

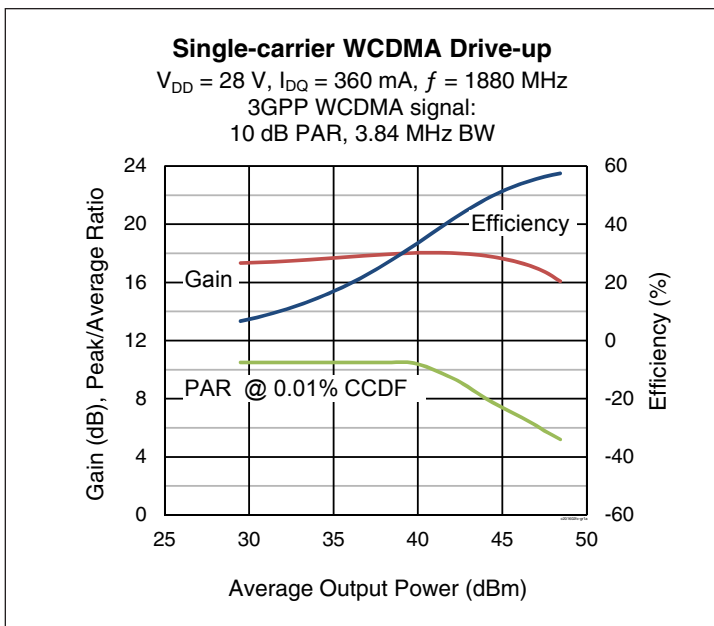
Thermally-Enhanced High Power RF LDMOS FET 140 W, 28 V, 1880 – 1920 MHz, 2010 – 2025 MHz

Description

The PXAC201602FC is a 140-watt LDMOS FET for use in multi-standard cellular power amplifier applications in the 1880 to 1920 MHz and 2010 to 2025 MHz frequency bands. It features input and output matching, and a thermally-enhanced package with earless flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC201602FC
Package H-37248-4



Features

- Asymmetric Doherty design
 - Main: 55 W Typ (P_{1dB})
 - Peak: 85 W Typ (P_{1dB})
- Broadband internal matching
- Pulsed CW performance, 1960 MHz, 28 V
 - Output power at $P_{1dB} = 100\text{ W}$
 - Gain = 18 dB
 - Efficiency = 55%
- Capable of handling 10:1 VSWR @ 28 V, 140 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1C (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant
- Can be operated with I_{DQ} of up to 700 mA (not to exceed maximum ratings limits)

RF Specifications

Single-carrier WCDMA Characteristics (tested in Infineon Doherty test fixture)

$V_{DD} = 28\text{ V}$, $V_{GS(PEAK)} = 1.4\text{ V}$, $I_{DQ} = 360\text{ mA}$, $P_{OUT} = 22.5\text{ W}$ average, $f = 2025\text{ MHz}$, 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, 10 dB PAR @ 0.01% CCDF.

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------------------------|----------|------|------|-----|------|
| Gain | G_{ps} | 16.5 | 17.7 | — | dB |
| Drain Efficiency | η_D | 41 | 44 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -28 | -26 | dBc |
| Output PAR @ 0.01% CCDF 1880 MHz | OPAR | 7.0 | — | — | dB |
| Output PAR @ 0.01% CCDF 2025 MHz | OPAR | 7.8 | — | — | dB |

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 | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ | 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) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.175 | — | Ω |
| | (peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.175 | — | Ω |
| Operating Gate Voltage | (main) $V_{DS} = 28\text{ V}, I_{DQ} = 360\text{ mA}$ | V_{GS} | 2.5 | 2.71 | 2.8 | V |
| | (peak) $V_{DS} = 1.2\text{ V}, I_{DQ} = 0\text{ A}$ | V_{GS} | 0.9 | 1.2 | 1.5 | V |

