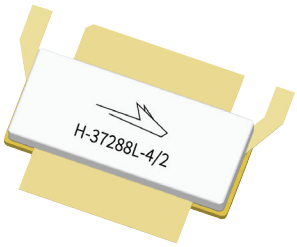
PTFB092707FH

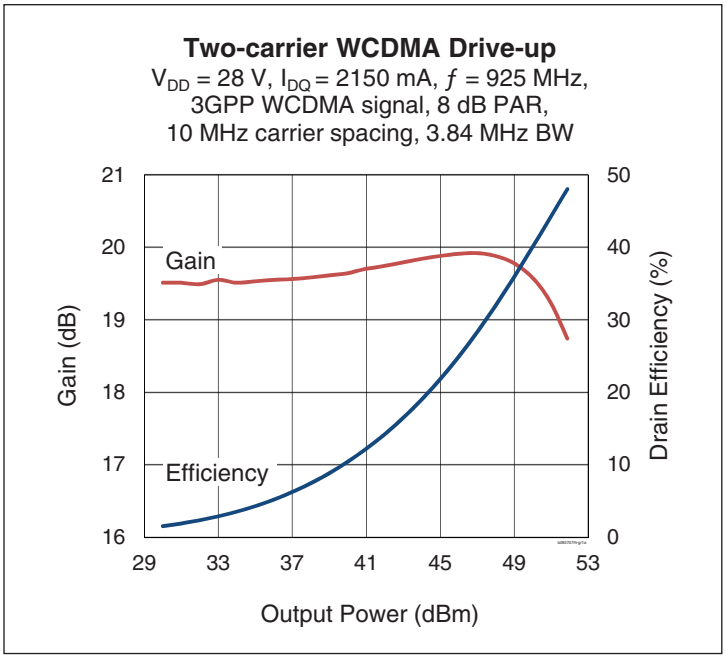
Thermally-Enhanced High Power RF LDMOS FET
270 W, 28 V, 925 – 960 MHz

Description

The PTFB092707FH is a 270-watt LDMOS FET intended for use in multi-standard cellular power amplifier applications in the 925 to 960 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.



PTFB092707FH
Package H-37288L-4/2



Features

- Broadband internal input and output matching
- Typical pulsed CW performance (10 µs pulse width10%, duty cycle, class AB), 960 MHz, 28 V
  - Output power at P_{1dB} = 250 W
  - Efficiency = 52%
  - Gain = 18.5 dB
- Typical single-carrier WCDMA performance, 960 MHz, 28 V, 7.5 dB PAR @ 0.01% CCDF,
  - Output power = 63 W
  - Efficiency = 33%
  - Gain = 19.5 dB
  - ACPR = –35 dBc @ 3.84 MHz
- Capable of handling 10:1 VSWR @28 V, 220 W (CW) output power
- Integrated ESD protection
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Two-carrier WCDMA Specifications (tested in Wolfspeed test fixture)

V_{DD} = 28 V, I_{DQ} = 2150 mA, P_{OUT} = 60 W avg, f = 960 MHz, 3GPP signal, 3.84 MHz channel bandwidth, 8 dB peak/average @ 0.01% CCDF, 10 MHz spacing

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	18	19	—	dB
Drain Efficiency	η_D	28	29	—	%
Intermodulation Distortion	IMD	—	–34	–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	$R_{DS(on)}$	—	0.05	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 2150 mA	V_{GS}	2.5	3.9	4.5	V

