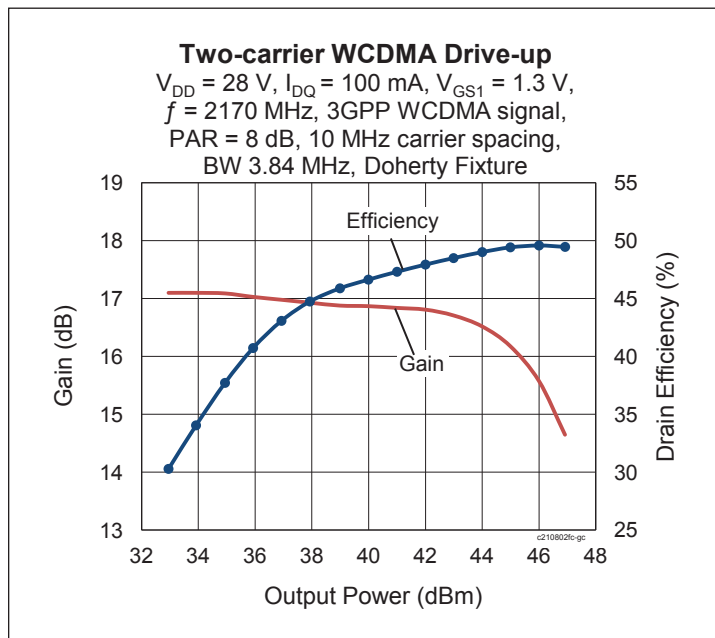


## Thermally-Enhanced High Power RF LDMOS FET 80 W, 28 V, 2110 – 2170 MHz

### Description

The PTAC210802FC is an 80-watt LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 2110 to 2170 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.

PTAC210802FC  
Package H-37248-4



### Features

- Asymmetrical design
  - Main : P1dB = 19 W Typ
  - Peak : P1dB = 60 W Typ
- Broadband internal matching
- Wide video bandwidth
- Typical CW pulsed performance, 2170 MHz, 28 V (Doherty fixture)
  - Output power @ P<sub>3dB</sub> = 75 W
  - Efficiency = 48%
  - Gain @ P<sub>3dB</sub> = 14 dB
- Capable of handling 10:1 VSWR @28 V, 80 W (CW) output power
- Integrated ESD protection : Human Body Model, Class 1B (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant

### RF Characteristics

#### Two-carrier WCDMA Specifications (tested in Infineon Doherty test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 85\text{ mA}$ ,  $V_{GS1} = 1.3\text{ V}$ ,  $P_{OUT} = 5\text{ W avg}$ ,  $f_1 = 2165\text{ MHz}$ ,  $f_2 = 2175\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF, 10 MHz carrier spacing

| Characteristic               | Symbol   | Min | Typ | Max | Unit |
|------------------------------|----------|-----|-----|-----|------|
| Linear Gain                  | $G_{ps}$ | 15  | 17  | —   | dB   |
| Drain Efficiency             | $\eta_D$ | 39  | 43  | —   | %    |
| Adjacent Channel Power Ratio | ACPR     | —   | -31 | -26 | 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 | $V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$          | $V_{(BR)DSS}$ | 65   | —    | —    | V             |
| Drain Leakage Current          | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$           | $I_{DSS}$     | —    | —    | 1    | $\mu\text{A}$ |
|                                | $V_{DS} = 63\text{ V}, V_{GS} = 0\text{ V}$           | $I_{DSS}$     | —    | —    | 10   | $\mu\text{A}$ |
| Gate Leakage Current           | $V_{GS} = 10\text{ V}, I_{DQ} = 0\text{ V}$           | $I_{GSS}$     | —    | —    | 1    | V             |
| On-State Resistance            | (main) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$  | $R_{DS(on)}$  | —    | 0.6  | —    | $\Omega$      |
|                                | (peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$  | $R_{DS(on)}$  | —    | 0.19 | —    | $\Omega$      |
| Operating Gate Voltage         | (main) $V_{DS} = 28\text{ V}, I_{DQ} = 85\text{ mA}$  | $V_{GS}$      | 2.30 | 2.65 | 3.0  | V             |
| Operating Gate Voltage         | (peak) $V_{DS} = 28\text{ V}, I_{DQ} = 360\text{ mA}$ | $V_{GS}$      | 2.35 | 2.70 | 3.05 | V             |