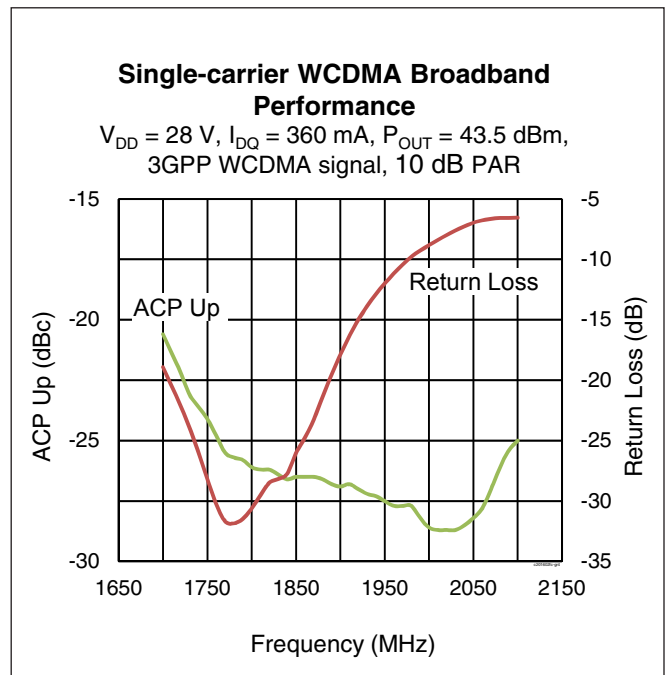
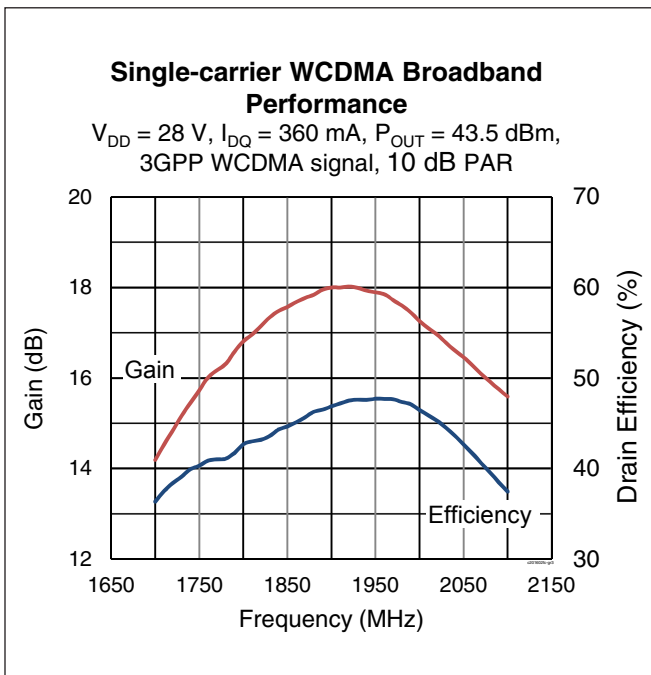
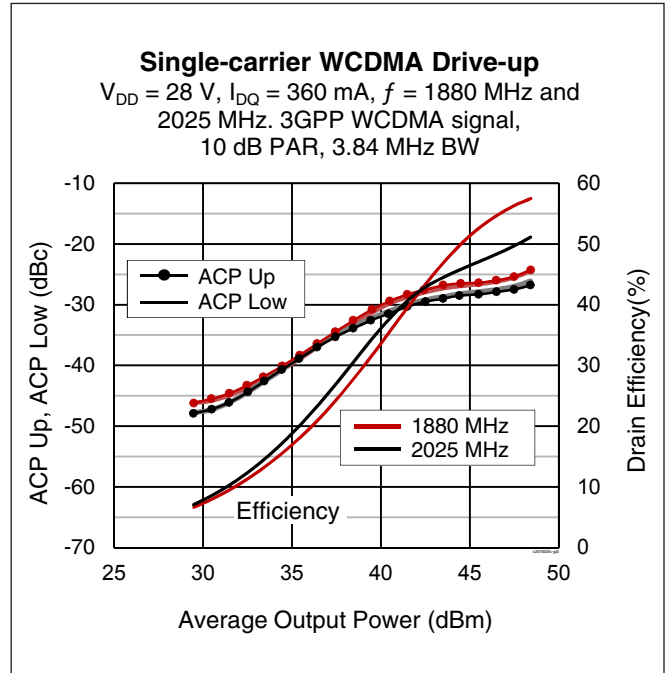
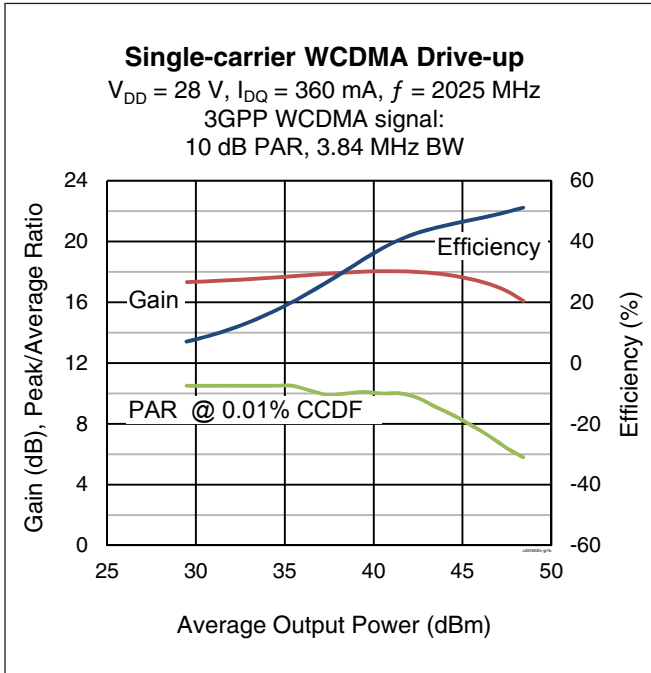
Maximum Ratings

