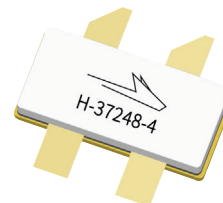


# PTFC261402FC

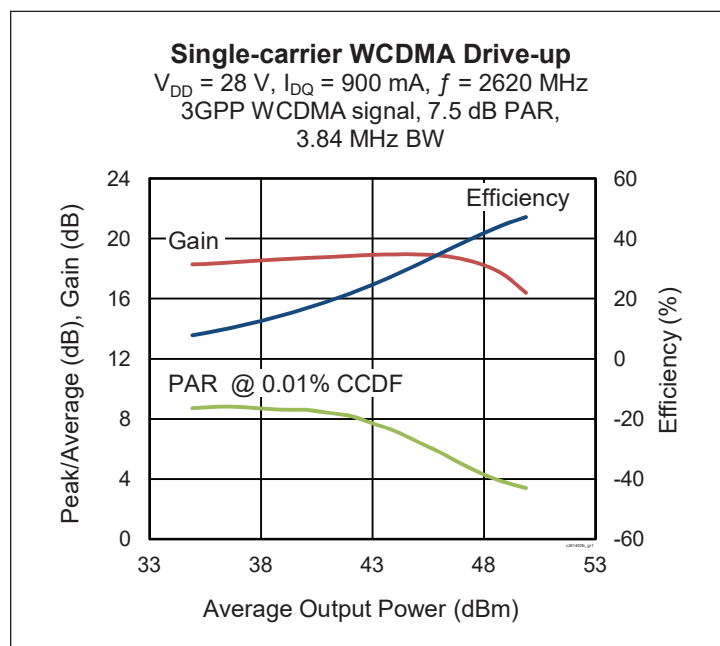
Thermally-Enhanced High Power RF LDMOS FET  
140 W, 28 V, 2620 – 2690 MHz

## Description

The PTFC261402FC is a 140-watt LDMOS FET intended for use in multi-standard cellular power amplifier applications in the 2620 to 2690 MHz frequency band. Features include input and output matching, high gain and thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTFC261402FC  
Package H-37248-4



## Features

- Broadband internal matching
- Wide video bandwidth
- Typical pulsed CW performance, 2655 MHz, 28 V (combined outputs)
  - Output power at  $P_{1dB} = 140\text{ W}$
  - Efficiency = 50%
  - Gain = 16.5 dB
- Typical single-carrier WCDMA performance, 2655 MHz, 28 V
  - Output power = 46 dBm avg
  - Gain = 17.5 dB
  - Efficiency = 30.5%
- Capable of handling 10:1 VSWR @ 28 V, 140 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** (combined outputs, tested in Wolfspeed production test fixture)

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $P_{OUT} = 28\text{ W avg}$ ,  $f = 2655\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

| Characteristic               | Symbol   | Min  | Typ | Max | Unit |
|------------------------------|----------|------|-----|-----|------|
| Gain                         | $G_{ps}$ | 17   | 18  | —   | dB   |
| Drain Efficiency             | $\eta_D$ | 23.5 | 25  | —   | %    |
| Adjacent Channel Power Ratio | ACPR     | —    | -34 | -31 | 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           | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$    | $I_{GSS}$     | —   | —   | 1   | $\mu\text{A}$ |
| On-State Resistance            | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$  | $R_{DS(on)}$  | —   | 0.1 | —   | $\Omega$      |
| Operating Gate Voltage         | $V_{DS} = 28\text{ V}$ , $I_{DQ} = 900\text{ mA}$ | $V_{GS}$      | —   | 2.5 | —   | V             |

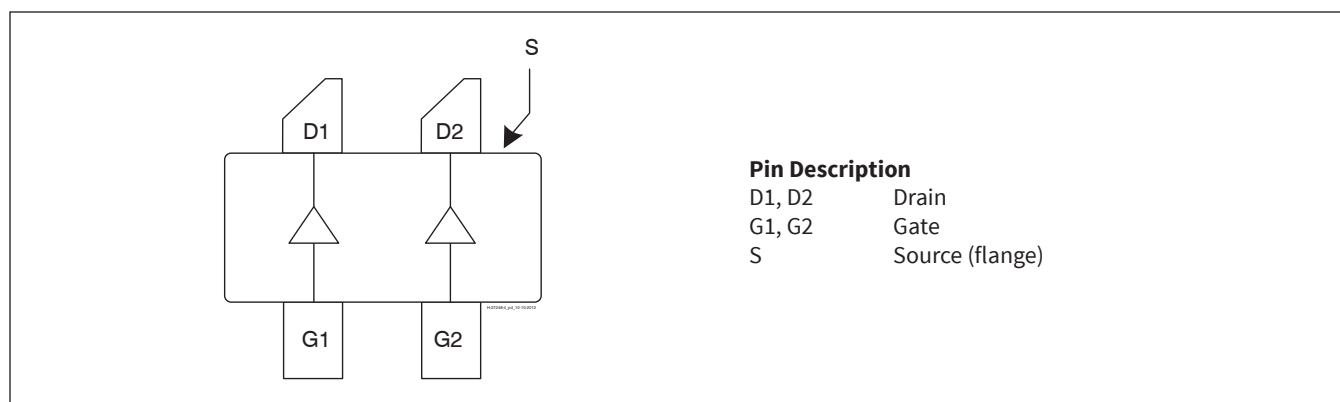
## Maximum Ratings

| 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 ( $T_{CASE} = 70^{\circ}\text{C}$ , 140 W CW) | $R_{\theta JC}$ | 0.30        | $^{\circ}\text{C/W}$ |

