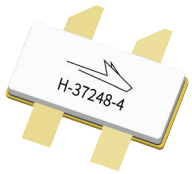
PTFB091802FC

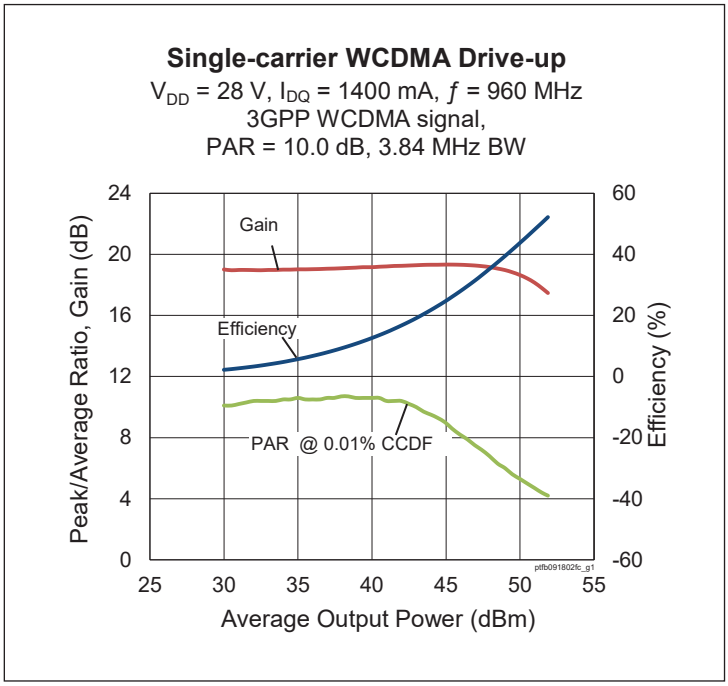
Thermally-Enhanced High Power RF LDMOS FET
180 W, 28 V, 920 – 960 MHz

Description

The PTFB091802FC LDMOS FET is designed for use in power amplifier applications in the 920 MHz to 960 MHz frequency band. Features include high gain and a thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PTFB091802FC
Package H-37248-4





Features

- Broadband internal input and output matching
- Dual path design (2 X 90 W)
- Typical CW performance at 960 MHz, 28 V
  - Ouput power @ P_{1dB} = 206 W
  - Efficiency = 56%
  - Gain = 18 dB
- Capable of handling 10:1 VSWR @ 28 V, 180 W (CW) output power
- Integrated ESD protection
- Low thermal resistance
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed production test fixture)
V_{DD} = 28 V, I_{DQ} = 1400 mA, P_{OUT} = 55 W avg, f_1 =920 MHz, f_2 = 960 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18	19.5	—	dB
Drain Efficiency	η_D	32	34	—	%
Adjancent Channel Power Ratio	ACPR	—	–35	–33	dBc

All published data at T_{CASE} = 25°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 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	$R_{DS(on)}$	—	0.15	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 1400 mA	V_{GS}	2.5	3.9	4.5	V

Maximum Ratings

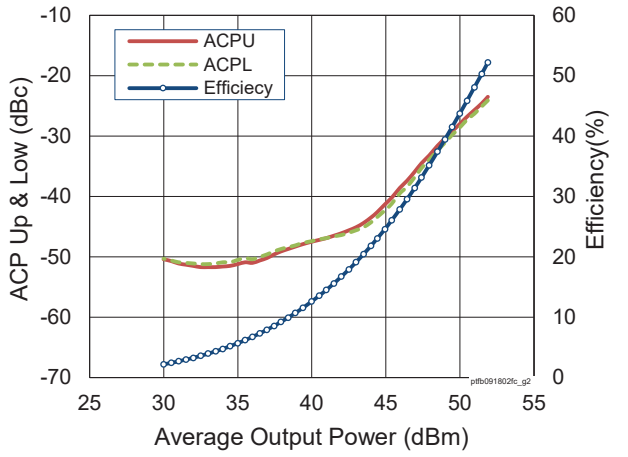
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 190 W CW)	$R_{\theta JC}$	0.38	°C/W