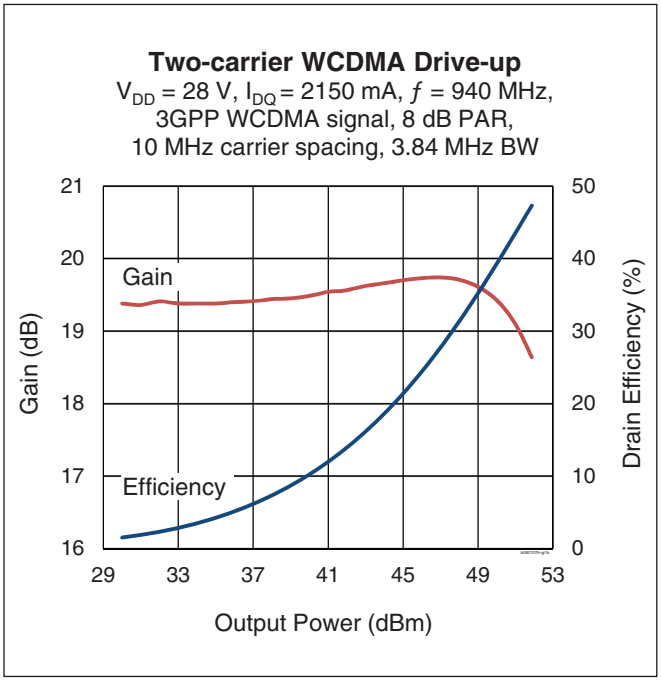
Maximum Ratings

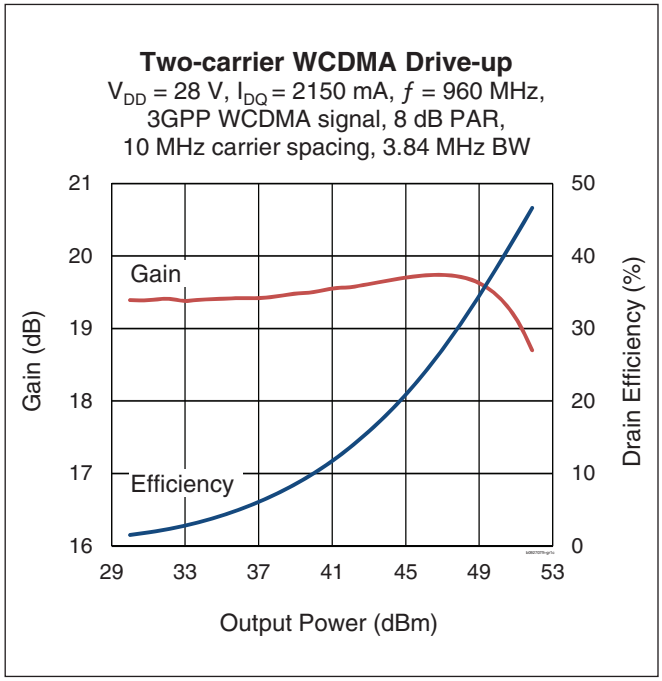
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–40 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 220 W CW)	$R_{\theta JC}$	0.214	°C/W

