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PXAC241702FC

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

Description

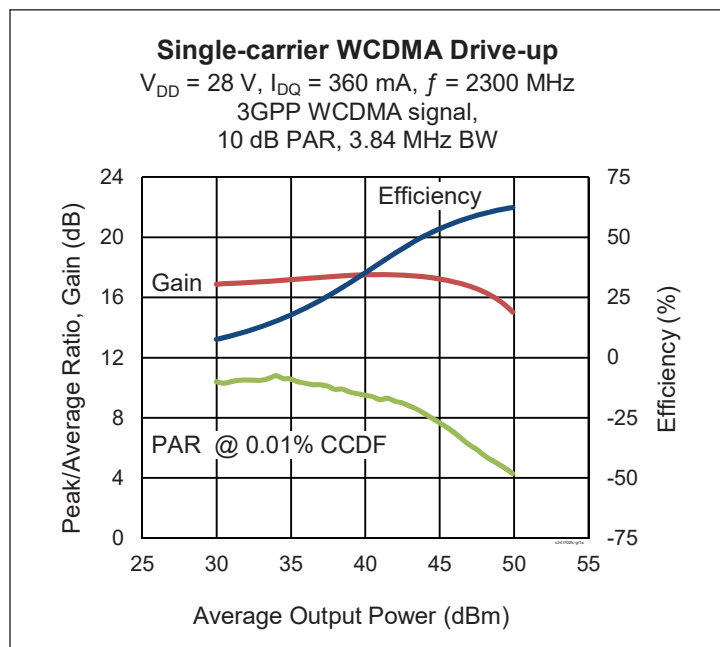
The PXAC241702FC is a 28 V LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 2300 to 2400 MHz frequency band. Features include dual-path design, high gain and thermally-enhanced package with earless flange. Manufactured with Wolfspeed's 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	η_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	μA
	$V_{DS} = 63\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10	μA
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1	μA
On-State Resistance	(main) $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.19	—	Ω
	(peak) $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.16	—	Ω
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 W CW)	$R_{\theta JC}$	0.53	$^{\circ}\text{C/W}$

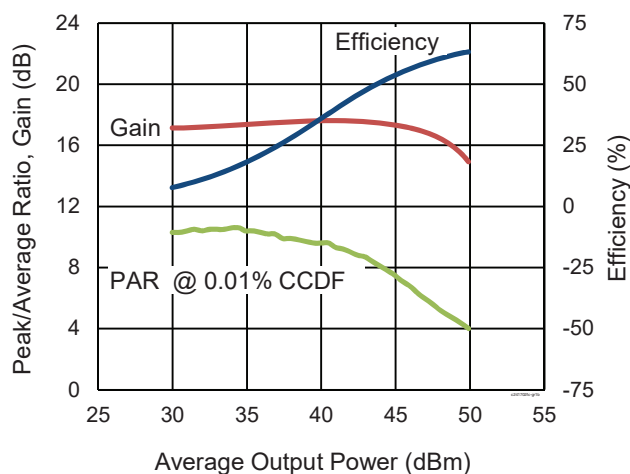
Ordering Information

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)

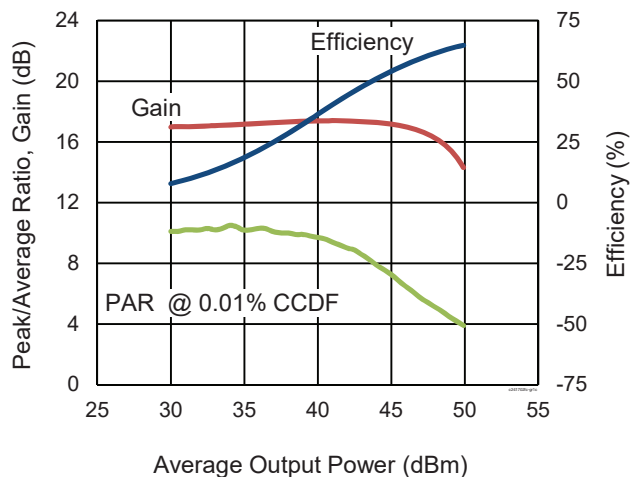
Single-carrier WCDMA Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 360\text{ mA}$, $f = 2350\text{ MHz}$
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



