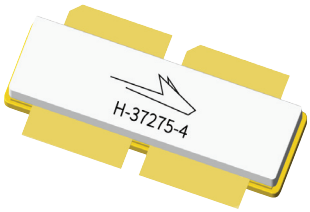
PXAC243502FV

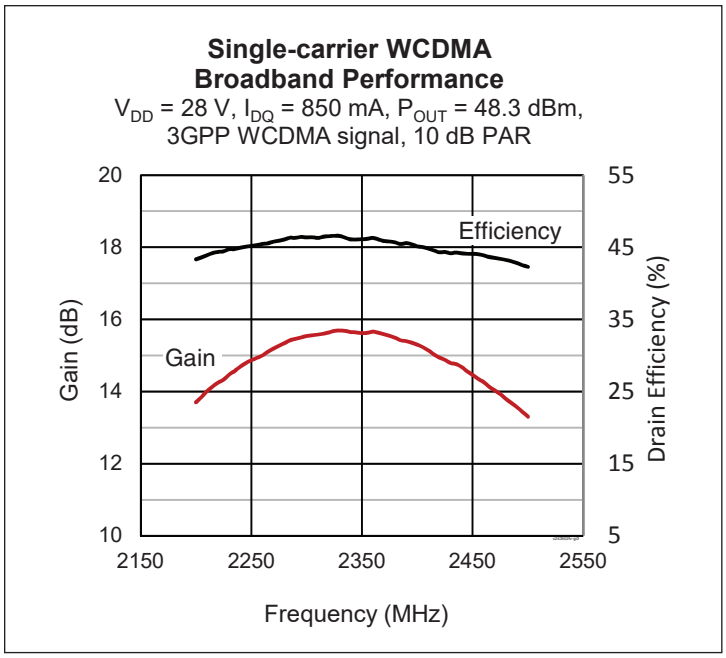
High Power RF LDMOS Field Effect Transistor
350 W, 28 V, 2300 – 2400 MHz

Description

The PXAC243502FV LDMOS FET is a 350-watt LDMOS FET designed for use in power amplifier applications in the 2300 MHz to 2400 MHz frequency band. Features include an asymmetric design with 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.



PXAC243502FV
Package H-37275-4



Features

- Asymmetric design
  - Main: 150 W P1dB
  - Peak: 200 W P1dB
- Broadband internal matching
- CW performance at 2350 MHz, 28 V
  - Ouput power = 250 W P_{1dB}
  - Efficiency = 46%
  - Gain = 16 dB
- Integrated ESD protection
- Human Body Model Class 2 (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS-compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed production test fixture in Doherty configuration)
V_{DD} = 28 V, $V_{GS(peak)}$ = 1.0 V, I_{DQ} = 850 mA, P_{OUT} = 68 W avg, f = 2400 MHz
3GPP WCDMA signal, 3.84 MHz channel bandwidth, 10 dB peak/average @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	14.0	15.0	—	dB
Drain Efficiency	η_D	42	45	—	%
Adjacent Channel Power Ratio	ACPR	—	–32	–26	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	main	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.088	—	Ω
	peak	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.088	—	Ω
Operating Gate Voltage	main	V_{DS} = 28 V, I_{DQ} = 850 mA	V_{GS}	2.3	2.6	3.0	V
	peak	V_{DS} = 28 V, I_{DQ} = 0 mA	V_{GS}	0.8	1.2	1.6	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, 250 W CW)	$R_{\theta JC}$	0.22	°C/W