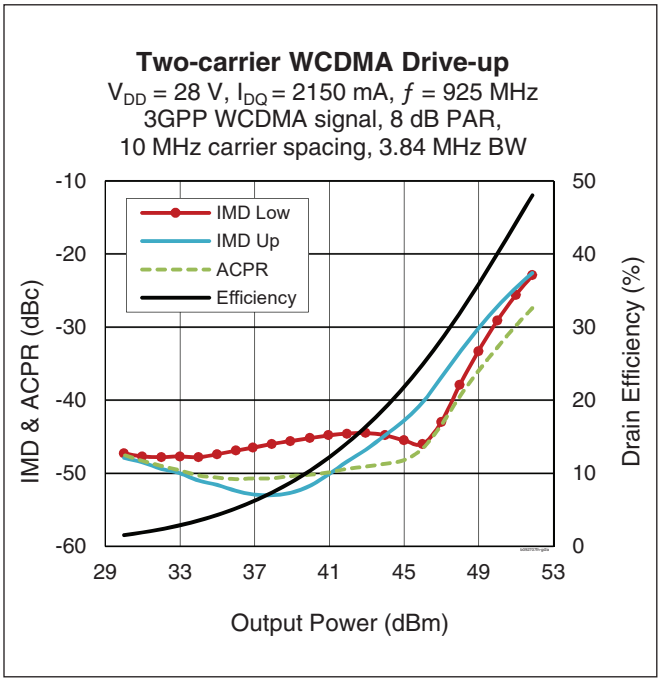
Ordering Information

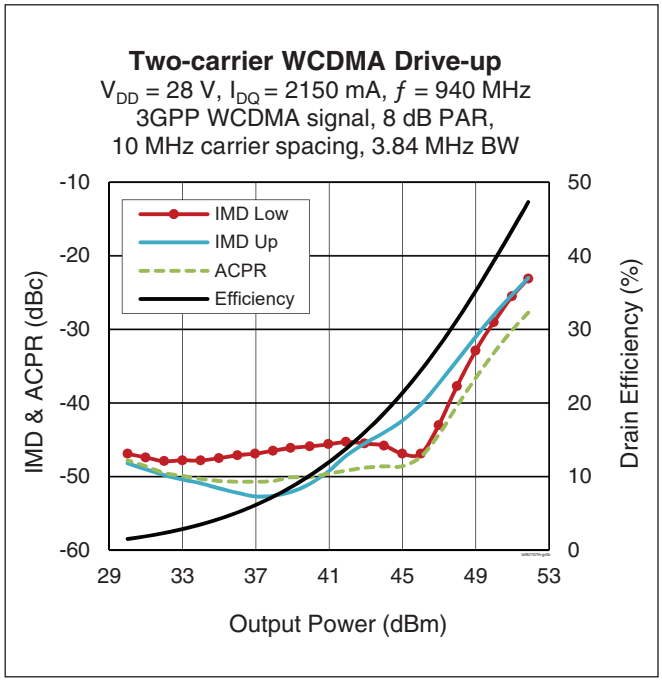
Type and Version	Order Code	Package and Description	Shipping
PTFB092707FH V1 R0	PTFB092707FH-V1-R0	H-37288L-4/2, earless flange	Tape & Reel, 50 pcs
PTFB092707FH V1 R250	PTFB092707FH-V1-R250	H-37288L-4/2, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in an Wolfspeed test fixture)



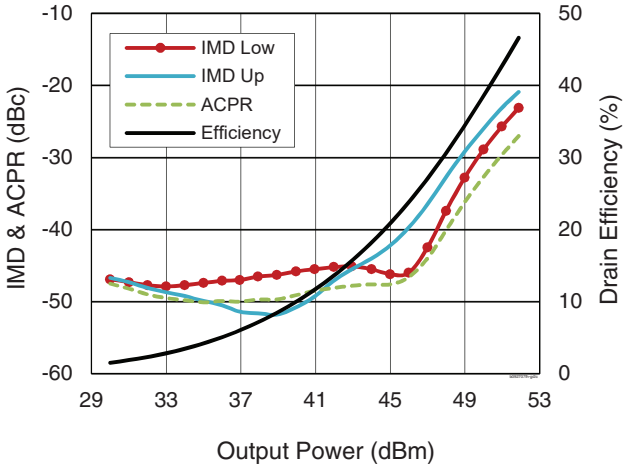






Typical Performance (cont.)

Two-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 2150 mA, f = 960 MHz
3GPP WCDMA signal, 8 dB PAR,
10 MHz carrier spacing, 3.84 MHz BW



