

# PXAC241702FC

## Thermally-Enhanced High Power RF LDMOS FET 150 W, 28 V, 2300 – 2400 MHz

### Description

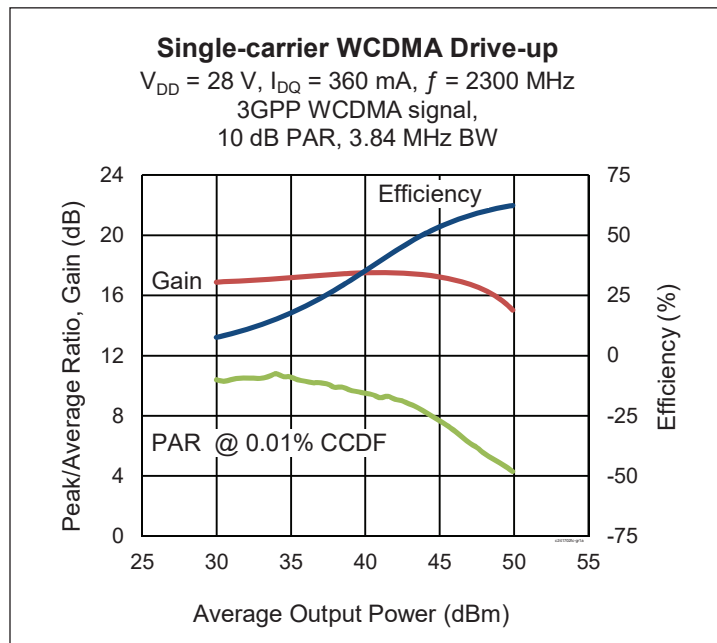
The PXAC241702FC is a 28 V LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 2300 to 2400 MHz frequency band. Features include dual-path design, high gain and thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC241702FC  
Package H-37248-4

### Features

- Asymmetrical Doherty design
  - Main:  $P_{1dB} = 60$  W Typ
  - Peak:  $P_{1dB} = 90$  W Typ
- Broadband internal input and output matching
- Typical pulsed CW performance, 2350 MHz, 28 V, Doherty configuration
  - Output power at  $P_{1dB} = 100$  W
  - Efficiency = 49%
  - Gain = 17.5 dB
- Integrated ESD protection: Human Body Model, Class 1C (per JESD22-A114)
- Capable of handling 10:1 VSWR @28 V, 120 W (CW) output power
- Low thermal resistance
- Pb-free and RoHS compliant



### RF Characteristics

#### Single-carrier WCDMA Specifications (tested in Wolfspeed Doherty test fixture)

$V_{DD} = 28$  V,  $I_{DQ(main)} = 360$  mA,  $V_{GS(peak)} = 1.2$  V,  $P_{OUT} = 28$  W avg,  $f = 2400$  MHz, 3GPP signal, 3.84 MHz channel bandwidth, 10 dB peak/average @ 0.01% probability on CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	15.5	16.5	—	dB
Drain Efficiency	$\eta_D$	46	52	—	%
Adjacent Channel Power Ratio	ACPR	—	-33.5	-28.0	dBc
Output PAR (at 0.01% probability on CCDF)	OPAR	6.5	7.5	—	dB

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	(main) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.19	—	$\Omega$
	(peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.16	—	$\Omega$
Operating Gate Voltage	(main) $V_{DS} = 28\text{ V}, I_{DQ} = 360\text{ mA}$	$V_{GS}$	2.3	2.65	3.0	V
	(peak) $V_{DS} = 28\text{ V}, I_{DQ} = 0\text{ mA}$	$V_{GS}$	0.8	1.30	1.8	V

