

# PXAC201202FC

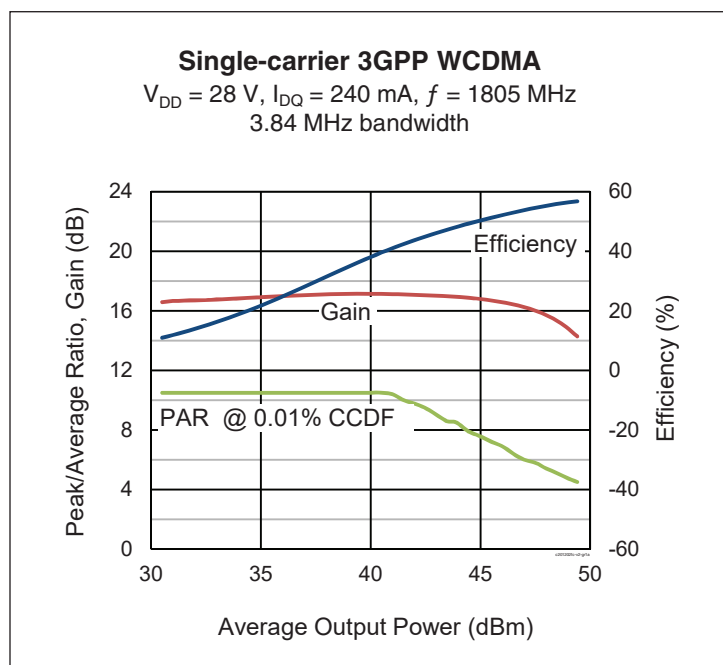
## Thermally-Enhanced High Power RF LDMOS FET 120 W, 28 V, 1800 – 2200 MHz

### Description

The PXAC201202FC is a 120-watt LDMOS FET for use in multi-standard cellular power amplifier applications in the 1800 to 2200 MHz frequency band. Its asymmetric and dual-path design make it ideal for Doherty amplifier designs. It features input and output matching, and a thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC201202FC  
Package H-37248-4



### Features

- Broadband internal matching
- Asymmetric Doherty design
  - Main: P1dB = 35 W Typ
  - Peak: P1dB = 80 W Typ
- CW performance in a Doherty configuration, 1805 MHz, 28 V
  - Output power = 100 W P1dB
  - Gain = 17.3 dB at 17.8 W Avg.
  - Efficiency = 46% at 17.8 W Avg.
- CW performance in a Doherty configuration, 2100 MHz, 28 V
  - Output power = 15.8 W Avg.
  - Gain = 15.5 dB
  - Efficiency = 46%
- Capable of handling 10:1 VSWR @ 28 V, 16 W (CW) output power
- Integrated ESD protection: Human Body Model, Class 1C (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant

### RF Specifications, 1880 MHz

#### One-carrier WCDMA Characteristics (tested in Wolfspeed Doherty test fixture)

$V_{DD} = 28\text{ V}$ ,  $V_{GS(peak)} = 1.4\text{ V}$ ,  $I_{DQ} = 240\text{ mA}$ ,  $P_{OUT} = 16\text{ W}$  average,  $f = 1880\text{ MHz}$ . 3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @0.01% probability on CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	16	17	—	dB
Drain Efficiency	$\eta_D$	43	46	—	%
Adjacent Channel Power Ratio	ACPR	—	-29	-26	dBc

All published data at  $T_{CASE} = 25^\circ\text{C}$  unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

## RF Specifications, 2140 MHz

**One-carrier WCDMA Characteristics** (not subject to production test—verified by design/characterization in Wolfspeed Doherty test fixture)

$V_{DD} = 28\text{ V}$ ,  $V_{GS(\text{peak})} = 1.2\text{ V}$ ,  $I_{DQ} = 240\text{ mA}$ ,  $P_{OUT} = 16\text{ W}$  average,  $f = 2140\text{ MHz}$ . 3GPP WCDMA signal: 3.84 MHz bandwidth, 10 dB PAR @0.01% CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	16.0	16.5	—	dB
Drain Efficiency	$\eta_D$	39	42	—	%
Adjacent Channel Power Ratio	ACPR	—	-29	-27	dBc