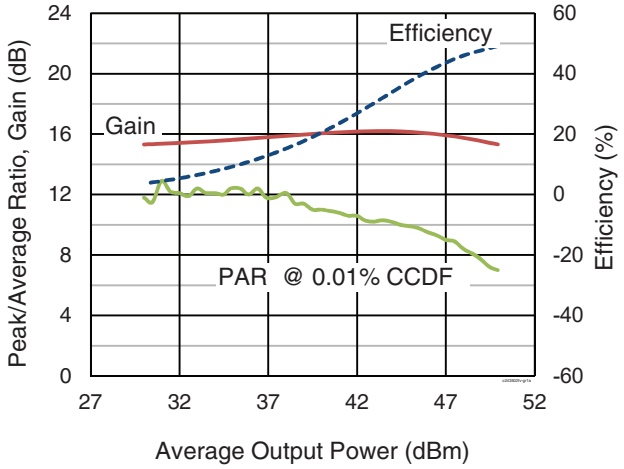
Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PXAC243502FV V1 R0	PXAC243502FV-V1-R0	H-37275-4	Tape & Reel, 50 pcs
PXAC243502FV V1 R250	PXAC243502FV-V1-R250	H-37275-4	Tape & Reel, 250 pcs

Typical RF Performance (data taken in production test fixture)

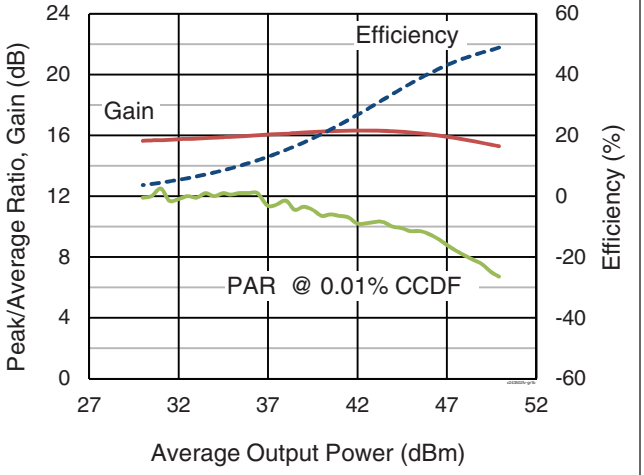
Single-carrier WCDMA Drive-up

V_{DD} = 28 V, I_{DQ} = 850 mA, f = 2300 MHz
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



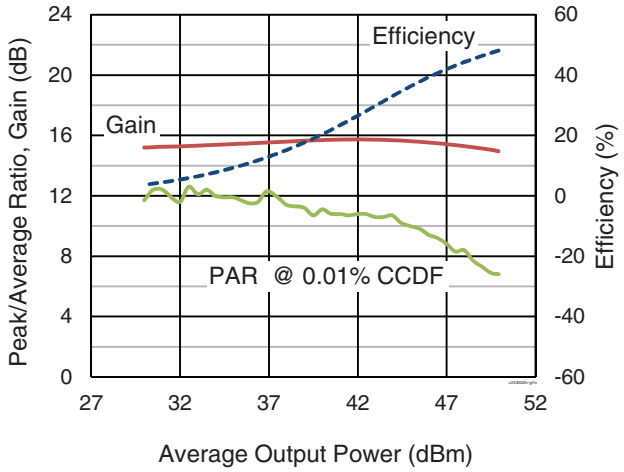
Single-carrier WCDMA Drive-up

V_{DD} = 28 V, I_{DQ} = 850 mA, f = 2350 MHz
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



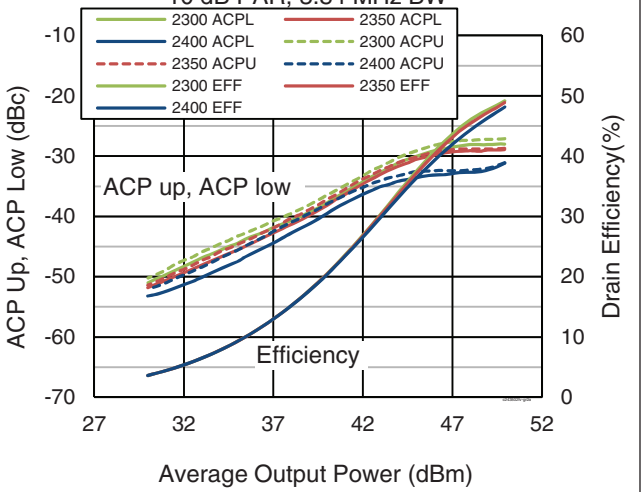
Single-carrier WCDMA Drive-up

V_{DD} = 28 V, I_{DQ} = 850 mA, f = 2400 MHz
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



