

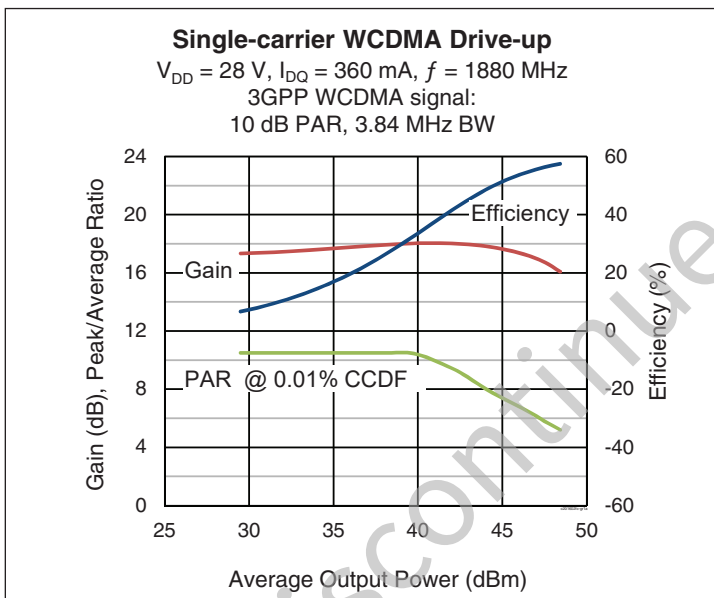
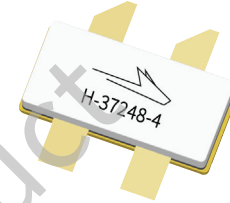
# PXAC201602FC

## Thermally-Enhanced High Power RF LDMOS FET 140 W, 28 V, 1880 – 1920 MHz, 2010 – 2025 MHz

### Description

The PXAC201602FC is a 140-watt LDMOS FET for use in multi-standard cellular power amplifier applications in the 1880 to 1920 MHz and 2010 to 2025 MHz frequency bands. 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.

PXAC201602FC  
Package H-37248-4



### Features

- Asymmetric Doherty design
  - Main: 55 W Typ ( $P_{1dB}$ )
  - Peak: 85 W Typ ( $P_{1dB}$ )
- Broadband internal matching
- Pulsed CW performance, 1960 MHz, 28 V
  - Output power at  $P_{1dB} = 100\text{ W}$
  - Gain = 18 dB
  - Efficiency = 55%
- Capable of handling 10:1 VSWR @ 28 V, 140 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1C (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant
- Can be operated with  $I_{DQ}$  of up to 700 mA (not to exceed maximum ratings limits)

### RF Specifications

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

$V_{DD} = 28\text{ V}$ ,  $V_{GS(PEAK)} = 1.4\text{ V}$ ,  $I_{DQ} = 360\text{ mA}$ ,  $P_{OUT} = 22.5\text{ W}$  average,  $f = 2025\text{ MHz}$ , 3GPP WCDMA signal, channel bandwidth = 3.84 MHz, 10 dB PAR @ 0.01% CCDF.

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	16.5	17.7	—	dB
Drain Efficiency	$\eta_D$	41	44	—	%
Adjacent Channel Power Ratio	ACPR	—	-28	-26	dBc
Output PAR @ 0.01% CCDF 1880 MHz	OPAR	7.0	—	—	dB
Output PAR @ 0.01% CCDF 2025 MHz	OPAR	7.8	—	—	dB

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

## DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	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) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.175	—	$\Omega$
	(peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.175	—	$\Omega$
Operating Gate Voltage	(main) $V_{DS} = 28\text{ V}, I_{DQ} = 360\text{ mA}$	$V_{GS}$	2.5	2.71	2.8	V
	(peak) $V_{DS} = 1.2\text{ V}, I_{DQ} = 0\text{ A}$	$V_{GS}$	0.9	1.2	1.5	V