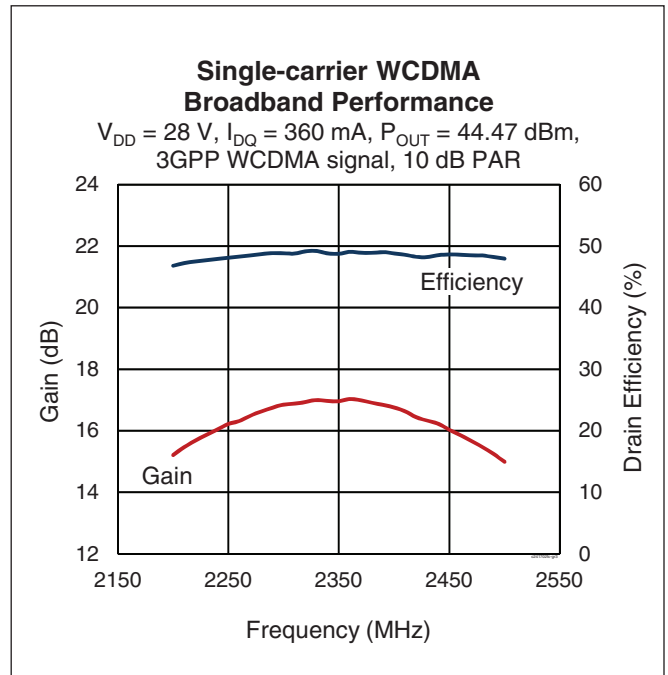
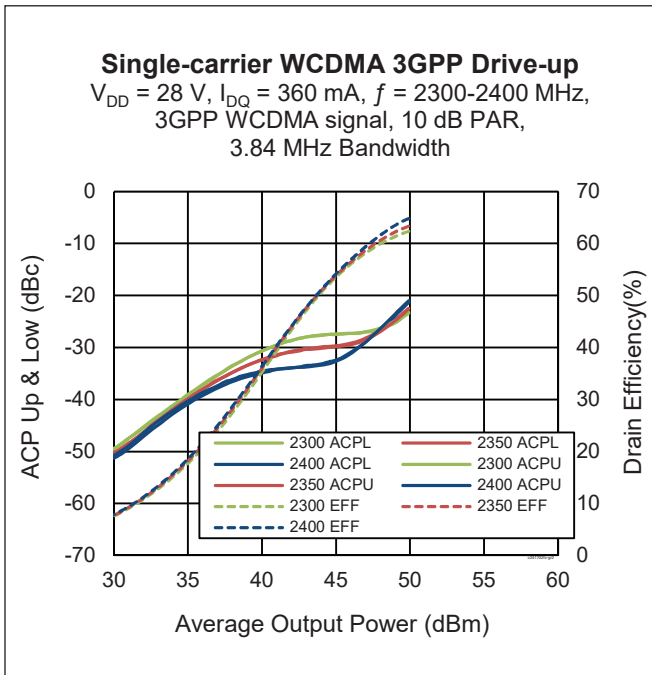
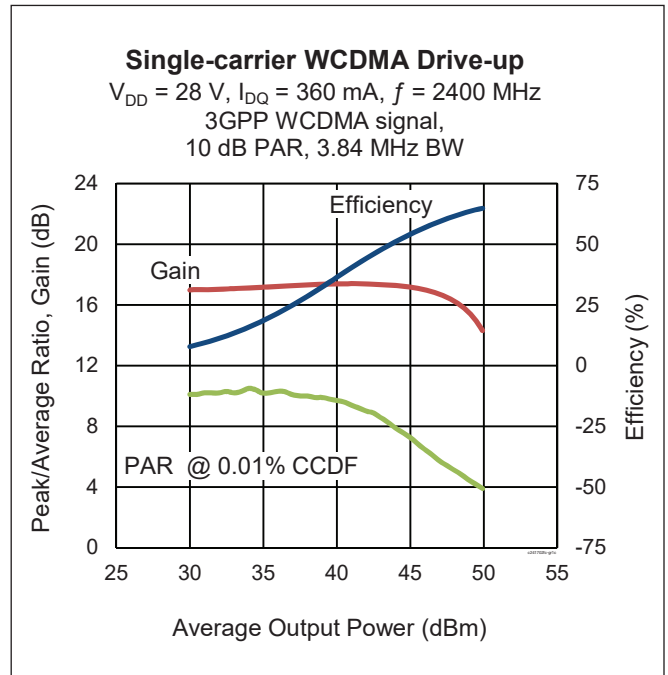
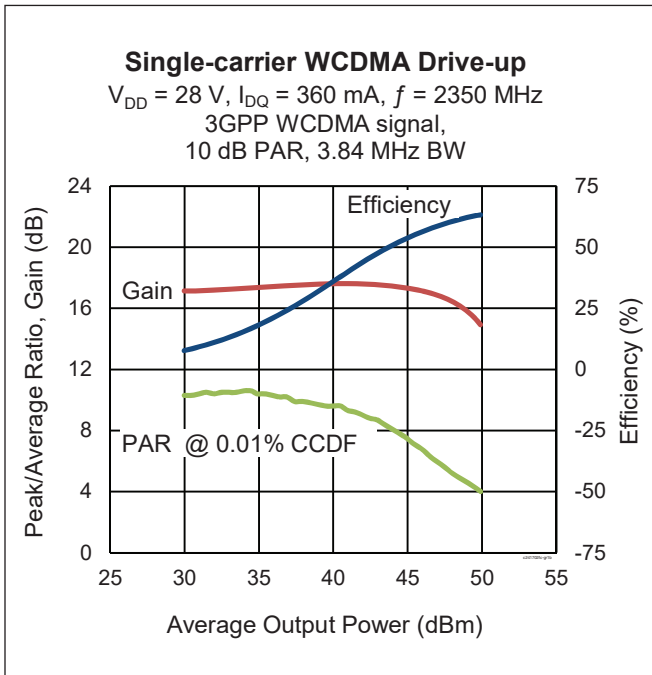
**Maximum Ratings**