## DC Characteristics

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	$V_{DS} = 28\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	1.0	$\mu\text{A}$
	$V_{DS} = 63\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	10.0	$\mu\text{A}$
Gate Leakage Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	1.0	$\mu\text{A}$
On-state Resistance	(main) $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(\text{on})}$	—	0.3	—	$\Omega$
	(peak) $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(\text{on})}$	—	0.16	—	$\Omega$
Operating Gate Voltage	(main) $V_{DS} = 28\text{ V}$ , $I_{DQ} = 242\text{ mA}$	$V_{GS}$	2.5	2.69	2.8	V
	(peak) $V_{DS} = 28\text{ V}$ , $I_{DQ} = 0\text{ A}$	$V_{GS}$	0.5	0.7	1.6	V

## Maximum Ratings

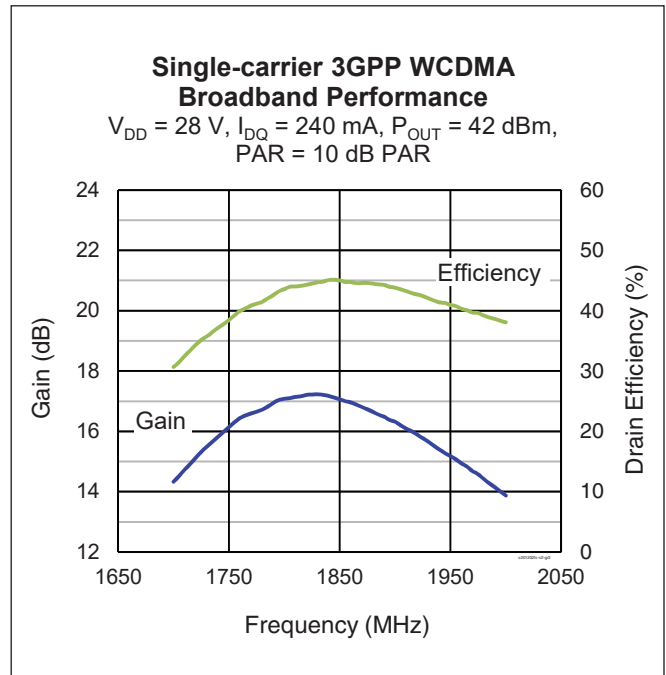
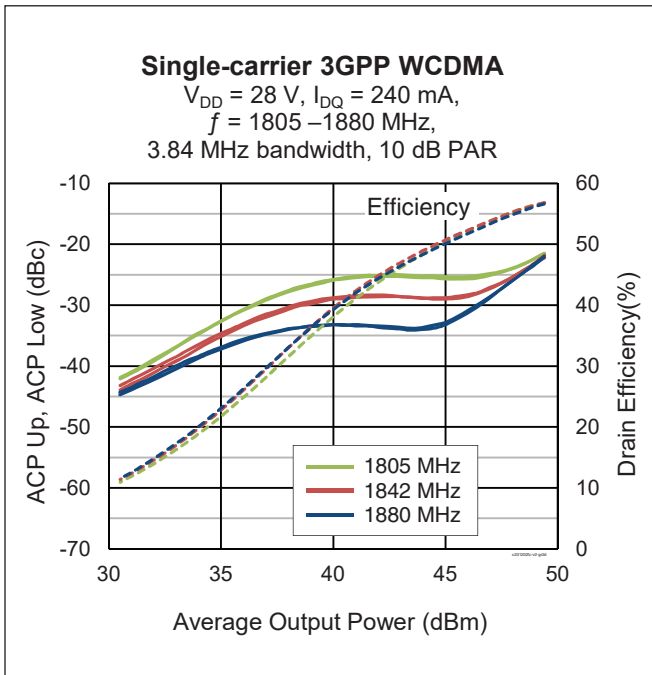
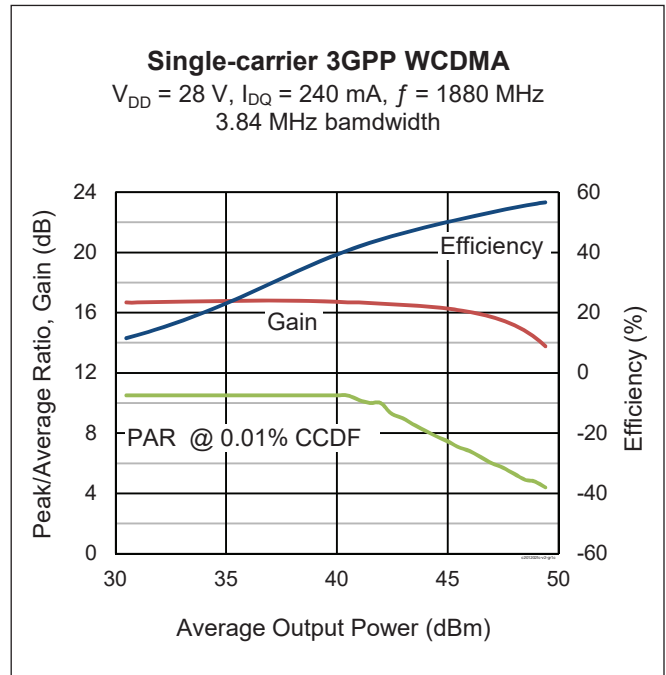
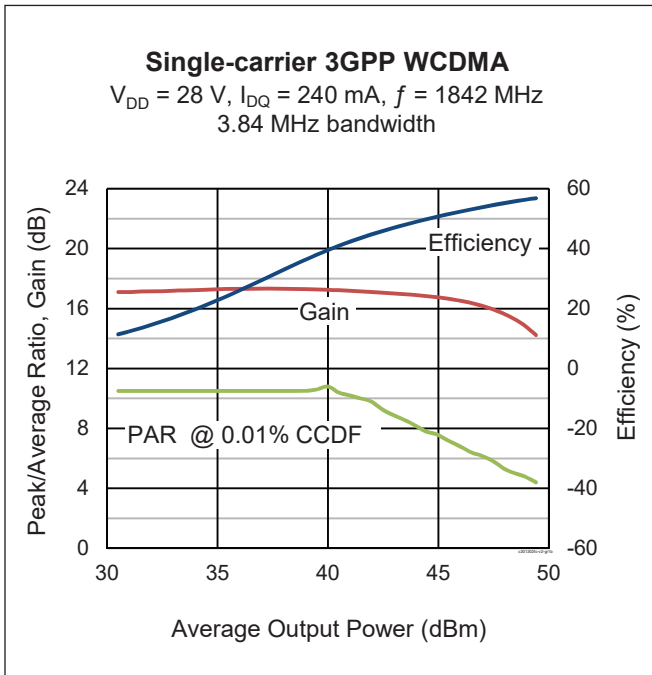
Parameter	Symbol	Value	Unit
Drain-source Voltage	$V_{DSS}$	65	V
Gate-source Voltage	$V_{GS}$	-6 to +10	V
Operating Voltage	$V_{DD}$	0 to +32	V
Junction Temperature	$T_J$	225	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to +150	$^{\circ}\text{C}$
Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}$ , 100 W CW)	$R_{\theta JC}$	0.7	$^{\circ}\text{C/W}$

## Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PXAC201202FC V2 R0	PXAC201202FC-V2-R0	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 50 pcs
PXAC201202FC V2 R250	PXAC201202FC-V2-R250	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 250 pcs

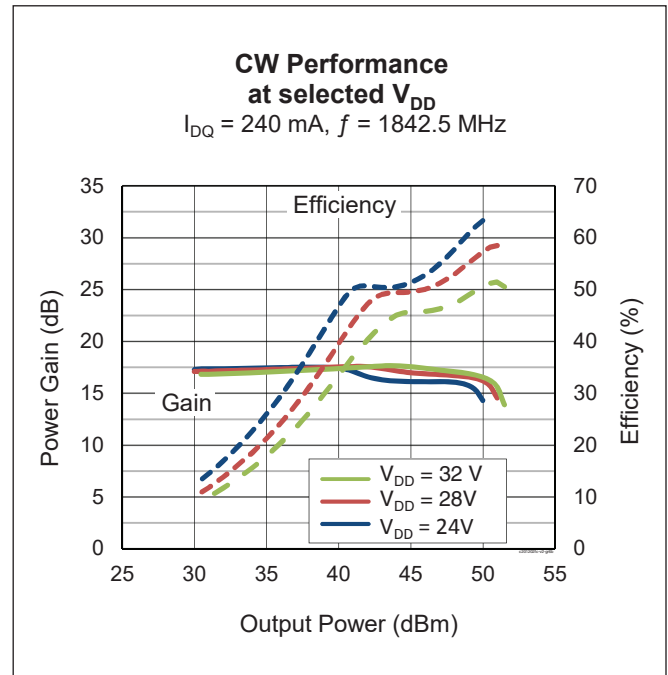
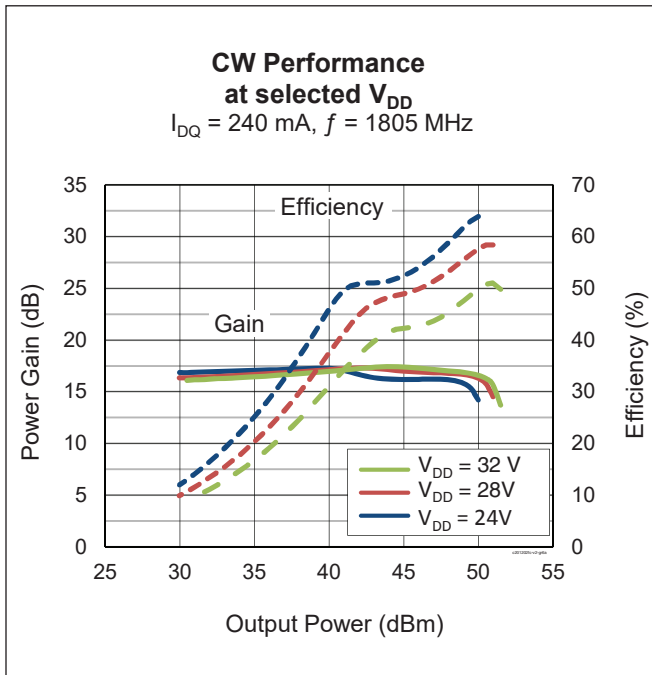
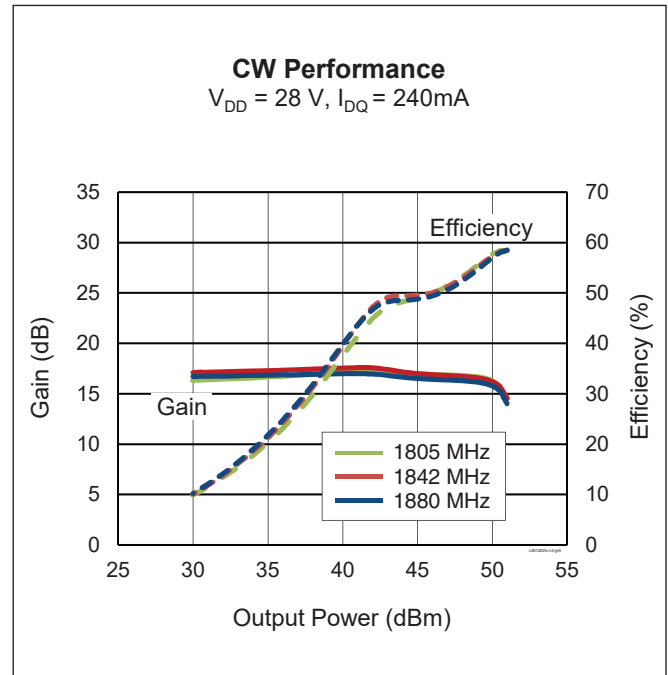
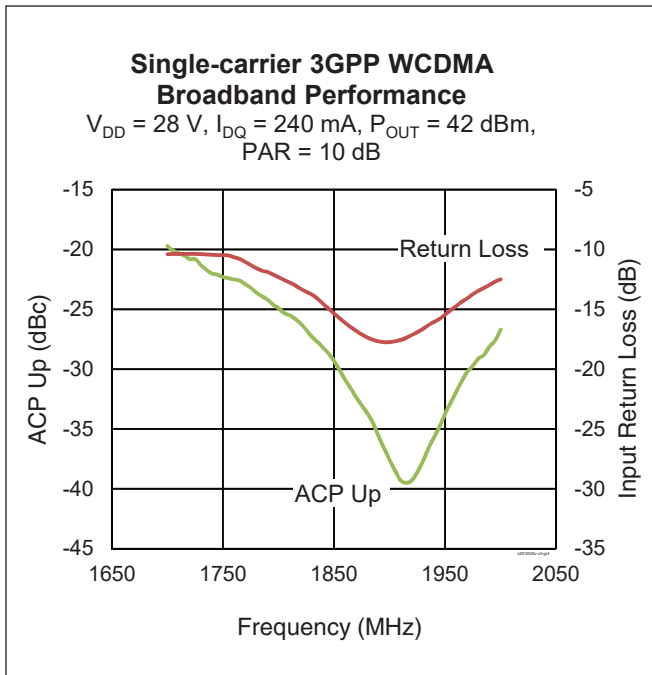


