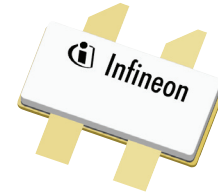


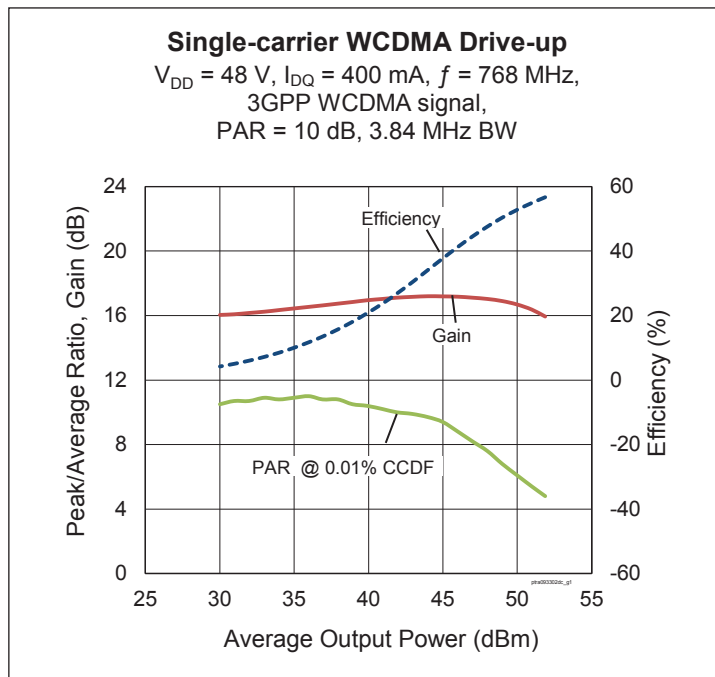
Thermally-Enhanced High Power RF LDMOS FET 330 W, 50 V, 746 – 768 MHz

Description

The PTRA093302FC is a 330-watt LDMOS FET with an asymmetric design intended for use in multi-standard cellular power amplifier applications in the 746 MHz to 768 MHz frequency band. Features include dual-path design, input matching, high gain and thermally-enhanced package with earless flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTRA093302FC
Package H-37248-4



Features

- Input matched
- Asymmetric Doherty design
 - Main: $P_{1dB} = 150\text{ W Typ}$
 - Peak: $P_{1dB} = 175\text{ W Typ}$
- Typical Pulsed CW performance, 746–768 MHz, 48 V, combined outputs
 - Output power at $P_{1dB} = 200\text{ W}$
 - Efficiency = 54%
 - Gain = 16.5 dB
- Capable of handling 10:1 VSWR @ 48 V, 79 W (CW) output power
- Integrated ESD protection
- 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 Infineon Doherty production test fixture)

$V_{DD} = 48\text{ V}$, $I_{DQ} = 400\text{ mA}$, $P_{OUT} = 79\text{ W avg}$, $V_{GS(peak)} = (V_{GS} @ I_{DQ} = 400\text{ mA}) - 3.0\text{ V}$, $f = 768\text{ MHz}$. 3GPP WCDMA signal: peak/average = 10 dB @ 0.01% CCDF, channel bandwidth = 3.84 MHz.

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|------|-------|-------|------|
| Gain | G_{ps} | 16.0 | 17.25 | — | dB |
| Drain Efficiency | η_D | 47.0 | 51.6 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -32.5 | -30.0 | dBc |

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics (each side)

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|---|---------------|-----|------|-----|---------------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$ | $V_{(BR)DSS}$ | 105 | — | — | V |
| Drain Leakage Current | $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1 | μA |
| | $V_{DS} = 105\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 10 | μA |
| Gate Leakage Current | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1 | μA |
| On-State Resistance | (main) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.4 | — | Ω |
| | (peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.3 | — | Ω |
| Operating Gate Voltage | (main) $V_{DS} = 50\text{ V}, I_{DQ} = 400\text{ mA}$ | V_{GS} | 3.1 | 3.56 | 4.0 | V |
| | (peak) $V_{DS} = 50\text{ V}, I_{DQ} = 0\text{ mA}$ | V_{GS} | 0.2 | 0.58 | 1.0 | V |