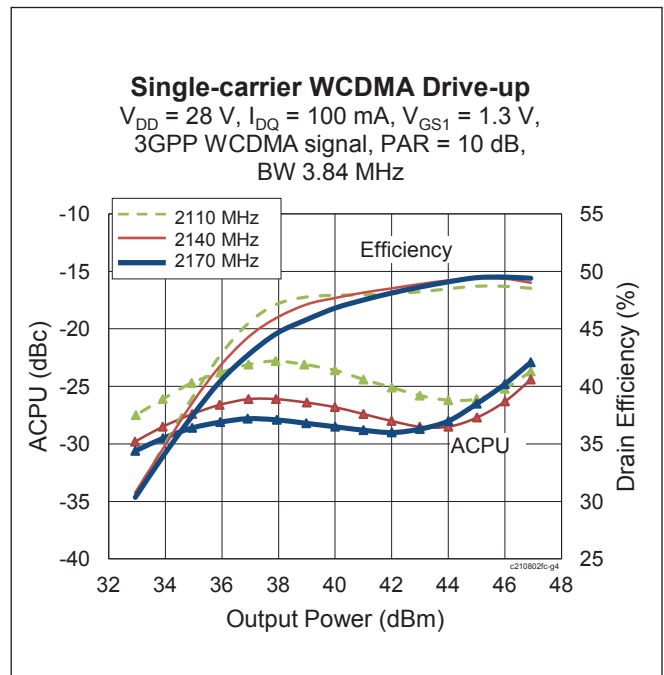
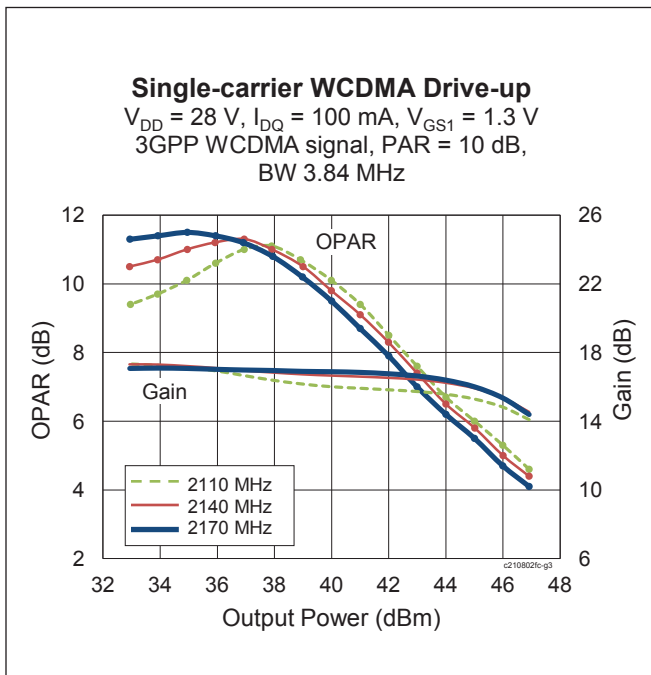
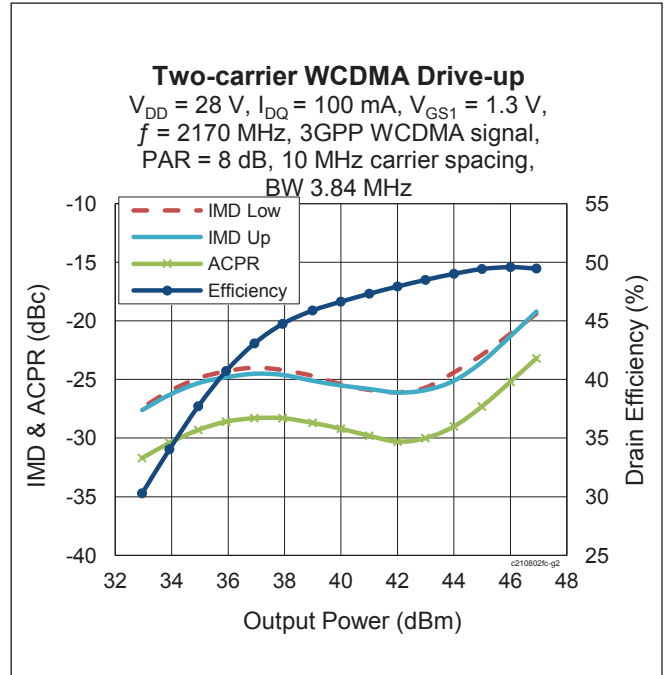
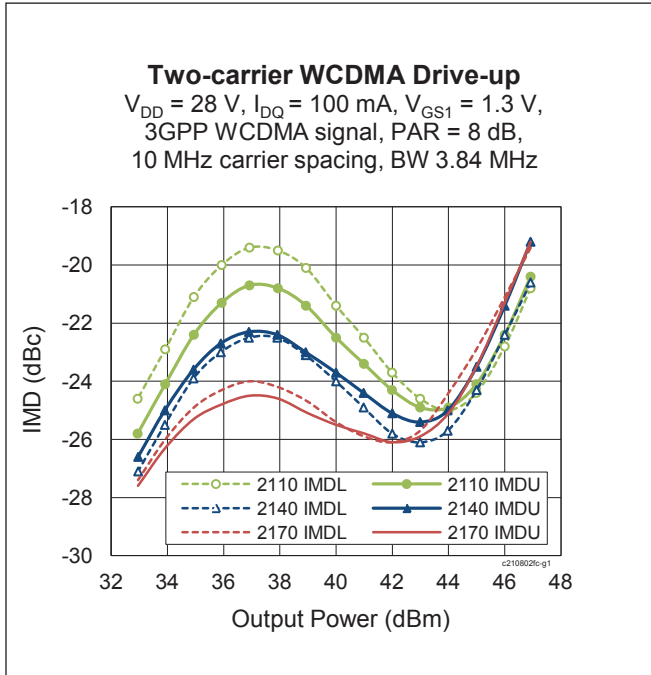
**Maximum Ratings**