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 ( $T_{CASE} = 70^{\circ}\text{C}, 100\text{ W CW}$ )	$R_{\theta JC}$	0.53	$^{\circ}\text{C/W}$

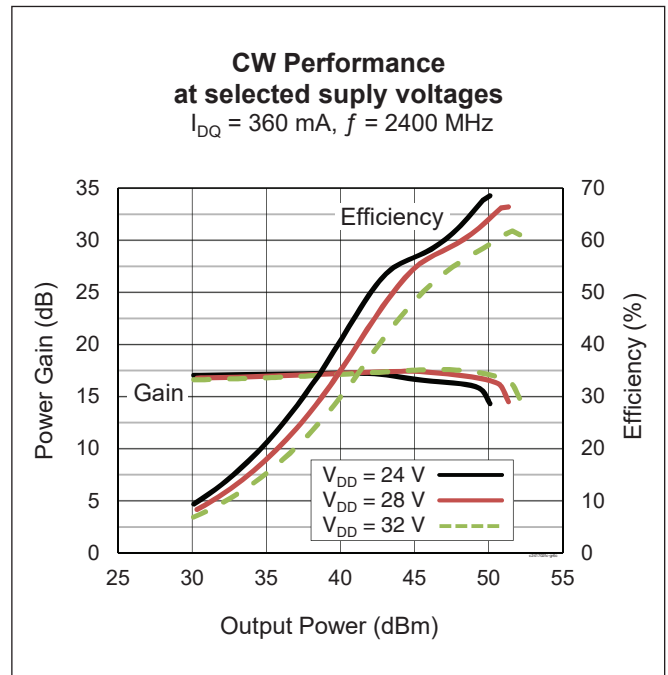
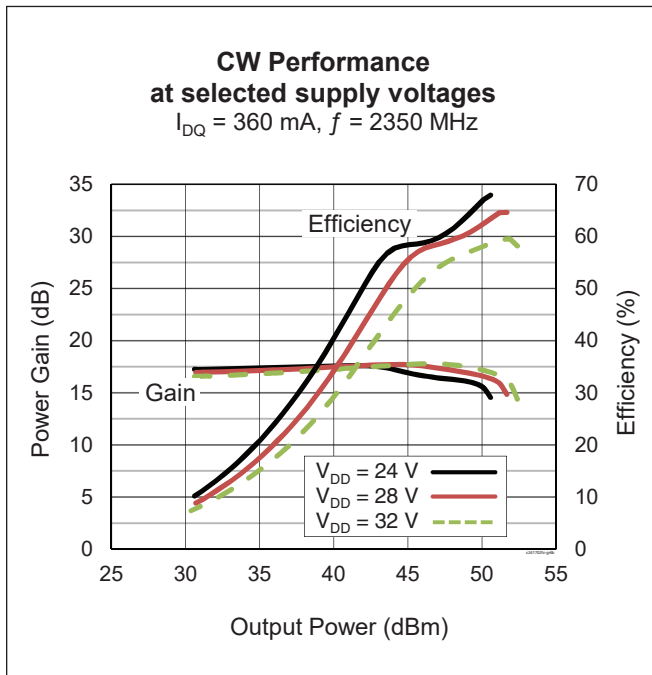
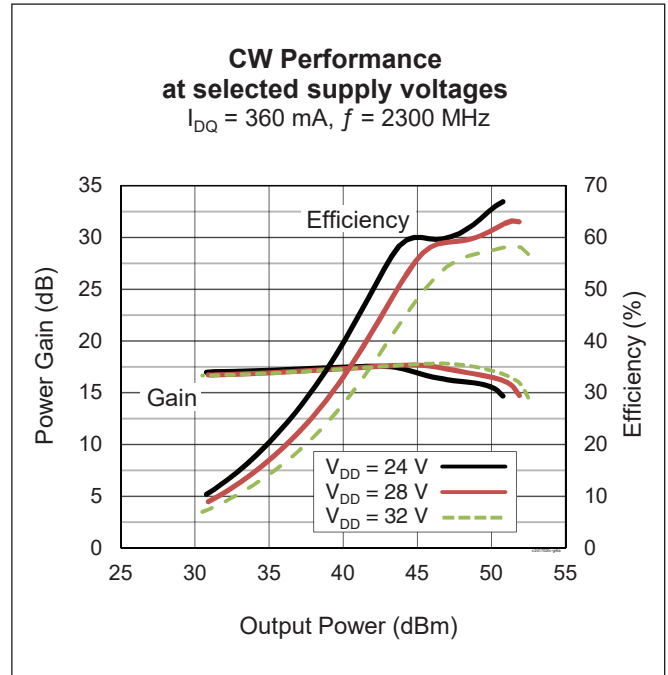
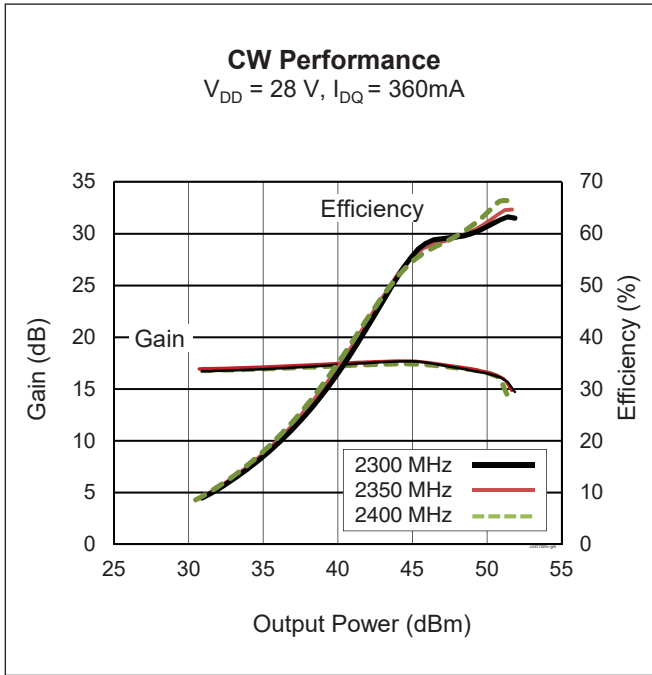
**Ordering Information**