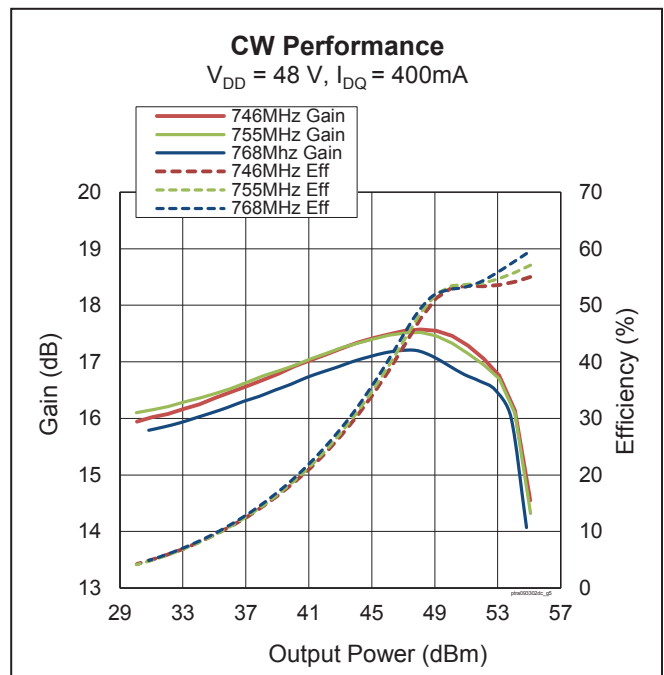
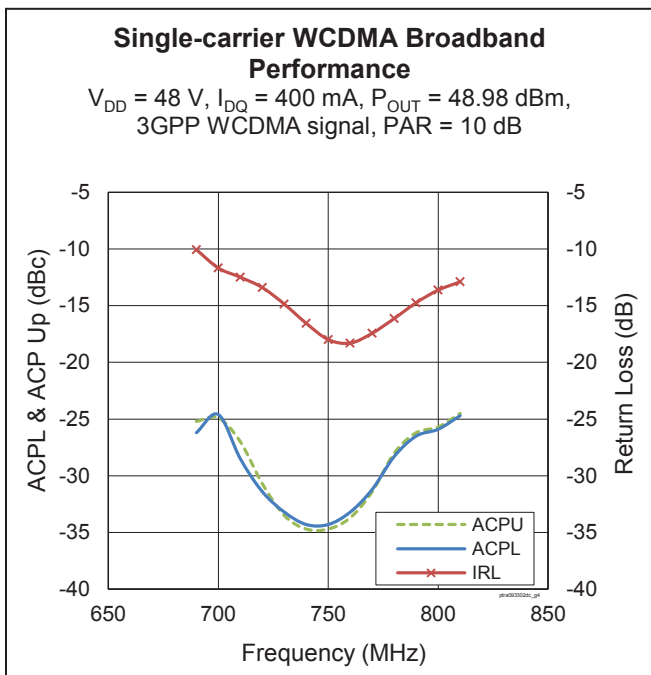
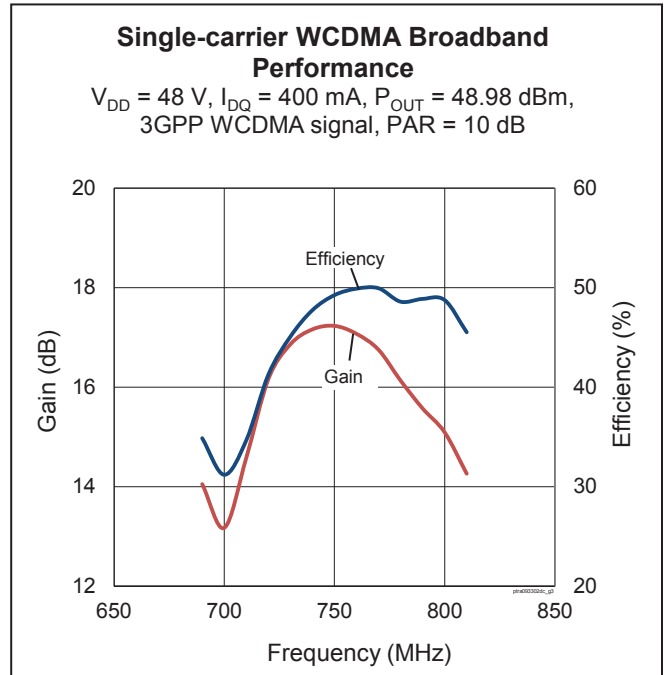
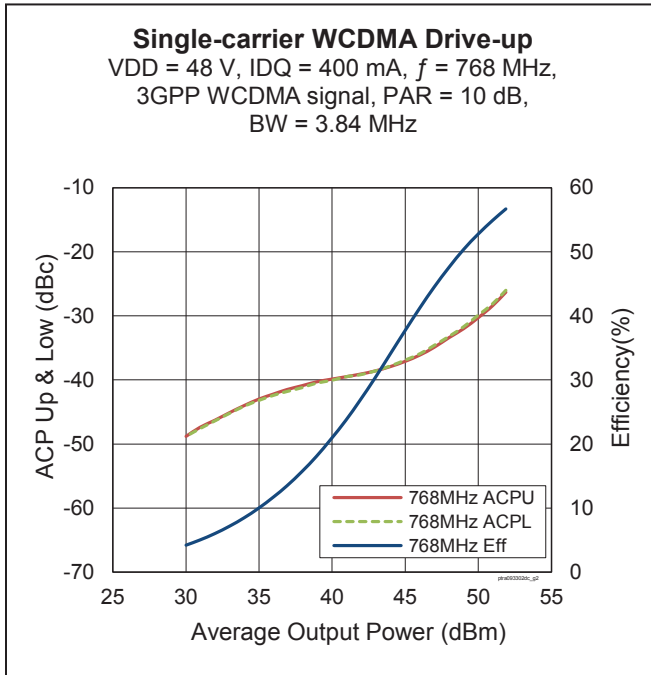
Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|----------------------|
| Drain-Source Voltage | V_{DSS} | 105 | V |
| Gate-Source Voltage | V_{GS} | -6 to +12 | V |
| Operating Voltage | V_{DD} | 0 to +55 | V |
| Junction Temperature | T_J | 225 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance (main, $T_{CASE} = 70^{\circ}\text{C}, 79\text{ W CW}$) | $R_{\theta JC}$ | 0.56 | $^{\circ}\text{C/W}$ |