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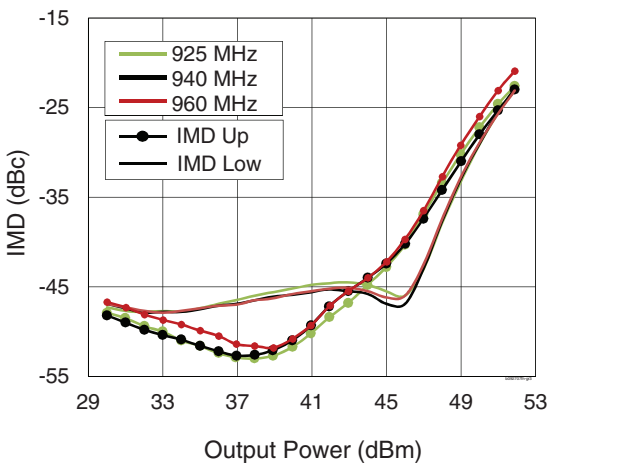
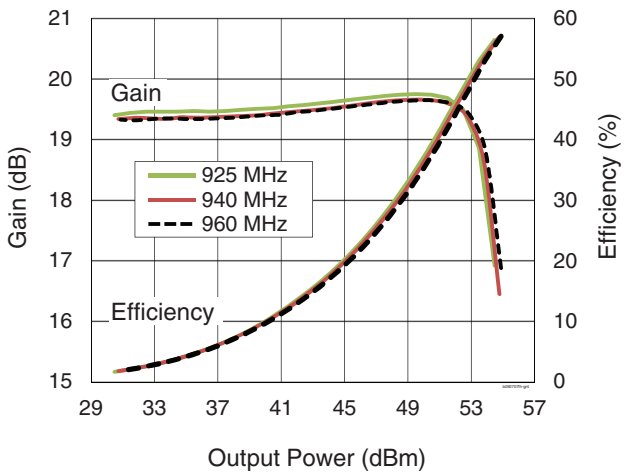
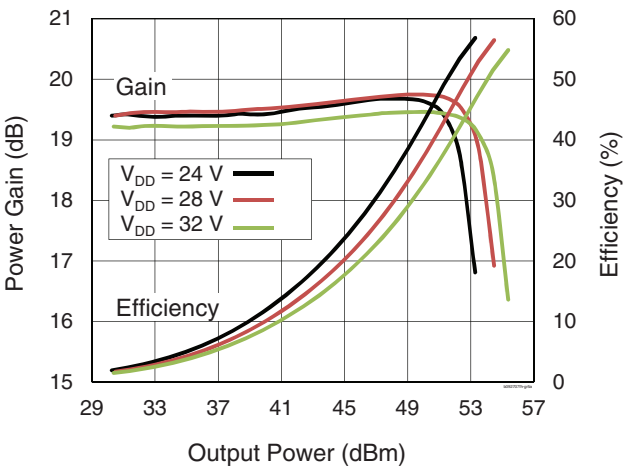


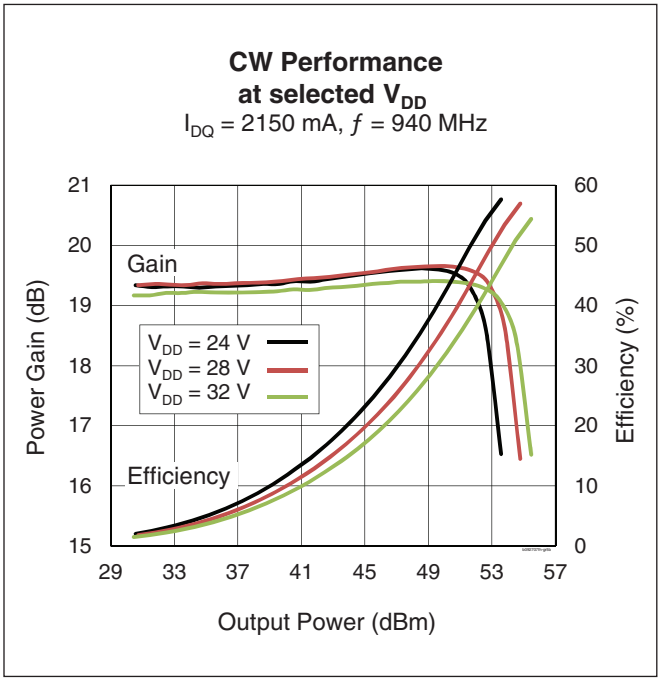
CW Performance
V_{DD} = 28 V, I_{DQ} = 2150 mA