**Typical Performance** (data taken in an Wolfspeed test fixture)

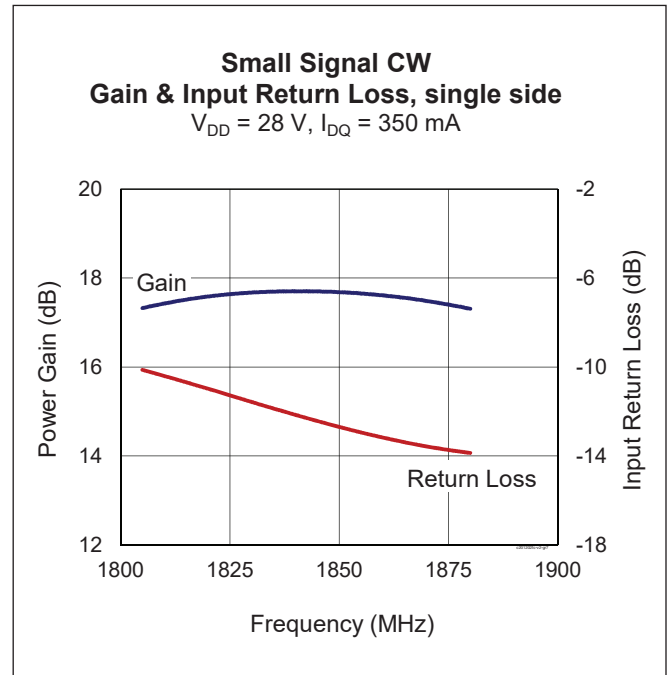
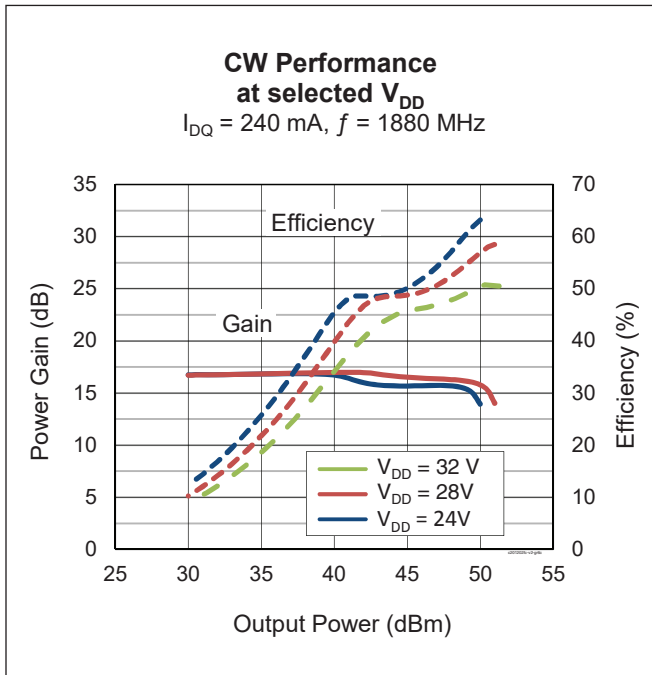




**Typical Performance (cont.)**



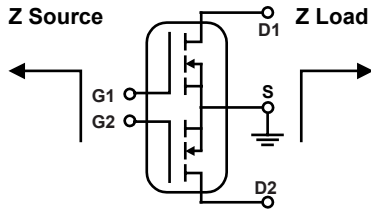
**Typical Performance** (cont.)