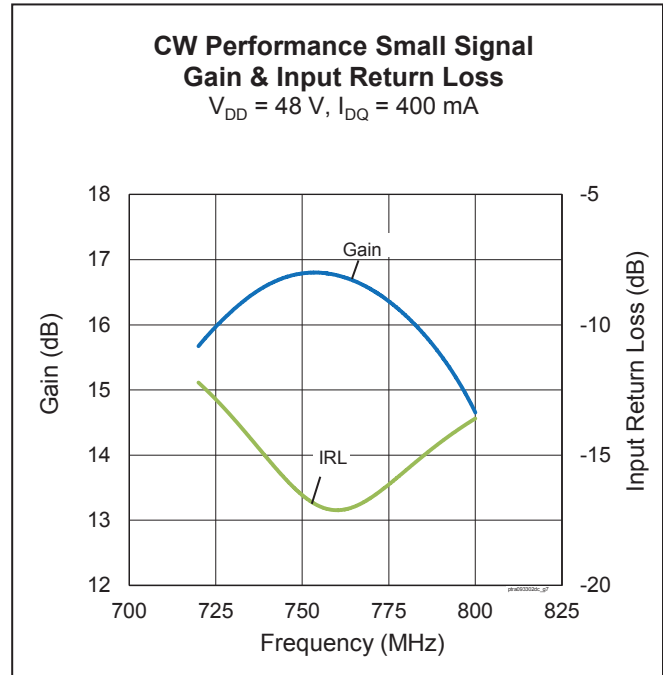
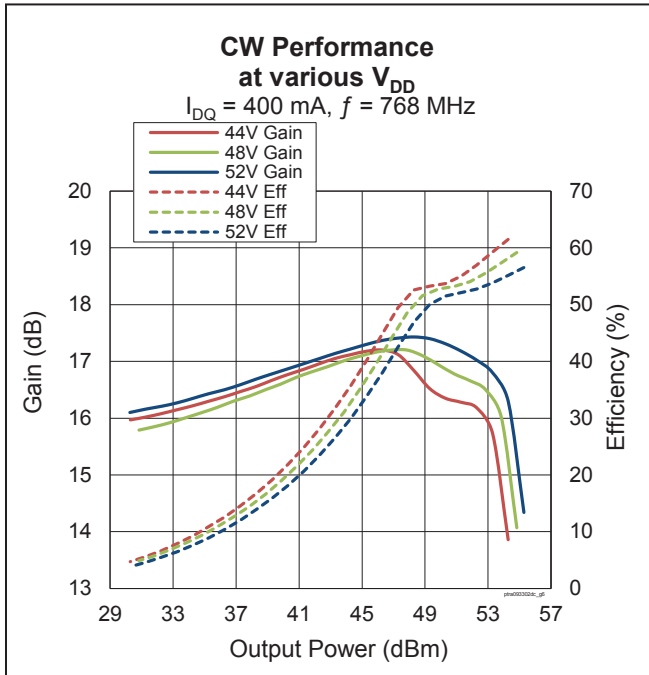
Ordering Information