## Ordering Information

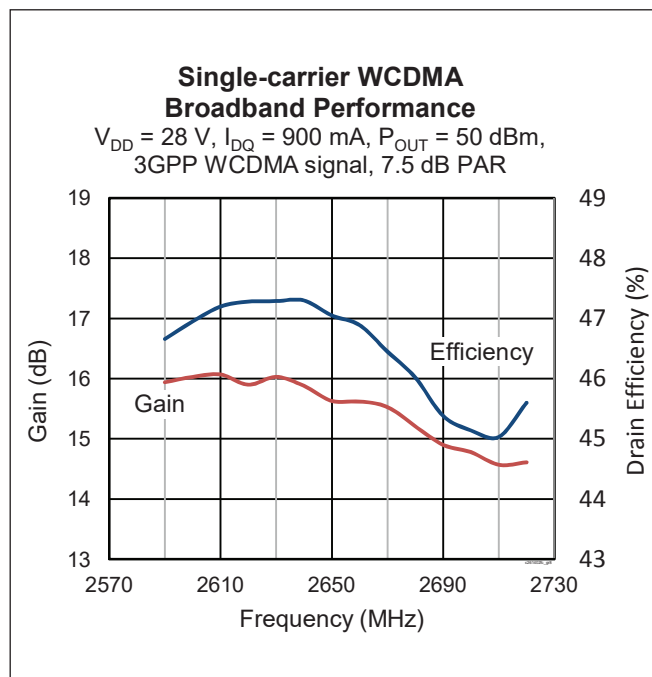
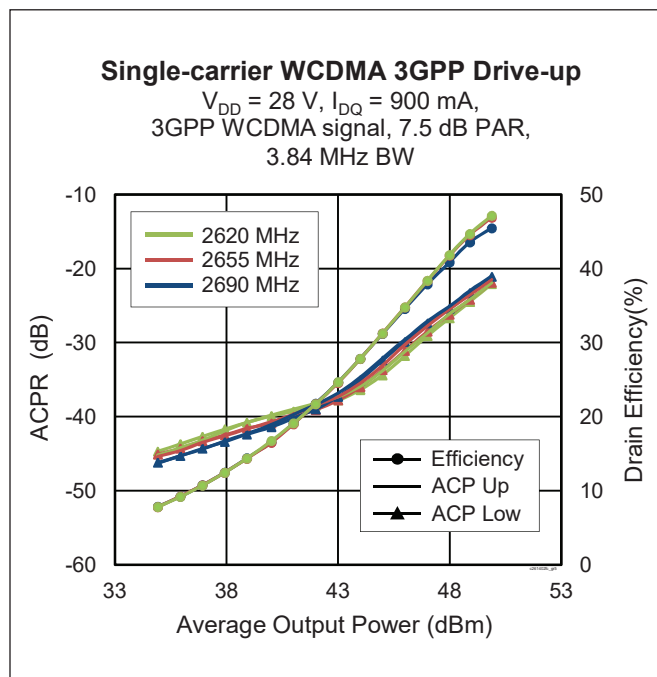
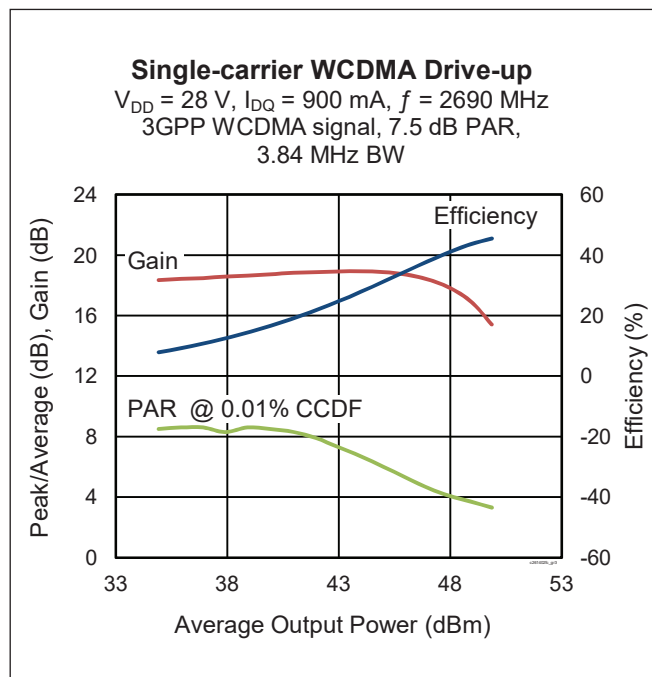
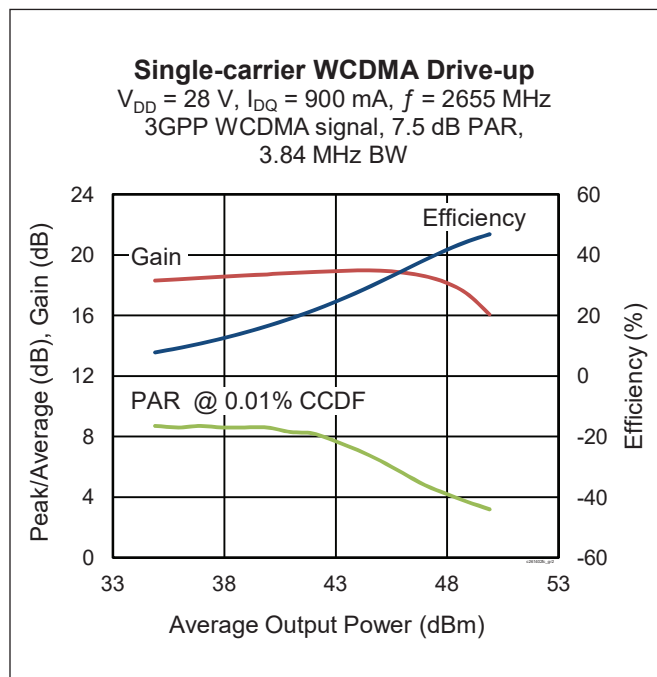
| Type and Version     | Order Code           | Package and Description                      | Shipping             |
|----------------------|----------------------|----------------------------------------------|----------------------|
| PTFC261402FC V1 R0   | PTFC261402FC-V1-R0   | Thermally-enhanced earless flange, push-pull | Tape & Reel, 50 pcs  |
| PTFC261402FC V1 R250 | PTFC261402FC-V1-R250 | Thermally-enhanced earless flange, push-pull | Tape & Reel, 250 pcs |