Ordering Information

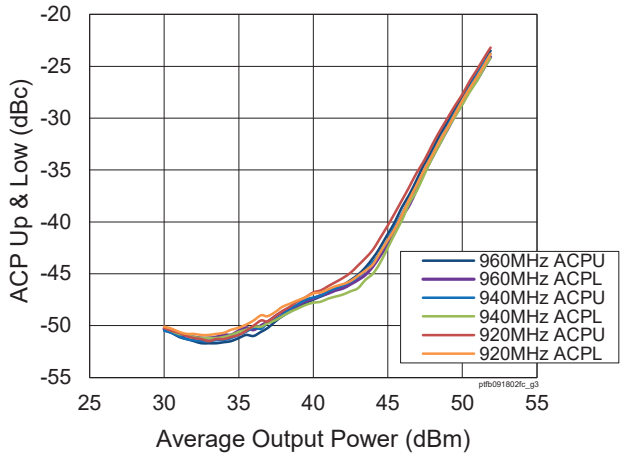
Type and Version	Order Code	Package Description	Shipping
PTFB091802FC V1 R0	PTFB091802FC-V1-R0	H-37248-4, earless flange	Tape & Reel, 50 pcs
PTFB091802FC V1 R250	PTFB091802FC-V1-R250	H-37248-4, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

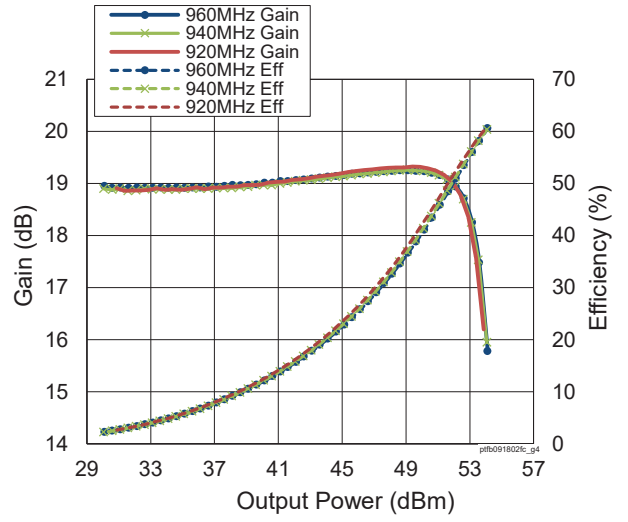
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 1400 mA, f = 960 MHz,
3GPP WCDMA signal, PAR = 10 dB,
BW = 3.84 MHz



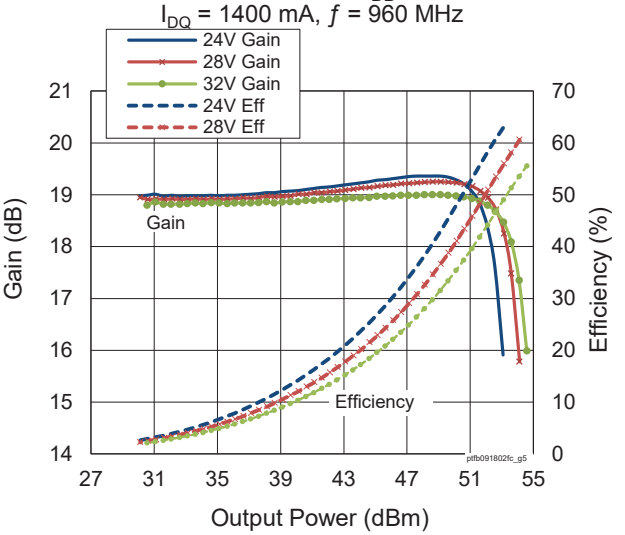
Single-carrier WCDMA 3GPP Drive-up
V_{DD} = 28 V, I_{DQ} = 1400 mA, f = 920-960 MHz,
3GPP WCDMA signal, PAR = 10 dB,
BW = 3.84 MHz