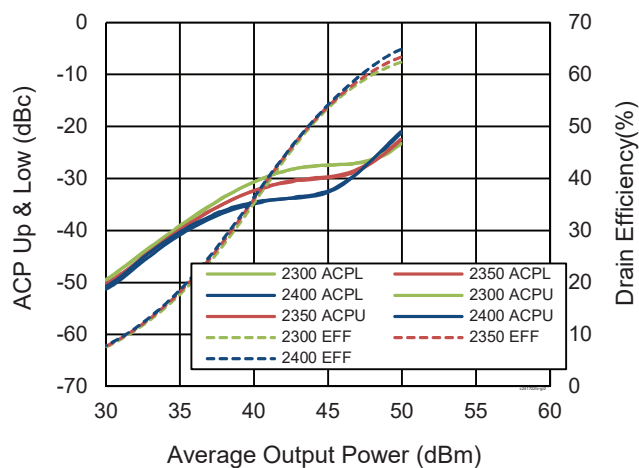
Single-carrier WCDMA Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 360\text{ mA}$, $f = 2400\text{ MHz}$
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz BW



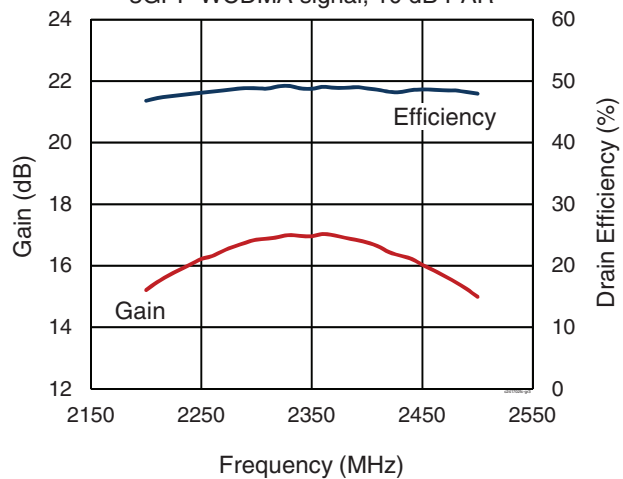
Single-carrier WCDMA 3GPP Drive-up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 360\text{ mA}$, $f = 2300\text{--}2400\text{ MHz}$,
3GPP WCDMA signal, 10 dB PAR,
3.84 MHz Bandwidth

