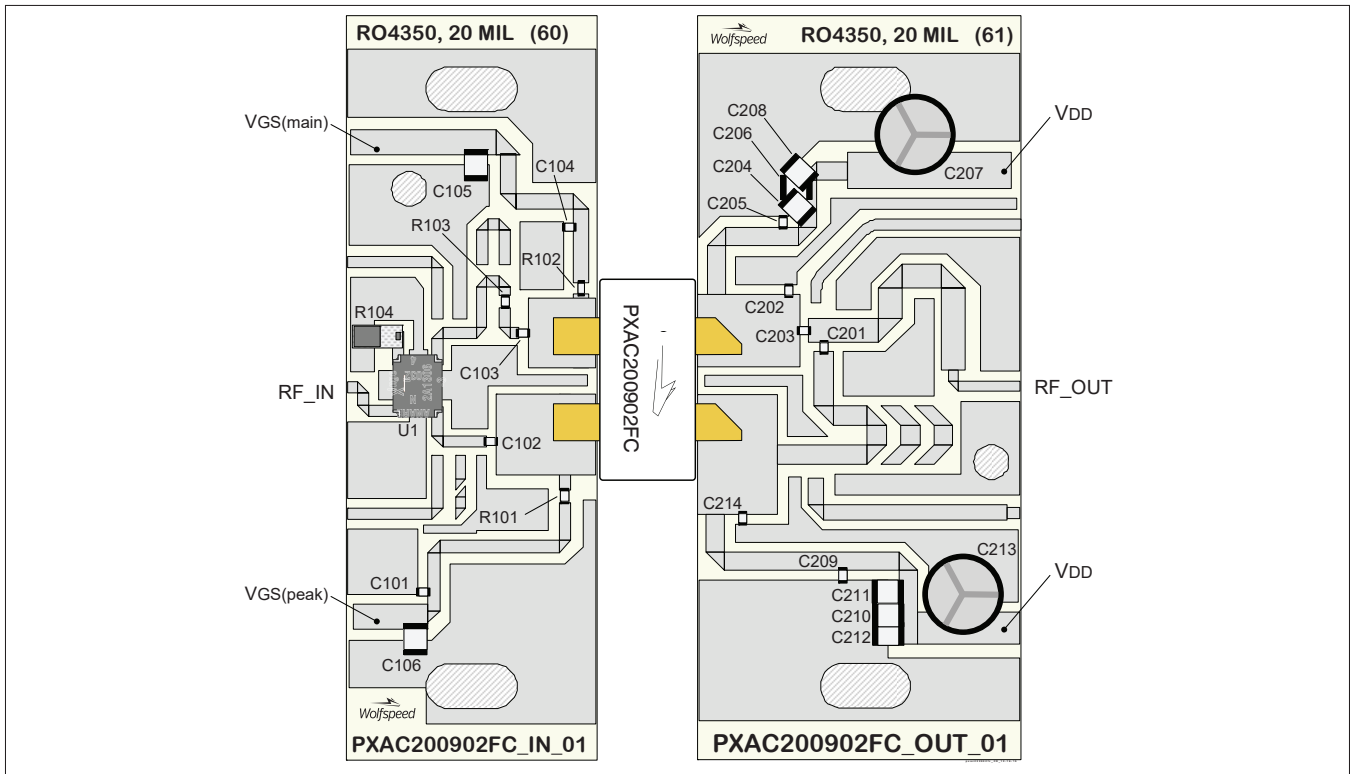
| Class AB   |                             | P <sub>1dB</sub>            |           |                        |                      |         |                             |           |                        |                      |         |  |
|------------|-----------------------------|-----------------------------|-----------|------------------------|----------------------|---------|-----------------------------|-----------|------------------------|----------------------|---------|--|
|            |                             | Max Output Power            |           |                        |                      |         | Max PAE                     |           |                        |                      |         |  |
| Freq [MHz] | Z <sub>s</sub> [ $\Omega$ ] | Z <sub>l</sub> [ $\Omega$ ] | Gain [dB] | P <sub>OUT</sub> [dBm] | P <sub>OUT</sub> [W] | PAE [%] | Z <sub>l</sub> [ $\Omega$ ] | Gain [dB] | P <sub>OUT</sub> [dBm] | P <sub>OUT</sub> [W] | PAE [%] |  |
| 1880       | 3.46 – j8.04                | 3.21 – j6.17                | 19.3      | 48.4                   | 69.2                 | 56.8    | 3.21 – j6.17                | 22.3      | 45.96                  | 39.4                 | 68.6    |  |
| 1900       | 3.5 – j8.19                 | 3.21 – j6.44                | 19.3      | 48.1                   | 64.6                 | 53.8    | 6.2 – j3.08                 | 22.1      | 45.9                   | 38.9                 | 64.3    |  |
| 1920       | 4.29 – j9.3                 | 3.03 – j6.35                | 19.3      | 48.3                   | 67.6                 | 54.6    | 5.33 – j3.12                | 21.9      | 46.3                   | 42.7                 | 66.0    |  |