Type and Version	Order Code	Package and Description	Shipping
PXAC241702FC V1 R0	PXAC241702FC-V1-R0	H-37248-4, ceramic open-cavity, push-pull, earless	Tape & Reel, 50 pcs
PXAC241702FC V1 R250	PXAC241702FC-V1-R250	H-37248-4, ceramic open-cavity, push-pull, earless	Tape & Reel, 250 pcs

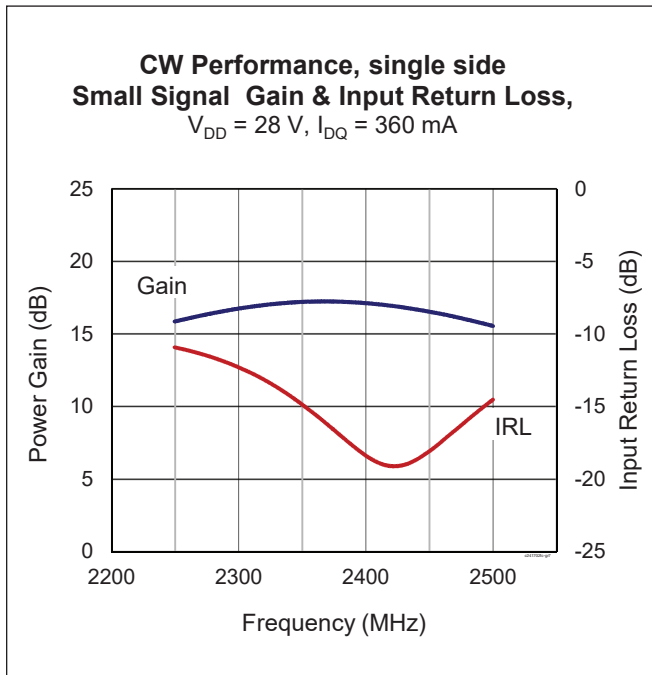
**Typical Performance** (data taken in an Wolfspeed production test fixture)



Typical Performance (cont.)



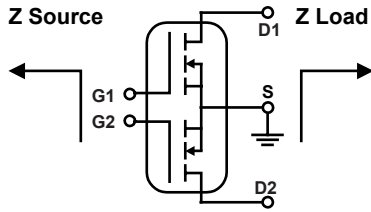
**Typical Performance** (cont.)



See next page for load pull performance



### Load Pull Performance



Main side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 360 mA

Class AB		P <sub>1dB</sub>										
		Max Output Power					Max Efficiency					
Freq [MHz]	Z <sub>in</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	
2300	7.02 – j16.25	18.46	48.25	48.26	66.99	3.70 – j5.99	21.09	60.29	46.10	40.78	7.31 – j2.51	
2350	8.74 – j17.99	18.55	51.07	48.10	64.57	3.95 – j6.20	21.35	58.44	45.56	35.96	6.07 – j1.30	
2400	12.84 – j19.05	18.51	49.06	47.87	61.24	4.07 – j6.49	21.28	58.55	45.90	38.91	5.53 – j1.93	

Peak side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 540 mA

Class AB		P <sub>1dB</sub>										
		Max Output Power					Max Efficiency					
Freq [MHz]	Z <sub>in</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	
2300	6.20 – j13.36	17.67	52.03	50.03	100.69	2.61 – j6.18	19.73	59.11	48.52	71.07	4.52 – j4.62	
2350	8.28 – j12.82	17.83	50.54	49.84	96.38	2.65 – j6.19	19.83	56.93	48.23	66.48	4.23 – j4.25	
2400	10.47 – j14.25	17.66	49.75	49.77	94.84	2.52 – j6.34	20.75	56.70	47.17	52.14	4.10 – j2.69	