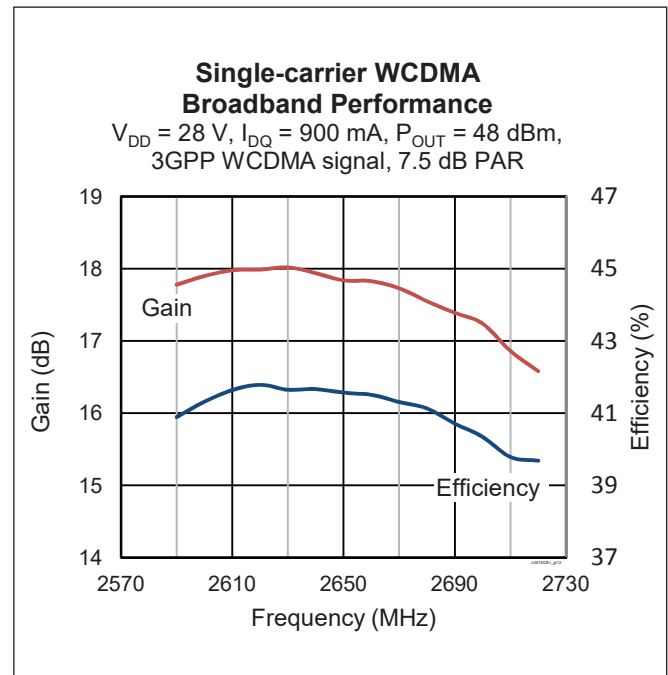
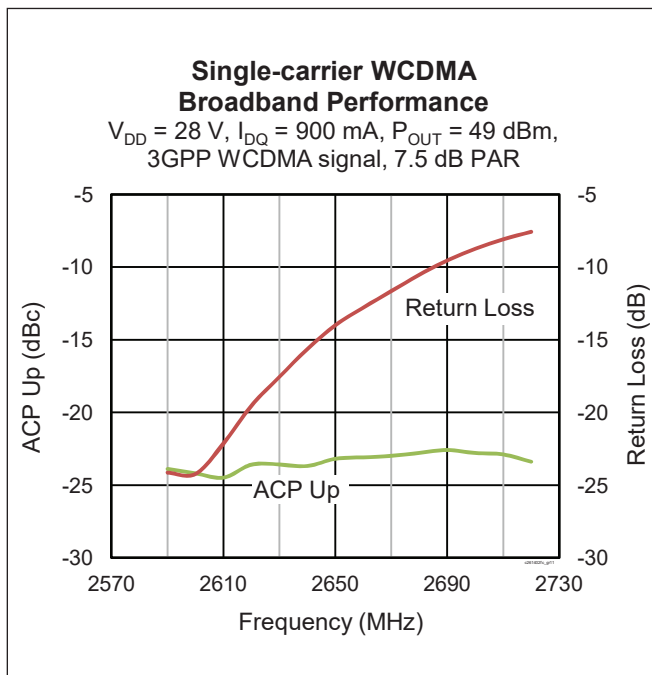
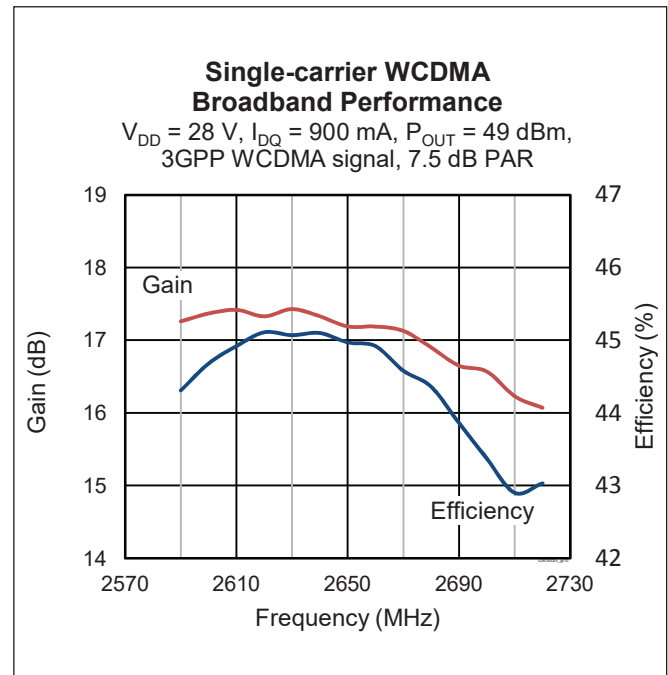
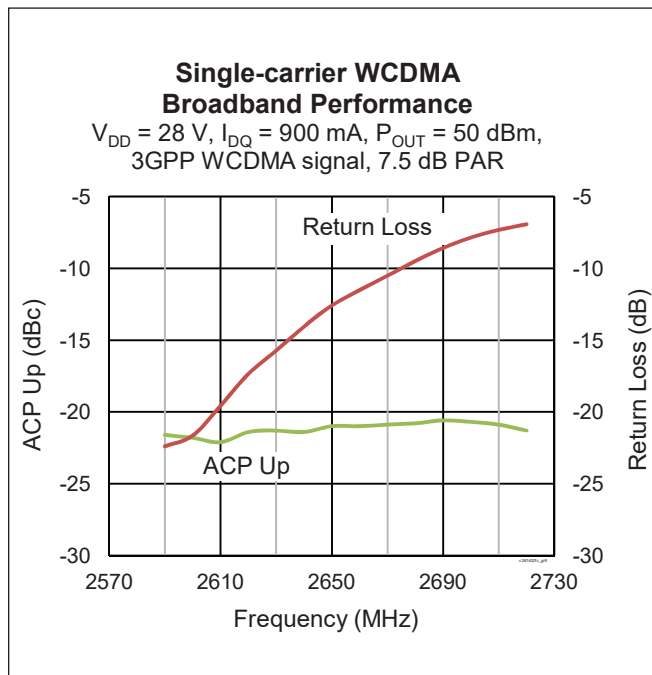
## Pinout Diagram