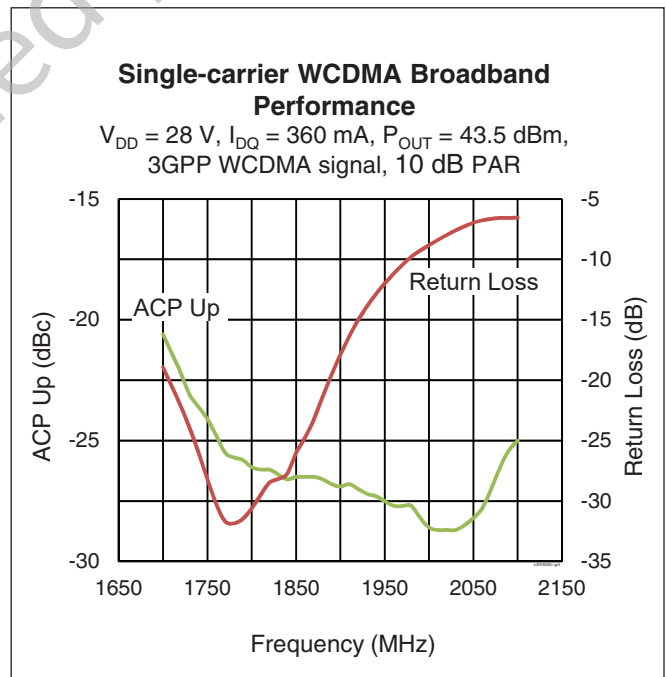
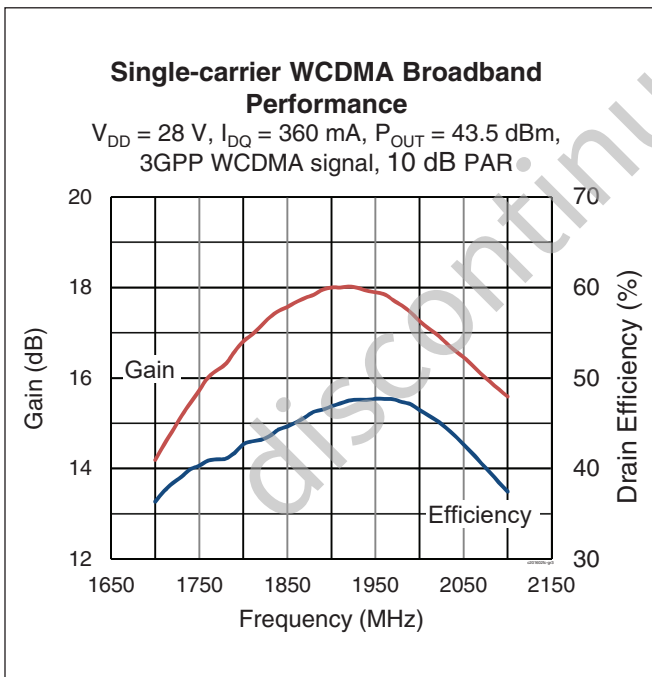
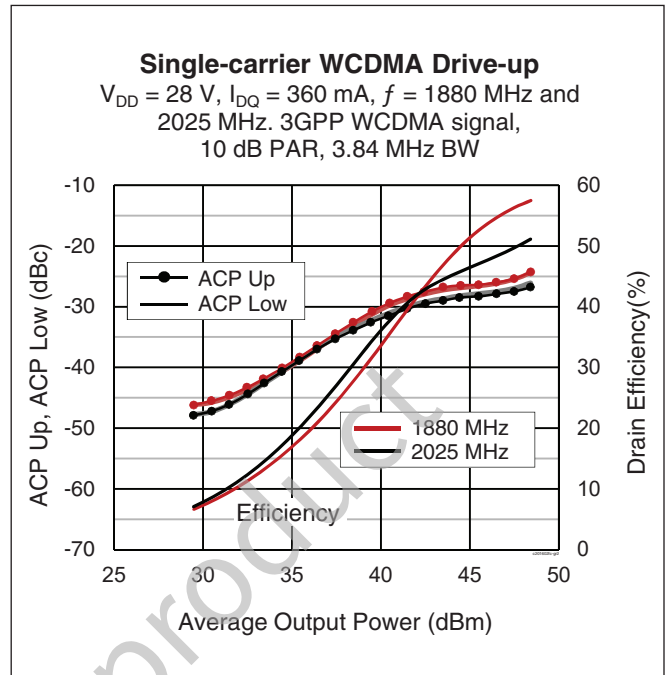
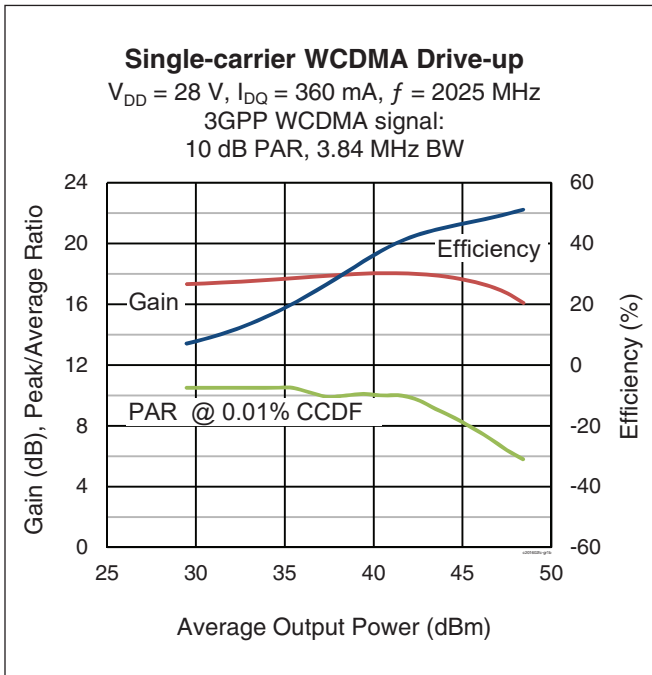
## Maximum Ratings

