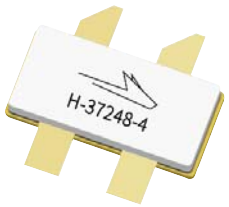
PTFC261402FC

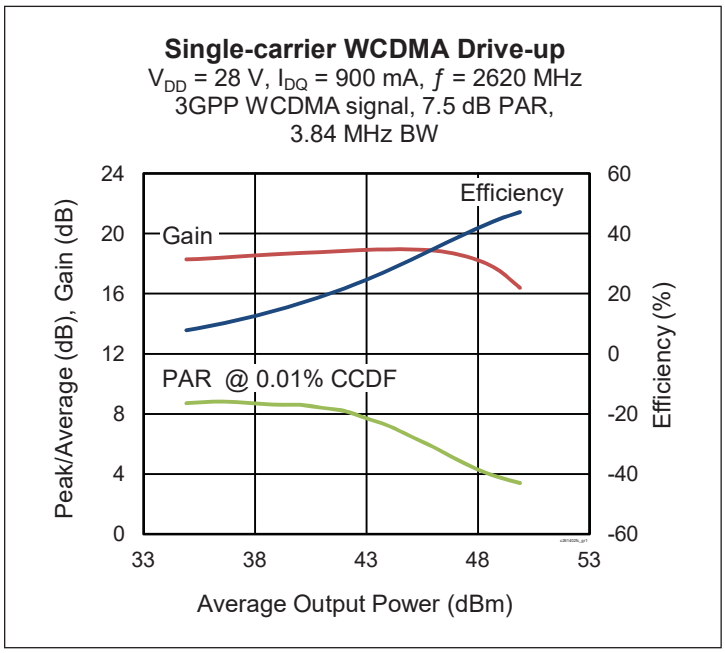
Thermally-Enhanced High Power RF LDMOS FET
140 W, 28 V, 2620 – 2690 MHz

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 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 V, I_{DQ} = 900 mA, P_{OUT} = 28 W avg, f = 2655 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	η_D	23.5	25	—	%
Adjacent Channel Power Ratio	ACPR	—	–34	–31	dBc

All published data at T_{CASE} = 25°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 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10	µA
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.1	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 900 mA	V_{GS}	—	2.5	—	V

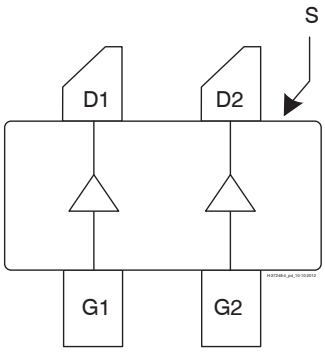
Maximum Ratings

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	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 140 W CW)	$R_{\theta JC}$	0.30	°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



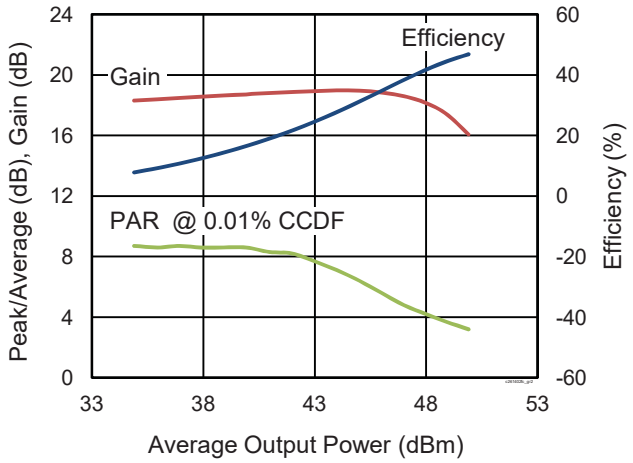
Pin Description

D1, D2	Drain
G1, G2	Gate
S	Source (flange)