See next page for load pull performance



### Load Pull Performance



Main side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 250 mA

Class AB		P <sub>1dB</sub>					P <sub>1dB</sub>				
		Max Output Power					Max PAE				
Freq [MHz]	Z <sub>s</sub> [ $\Omega$ ]	Z <sub>l</sub> [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]	Z <sub>l</sub> [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]
1810	3.92 – j12.74	8.74 – j8.12	19.55	46.79	47.75	53.6	14.51 – j15.32	21.55	45.00	31.65	62.1
1840	4.13 – j12.84	8.56 – j7.87	19.43	46.58	45.50	52.3	15.46 – j14.87	21.52	44.81	30.28	61.3
1880	4.54 – j14.31	8.66 – j8.19	19.37	46.92	49.20	55.3	18.77 – j12.73	21.53	45.05	31.98	65.2

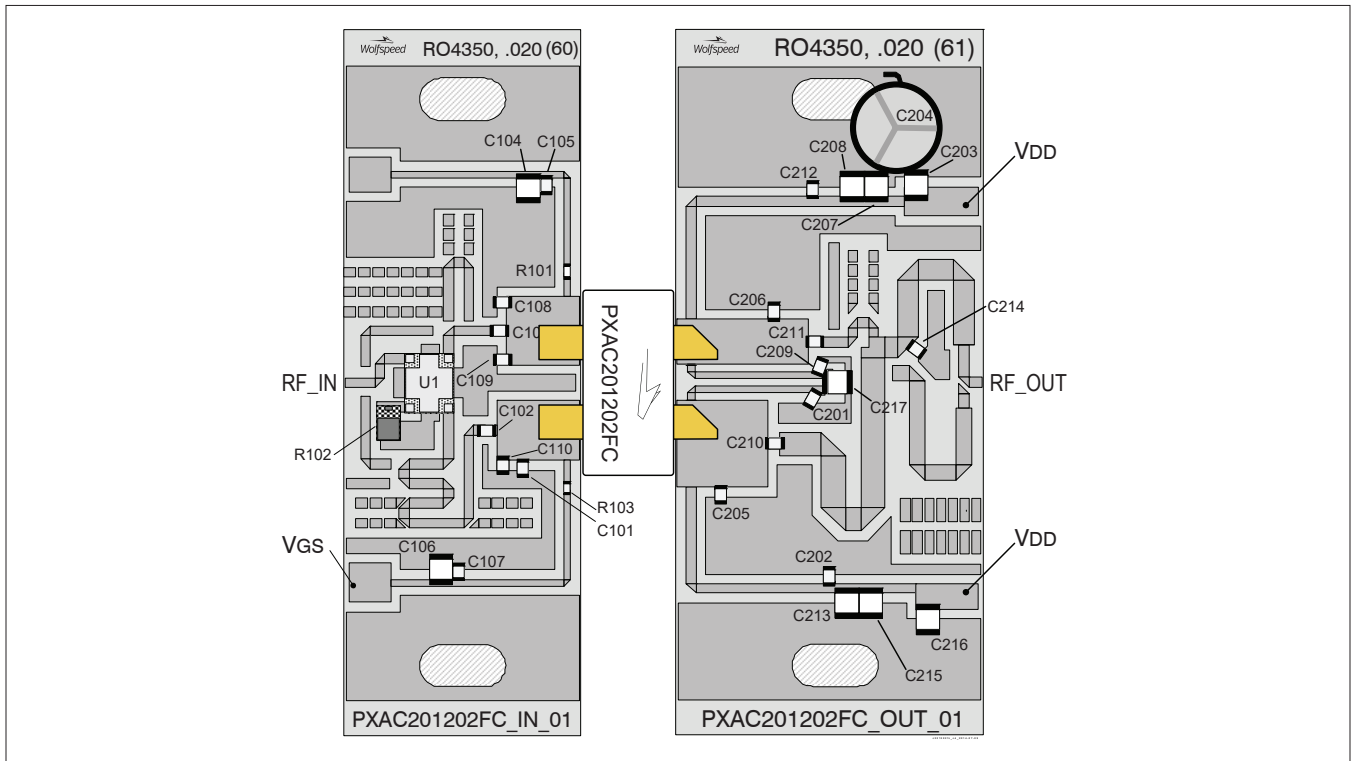
Peak side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 540 mA

Class AB		P <sub>1dB</sub>					P <sub>1dB</sub>				
		Max Output Power					Max PAE				
Freq [MHz]	Z <sub>s</sub> [ $\Omega$ ]	Z <sub>l</sub> [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]	Z <sub>l</sub> [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]
1810	3.75 – j8.61	2.62 – j5.15	18.47	49.89	97.50	48.3	4.96 – j7.28	20.92	48.49	70.63	59.9
1840	3.69 – j8.66	2.99 – j4.99	19.05	49.85	96.61	51.0	5.17 – j6.42	20.80	48.71	74.30	59.2
1880	5.57 – j9.39	3.09 – j5.13	19.31	50.12	102.8	50.1	6.31 – j6.59	21.34	48.55	71.61	63.2

### Reference Circuit, 1880 MHz

DUT	PXAC201202FC V2
Reference Circuit Part No.	LTA/PXAC201202FC V2
PCB	Rogers 4350, 0.508 mm [.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$
Find Gerber files for this reference fixture on the Wolfspeed Web site at ( <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a> )	

Reference Circuit (cont.)