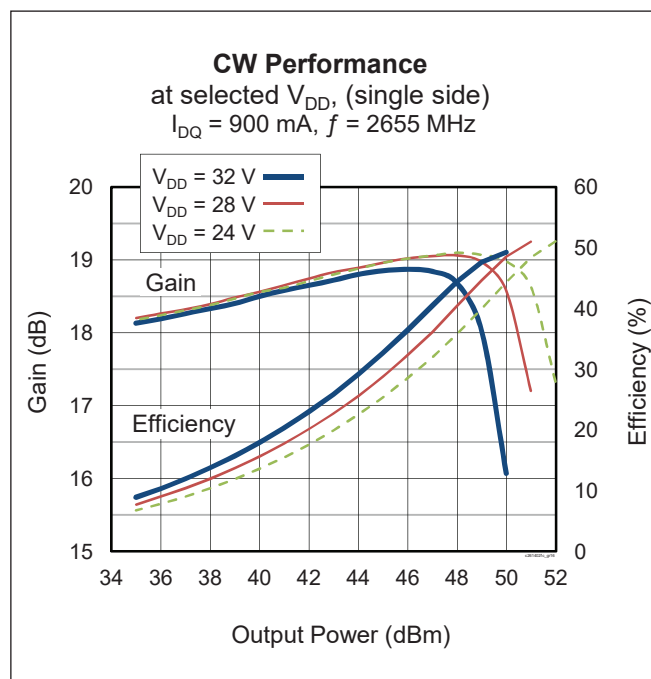
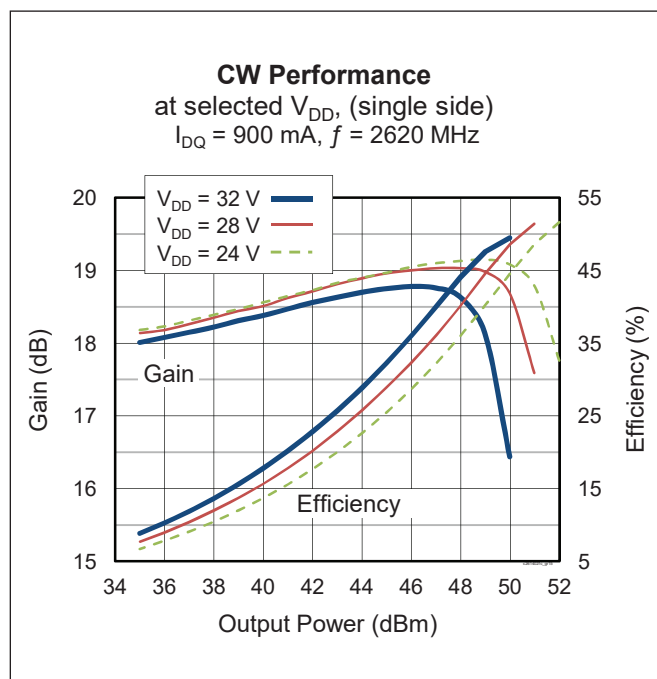
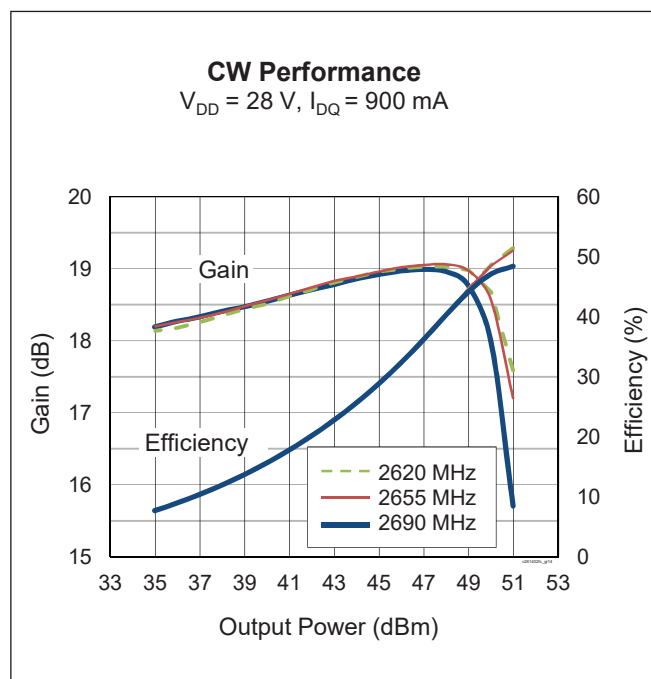
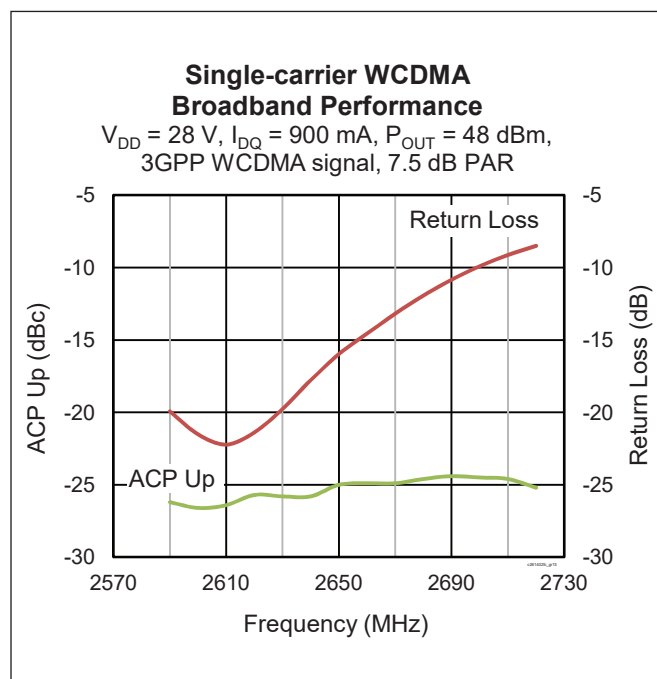
Lead connections for PTFC261402FC