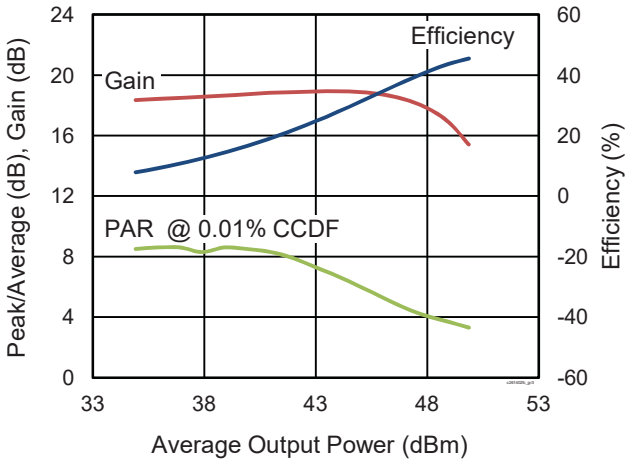
Lead connections for PTFC261402FC

Typical Performance (data taken in a production test fixture)

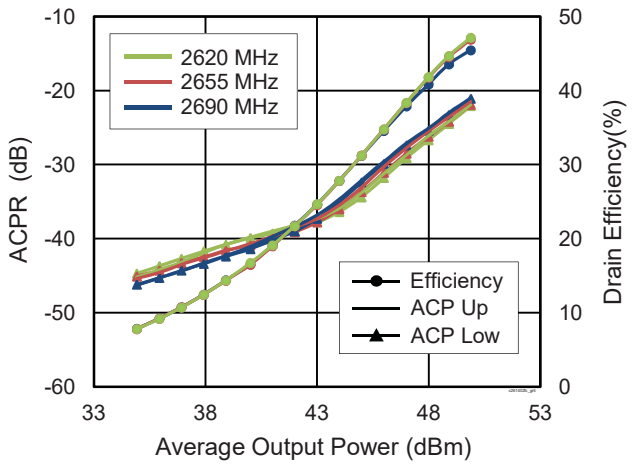
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 900 mA, f = 2655 MHz
3GPP WCDMA signal, 7.5 dB PAR,
3.84 MHz BW



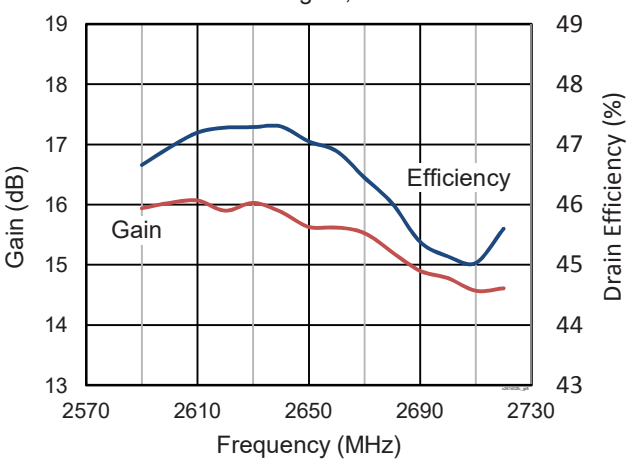
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 900 mA, f = 2690 MHz
3GPP WCDMA signal, 7.5 dB PAR,
3.84 MHz BW



Single-carrier WCDMA 3GPP Drive-up
V_{DD} = 28 V, I_{DQ} = 900 mA,
3GPP WCDMA signal, 7.5 dB PAR,
3.84 MHz BW

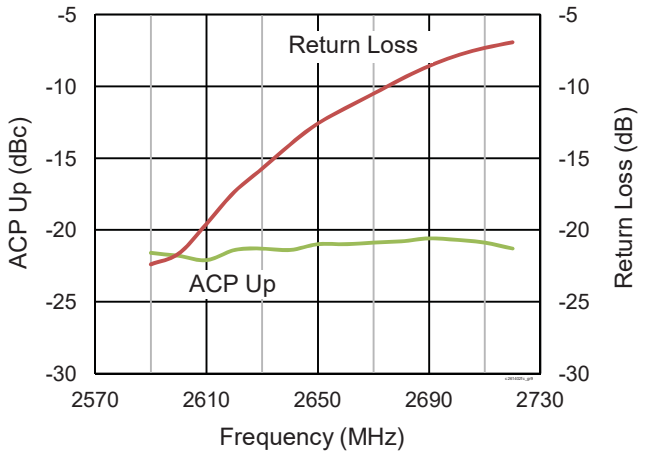


Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 50 dBm,
3GPP WCDMA signal, 7.5 dB PAR