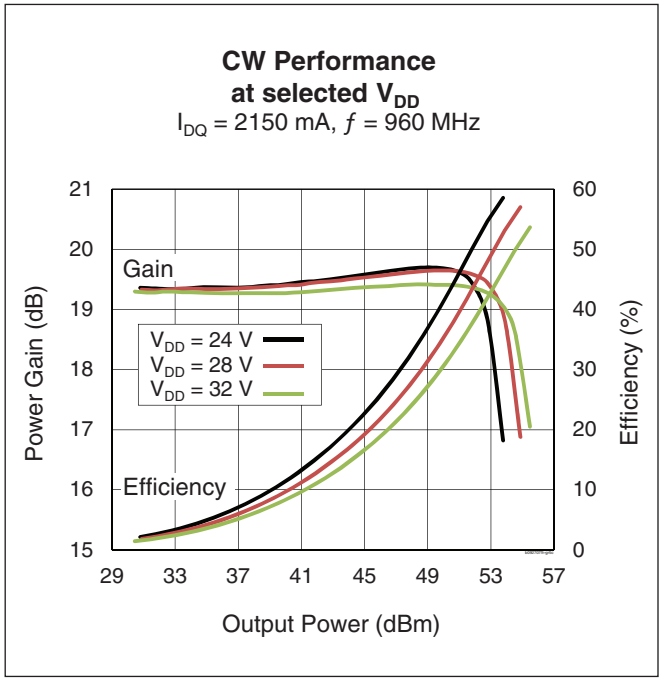


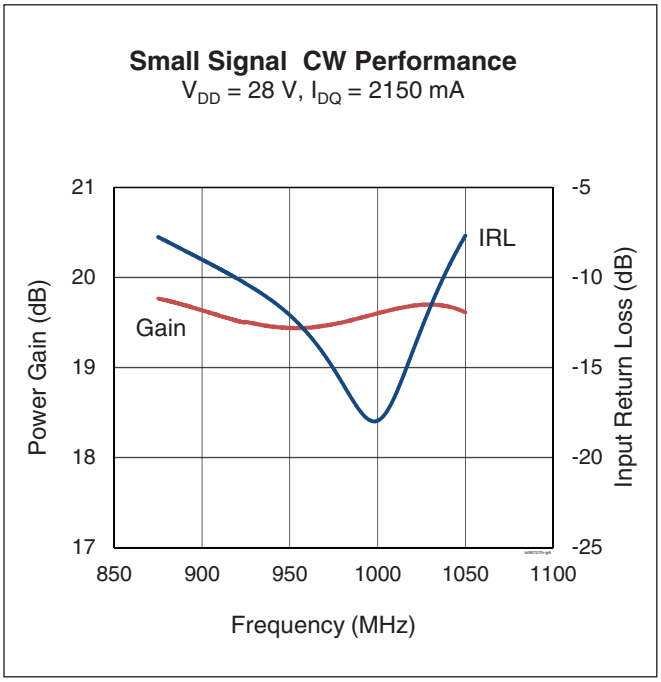
CW Performance
at selected V_{DD}
I_{DQ} = 2150 mA, f = 925 MHz



Typical Performance (cont.)