### Reference Circuit Assembly, 1880 – 1920 MHz

|                       |   |
|-----------------------|---|
| DUT                   | PXAC200902FC V1   |
| Reference Circuit No. | LTA/PXAC200902FC V1   |
| Order Code            | LTA/PXAC200902FC V1   |
| PCB                   | Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ |

Find Gerber files for this test fixture on the Wolfspeed Web site at <http://www.wolfspeed.com/RF>

Reference Circuit (cont.)



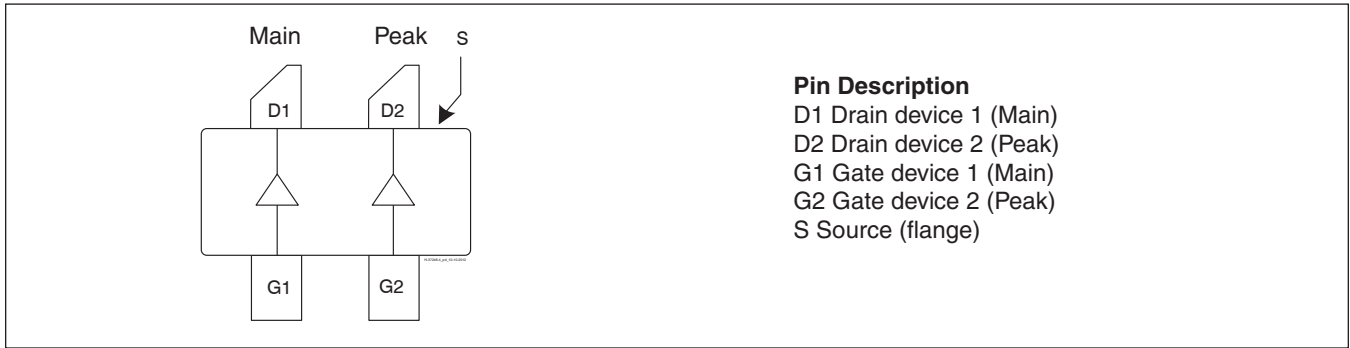
Reference circuit assembly diagram (not to scale)

Components Information

| Component                          | Description       | Manufacturer                 | P/N              |
|------------------------------------|-------------------|------------------------------|------------------|
| <b>In</b>                          |                   |                              |                  |
| C101, C102, C104                   | Capacitor, 18 pF  | ATC                          | ATC600F180JW250T |
| C103                               | Capacitor, 9.1 pF | ATC                          | ATC600F9R1JW250T |
| C105, C106                         | Capacitor, 10 μF  | Taiyo Yuden                  | UMK325C7106MM-T  |
| R101, R102                         | Resistor, 10 Ω    | Panasonic                    | ERJ-8GEYJ100V    |
| R103                               | Resistor, 5.6 Ω   | Panasonic                    | ERJ-8RQJ5R6V     |
| R104                               | Resistor, 50 Ω    | Anaren                       | C8A50Z4A         |
| U1                                 | Hybrid Coupler    | Anaren                       | X3C19P1-03S      |
| <b>Out</b>                         |                   |                              |                  |
| C201                               | Capacitor, 15 pF  | ATC                          | ATC600F150JW250T |
| C202                               | Capacitor, 0.7 pF | ATC                          | ATC600F0R7CW250T |
| C203                               | Capacitor, 10 pF  | ATC                          | ATC600F100JW250T |
| C204, C206, C208, C210, C211, C212 | Capacitor, 10 μF  | Taiyo Yuden                  | UMK325C7106MM-T  |
| C205, C209                         | Capacitor, 18 pF  | ATC                          | ATC600F180JW250T |
| C207, C213                         | Capacitor, 220 μF | Cornell Dubilier Electronics | SK221M050ST      |
| C214                               | Capacitor, 1.6 pF | ATC                          | ATC600F1R6JW250T |