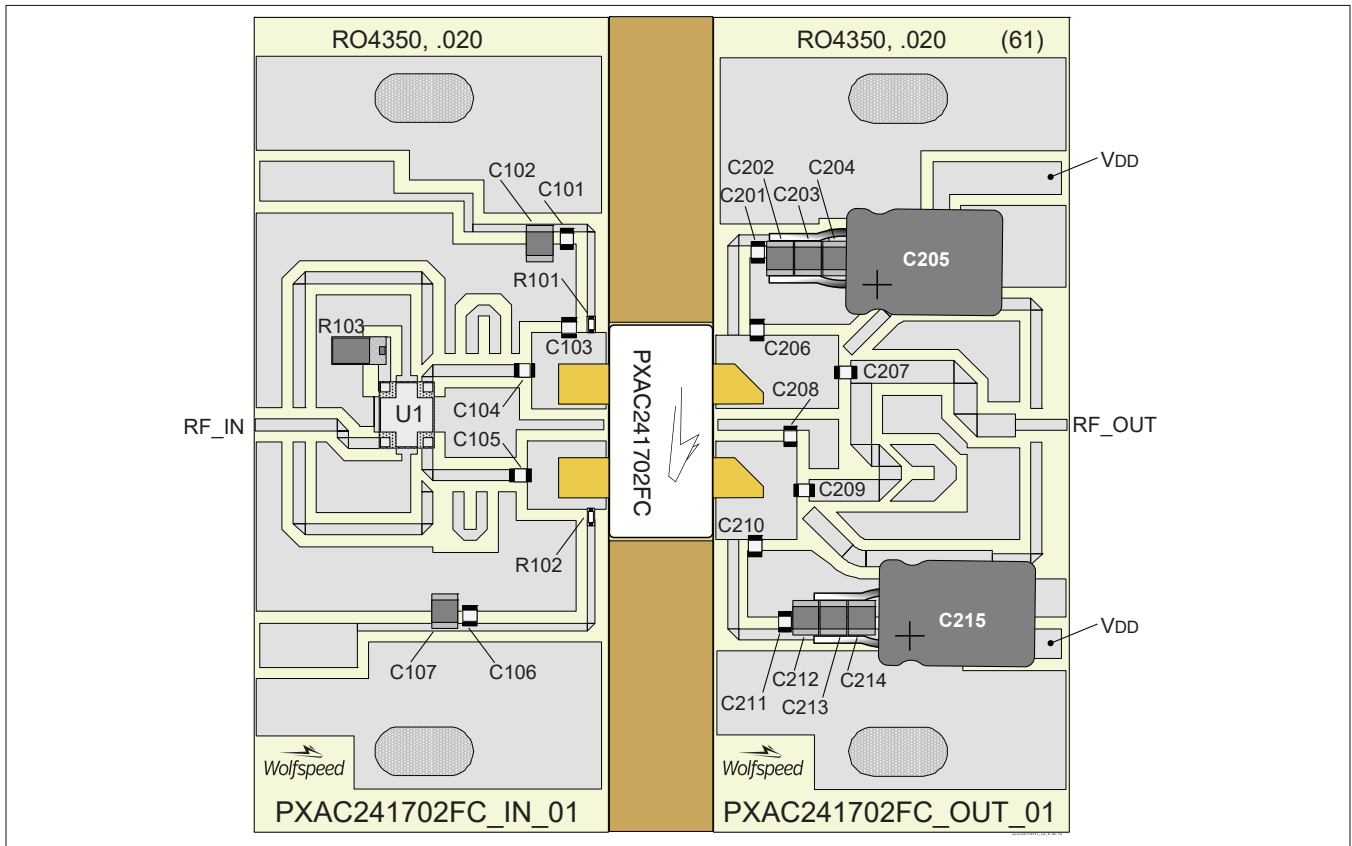
Peak side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, V<sub>G</sub> = 1.5 V