| 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, $T_{CASE} = 70^{\circ}\text{C}, 19\text{ W CW}$ ) | $R_{\theta JC}$ | 2.5         | $^{\circ}\text{C/W}$ |
| Thermal Resistance (peak, $T_{CASE} = 70^{\circ}\text{C}, 60\text{ W CW}$ ) | $R_{\theta JC}$ | 0.8         | $^{\circ}\text{C/W}$ |

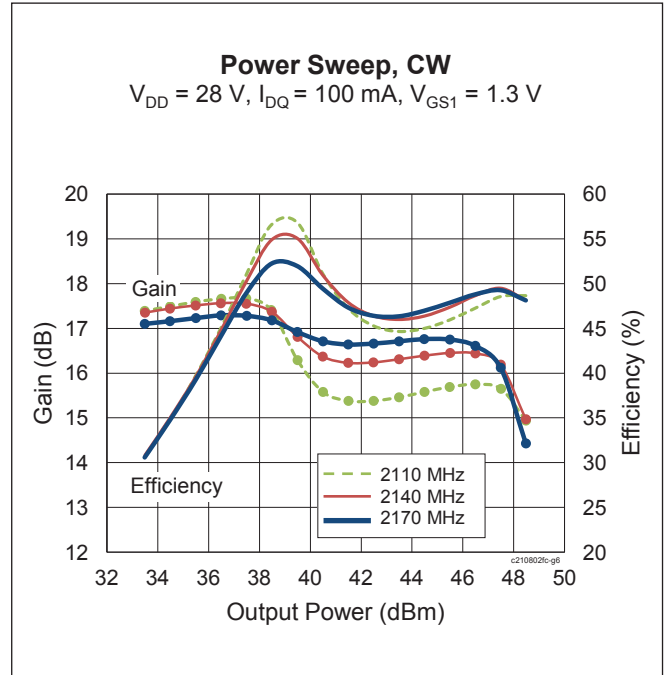
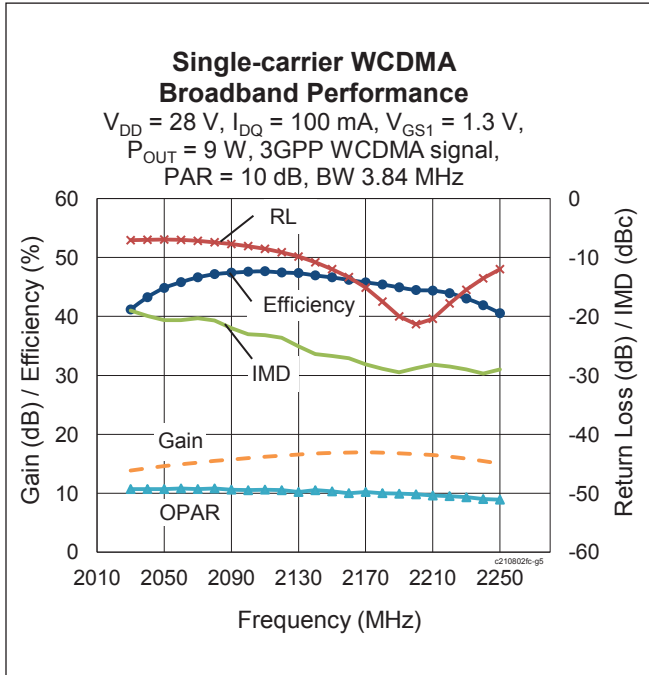
**Ordering Information**

| Type and Version     | Order Code              | Package Description       | Shipping             |
|----------------------|-------------------------|---------------------------|----------------------|
| PTAC210802FC V1 R0   | PTAC210802FCV1R0XTMA1   | H-37248-4, earless flange | Tape & Reel, 50 pcs  |
| PTAC210802FC V1 R250 | PTAC210802FCV1R250XTMA1 | H-37248-4, earless flange | Tape & Reel, 250 pcs |

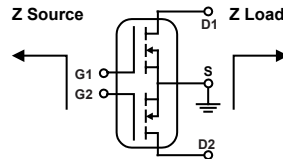
**Typical Performance** (data taken in a production Doherty test fixture)



Typical Performance (cont.)