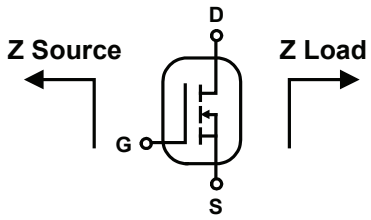






Broadband Circuit Impedance

Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
900	1.52	–1.80	0.98	–1.65
920	1.55	–1.69	0.89	–1.54
940	1.59	–1.60	0.82	–1.42
960	1.63	–1.53	0.74	–1.29
980	1.65	–1.48	0.67	–1.16



Load Pull Performance

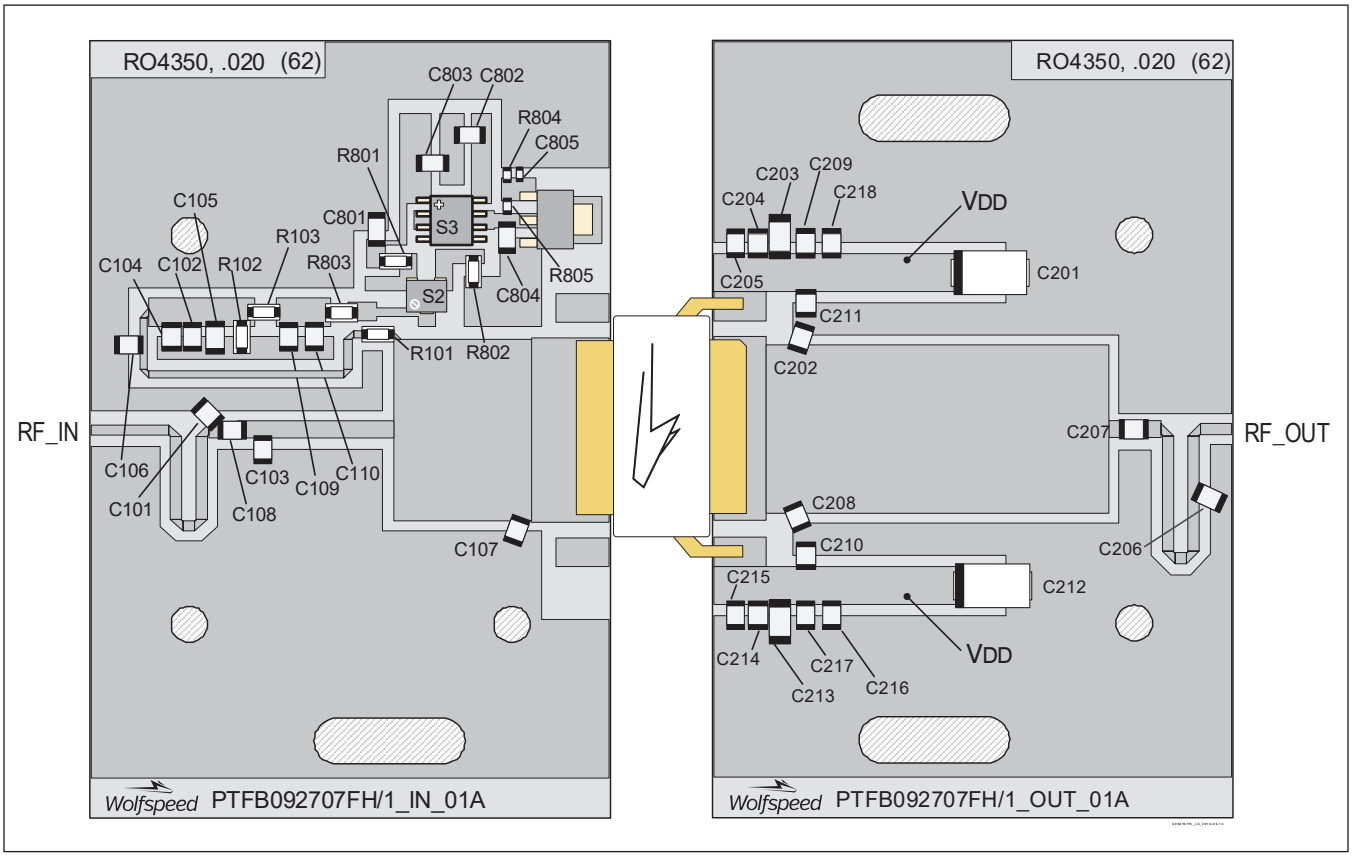
Pulsed CW signal: 10 µsec, 10% duty cycle, 28 V, 2.0 A