# Typical Performance (data taken in a production test fixture)



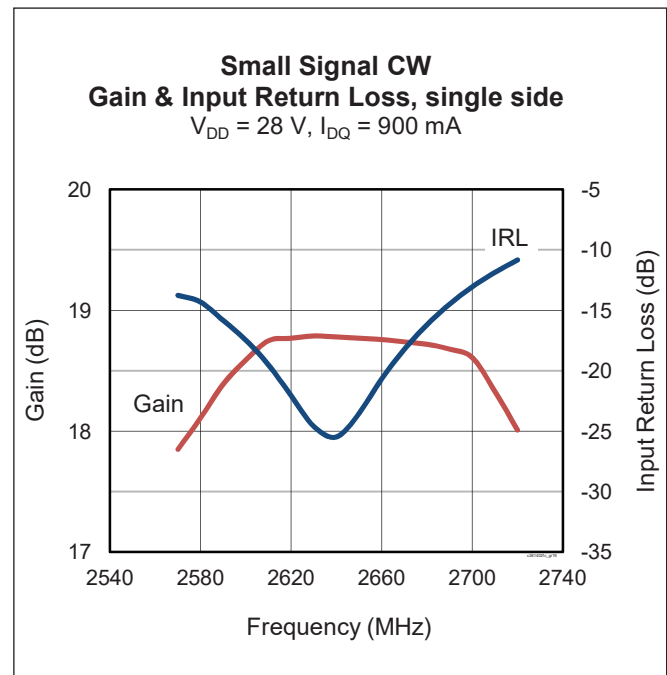
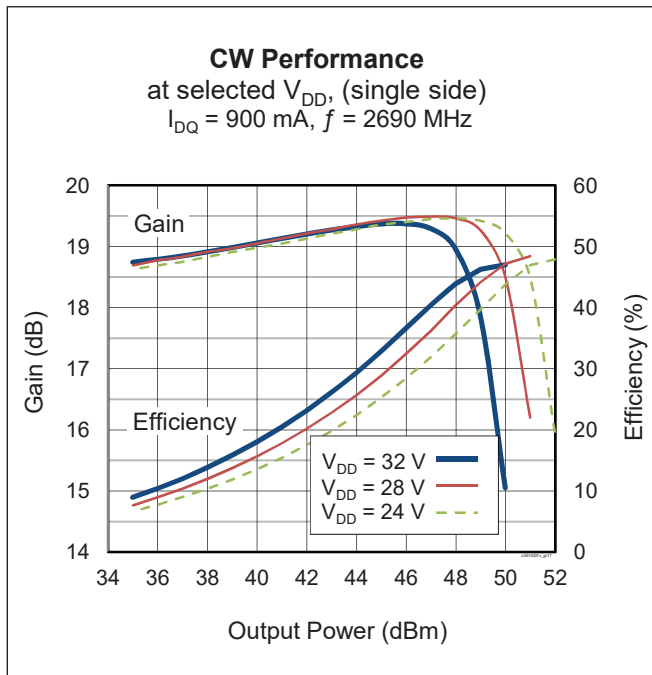
**Typical Performance** (cont.)