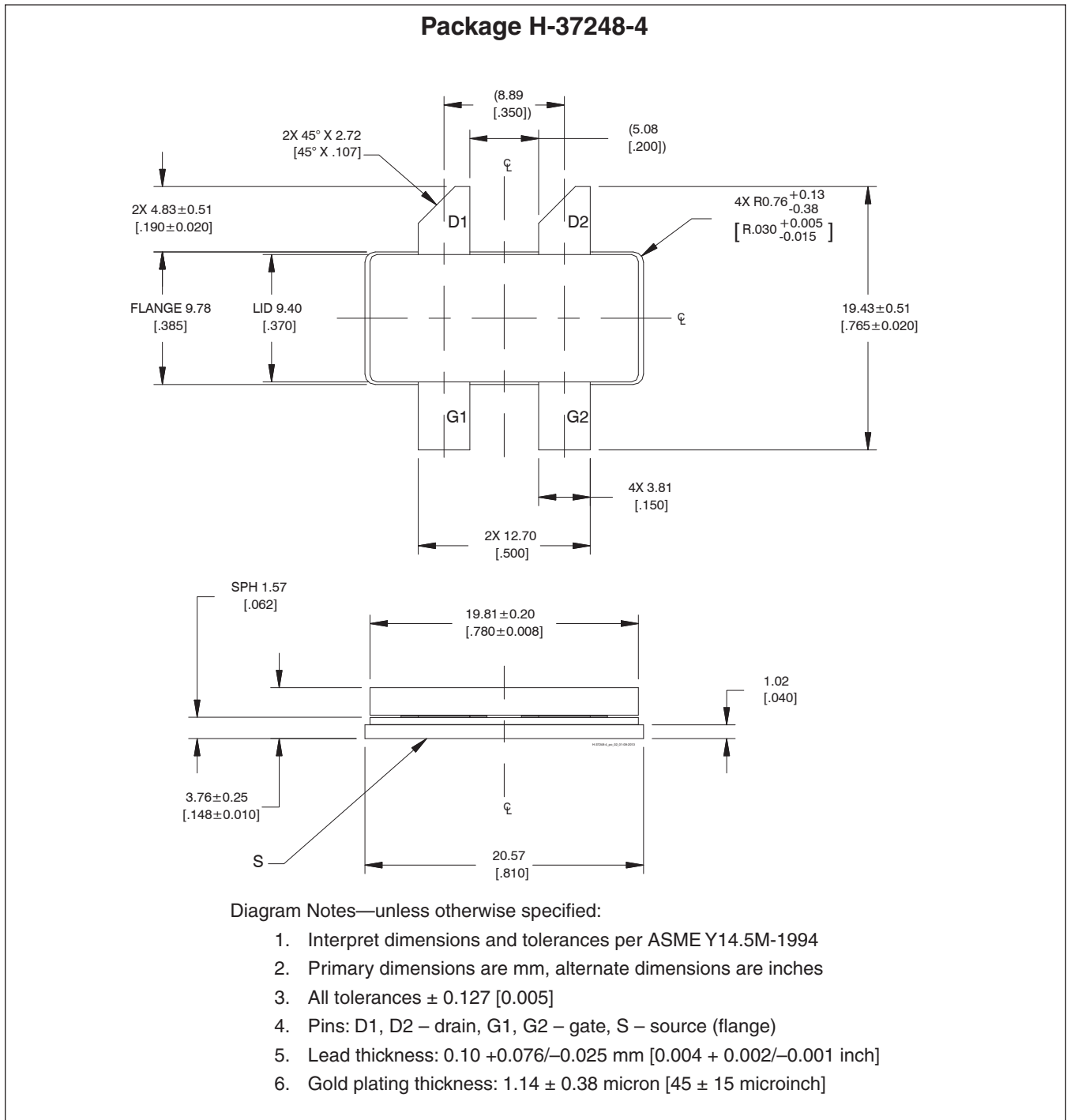
**Pinout Diagram** (top view)



**See next page for package outline specifications**



Package Outline Specifications



## Revision History

|      |            |            |     |   |
|------|------------|------------|-----|---|
| 01   | 2015-06-08 | Advance    | All | First Data Sheet for this released product.           |
| 02   | 2015-10-27 | Production | All | Updated and firm specifications for released product. |
| 02.1 | 2016-02-11 | Production | All | Updated Order Code and Reference Circuit MHz          |
| 03   | 2018-06-29 | Production | All | Converted to Wolfsped Data Sheet                      |

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## Notes

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