Single-carrier WCDMA 3GPP Drive-up

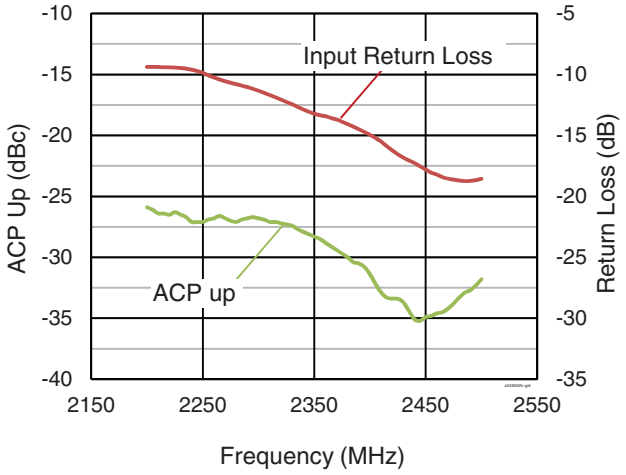
V_{DD} = 28 V, I_{DQ} = 850 mA,
f = 2300 to 2400 MHz. 3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



Typical RF Performance (cont.)

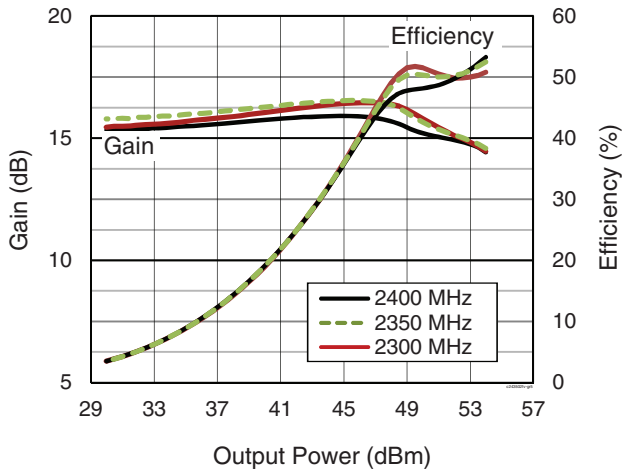
Single-carrier WCDMA Broadband Performance