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 (Doherty, $T_{CASE} = 70^{\circ}\text{C}$ , 100 W CW)	$R_{\theta JC}$	0.48	$^{\circ}\text{C}/\text{W}$

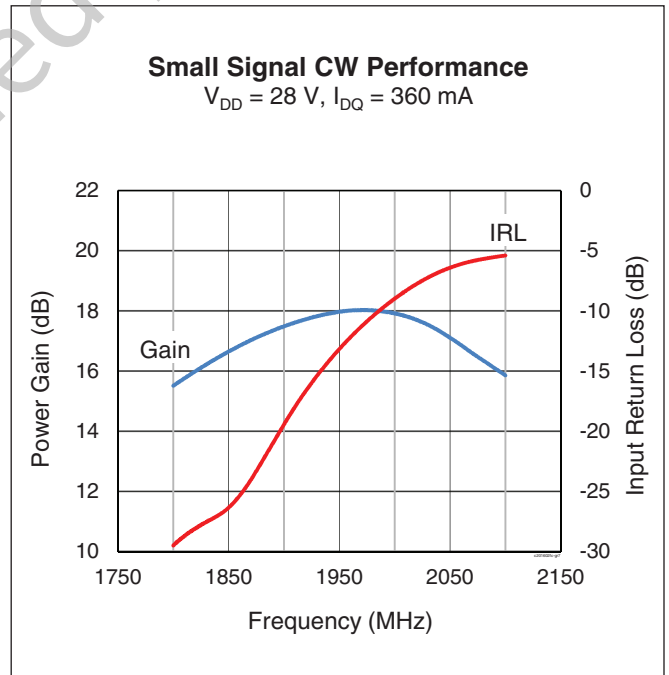
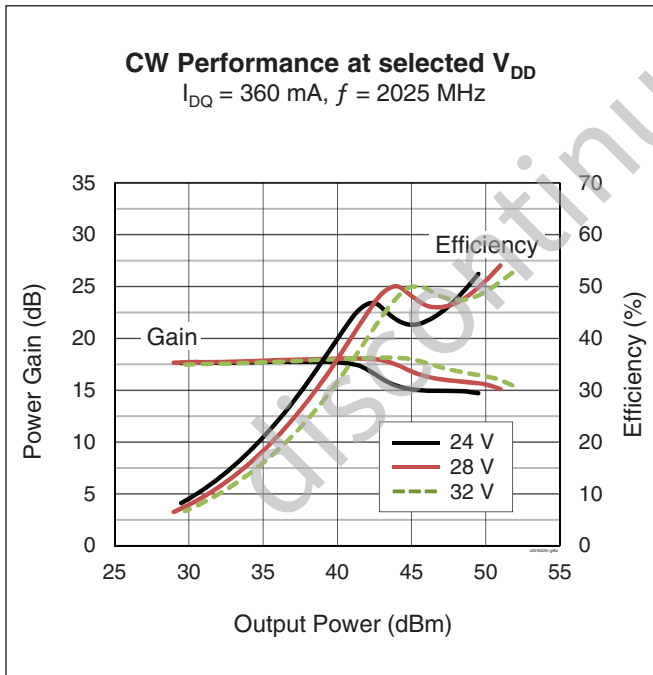
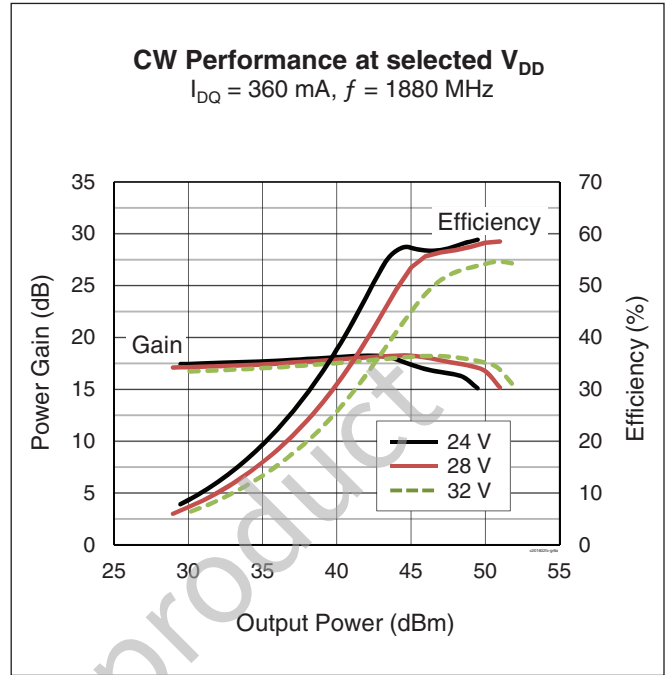
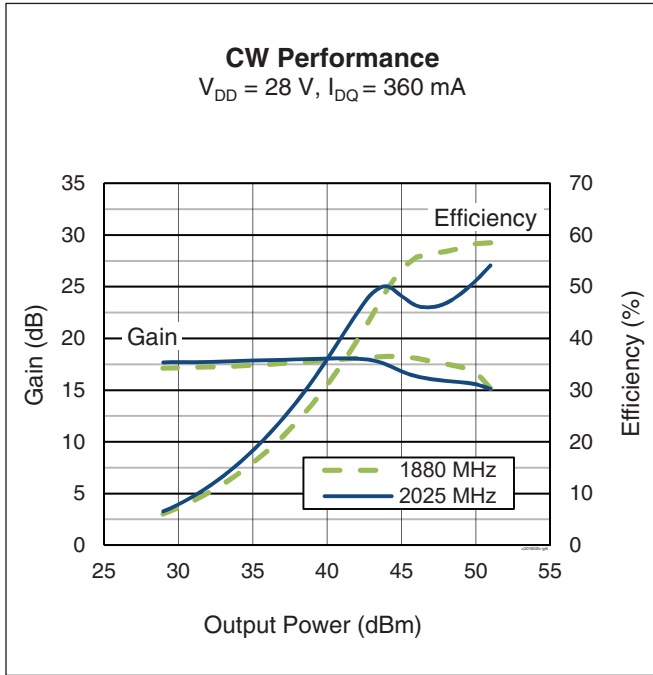
## Ordering Information