		P_{1dB}									
Class AB		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 [%]
920	1.62 – j2.25	0.88 – j1.37	17.3	54.26	267	42.9	2.16 – j0.22	20.8	52.02	159	62.1
940	1.80 – j2.54	0.76 – j1.49	17.0	54.38	274	41.4	2.38 – j0.50	20.9	51.87	154	61.8
960	1.73 – j2.59	0.73 – j1.46	17.4	54.38	274	41.4	2.09 – j0.64	20.8	52.02	159	60.3

Reference Circuit, tuned for 925 – 960 MHz

DUT	PTFB092707FH V1
Reference Circuit Part No.	LTN/PTFB092707FH V1
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, ε_r = 3.66
Find Gerber files for this reference fixture on the Wolfspeed Web site (**www.wolfspeed.com/RF**)	

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Assembly Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101	Chip capacitor, 1 pF	ATC	ATC100B1R0CW500XB
C102	Chip capacitor, 0.002 µF	ATC	ATC200B203MW50X
C103	Chip capacitor, 4.7 pF	ATC	ATC100B4R7CW500XB
C104	Chip capacitor, 33 pF	ATC	ATC100B330JW
C105	Capacitor 4.7 µF	Nichicon	F931C475MAA
C106, C108	Chip capacitor, 56 pF	ATC	ATC100B560JT
C107	Chip capacitor, 12 pF	ATC	ATC100B120JW
C109	Chip capacitor, 4.7 pF	ATC	ATC100B4R7CT
C110	Chip capacitor, 0.01 µF	ATC	ATC200B103MW50X
C801, C804	Chip capacitor, 0.1 µF	Panasonic Electronic Components	ECJ-3VB1H104K
C802, C803, C805	Chip capacitor, 0.001 µF	Panasonic	ECJ-1VB1H102K
R101, R801, R803	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R102, R103	Resistor, 20 Ω	Panasonic Electronic Components	ERJ-8GEYJ200V
R802	Resistor, 1k Ω	Panasonic Electronic Components	ERJ-8GEYJ102V
R804	1.3k ohms	Panasonic Electronic Components	ERJ-3GEYJ132V
R805	1.2k ohms	Panasonic Electronic Components	ERJ-3GEYJ122V

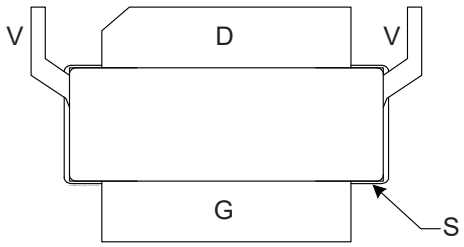
(table cont. next page)

Reference Circuit (cont.)

Assembly Information (cont.)

Component	Description	Suggested Manufacturer	P/N
S1	Transistor	Fairchild Semiconductor	BCP56-10
S2	Potentiometer, 2k Ω	Bourns Inc.	3224W-1-202E
S3	Voltage regulator	Fairchild Semiconductor	LM7805
Output			
C201, C212	Chip capacitor, 10 µF	Matsuo	281M5002106K
C202	Chip capacitor, 2.2 pF	ATC	ATC100B2R2CW
C203, C213	Ceramic capacitor, 1 µF, 250 V	AVX Corporation	2225PC105KAT1A
C204, C205, C214, C215	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C206	Chip capacitor, 4.2 pF	ATC	ATC100B4R2CT
C207	Chip capacitor, 56 pF	ATC	ATC100B560JT
C208	Chip capacitor, 3.3 pF	ATC	ATC100B3R3CW
C209, C216, C217, C218	Ceramic capacitor, 4.7 µF, 50 V	Murata Electronics North America	GRM32ER71H475KA88L
C210, C211	Capacitor, 10k pF	ATC	ATC200B103MW50X