| Type and Version | Order Code | Package Description | Shipping |
|--------------------|-----------------------|---------------------------|----------------------|
| PTRA093302FC V1 R0 | PTRA093302FCV1R0XTMA1 | H-37248-4, earless flange | Tape & Reel, 50 pcs |
| PTRA093302FC V1 R2 | PTRA093302FCV1R2XTMA1 | H-37248-4, earless flange | Tape & Reel, 250 pcs |

Typical RF Performance (data taken in production test fixture)



Typical RF Performance (cont.)



Load Pull Performance

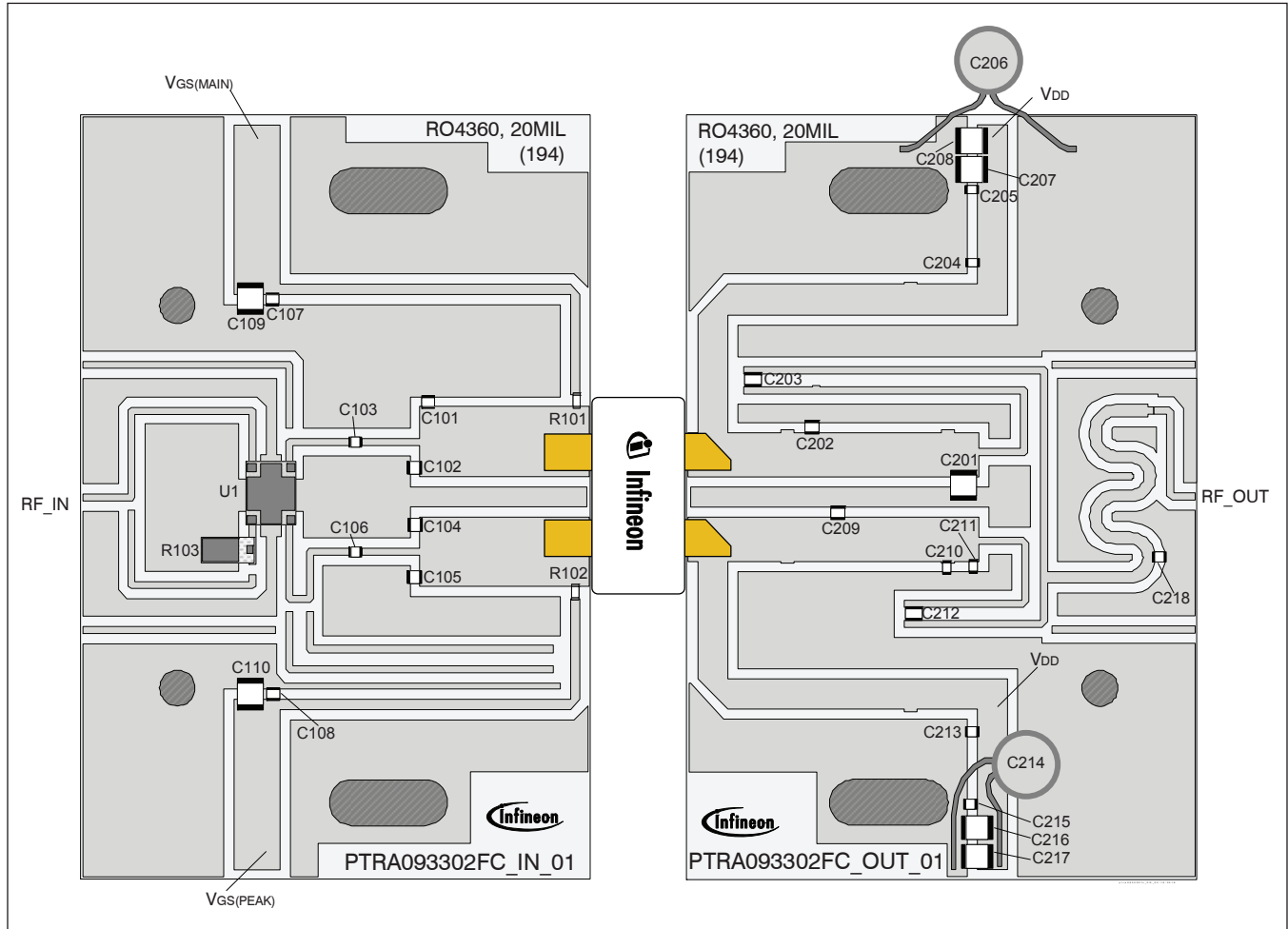
Main Side Load Pull Performance – Pulsed CW signal: 10 μs , 10% duty cycle, 48 V, $I_{DQ} = 300 \text{ mA}$, class AB