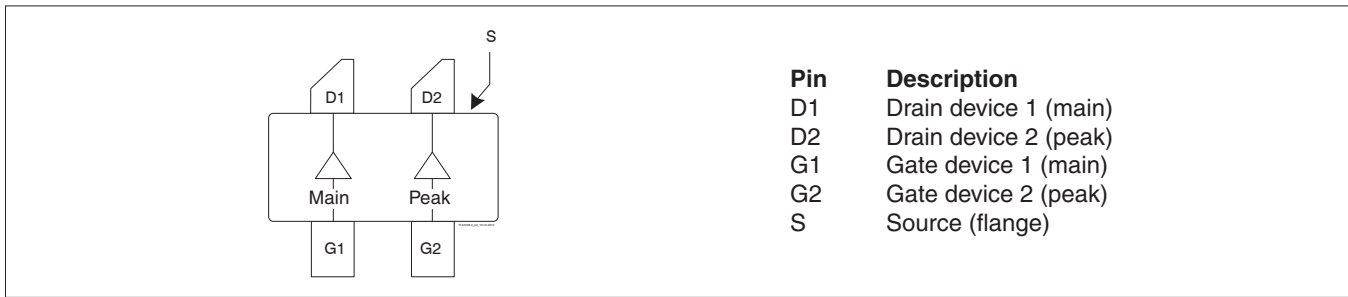
Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101	Chip capacitor, 2.2 pF	ATC	ATC600F2R2CW250T
C102, C105, C107	Chip capacitor, 18 pF	ATC	ATC600F180JW250T
C103	Chip capacitor, 1.5 pF	ATC	ATC600F1R5CW250T
C104, C106	Capacitor, 10 $\mu$ F, 50 V	Taiyo Yuden	UMK325C7106MM-T
C108	Chip capacitor, 0.3 pF	ATC	ATC600F0R3CW250T
C109, C110	Chip capacitor, 0.3 pF	ATC	ATC600F0R3CW250T
R101, R103	Resistor, 10 Ohm	Panasonic Electronic Components	ERJ-3GEYJ
R102	Resistor, 50 Ohm	Anaren	RFP060120A15Z50
U1	Hybrid coupler, 5 dB, 90°	Anaren	X3C19P1-05S
<b>Output</b>			
C201, C202, C209, C210, C211, C212	Chip capacitor, 18 pF	ATC	ATC600F180JW250T
C203, C207, C208, C213, C215, C216, C217	Capacitor, 10 $\mu$ F, 50 V	Taiyo Yuden	UMK325C7106MM-T
C204	Capacitor, 220 $\mu$ F, 50 V	Cornell Dubilier Electronics (CDE)	SK221M050ST
C205	Chip capacitor, 1.8 pF	ATC	ATC600F1R8CW250T
C206	Chip capacitor, 0.3 pF	ATC	ATC600F0R3CW250T
C214	Chip capacitor, 0.5 pF	ATC	ATC600F0R5CW250T