| 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 (Doherty, $T_{CASE} = 70^{\circ}\text{C}, 100\text{ W CW}$) | $R_{\theta JC}$ | 0.48 | $^{\circ}\text{C/W}$ |

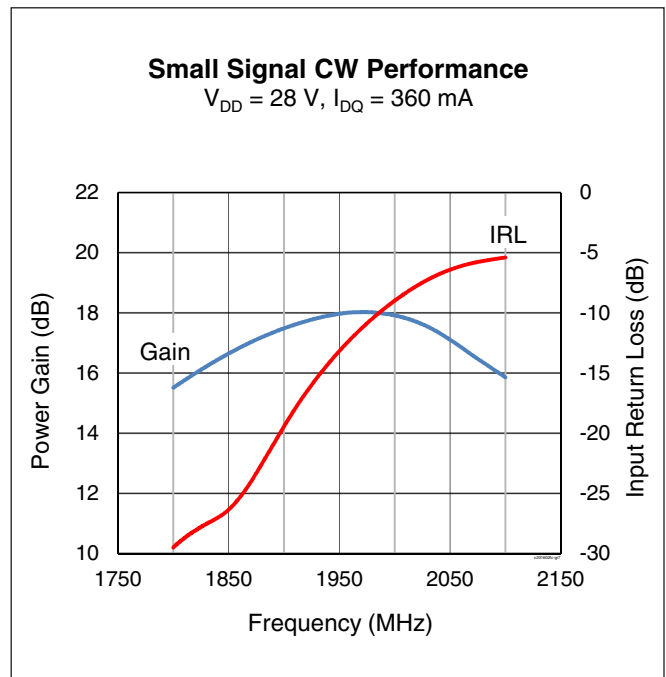
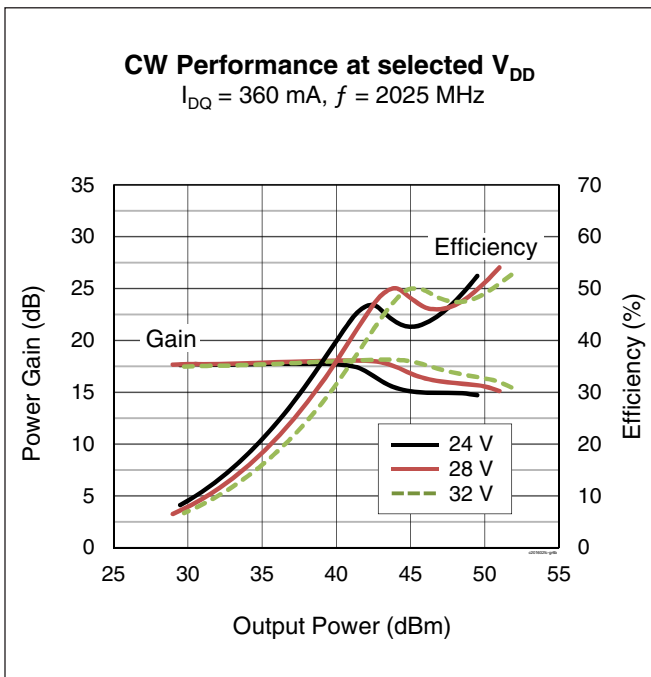
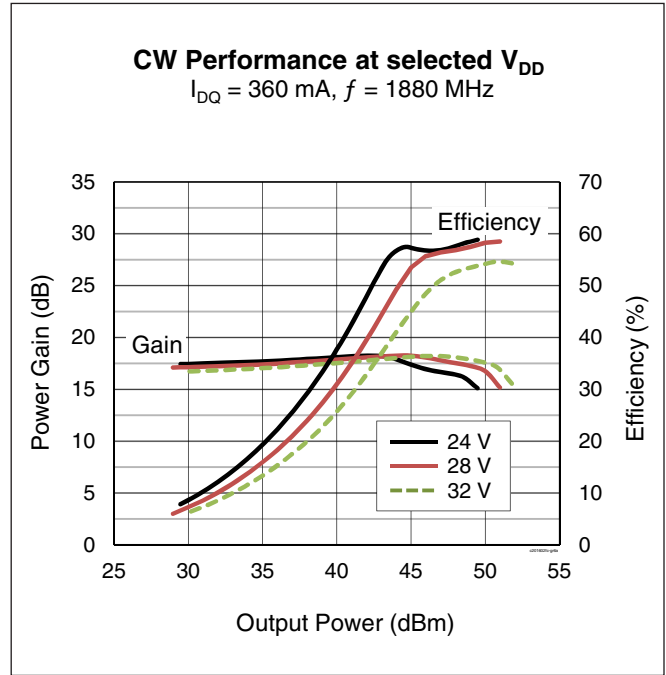
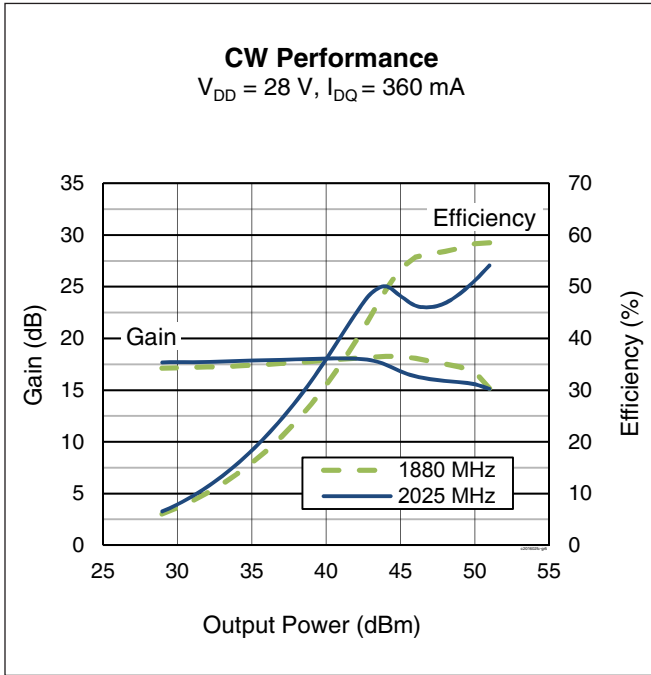
Ordering Information