Class C		P <sub>1dB</sub>										
		Max Output Power					Max Efficiency					
Freq [MHz]	Z <sub>in</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	Gain [dB]	PAE [%]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	Z <sub>o</sub> [ $\Omega$ ]	
2300	6.20 – j13.36	14.18	58.22	50.38	109.14	2.47 – j5.92	15.13	64.64	48.83	76.42	4.33 – j4.75	
2350	8.28 – j12.82	13.92	55.03	50.16	103.75	2.45 – j6.22	14.84	61.91	49.20	83.25	3.70 – j5.15	
2400	10.47 – j14.25	14.08	53.80	50.08	101.86	2.31 – j6.36	15.19	60.42	47.54	56.77	4.17 – j3.00	

### Reference Circuit, 2300 MHz to 2400 MHz

DUT	PXAC241702FC V1
Reference Circuit Part No.	LTA/PXAC241702FC V1
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$
Find Gerber files for this reference circuit on the Wolfspeed Web site at <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a>	

**Reference Circuit** (cont.)



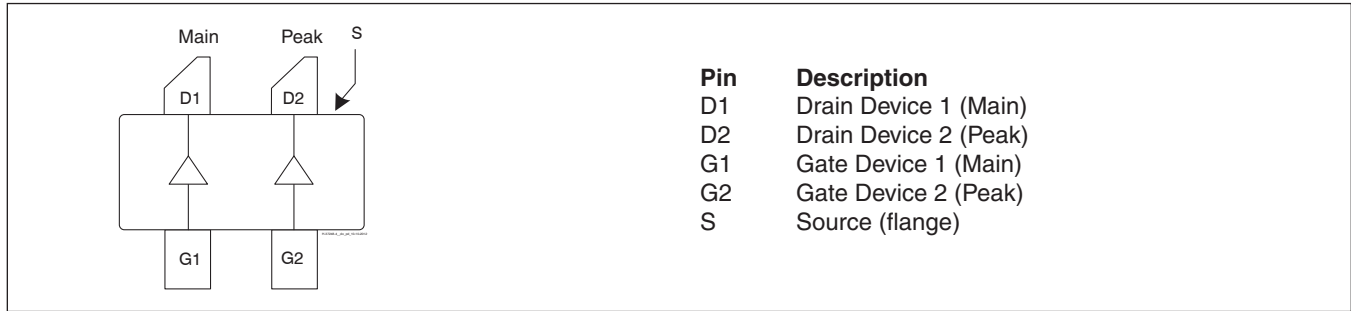
Reference circuit assembly diagram (not to scale)

**Component Information**

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101, C104, C105, C106	Capacitor, 15 pF	ATC	600F150JT250
C102, C107	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C103	Capacitor, 0.3 pF	ATC	600F0R3BT250
R101, R102	Chip resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ101V
R103	Chip resistor, 50 ohms	Anaren	C16A50Z4
U1	Coupler	Anaren	X3C25P1-02S
<b>Output</b>			
C201, C209, C211	Capacitor, 15 pF	ATC	600F150JT250
C202, C203, C204, C212, C213, C214	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C205, C215	Capacitor, 220 µF, 50 V	Cornell Dubilier Electronics (CDE)	SK221M050ST
C206	Capacitor, 0.6 pF	ATC	600F0R6BT250
C207	Capacitor, 4.7 pF	ATC	600F4R7BT250
C208, C210	Capacitor, 1.2 pF	ATC	600F 1R2BT250