| Freq [MHz] | Z_s [Ω] | P_{1dB} | | | | | | | | | |
|------------|--------------------|--------------------|-----------|-----------------|---------------|--------------|--------------------|-----------|-----------------|---------------|--------------|
| | | Max Output Power | | | | | Max PAE | | | | |
| | | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] |
| 746 | 1.72-j4.55 | 2.68-j0.21 | 20.45 | 52.45 | 176 | 55.0 | 2.14+j2.47 | 22.95 | 50.52 | 113 | 70.0 |
| 751 | 1.85-j4.5 | 2.22-j0.22 | 19.88 | 52.37 | 173 | 49.6 | 2.03+j3.1 | 23.54 | 49.57 | 91 | 70.6 |
| 756 | 1.91-j4.63 | 3.66-j0.89 | 20.24 | 52.30 | 170 | 53.5 | 2.34+j2.63 | 22.98 | 50.42 | 110 | 69.9 |
| 768 | 2.1-j4.9 | 3.49-j0.85 | 20.13 | 52.33 | 171 | 53.7 | 2.51+j2.47 | 22.64 | 50.64 | 116 | 69.6 |

Peak Side Load Pull Performance – Pulsed CW signal: 10 μs , 10% duty cycle, 48 V, $V_{GS(PEAK)} = 2.1 \text{ V}$, class C

| Freq [MHz] | Z_s [Ω] | P_{1dB} | | | | | | | | | |
|------------|--------------------|--------------------|-----------|-----------------|---------------|--------------|--------------------|-----------|-----------------|---------------|--------------|
| | | Max Output Power | | | | | Max PAE | | | | |
| | | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] |
| 746 | 1.45-j4.42 | 1.91-j0.19 | 16.5 | 53.07 | 203 | 54.8 | 1.85+j2.73 | 17.60 | 50.22 | 105 | 71.8 |
| 751 | 1.51-j4.50 | 1.65+j0.04 | 16.6 | 53.08 | 203 | 55.3 | 2.18+j2.84 | 17.62 | 50.40 | 110 | 73.6 |
| 756 | 1.59-j4.59 | 2.25-j0.56 | 16.3 | 52.90 | 195 | 53.2 | 2.00+j2.41 | 17.51 | 50.66 | 116 | 71.1 |
| 768 | 1.72-j4.94 | 2.40-j0.76 | 16.2 | 52.99 | 199 | 53.4 | 1.75+j3.02 | 17.27 | 49.62 | 92 | 71.6 |

Reference Circuit, 746 – 768 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit Assembly