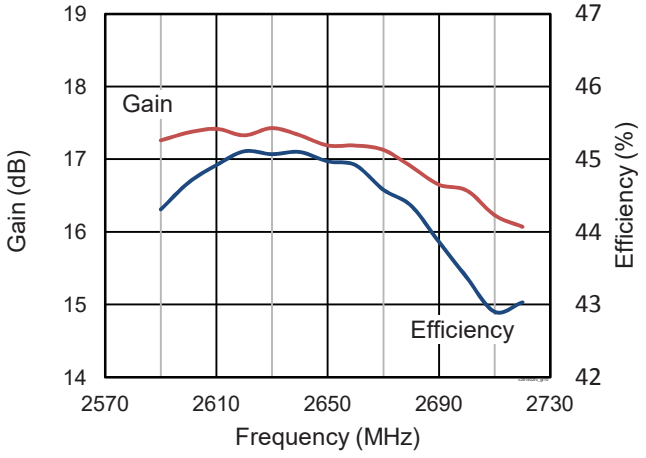


Typical Performance (cont.)

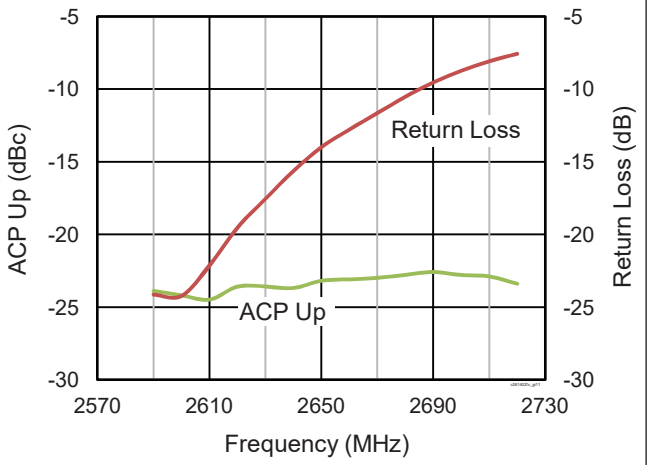
Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 50 dBm,
3GPP WCDMA signal, 7.5 dB PAR



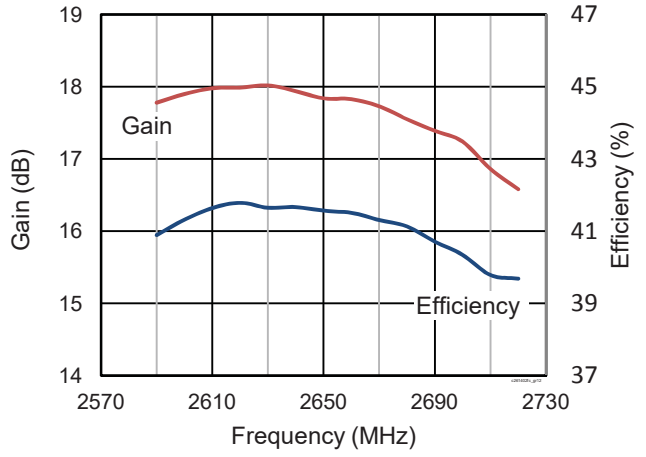
Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 49 dBm,
3GPP WCDMA signal, 7.5 dB PAR



Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 49 dBm,
3GPP WCDMA signal, 7.5 dB PAR

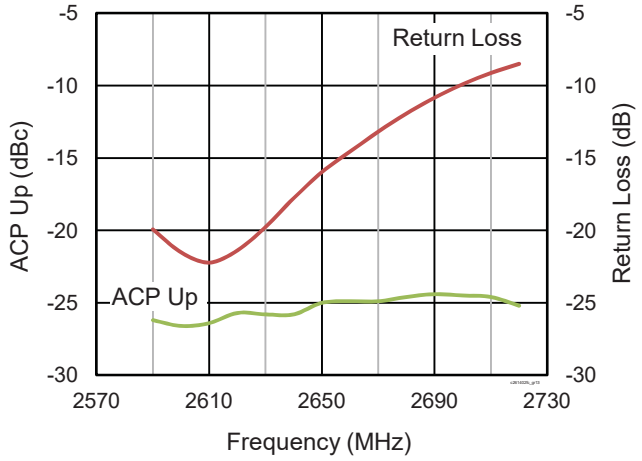


Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 48 dBm,
3GPP WCDMA signal, 7.5 dB PAR