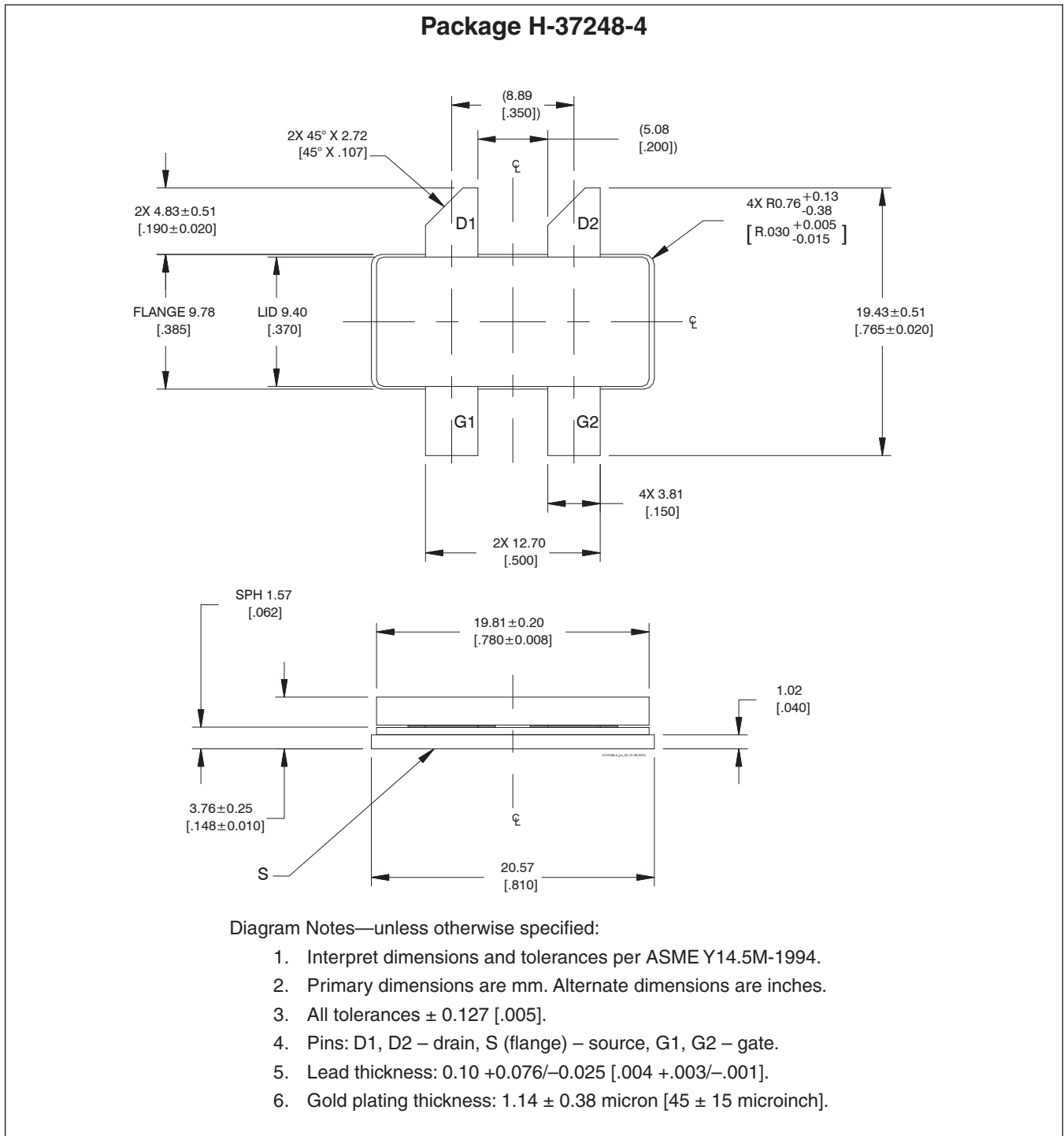
**Pinout Diagram** (top view)



**See next page for package mechanical specifications**



Package Outline Specifications



## Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes in comparison with previous revision)
01	2014-02-06	Advance	All	New product, proposed only.
02	2014-03-07	Production	All	Data Sheet reflects released product specifications, including reference circuit and performance information.
03	2014-03-12	Production	1, 2, 3, 6	(1) Add features, update graph. (2) Update Operating Gate Voltage. (3) Update two graphs. (6) Add Load Pull tables.
04	2014-06-27	Production	All	Product now V2.
04.1	2014-08-25	Production	7	Assembly diagram: position of C201 changed.
05	2014-08-25	Production	2	RF Specifications at 2140 MHz: values updated.
05.1	2016-06-22	Production	2	Updated ordering information
06	2018-06-29	Production	All	Converted to Wolfspeed Data Sheet

For more information, please contact:

4600 Silicon Drive  
Durham, North Carolina, USA 27703  
[www.wolfspeed.com/RF](http://www.wolfspeed.com/RF)

Sales Contact  
[RFSales@wolfspeed.com](mailto:RFSales@wolfspeed.com)

RF Product Marketing Contact  
[RFMarketing@wolfspeed.com](mailto:RFMarketing@wolfspeed.com)  
919.407.7816

## Notes

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