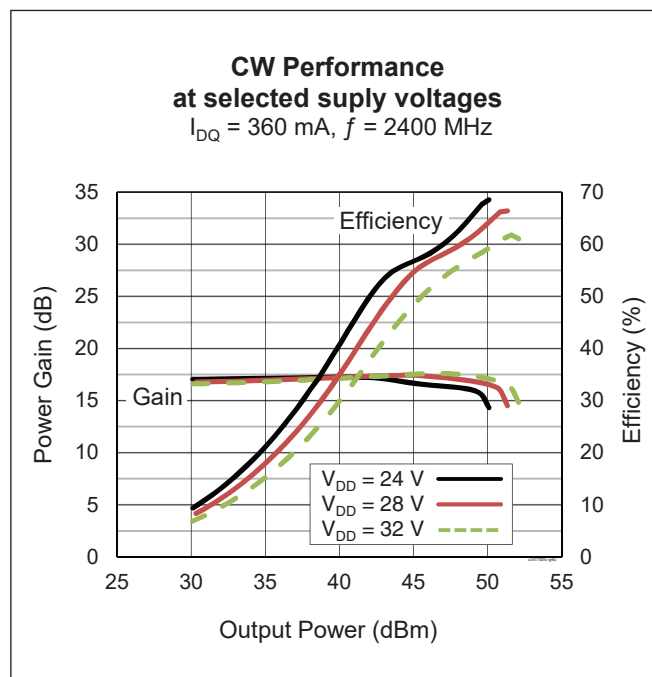
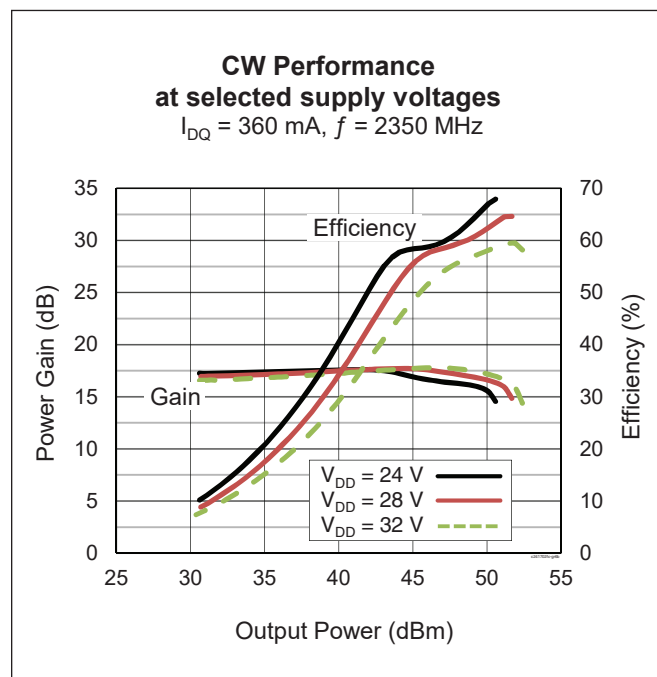
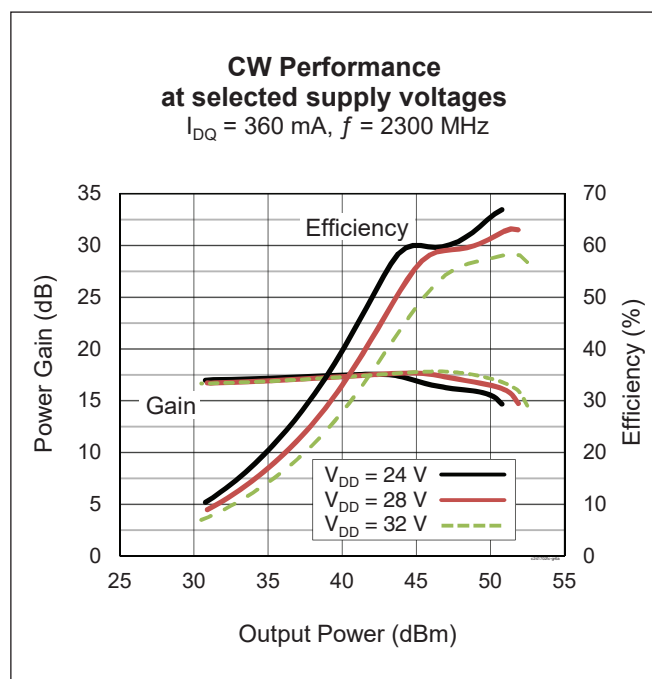
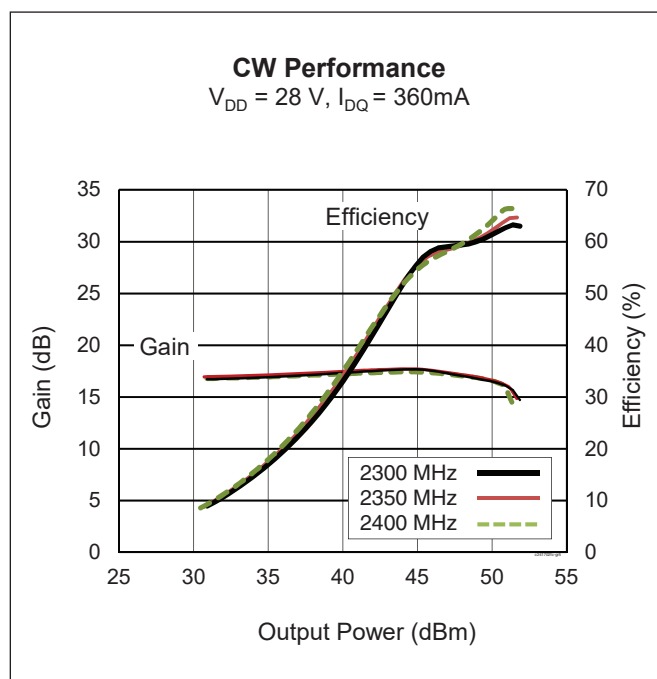