Type and Version	Order Code	Package Description	Shipping
PXAC201602FC V1 R0	PXAC201602FC-V1-R0	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 50 pcs
PXAC201602FC V1 R250	PXAC201602FC-V1-R250	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 250 pcs

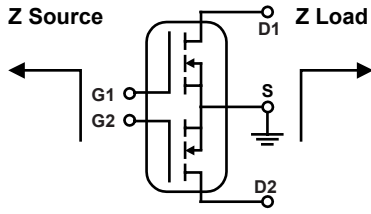
**Typical Performance** (data taken in a reference test fixture)



Typical Performance (cont.)



### Load Pull Performance



Main side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 360 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 [%]
1880	3.88 - j12.84	3.96 - j4.18	20.01	48.39	69.02	54.18	7.54 - j1.33	22.43	46.72	46.99	65.35
1900	5.30 - j12.89	4.14 - j4.36	20.21	48.1	64.57	53.31	7.70 - j1.56	22.38	46.36	43.25	61.53
1920	5.84 - j14.94	4.13 - j4.48	20.33	48.32	67.92	55.15	7.03 - j0.76	22.6	46.41	43.75	63.54
2010	11.80 - j17.15	3.84 - j4.53	20.31	48.36	68.55	55.74	5.79 - j0.62	22.76	46.22	41.88	64.2
2025	12.09 - j16.26	3.99 - j4.73	20.4	48.14	65.16	54.0.3	5.26 - j0.81	22.7	46.17	41.40	62.49