| Type and Version | Order Code | Package Description | Shipping |
|----------------------|-------------------------|---|----------------------|
| PXAC201602FC V1 R0 | PXAC201602FCV1R0XTMA1 | H-37248-4, ceramic open-cavity, earless | Tape & Reel, 50 pcs |
| PXAC201602FC V1 R250 | PXAC201602FCV1R250XTMA1 | H-37248-4, ceramic open-cavity, earless | Tape & Reel, 250 pcs |

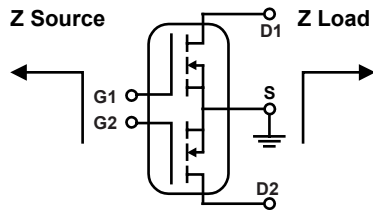
Typical Performance (data taken in a reference test fixture)



Typical Performance (cont.)



Load Pull Performance



Main side pulsed CW signal: 160 μ sec, 10% duty cycle; 28 V, 360 mA

| Class AB | | 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 [%] | |
| 1880 | 3.88 – j12.84 | 3.96 – j4.18 | 20.01 | 48.39 | 69.02 | 54.18 | 7.54 – j1.33 | 22.43 | 46.72 | 46.99 | 65.35 | |
| 1900 | 5.30 – j12.89 | 4.14 – j4.36 | 20.21 | 48.1 | 64.57 | 53.31 | 7.70 – j1.56 | 22.38 | 46.36 | 43.25 | 61.53 | |
| 1920 | 5.84 – j14.94 | 4.13 – j4.48 | 20.33 | 48.32 | 67.92 | 55.15 | 7.03 – j0.76 | 22.6 | 46.41 | 43.75 | 63.54 | |
| 2010 | 11.80 – j17.15 | 3.84 – j4.53 | 20.31 | 48.36 | 68.55 | 55.74 | 5.79 – j0.62 | 22.76 | 46.22 | 41.88 | 64.2 | |
| 2025 | 12.09 – j16.26 | 3.99 – j4.73 | 20.4 | 48.14 | 65.16 | 54.0.3 | 5.26 – j0.81 | 22.7 | 46.17 | 41.40 | 62.49 | |

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

| Class AB | | 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 [%] | |
| 1880 | 4.62 – j9.02 | 2.53 – j4.95 | 19.44 | 50.31 | 107.40 | 54.66 | 5.39 – j2.83 | 22.15 | 48.15 | 65.31 | 64.38 | |
| 1900 | 5.10 – j8.97 | 2.65 – j4.91 | 19.87 | 49.97 | 99.31 | 53.40 | 4.50 – j3.28 | 21.90 | 48.47 | 70.31 | 61.18 | |
| 1920 | 6.65 – j8.28 | 2.587 – j5.03 | 19.82 | 50.07 | 101.62 | 53.76 | 4.31 – j3.12 | 21.93 | 48.54 | 71.45 | 62.86 | |
| 2010 | 10.61 – j5.85 | 2.48 – j5.17 | 20.19 | 50.19 | 104.47 | 53.45 | 3.80 – j3.47 | 22.46 | 48.61 | 72.61 | 63.49 | |
| 2025 | 12.35 – j5.04 | 2.48 – j5.64 | 20.34 | 50.09 | 102.09 | 52.31 | 3.83 – j3.38 | 22.70 | 48.26 | 66.99 | 61.23 | |