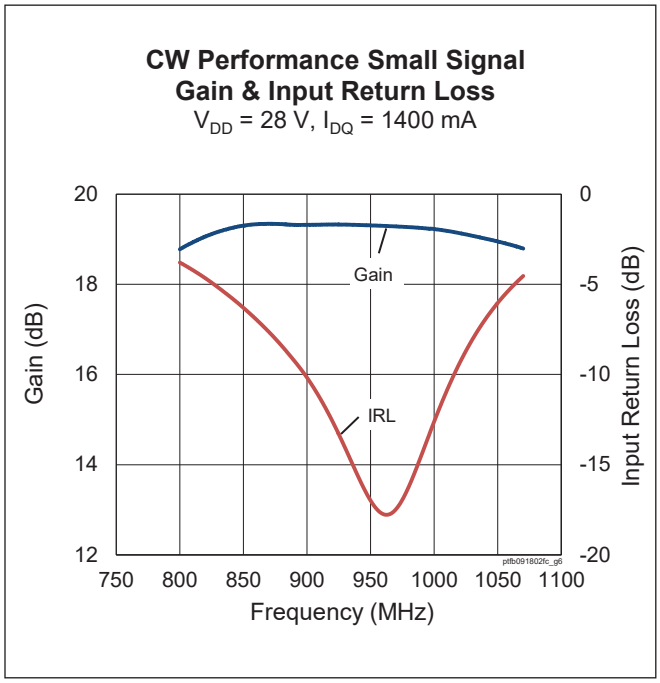
CW Performance
V_{DD} = 28 V, I_{DQ} = 1400mA



CW Performance at various V_{DD}
I_{DQ} = 1400 mA, f = 960 MHz



Typical Performance (cont.)