V_{DD} = 28 V, I_{DQ} = 850 mA, P_{OUT} = 48.3 dBm, 3GPP WCDMA signal, 10 dB PAR



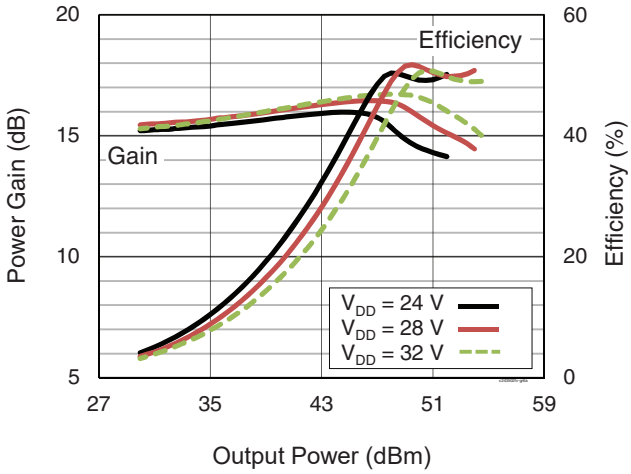
CW Performance

V_{DD} = 28 V, I_{DQ} = 850 mA



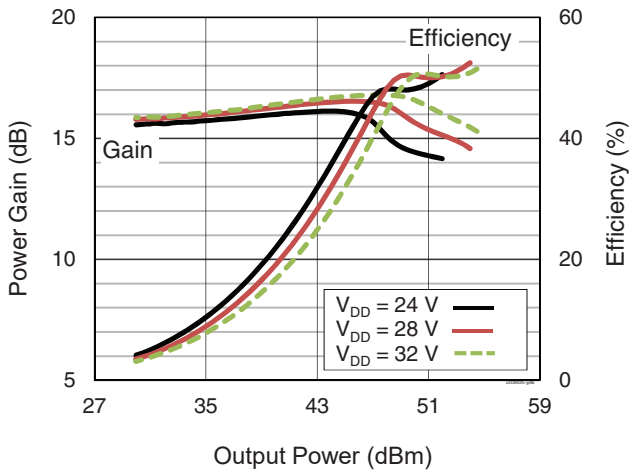
Pulse CW Performance at selected V_{DD}

I_{DQ} = 850 mA, f = 2300 MHz

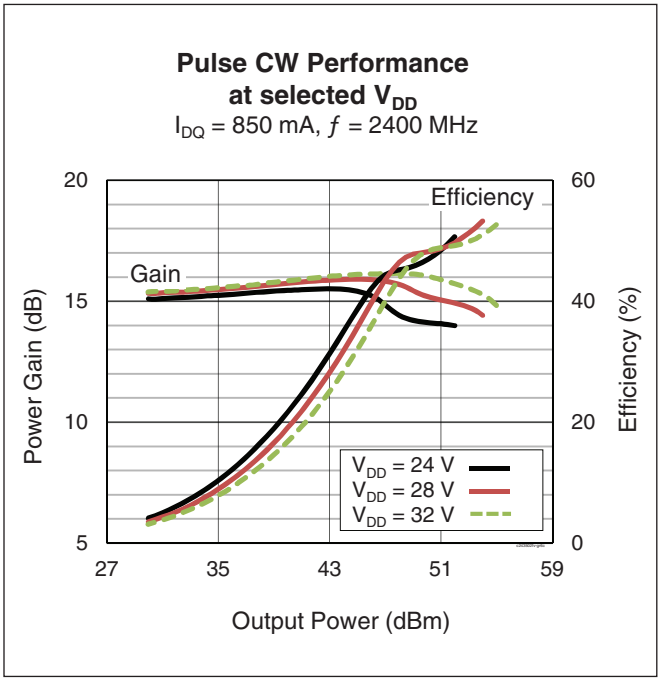


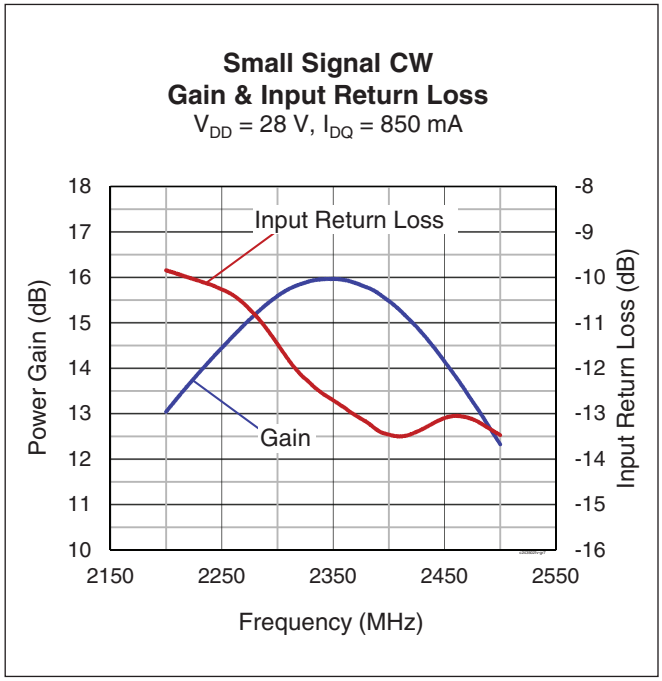
Pulse CW Performance at selected V_{DD}

I_{DQ} = 850 mA, f = 2350 MHz



Typical RF Performance (cont.)