Load Pull Performance



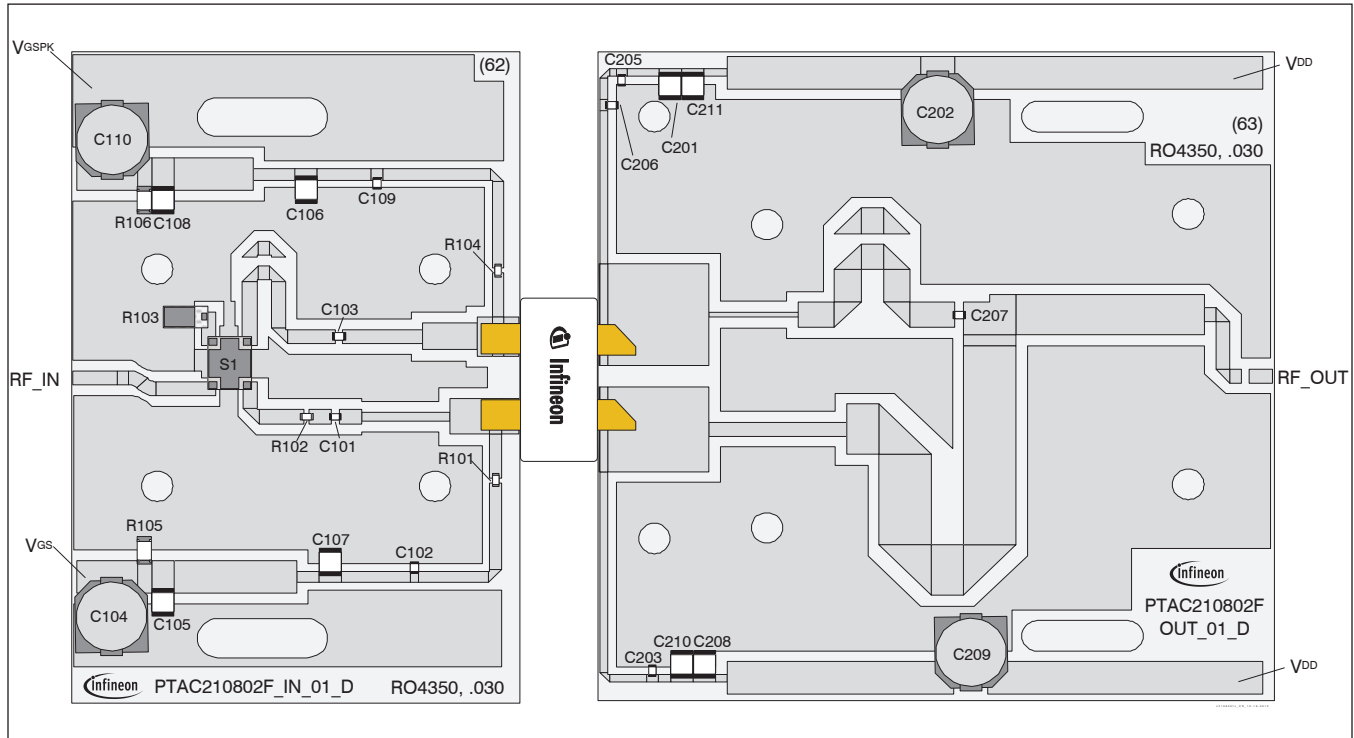
Main Side Load Pull Performance – Pulsed CW signal: 16  $\mu\text{sec}$ , 10% duty cycle;  $V_{DD} = 28\text{ V}$ , 100 mA

| Freq [MHz] | $Z_s$ [ $\Omega$ ] | $P_{1dB}$          |           |                 |               |         |                    |           |                 |               |         |
|------------|--------------------|--------------------|-----------|-----------------|---------------|---------|--------------------|-----------|-----------------|---------------|---------|
|            |                    | Max Output Power   |           |                 |               |         | Max PAE            |           |                 |               |         |
|            |                    | $Z_L$ [ $\Omega$ ] | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE [%] | $Z_L$ [ $\Omega$ ] | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE [%] |
| 2110       | $28.4 - j28.1$     | $15.1 - j11.9$     | 20.8      | 43.40           | 22            | 50      | $4.6 - j5.2$       | 23.6      | 41.3            | 13            | 68.1    |
| 2140       | $32.4 - j27.7$     | $7.7 - j10$        | 22.0      | 43.50           | 22            | 61      | $4.15 - j6$        | 23.9      | 41.3            | 13            | 71.9    |
| 2170       | $45.1 - j33.3$     | $10.8 - j10.6$     | 21.6      | 43.64           | 23            | 58      | $5.2 - j7.2$       | 23.4      | 42.1            | 16            | 68.6    |