Reference Circuit, tuned for 1800 – 2200 MHz

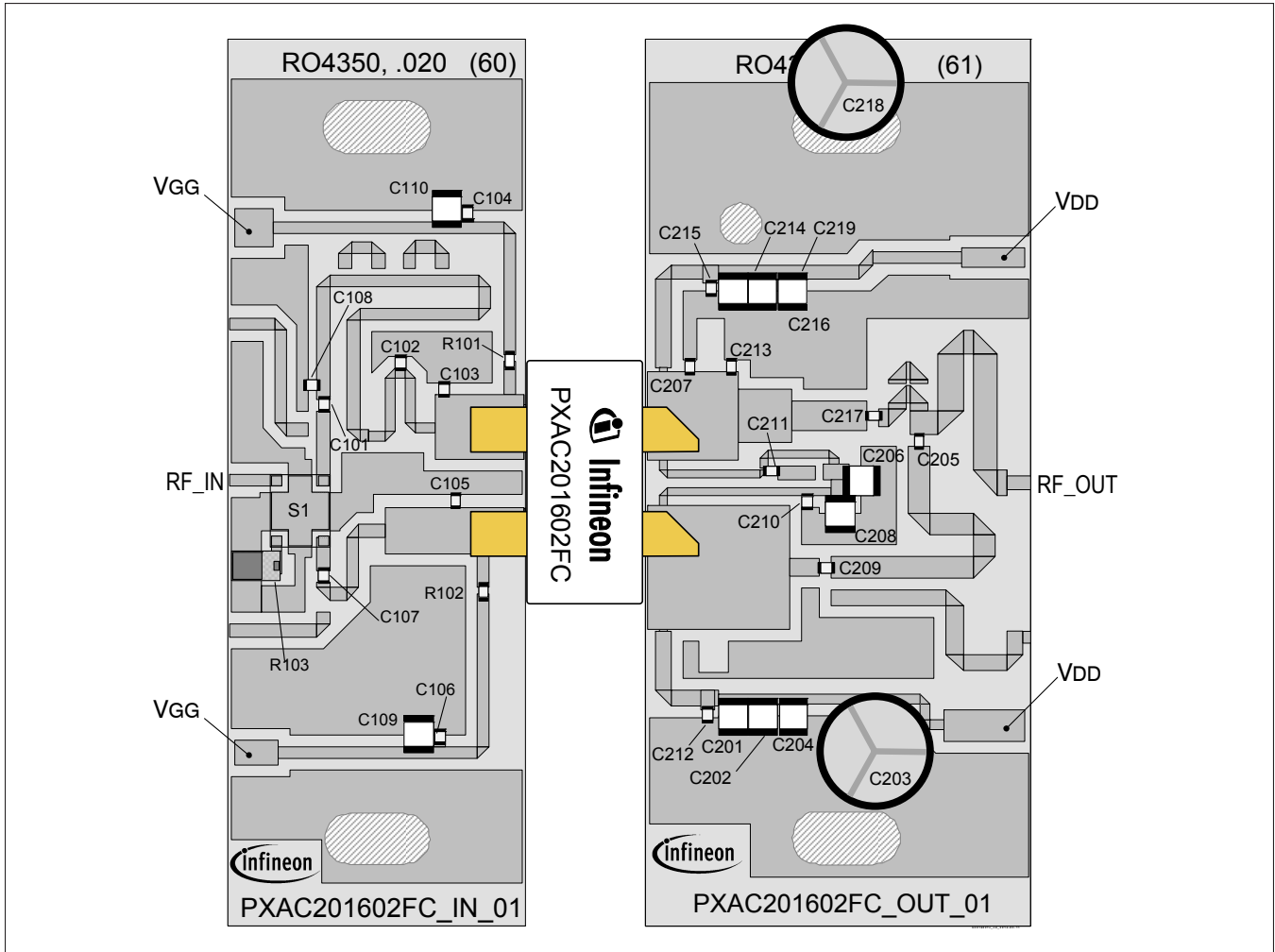
DUT PXAC201602FC V1

Reference Circuit Part No. LTA/PXAC201602FC V1

PCB Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$

Find Gerber files for this reference fixture on the Infineon Web site at (www.infineon.com/rfpower)