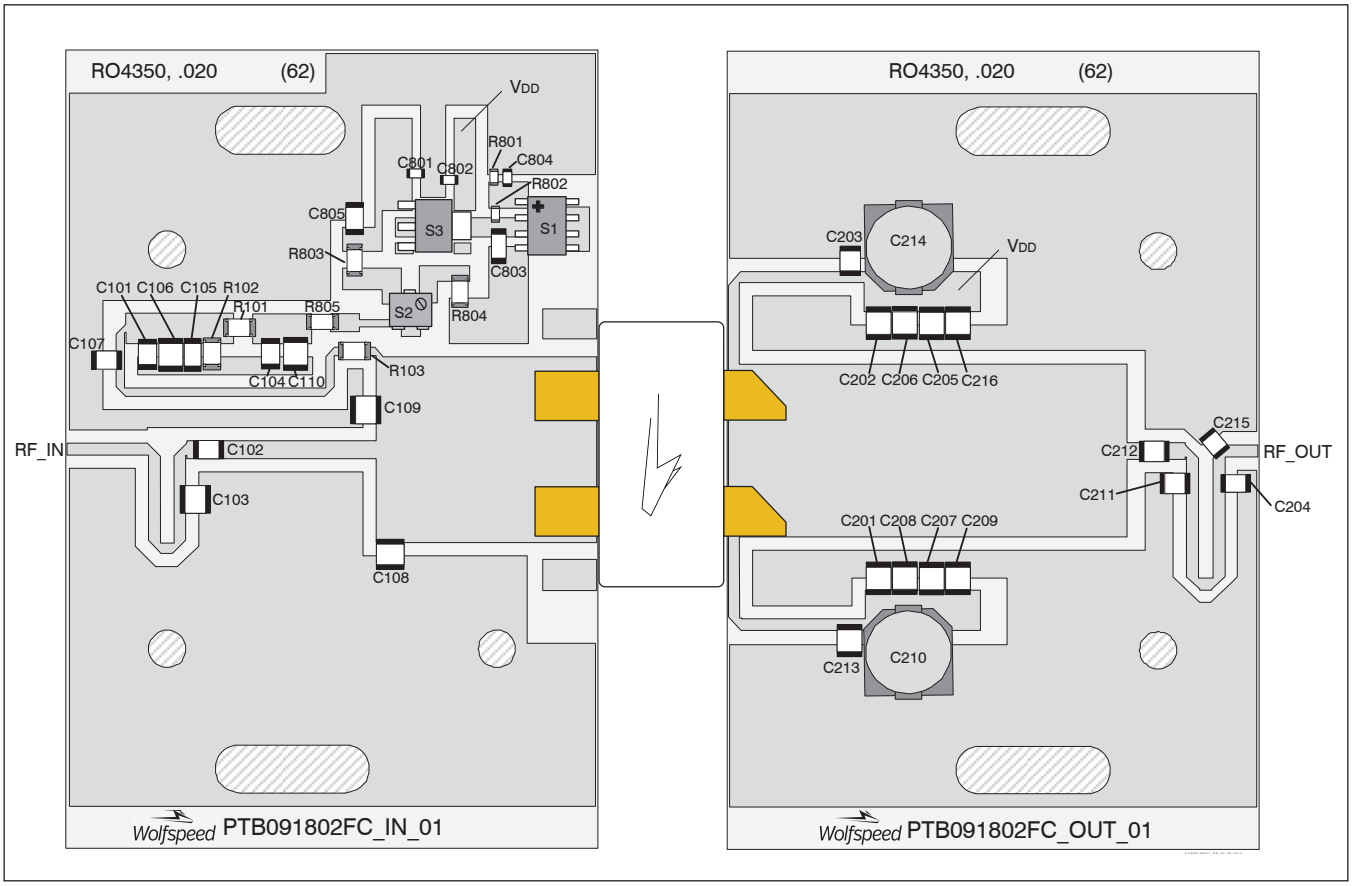


Load Pull Performance

Load Pull Performance – Pulsed CW signal: 10 µs, 10% duty cycle, 28 V, I_{DQ} = 1400 mA

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	η_D [%]
920	3.48 – j4.93	1.95 – j1.75	17.2	51.1	127	55.1	4.47 – j0.46	20.2	48.9	77	71.0
942	4.17 – j5.32	1.93 – j1.59	18.3	50.4	110	56.0	4.77 + j0.06	20.8	47.8	60	66.4
960	4.61 – j5.47	1.86 – j1.64	18.3	50.4	109	56.2	4.23 – j0.33	20.6	48.2	65	66.9

Reference Circuit , 920 – 960 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

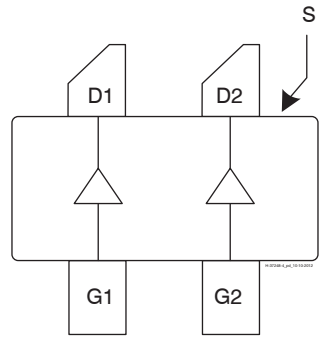
Reference Circuit Assembly

DUT	PTFB091802FC V1
Test Fixture Part No.	LTN/PTFB091802FC V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 920 – 960 MHz
Find Gerber files for this test fixture on the Wolfspeed Web site at http://www.wolfspeed.com/RF	

Components Inform

Component	Description	Manufacturer	P/N
Input			
C101	Capacitor, 33 pF	ATC	ATC100B330JW500XB
C102, C107	CAPACITOR, 56 pF	ATC	ATC100B560JW500XB
C103	CAPACITOR, 2.6 pF	ATC	ATC100B2R6CW500XB
C104	CAPACITOR, 4.7 pF	ATC	ATC100B4R7CW500XB
C105	Tantalum Capacitor, 4.7 µF	AVX Corporation	F931C475MAA
C106	Capacitor, 20000 pF	ATC	ATC200B203MC
C108, C109	Capacitor, 3.9 pF	ATC	ATC100B3R9CW500XB
C110	Capacitor, 10000 pF	ATC	ATC200B103MC
C801, C802, C804	Capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
C803, C805	Capacitor, 0.1 µF	Panasonic Electronic Components	ECJ-3VB1H104
R101, R102	Resistor, 220 Ω	Panasonic Electronic Components	ERJ-8GEYJ221V
R103, R803, R805	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R801	Resistor, 1300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
R802	Resistor, 1200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R804	Resistor, 2000 Ω	Panasonic Electronic Components	ERJ-8GEYJ202V
S1	Transistor	Infineon Technologies	BCP56
S2	Potentiometer, 2k Ω	Bourns Inc.	3224W-1-202E
S3	Voltage Regulator	Texas Instruments	LM78L05ACM
Output			
C201, C202, C206, C208	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C203, C212, C213	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C204	Capacitor, 2.2 pF	ATC	ATC100B2R2CW500XB
C205, C207, C209, C216	Capacitor, 4.7 µF	Murata Electronics North America	GRM32ER71H475KA88
C210, C214	Capacitor, 100 µF	Panasonic Electronic Components	EEE-FP1V101AP
C211	Capacitor, 1.5 pF	ATC	ATC100B1R5CW500XB
C215	Capacitor, 1.7 pF	ATC	ATC100B1R7CW500XB