Peak Side Load Pull Performance – Pulsed CW signal: 16  $\mu\text{sec}$ , 10% duty cycle;  $V_{DD} = 28\text{ V}$ ,  $V_{GS1} = 1.41\text{ V}$ , Doherty Class C

| Freq [MHz] | $Z_s$ [ $\Omega$ ] | $P_{3dB}$          |           |                 |               |         |                    |           |                 |               |         |
|------------|--------------------|--------------------|-----------|-----------------|---------------|---------|--------------------|-----------|-----------------|---------------|---------|
|            |                    | Max Output Power   |           |                 |               |         | Max PAE            |           |                 |               |         |
|            |                    | $Z_L$ [ $\Omega$ ] | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE [%] | $Z_L$ [ $\Omega$ ] | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE [%] |
| 2110       | $14.8 - j14.6$     | $2.4 - j7.4$       | 14.1      | 49.60           | 91            | 62.0    | $1.6 - j6.0$       | 15.3      | 48.3            | 68            | 72.5    |
| 2140       | $20.6 - j13.6$     | $2.7 - j7.8$       | 14.0      | 49.50           | 89            | 58.8    | $1.8 - j6.5$       | 15.2      | 48.7            | 74            | 68.5    |
| 2170       | $24.5 - j9.8$      | $2.6 - j8.1$       | 13.9      | 49.60           | 91            | 57.7    | $2.0 - j6.6$       | 15.3      | 48.6            | 72            | 67.9    |