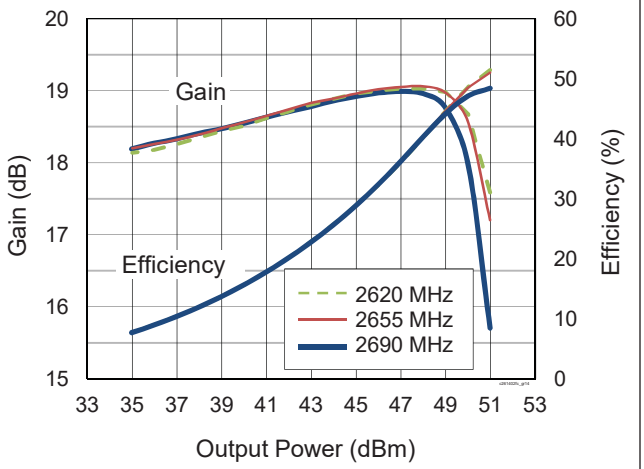


Typical Performance (cont.)

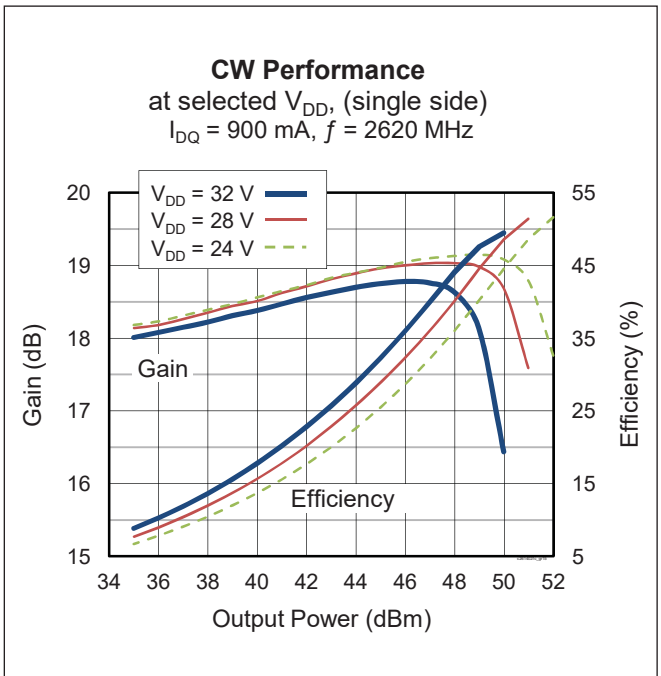
Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 900 mA, P_{OUT} = 48 dBm,
3GPP WCDMA signal, 7.5 dB PAR



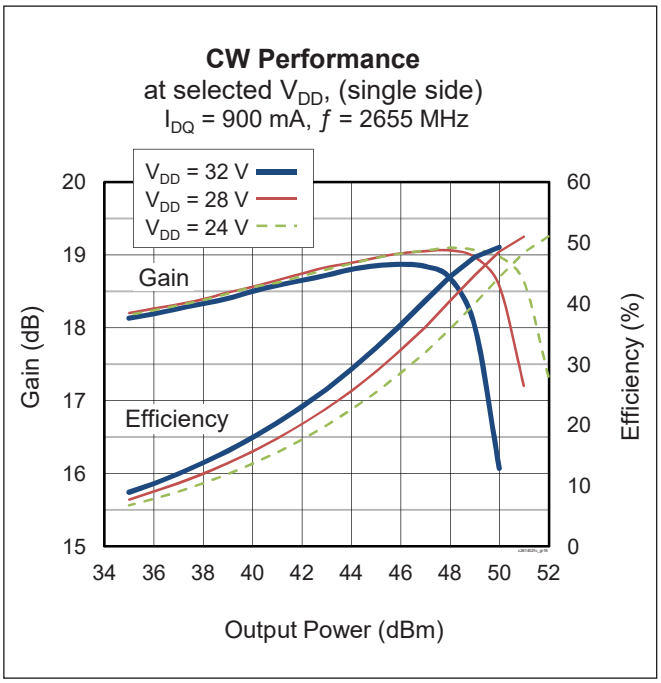
CW Performance
V_{DD} = 28 V, I_{DQ} = 900 mA