Pinout Diagram (top view)



Pin	Description
D	Drain
G	Gate
S (flange)	Source
V	Supply voltage, V_{DD}

Lead connections for PTFB092707FH

Package Outline Specifications

Package H-37288L-4/2

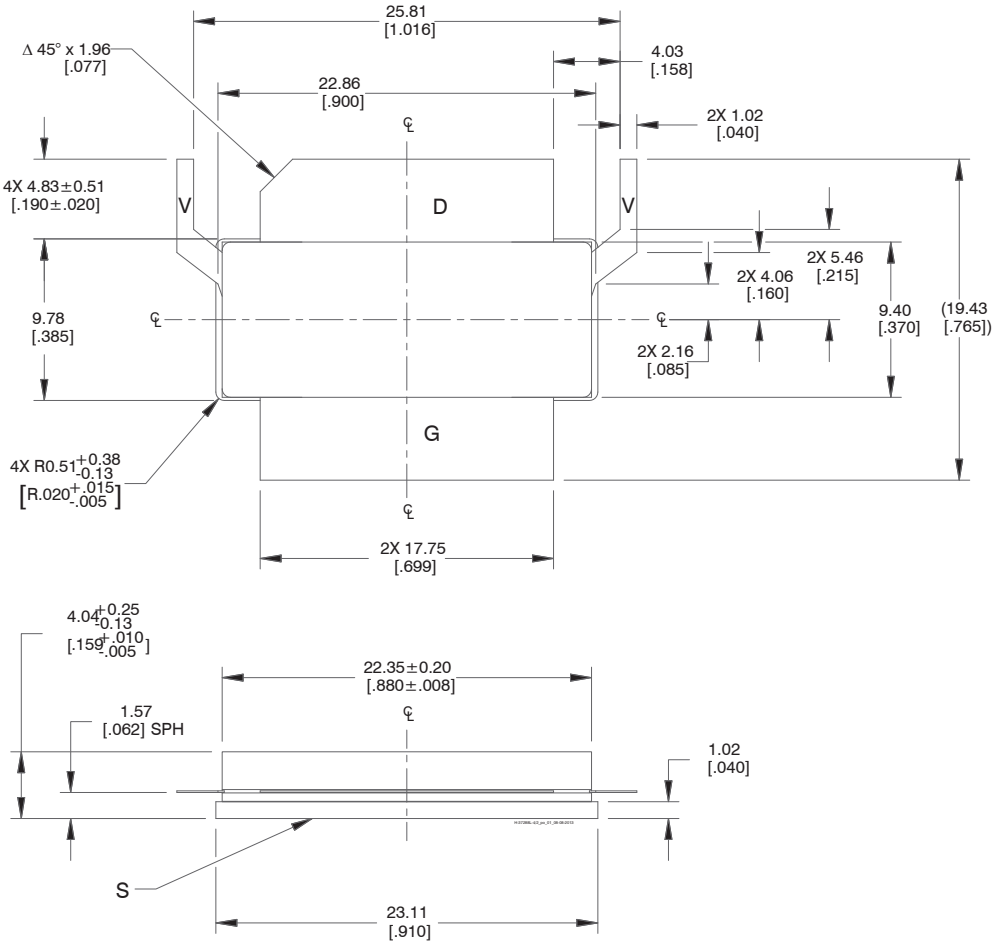


Diagram Notes—unless otherwise specified:

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].
4. Pins: D – drain, G – gate, S (flange) – source, V – V_{DD}.
5. Lead thickness: 0.10 +0.051/–0.025 [.004 +.002/–.001].
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	2011-03-25	Advance	All	New product, proposed only
02	2014-02-25	Advance	All	Package changed, revised all data
03	2014-04-01	Production	All	Data Sheet now represents production-released product specificaitons, including reference circuit and performance information
03.1	2016-06-10	Production	2	Updated ordering code to R0
04	2018-06-13	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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