# Typical Performance (cont.)

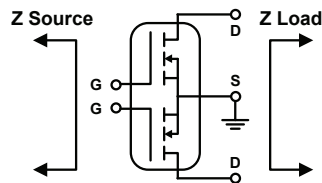




## Typical Performance (cont.)



## Load Pull Performance

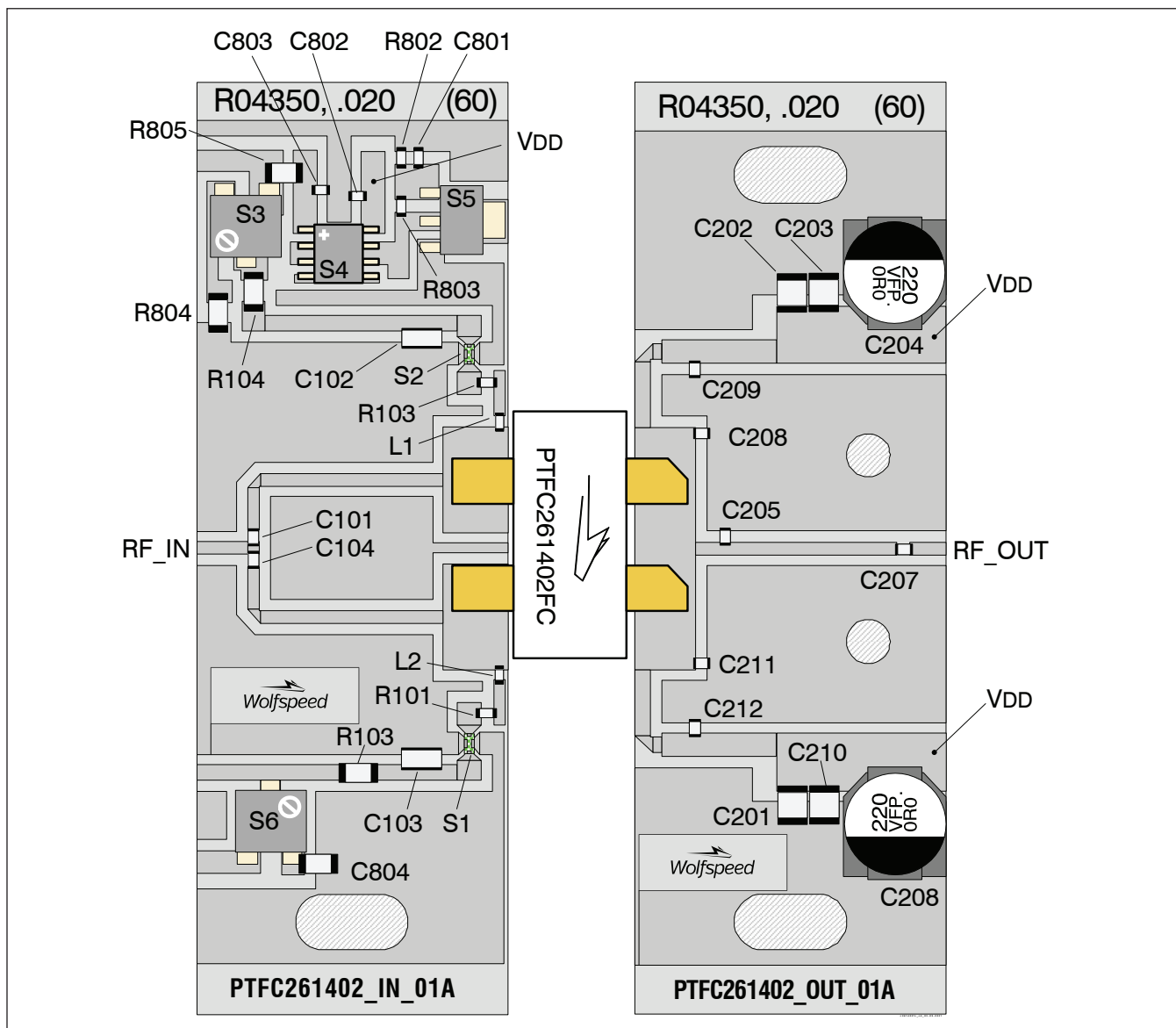


**Single Side Load Pull Performance** – Pulsed CW signal: 16  $\mu$ sec, 10% duty cycle; 28 V, 450 mA

| Class AB   |                | $P_{1dB}$        |           |                 |               |       |              |           |                 |               |       |
|------------|----------------|------------------|-----------|-----------------|---------------|-------|--------------|-----------|-----------------|---------------|-------|
|            |                | Max Output Power |           |                 |               |       | Max PAE      |           |                 |               |       |
| Freq [MHz] | $Z_s \Omega$   | $Z_L \Omega$     | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE % | $Z_L \Omega$ | Gain [dB] | $P_{OUT}$ [dBm] | $P_{OUT}$ [W] | PAE % |
| 2620       | $12.1 - j1.0$  | $2.0 - j8.8$     | 15.8      | 50.01           | 100           | 53.9  | $3.8 - j7.4$ | 18        | 48.39           | 69            | 60.2  |
| 2655       | $15.7 - j0.2$  | $2.0 - j9.0$     | 15.7      | 49.98           | 99            | 53.2  | $3.5 - j7.7$ | 17.9      | 48.50           | 71            | 59.5  |