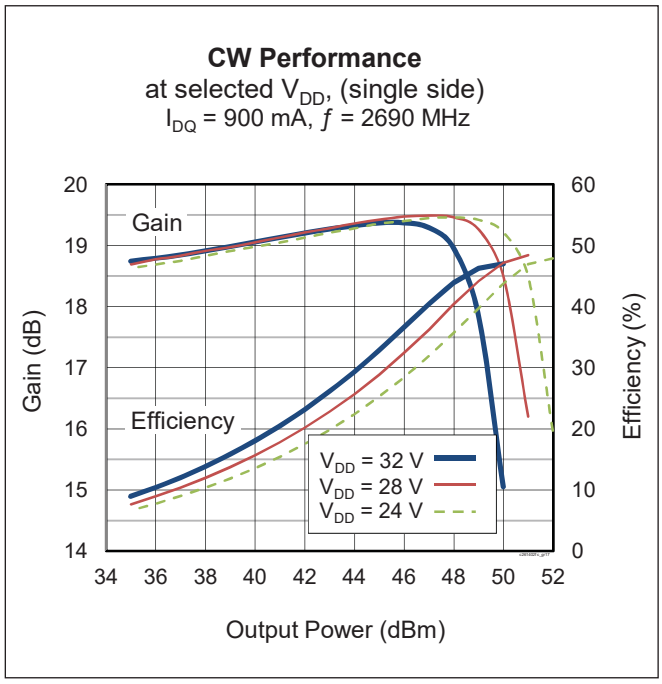
CW Performance
at selected V_{DD}, (single side)
I_{DQ} = 900 mA, f = 2620 MHz

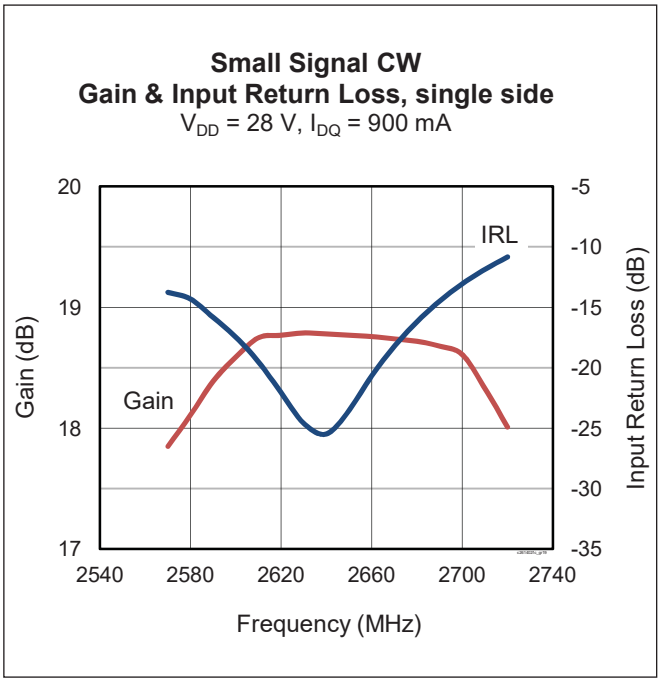


CW Performance
at selected V_{DD}, (single side)
I_{DQ} = 900 mA, f = 2655 MHz

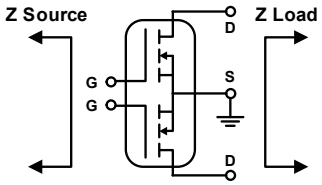


Typical Performance (cont.)