### Reference Circuit



Reference circuit assembly diagram (not to scale)\*

### Reference Circuit Assembly

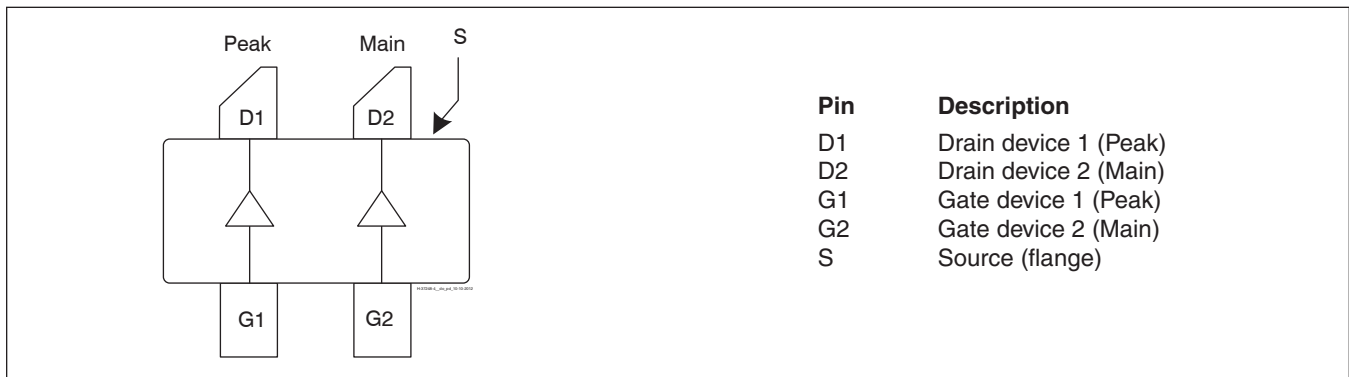
|   |   |
|---|---|
| DUT   | PTAC210802FC  |
| Test Fixture Part No.   | LTA/PTAC210802FC  |
| PCB   | Rogers 4350, 0.762 mm [0.030"] thick, 2 oz. copper, $\epsilon_r = 3.66$ |
| Find Gerber files for this test fixture on the Infineon Web site at <a href="http://www.infineon.com/rfpower">http://www.infineon.com/rfpower</a> |   |