| 2690       | $17.8 - j12.4$ | $2.0 - j9.2$     | 15.7      | 49.79           | 95            | 51.3  | $3.6 - j7.8$ | 18.1      | 48.38           | 69            | 58.8  |

## Reference Circuit

|                                                                                                                                         |                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| DUT                                                                                                                                     | PTFC261402FC                                                           |
| Test Fixture Part No.                                                                                                                   | LTN/PTFC261402FC-V1                                                    |
| PCB                                                                                                                                     | Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ |
| Find Gerber files for this test fixture on the Wolfspeed Web site at ( <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a> ) |                                                                        |



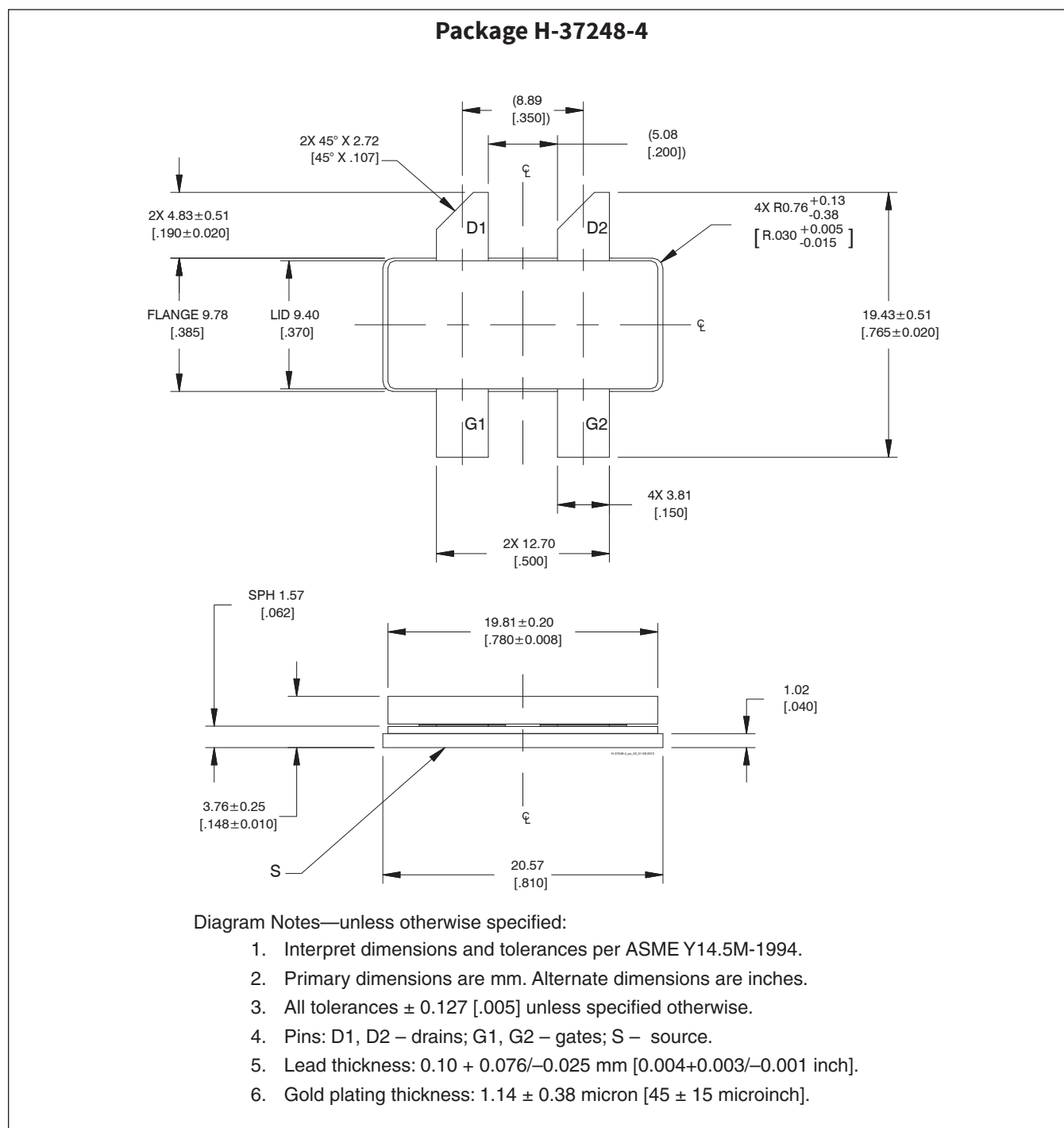
Reference circuit assembly diagram (not to scale)