Single-carrier WCDMA Broadband Performance

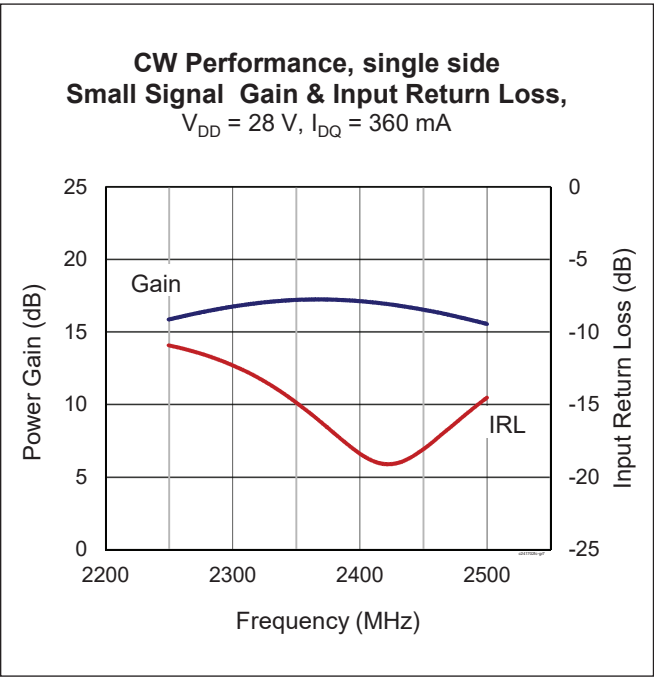
$V_{DD} = 28\text{ V}$, $I_{DQ} = 360\text{ mA}$, $P_{OUT} = 44.47\text{ dBm}$,
3GPP WCDMA signal, 10 dB PAR



Typical Performance (cont.)

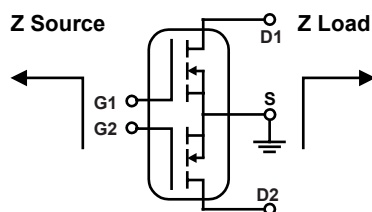


Typical Performance (cont.)



See next page for load pull performance

Load Pull Performance



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

Class AB		P _{1dB}									
		Max Output Power					Max Efficiency				
Freq [MHz]	Z _{in} [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]
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 μ sec, 10% duty cycle; 28 V, 540 mA

Class AB		P _{1dB}									
		Max Output Power					Max Efficiency				
Freq [MHz]	Z _{in} [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]
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 μ sec, 10% duty cycle; 28 V, V_G = 1.5 V

Class C		P _{1dB}									
		Max Output Power					Max Efficiency				
Freq [MHz]	Z _{in} [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]	Gain [dB]	PAE [%]	P _{OUT} [dBm]	P _{OUT} [W]	Z _o [Ω]
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