See next page for Load Pull Performance

Load Pull Performance

Main Side – Pulsed CW signal: 160 µsec, 10% duty cycle; V_{DD} = 28 V, I_{DQ} = 850 mA

		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 [%]
2300	6.82 – j9.56	1.28 – j3.64	16.16	52.39	173.38	49.67	2.37 – j2.28	18.79	50.39	109.47	59.01
2350	8.29 – j9.42	1.25 – j3.62	16.44	52.20	165.96	49.05	1.97 – j2.50	18.63	50.66	116.49	57.37
2400	10.06 – j7.29	1.30 – j3.61	16.46	51.82	152.05	45.61	1.99 – j2.24	18.90	50.15	103.49	54.87

Peak Side – Pulsed CW signal: 160 µsec, 10% duty cycle; V_{DD} = 28 V, I_{DQ} = 1350 mA

		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 [%]
2300	3.27 – j6.01	2.09 – j3.76	17.42	53.03	200.91	48.19	1.43 – j2.25	19.79	51.17	130.98	55.51
2350	4.08 – j6.00	2.03 – j3.86	17.54	52.77	189.23	45.76	1.33 – j2.63	19.82	51.31	135.33	53.60
2400	5.14 – j6.25	1.90 – j3.64	18.08	52.61	182.39	45.91	1.49 – j2.71	20.01	51.45	139.57	51.41

Peak Side – Pulsed CW signal: 160 µsec, 10% duty cycle; V_{DD} = 28 V, $V_{GS(peak)}$ = 1.5 V

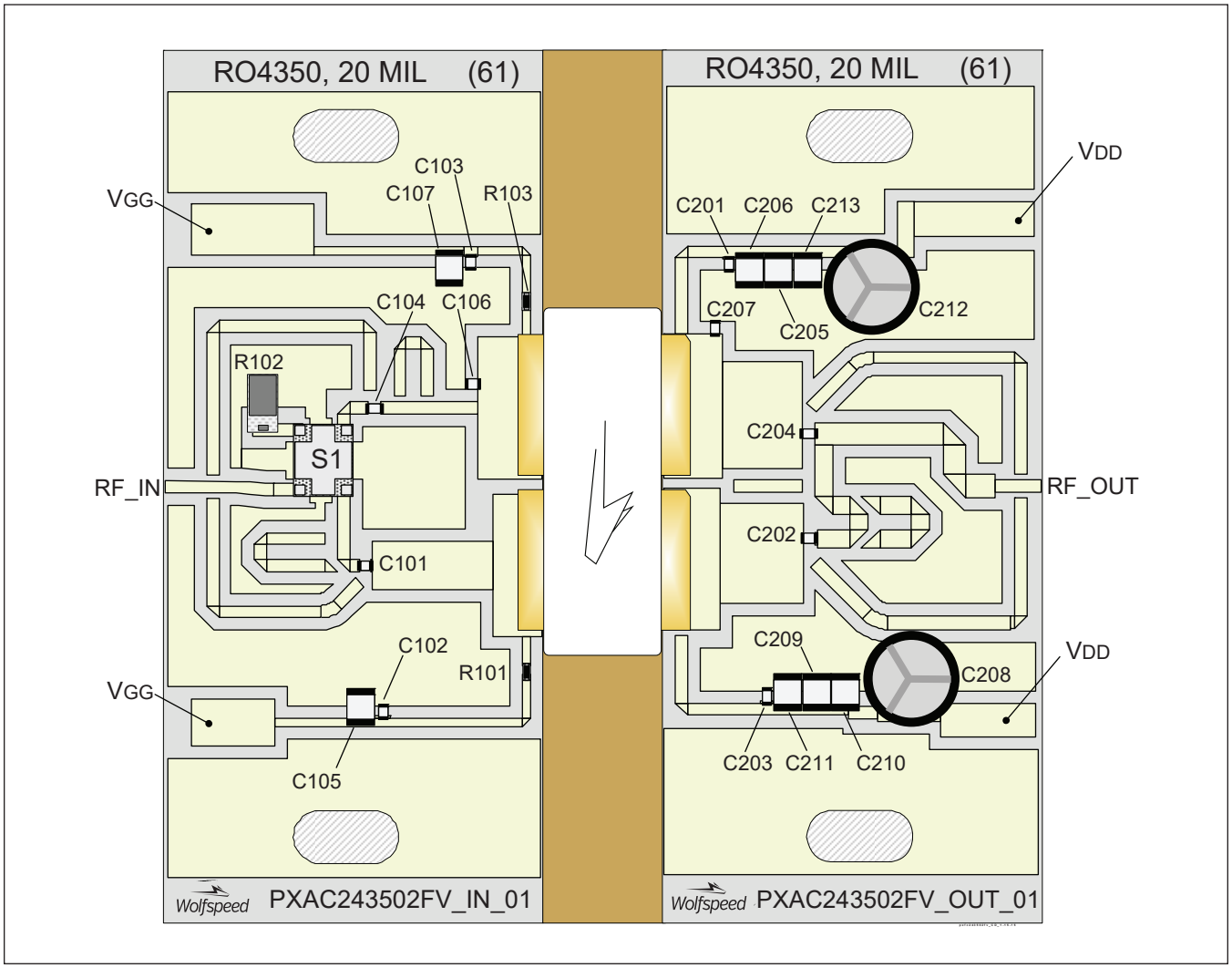
		P_{1dB}									
Class C		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]
2300	3.27 – j6.01	1.67 – j4.02	12.90	53.71	234.96	50.13	1.42 – j2.66	14.27	52.51	178.28	59.99
2350	4.08 – j6.00	1.62 – j4.07	13.16	53.57	227.51	50.21	1.37 – j2.69	14.53	51.75	149.62	58.18
2400	5.14 – j6.25	1.96 – j4.15	13.39	53.43	220.29	48.66	1.47 – j2.71	14.74	51.79	150.83	56.64