## Reference Circuit (cont.)

| Components Information |                                      |                                  |                    |
|------------------------|--------------------------------------|----------------------------------|--------------------|
| Component              | Description                          | Suggested Supplier               | P/N                |
| <b>Input</b>           |                                      |                                  |                    |
| C101, C104             | Chip capacitor, 10 pF                | ATC                              | ATC800A100JT       |
| C102, C103             | Capacitor, 10 $\mu$ F                | Murata Electronics North America | LLL31BC70G106MA01L |
| C801, C802, C803       | Capacitor, 1 nF                      | Panasonic                        | ECJ-1VB1H102K      |
| L1, L2                 | Chip inductor, 47 nH                 | Coilcraft                        | 0603HP-47NXJLU     |
| R101, R102             | Resistor, 10 W                       | Panasonic Electronic Components  | ERJ-3GEYJ100V      |
| R103, R104             | Resistor, 10 W                       | Panasonic Electronic Components  | ERJ-8GEYJ100V      |
| R801, R804             | Resistor, 1k W                       | Panasonic Electronic Components  | ERJ-8GEYJ102V      |
| R802                   | Resistor, 1.3k W                     | Panasonic Electronic Components  | ERJ-3GEYJ132V      |
| R803                   | Resistor, 1.2k W                     | Panasonic Electronic Components  | ERJ-3GEYJ122V      |
| S1, S2                 | High frequency EMI filter, 1 $\mu$ F | Murata Electronics North America | NFM18PS105R0J3D    |
| S3                     | Potentiometer, 2k $\Omega$           | Bourns Inc.                      | 3224W-1-202E       |
| S4                     | Voltage Regulator                    | National Semiconductor           | LM7805             |
| S5                     | Transistor                           | Infineon Technologies            | BCP56              |
| <b>Output</b>          |                                      |                                  |                    |
| C201, C202, C203, C210 | Capacitor, 10 $\mu$ F                | Taiyo Yuden                      | UMK325C7106MM-T    |
| C204, C208             | Electrolytic capacitor, 220 $\mu$ F  | Panasonic Electronic Components  | EEE-FP1V221AP      |
| C205, C206             | Chip capacitor, 1 pF                 | ATC                              | ATC800A1R2BT       |
| C206, C211             | Chip capacitor, 2 pF                 | ATC                              | ATC800A1R6BT       |
| C207                   | Chip capacitor, 8 pF                 | ATC                              | ATC800A8R2CT       |
| C209, C212             | Chip capacitor, 10 pF                | ATC                              | ATC800A100JT       |

## Package Outline Specifications



## Revision History

| Revision | Date       | Data Sheet Type | Page   | Subjects (major changes since last revision)                                              |
|----------|------------|-----------------|--------|-------------------------------------------------------------------------------------------|
| 01       | 2011-11-10 | Advance         | All    | Data Sheet reflects advance specification for product development.                        |
| 02       | 2012-04-27 | Preliminary     | 1, 2   | Specifications updated.                                                                   |
| 03       | 2012-06-01 | Advance         | All    | Reformat to Advance Specification—Marketing survey only.                                  |
| 04       | 2014-02-14 | Production      | All    | Data Sheet reflects released product specification.                                       |
| 05       | 2016-06-21 | Production      | 1<br>2 | Added ESD rating<br>Maximum junction temperature raised to 225 °C, updated ordering info. |
| 06       | 2018-07-03 | Production      | All    | Converted to Wolfspeed Data Sheet.                                                        |
| 06.1     | 2021-03-09 | Production      | 7      | Updated reference circuit revision number                                                 |

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