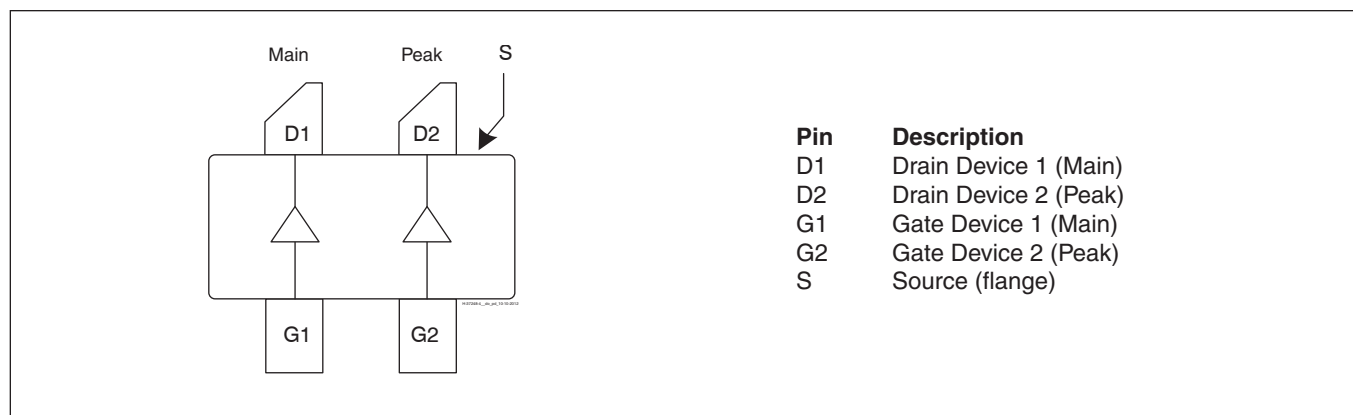
| | |
|---|---|
| DUT | PTRA093302FC V1 |
| Test Fixture Part No. | LTA/PTRA093302FC V1 |
| PCB | Rogers 4360, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 6.15$, $f = 746 - 768$ MHz |
| Find Gerber files for this test fixture on the Infineon Web site at http://www.infineon.com/rfpower | |

Reference Circuit (cont.)