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Assembly Information

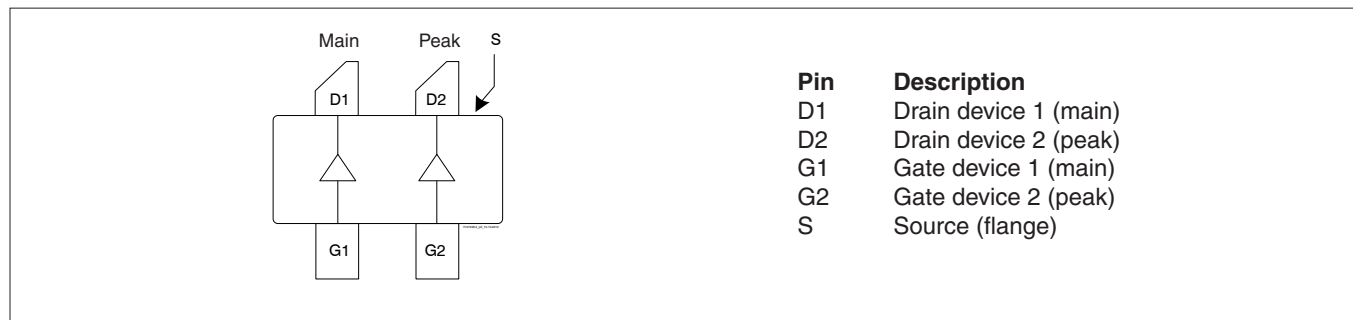
| Component | Description | Suggested Manufacturer | P/N |
|------------------------|------------------------|---------------------------------|------------------|
| Input | | | |
| C101, C104, C106, C107 | Chip capacitor, 18 pF | ATC | ATC800A180JT250T |
| C102 | Chip capacitor, 0.4 pF | ATC | ATC600F0R4BT |
| C103 | Chip capacitor, 1.6 pF | ATC | ATC600F1R6BT |
| C105 | Chip capacitor, 2.4 pF | ATC | ATC800A2R4BT250T |
| C108 | Chip capacitor, 0.3 pF | ATC | ATC600F0R3BT |
| C109, C110 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| R101, R102 | Resistor, 10 Ohm | Panasonic Electronic Components | ERJ-3GEYJ100V |
| R103 | Resistor, 50 Ohm | Anaren | C16A50Z4 |
| S1 | Directional coupler | Anaren | X3C21P1-04S |

Reference Circuit (cont.)