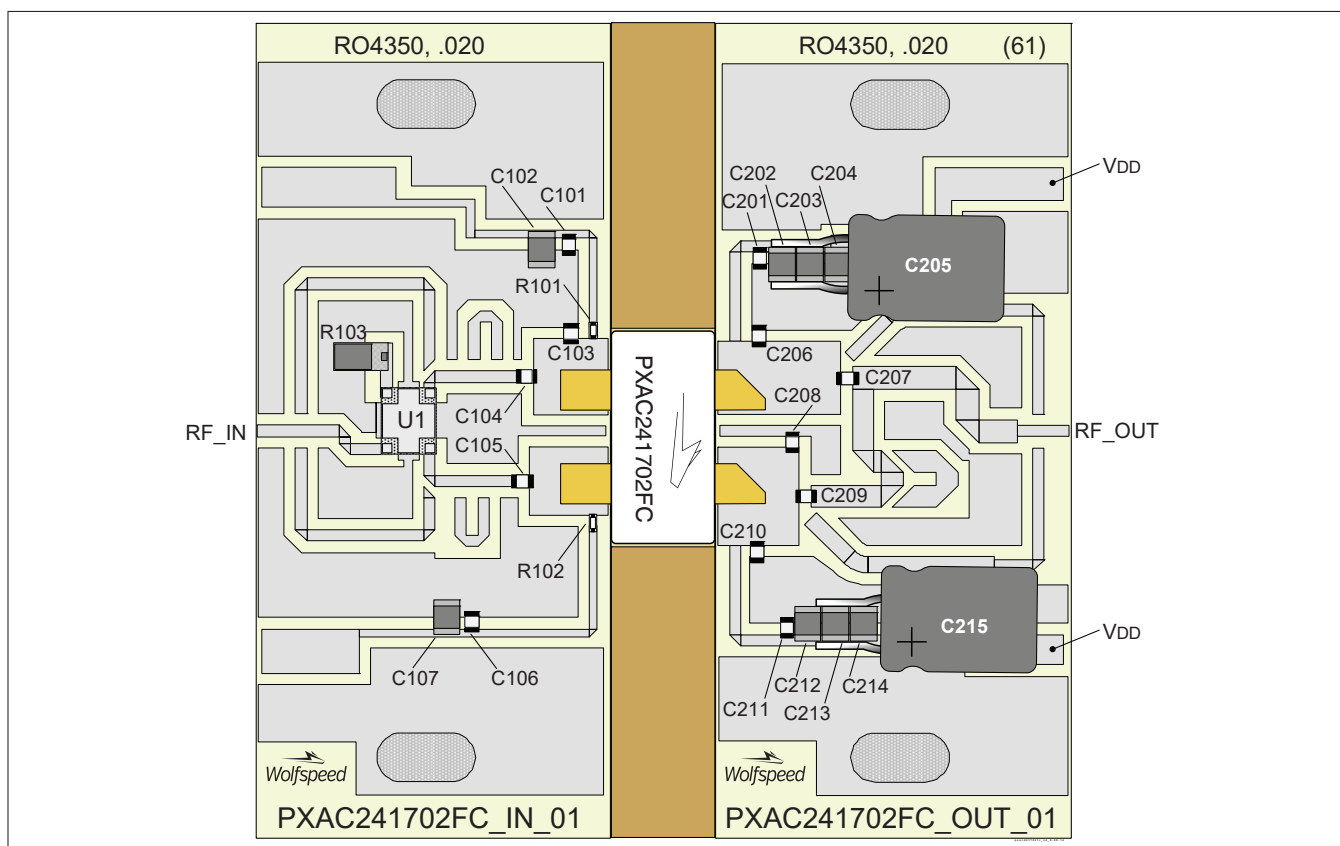
DUT PXAC241702FC V1

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 www.wolfspeed.com/RF

Reference Circuit (cont.)



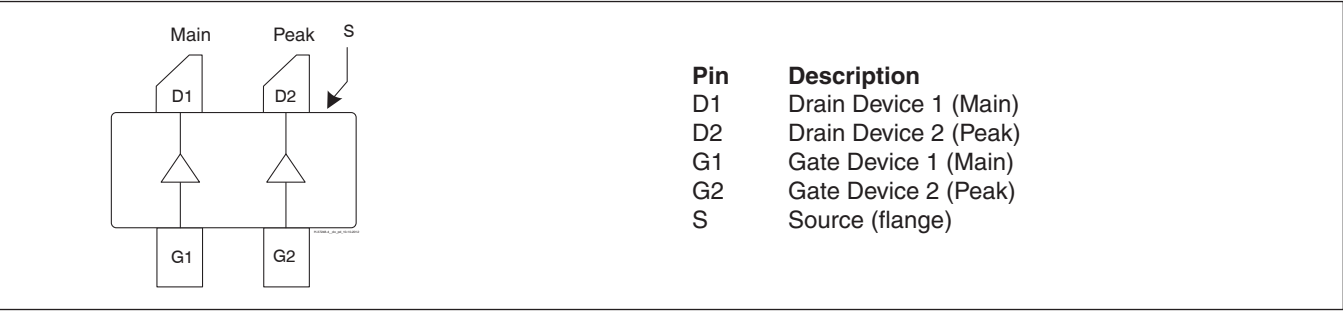
Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Manufacturer	P/N
Input			
C101, C104, C105, C106	Capacitor, 15 pF	ATC	600F150JT250
C102, C107	Capacitor, 10 μ F	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
Output			
C201, C209, C211	Capacitor, 15 pF	ATC	600F150JT250
C202, C203, C204, C212, C213, C214	Capacitor, 10 μ F	Taiyo Yuden	UMK325C7106MM-T
C205, C215	Capacitor, 220 μ F, 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