**Pinout Diagram** (top view)

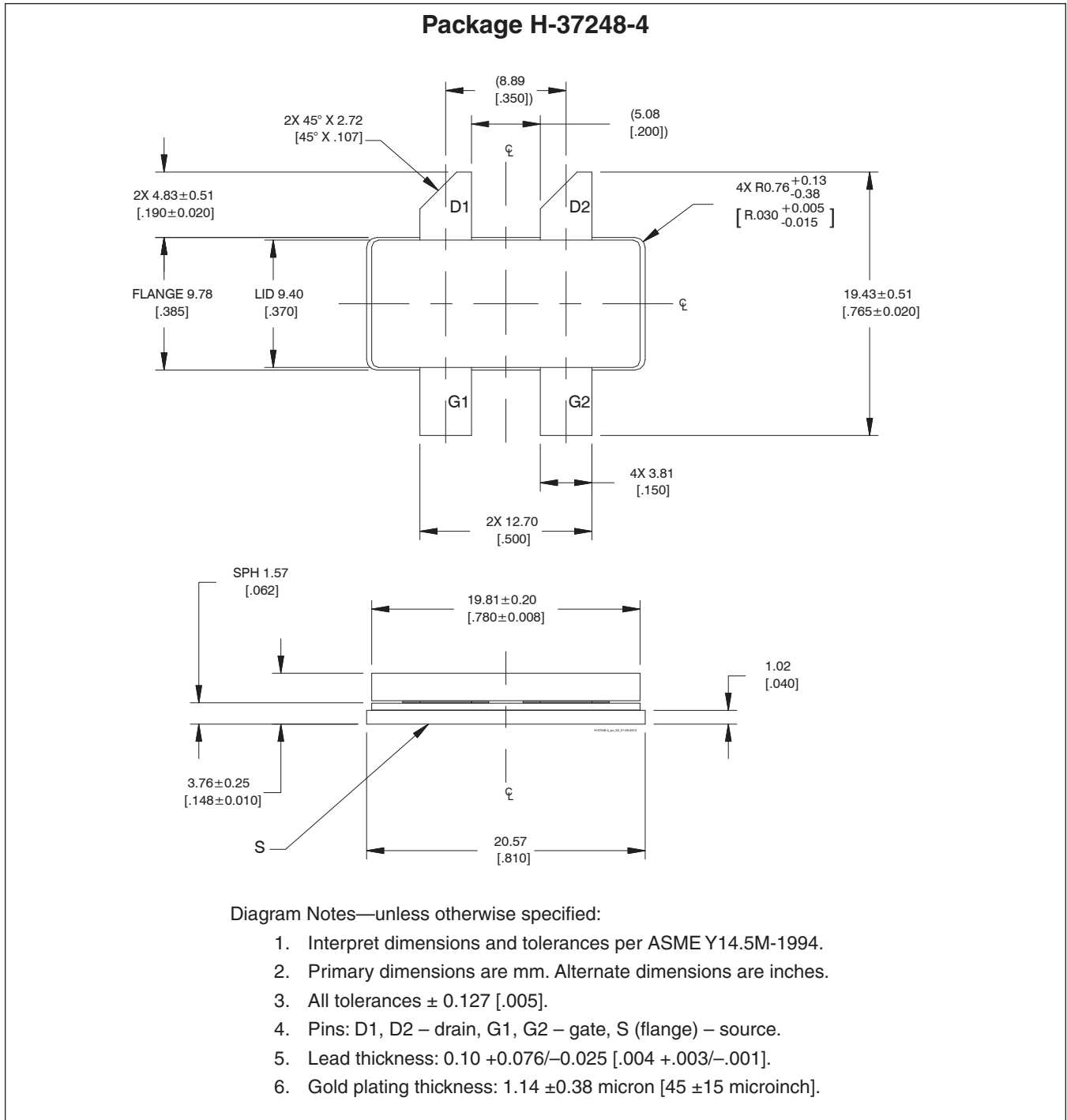


Lead connections for PXAC241702FC

**See next page for package mechanical specifications**



Package Outline Specifications



## Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2014-04-04	Advance	All	Data Sheet reflects advance specification for product development
02	2014-08-28	Production	All	Data Sheet represents released product specifications, including reference circuit and updated performance information.
02.1	2016-06-22	Production	2	Updated ordering information
03	2018-07-03	Production	All	Converted to Wolfspeed Data Sheet

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## Notes

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