Reference Circuit, 2300 to 2400 MHz

DUT	PXAC243502FV V1
Test Fixture Part No.	LTA/PXAC243502FV 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 at (**http://www.wolfspeed.com/RF**)

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Manufacturer	Part Number
Input			
C101, C102, C103, C104	Capacitor, 15 pF	ATC	ATC600F150JT250XT
C105, C107	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C106	Capacitor, 0.5 pF	ATC	ATC600F0R5BT250XT
R101, R103	Chip resistor, 10 ohms	Panasonic Electronic Components	ERJ-3GEYJ100V
R102	Chip resistor, 50 ohms	Anaren	C16A50Z4
S1	Hybrid coupler	Anaren	X3C25P1-02S

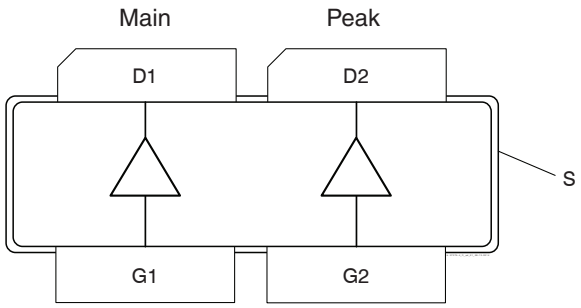
(table cont. next page)

Reference Circuit (cont.)

Component Information (cont.)

Component	Description	Manufacturer	Part Number
Output			
C201, C203	Capacitor, 15 pF	ATC	ATC600F150JT250XT
C207	Capacitor, 0.8 pF	ATC	ATC600F0R8BT250XT
C204	Capacitor, 3 pF	ATC	ATC600F3R0BT250XT
C202	Capacitor, 3.9 pF	ATC	ATC600F3R9BT250XT
C205, C206, C209, C210, C211, C213	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C212, C208	Capacitor, 220 µF	Panasonic Electronic Components	EEE-FP1V221AP

Pinout Diagram (top view)