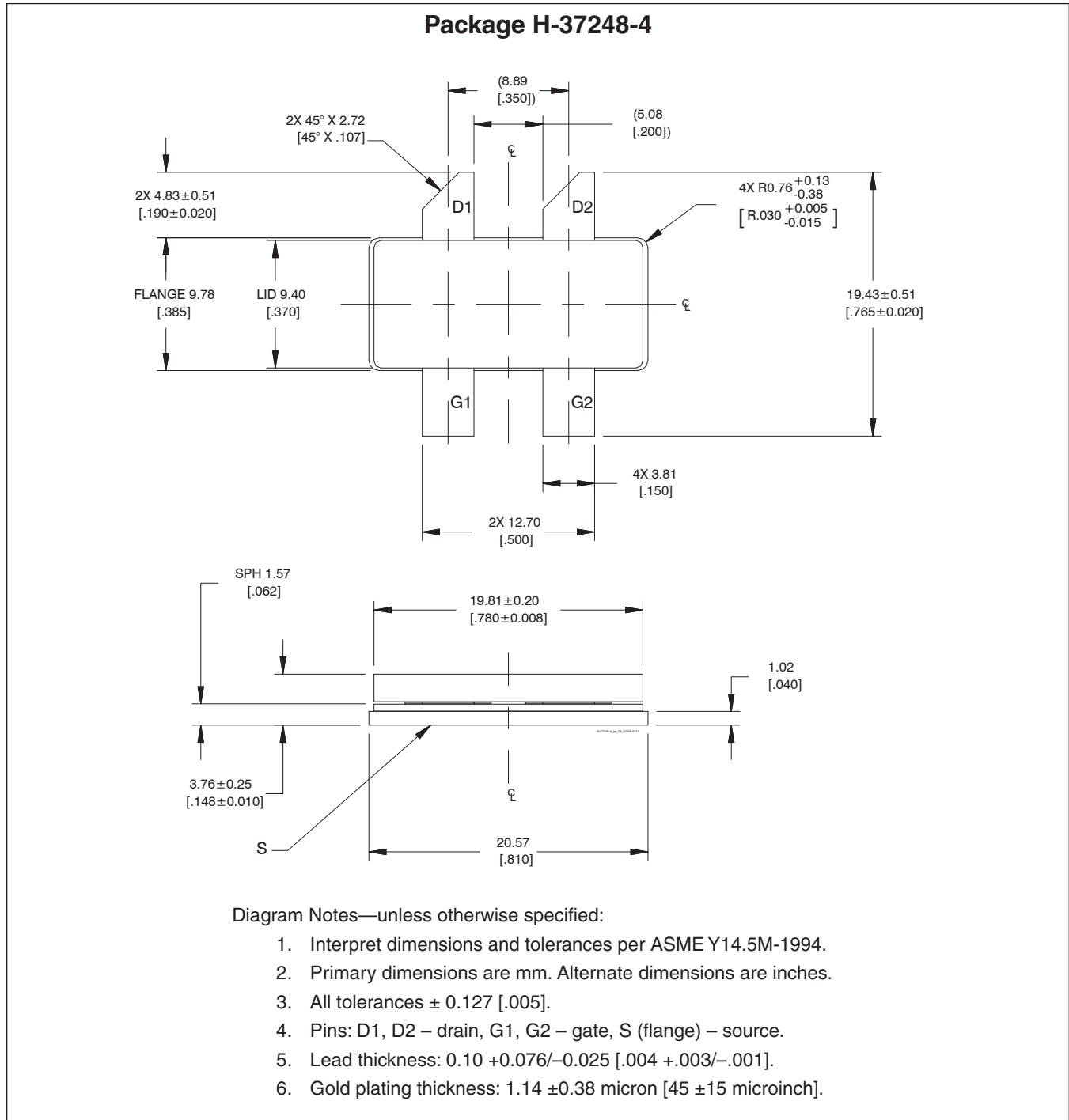
Pinout Diagram (top view)



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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