Components Information for circuit assembly

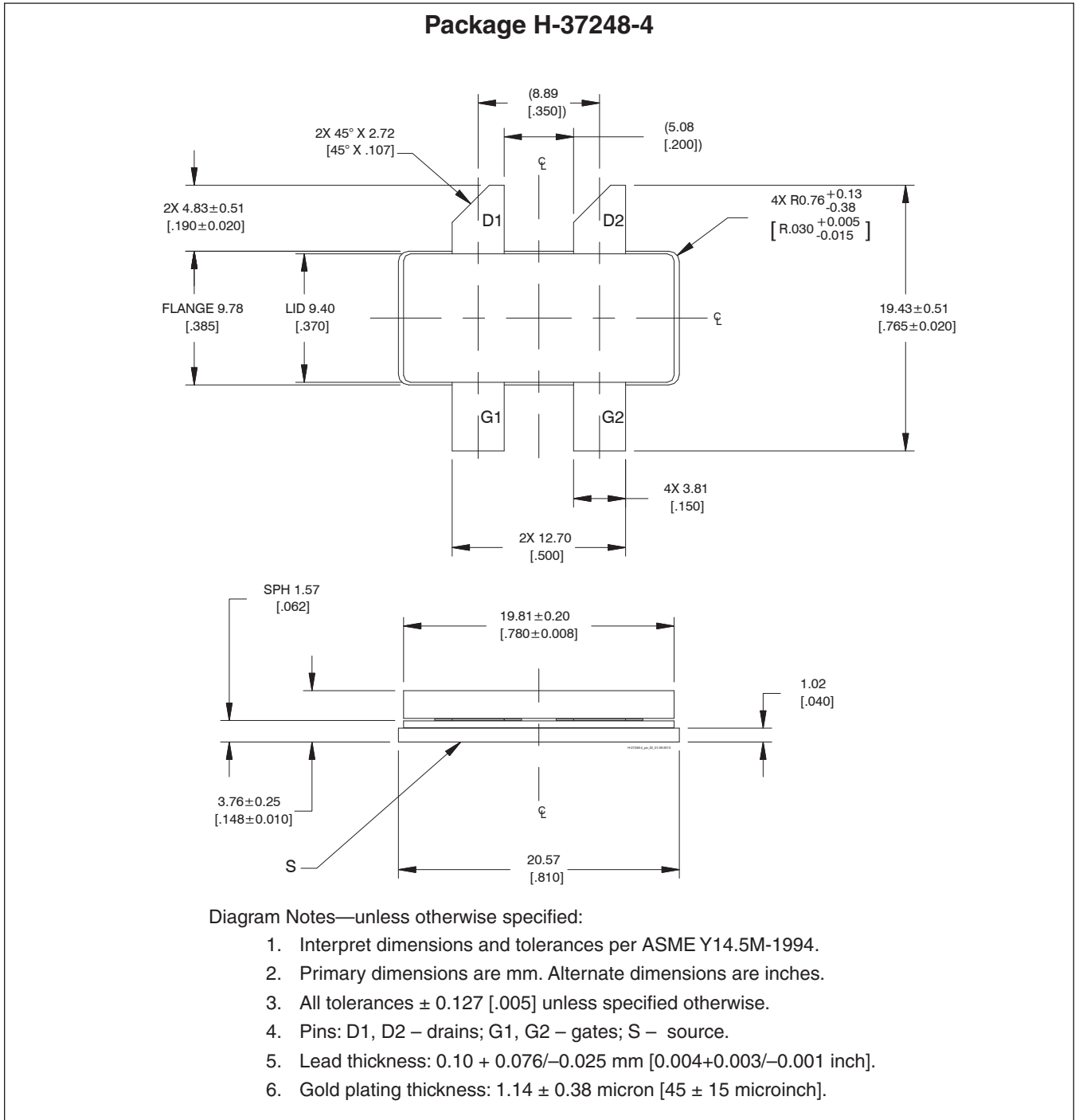
| Component | Description | Manufacturer | P/N |
|------------------------|------------------------|------------------------------------|-------------------|
| Input | | | |
| C101, C102, C104 | Capacitor, 6.8 pF | ATC | ATC100A6R8CW150XB |
| C103, C106, C107, C108 | Capacitor, 68 pF | ATC | ATC100A680JW150XB |
| C105 | Capacitor, 3.9 pF | ATC | ATC800A3R9CW250T |
| C109, C110 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| R101, R102 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-3GEYJ100V |
| R103 | Resistor, 50 Ω | Richardson | C16A50Z4 |
| U1 | Hybrid Coupler | Anaren | X3C07P1-05S |
| Output | | | |
| C201 | Capacitor, 9.1 pF | ATC | ATC100B9R1CW500XB |
| C202, C209, C210 | Capacitor, 6.8 pF | ATC | ATC100A6R8CW150XB |
| C203, C204, C212, C213 | Capacitor, 68 pF | ATC | ATC100A680JW150XB |
| C205, C215 | Capacitor, 56 pF | ATC | ATC100A560JW150XB |
| C206, C214 | Capacitor, 470 μ F | Cornell Dubilier Electronics (CDE) | SEK471M050ST |
| C207, C208, C216, C217 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| C211 | Capacitor, 1.1 pF | ATC | ATC800A1R1CW250T |
| C218 | Capacitor, 0.5 pF | ATC | ATC100A0R5CW150XB |

Pinout Diagram (top view)



Lead connections for PTRA093302FC

Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page <http://www.infineon.com/rfpower>

Revision History

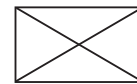
| Revision | Date | Data Sheet Type | Page | Subjects (major changes since last revision) |
|----------|------------|-----------------|------|---|
| 01 | 2014-06-19 | Advance | All | Data Sheet reflects advance specification for product development |
| 02 | 2015-10-29 | Preliminary | All | Data Sheet reflects preliminary specification |
| 03 | 2016-03-16 | Production | 5-6 | Add reference circuit information, firm specifications. Product released to production. |
| 03.1 | 2017-01-31 | Production | 2 | Update operating voltage and junction temperature |

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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



Edition 2017-01-31

Published by
Infineon Technologies AG
 85579 Neubiberg, Germany

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