Pinout Diagram (top view)



Pin Description
D1 Drain device 1
D2 Drain device 2
G1 Gate device 1
G2 Gate device 2
S Source (flange)

Lead connections for PTFB091802FC

Package Outline Specifications

Package H-37248-4

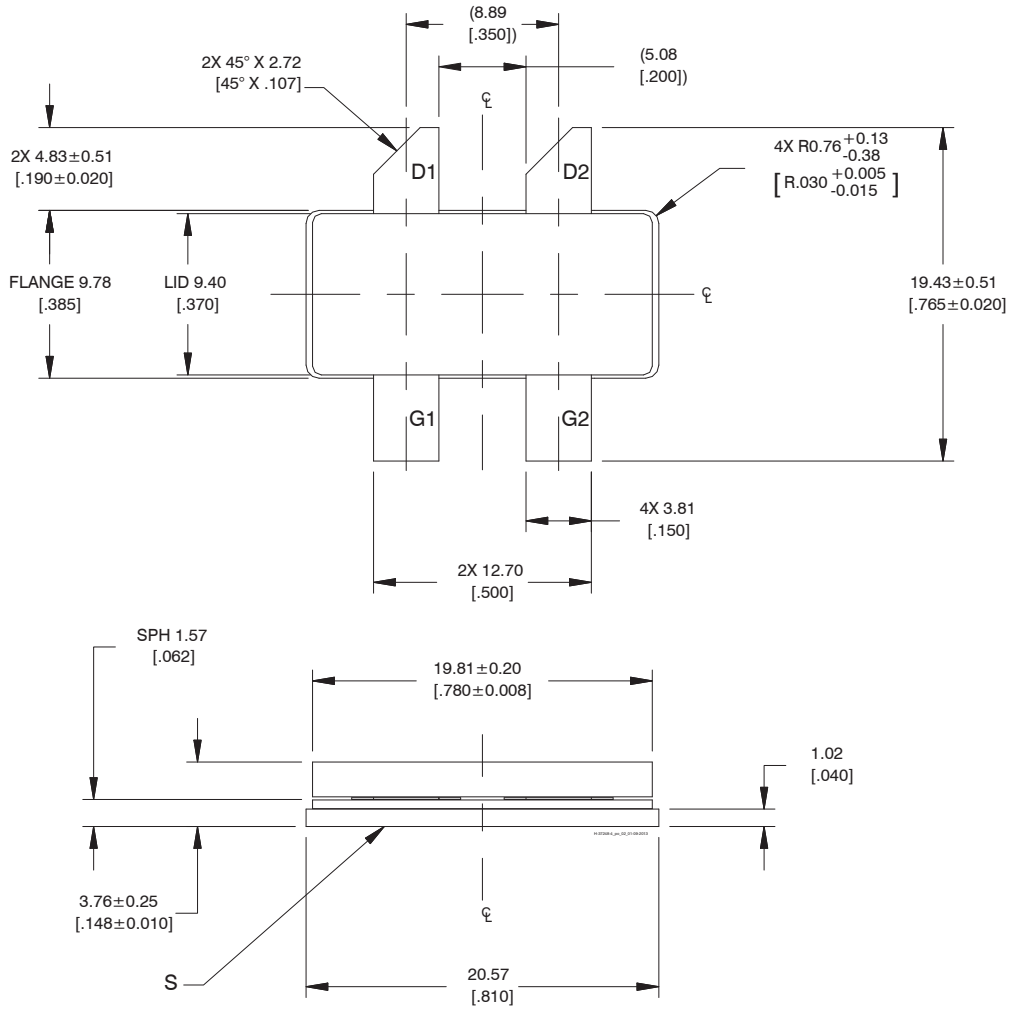


Diagram Notes—unless otherwise specified:

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	2014-07-22	Advance	All	Data Sheet reflects advance specification for product development
02	2015-03-27	Production	All All	Data Sheet reflects released product specification Revised all data and includes updated final specs, typical performance graphs, loadpull, reference circuit, package outline
02.1	2016-06-10	Production	2	Updated ordering code to R0
03	2018-06-22	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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