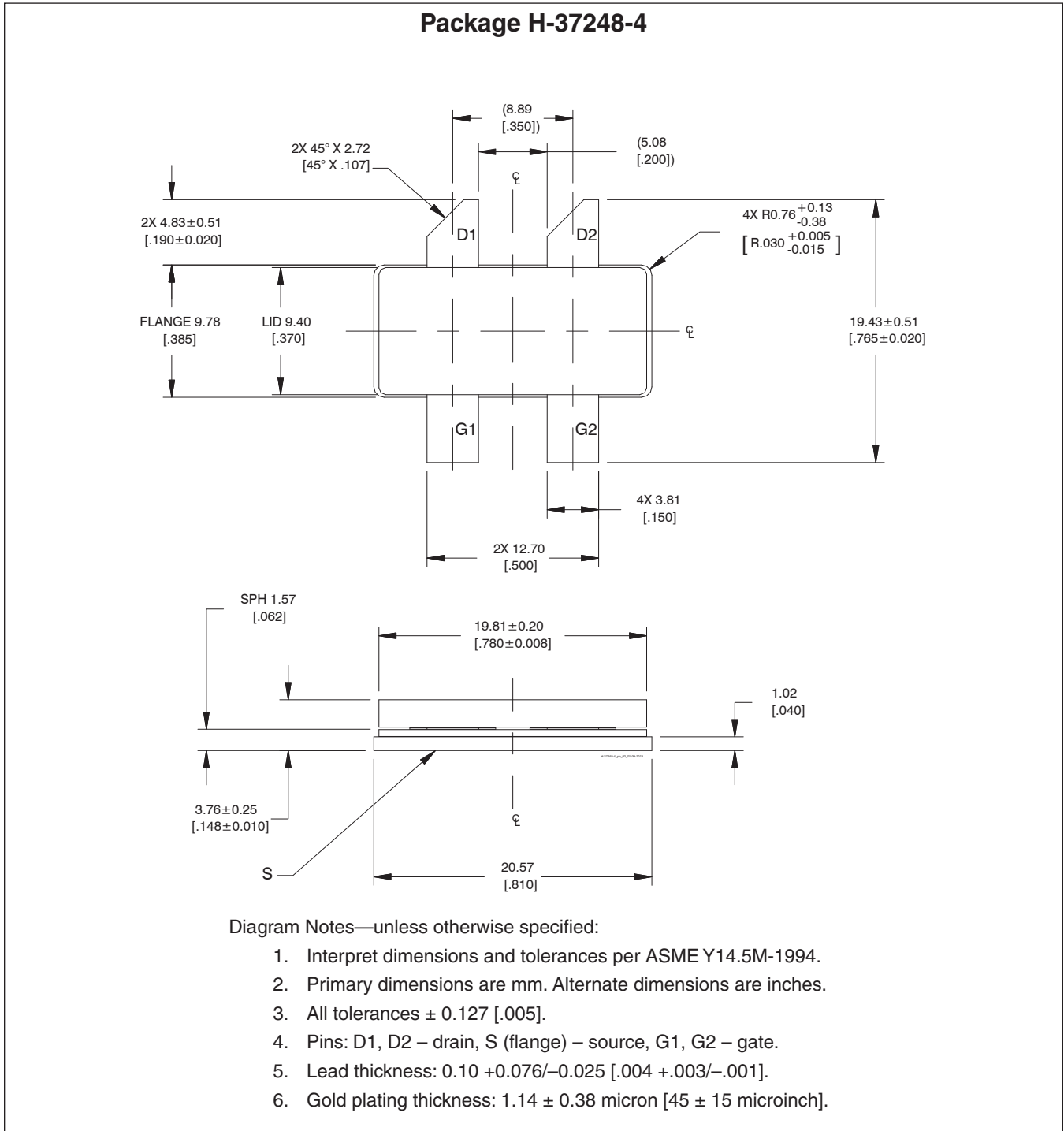
Assembly Information (cont.)

| Component | Description | Suggested Manufacturer | P/N |
|--|------------------------------|------------------------------------|------------------|
| Output | | | |
| C201, C202, C204, C206, C208, C214, C216, C219 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| C203, C218 | Capacitor, 220 μ F, 50 V | Cornell Dubilier Electronics (CDE) | SK221M050ST |
| C205, C210, C211, C212, C215 | Chip capacitor, 18 pF | ATC | ATC800A180JT250T |
| C207 | Chip capacitor, 1.5 pF | ATC | ATC600F1R5BT |
| C209 | Chip capacitor, 2.4 pF | ATC | ATC800A2R4BT250T |
| C213 | Chip capacitor, 1.2 pF | ATC | ATC600F1R2BT |
| C217 | Chip capacitor, 2.2 pF | ATC | ATC800A2R2BT250T |

Pinout Diagram (top view)



Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page (www.infineon.com/rfpower)

Revision History

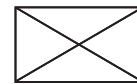
| Revision | Date | Data Sheet | Page | Subjects (major changes since last revision) |
|----------|------------|------------|------|---|
| 01 | 2014-02-21 | Advance | All | New product, proposed only |
| 01.1 | 2014-02-25 | Advance | 2 | Added thermal resistance information |
| 02 | 2014-03-14 | Production | All | Data Sheet now represents production-released product specifications, including reference circuit and performance information |
| 03 | 2015-05-13 | Production | 1 | Change to RF Test Specifications |
| 04 | 2015-05-31 | Production | 1, 2 | Revised condition for RF test specifications, updated ordering code |
| 04.1 | 2016-07-19 | Production | 1 | Added features information |

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highpowerRF@infineon.com

To request other information, contact us at:
 +1 877 465 3667 (1-877-GO-LDMOS) USA
 or +1 408 776 0600 International



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