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

Package Outline Specifications

Package H-37275-4

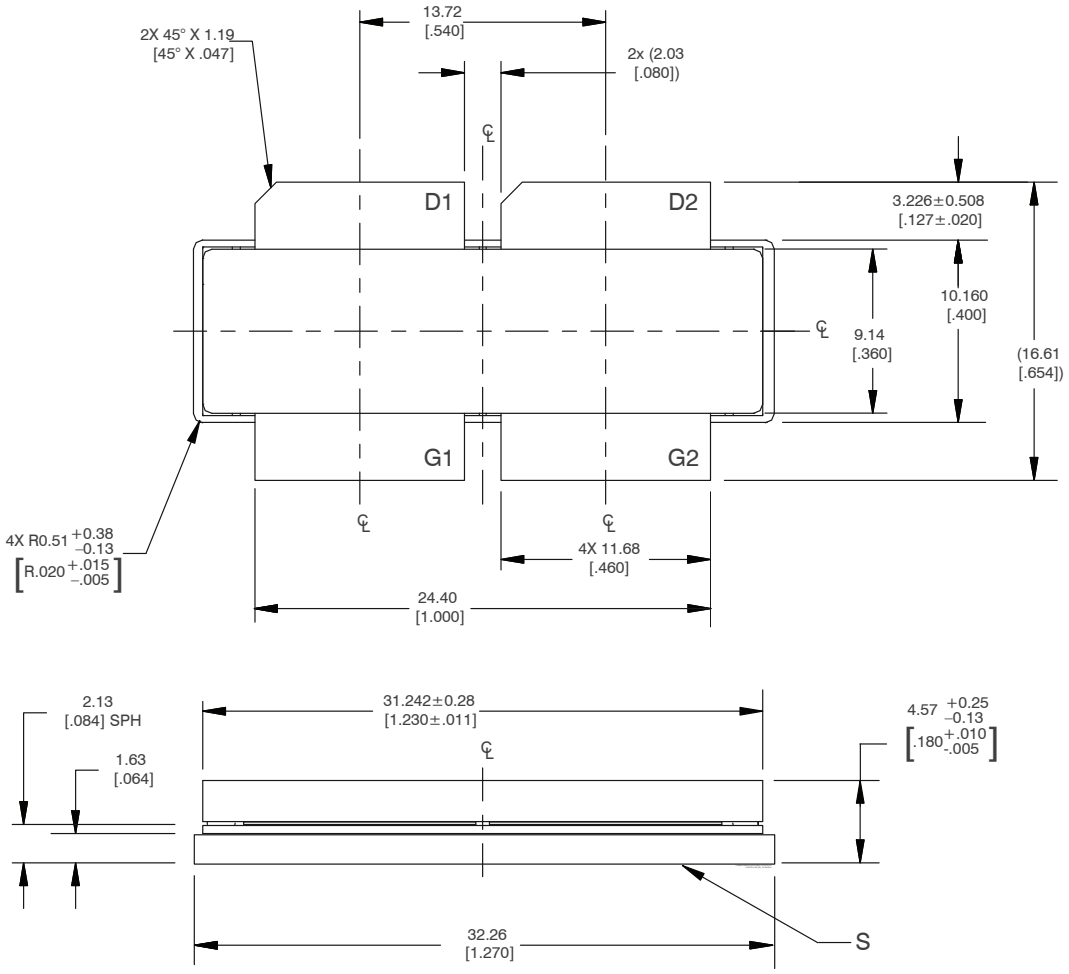


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.13 [0.005].
4. Pins: D1, D2 – drain; G1, G2 – gate; S (flange) – source.
5. Lead thickness: 0.127 ± 0.001 [.005 ±0.002].
6. Gold plating thickness: 1.1 ± 0.38 micron [45 ± 15 microinch].

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2013-03-05	Advance	All	Proposed specification for new product development.
02	2014-12-24	Producton	All	Includes released-product specifications, including performance graphs and load pull data.
03	2015-01-16	Production	6 – 8	Include reference circuit information.
03.1	2015-04-13	Production	1, 2	Update RF and DC tables. Removed 1C WCDMA performance from Features, added HBM rating. Updated ordering table.
03.2	2016-06-22	Production	2	Updated ordering information.
04	2018-07-03	Production	All	Converted to Wolfspeed Data Sheet.

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Notes

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