**Reference Circuit** (cont.)

**Components Information**

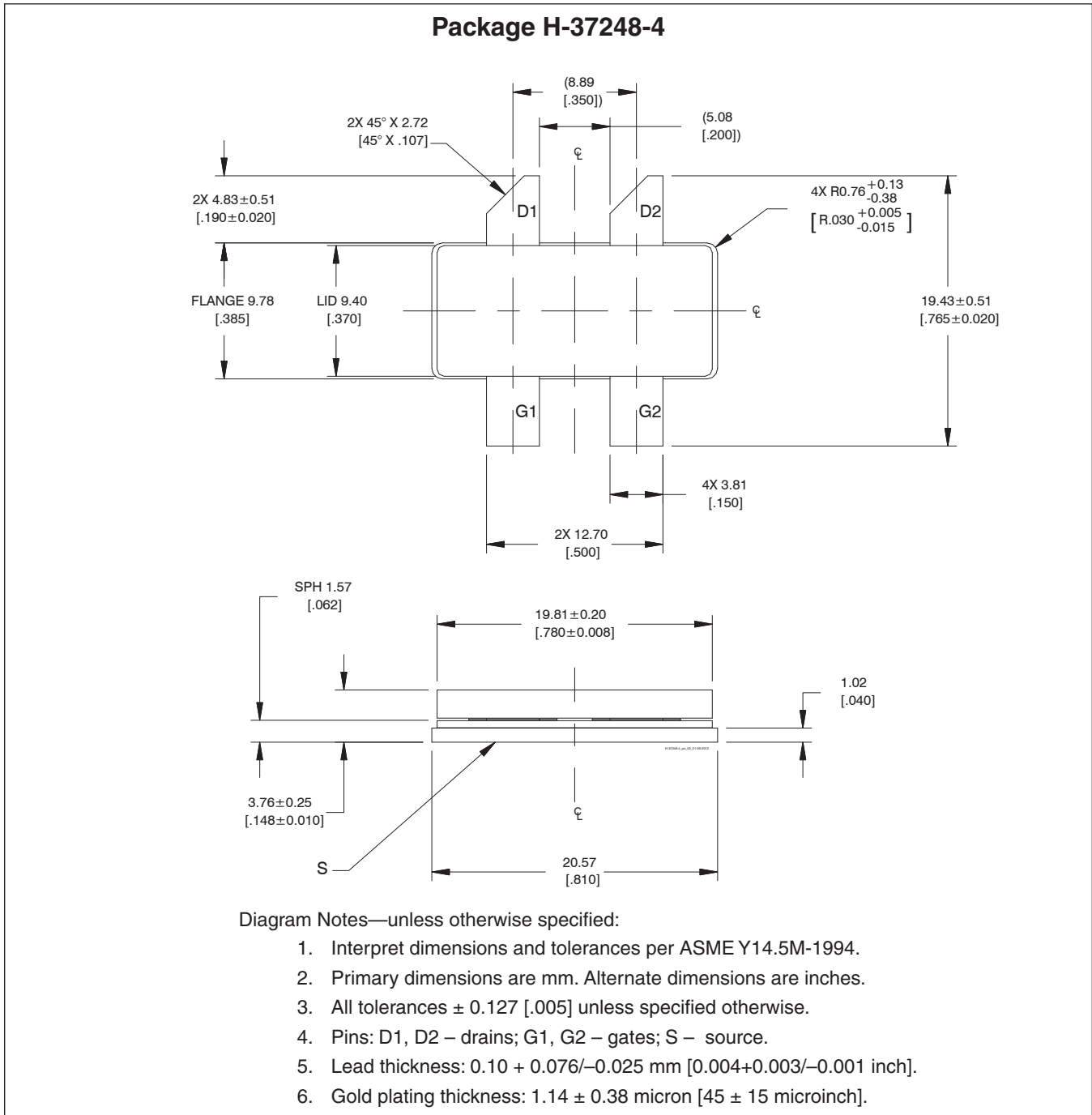
| Component                    | Description                 | Suggested Supplier | P/N               |
|------------------------------|-----------------------------|--------------------|-------------------|
| <b>Input</b>                 |                             |                    |                   |
| C101, C102, C103, C109       | Chip capacitor, 24 pF       | ATC                | ATC800A240JT250XB |
| C104, C110                   | Capacitor, 100 $\mu$ F      | Digi-Key           | PCE4442TR-ND      |
| C105, C108                   | Chip capacitor, 0.1 $\mu$ F | Digi-Key           | 399-1267-2-ND     |
| C106, C107                   | Capacitor, 10 $\mu$ F       | Digi-Key           | 587-1818-2-ND     |
| R101, R102, R104             | Resistor, 10 $\Omega$       | Digi-Key           | P10GCT-ND         |
| R103                         | Resistor, 50 $\Omega$       | Anaren             | C16A50Z4          |
| R105, R106                   | Resistor, 1000 $\Omega$     | Digi-Key           | P1.0KECT-ND       |
| S1                           | Hybrid coupler              | Anaren             | X3C21P1-03S       |
| <b>Output</b>                |                             |                    |                   |
| C201, C208, C210, C211       | Capacitor, 10 $\mu$ F       | Digi-Key           | 587-1818-2-ND     |
| C202, C209                   | Capacitor, 220 $\mu$ F      | Digi-Key           | PCE4444TR-ND      |
| C203, C204, C205, C206, C207 | Chip capacitor, 24 pF       | ATC                | ATC800A240JT250XB |

**Pinout Diagram** (top view)



Lead connections for PTAC210802FC

Package Outline Specifications



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