Load Pull Performance

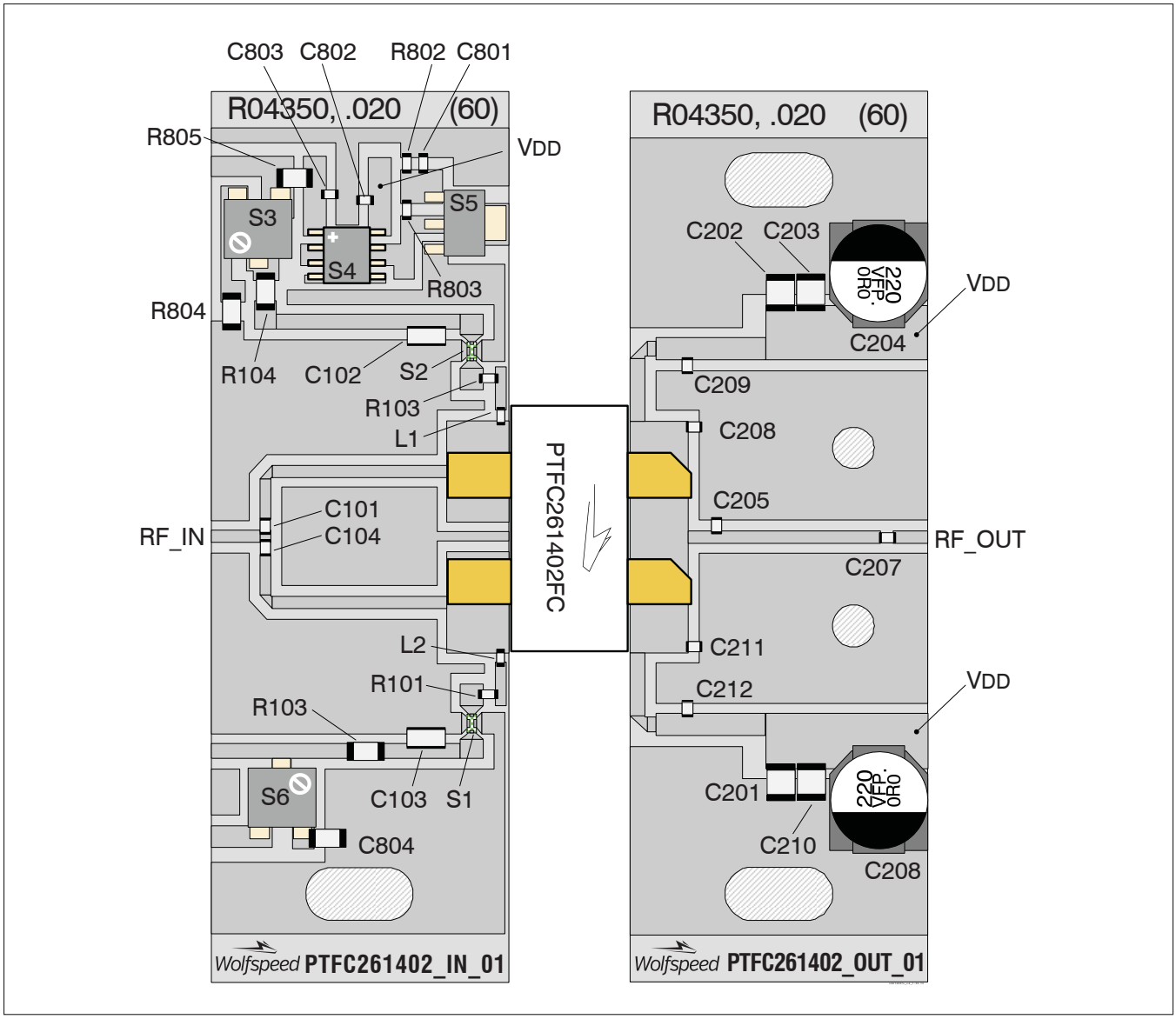


Single Side Load Pull Performance – Pulsed CW signal: 16 µsec, 10% duty cycle; 28 V, 450 mA

Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs Ω	Zl Ω	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE %	Zl Ω	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
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, ε_r = 3.66
Find Gerber files for this test fixture on the Wolfspeed Web site at (**www.wolfspeed.com/RF**)	



Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Suggested Supplier	P/N
Input			
C101, C104	Chip capacitor, 10 pF	ATC	ATC800A100JT
C102, C103	Capacitor, 10 µF	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 µF	Murata Electronics North America	NFM18PS105R0J3D
S3	Potentiometer, 2k Ω	Bourns Inc.	3224W-1-202E
S4	Voltage Regulator	National Semiconductor	LM7805
S5	Transistor	Infineon Technologies	BCP56
Output			
C201, C202, C203, C210	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C204, C208	Electrolytic capacitor, 220 µF	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

Package H-37248-4

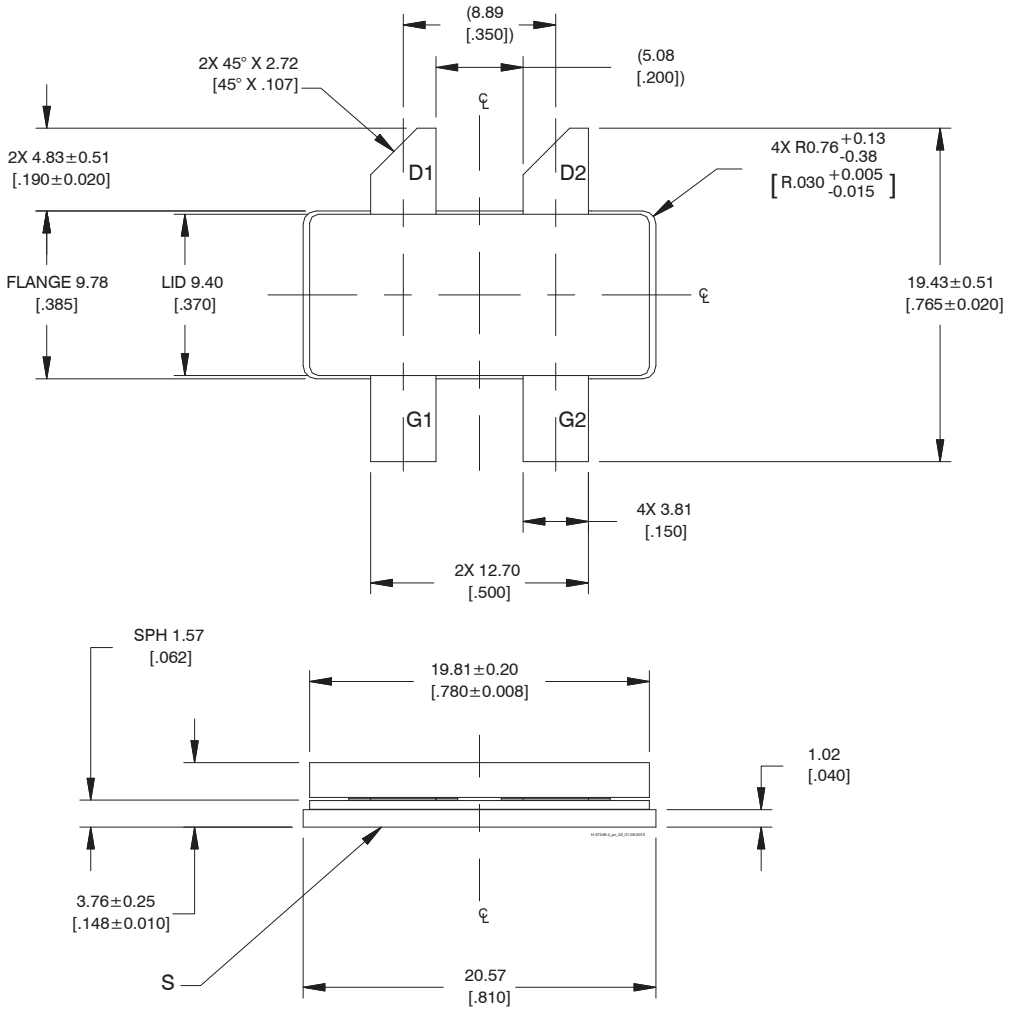


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005] unless specified otherwise.
4. Pins: D1, D2 – drains; G1, G2 – gates; S – source.
5. Lead thickness: 0.10 + 0.076/–0.025 mm [0.004+0.003/–0.001 inch].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

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 2	Added ESD rating Maximum junction temperature raised to 225 °C, updated ordering info.
06	2018-07-03	Production	All	Converted to Wolfspeed Data Sheet.

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Notes

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