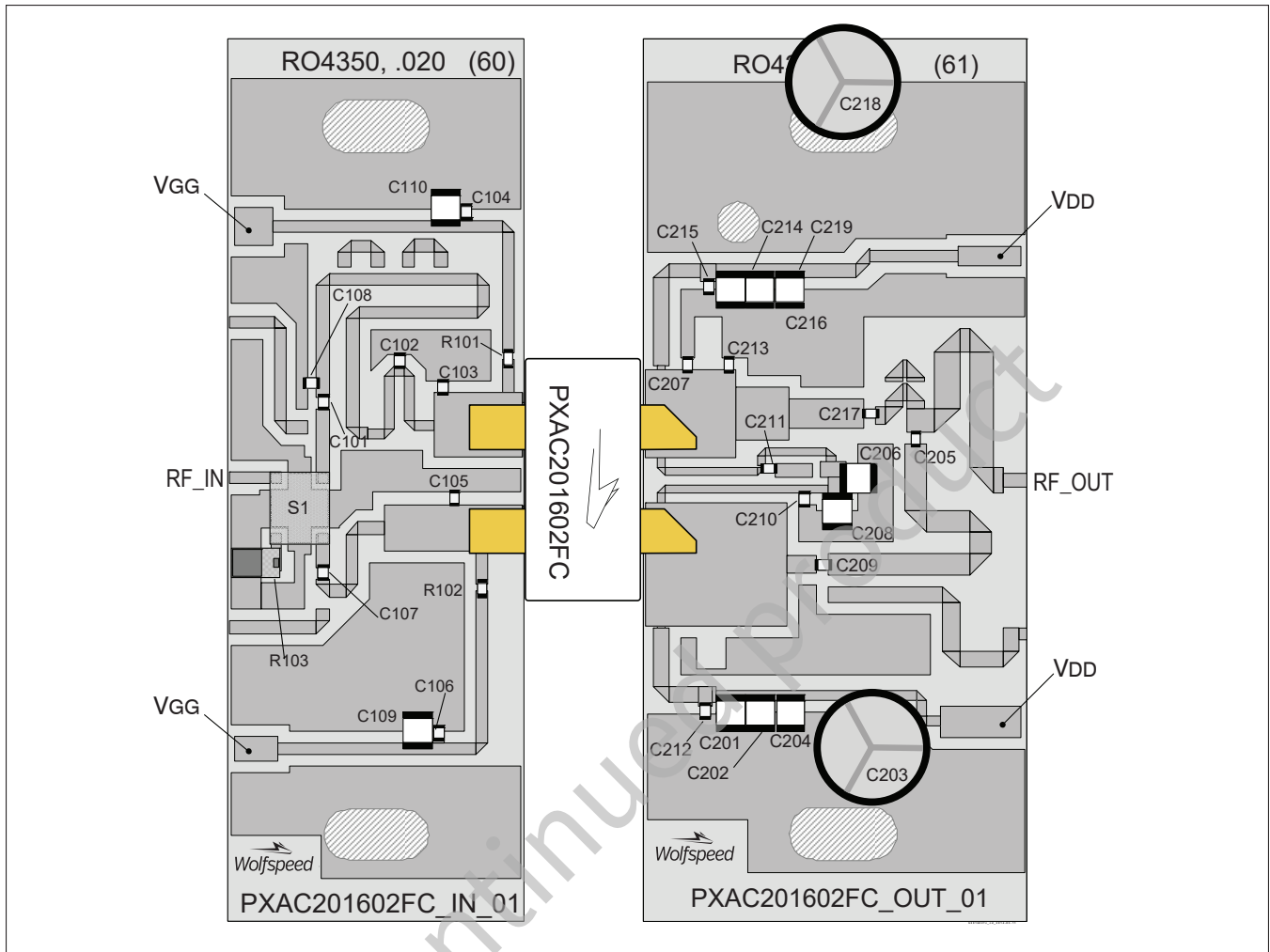
Peak side pulsed CW signal: 160  $\mu$ sec, 10% duty cycle; 28 V, 540 mA

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 [%]
1880	4.62 - j9.02	2.53 - j4.95	19.44	50.31	107.40	54.66	5.39 - j2.83	22.15	48.15	65.31	64.38
1900	5.10 - j8.97	2.65 - j4.91	19.87	49.97	99.31	53.40	4.50 - j3.28	21.90	48.47	70.31	61.18
1920	6.65 - j8.28	2.587 - j5.03	19.82	50.07	101.62	53.76	4.31 - j3.12	21.93	48.54	71.45	62.86
2010	10.61 - j5.85	2.48 - j5.17	20.19	50.19	104.47	53.45	3.80 - j3.47	22.46	48.61	72.61	63.49
2025	12.35 - j5.04	2.48 - j5.64	20.34	50.09	102.09	52.31	3.83 - j3.38	22.70	48.26	66.99	61.23

### Reference Circuit, tuned for 1800 – 2200 MHz

DUT	PXAC201602FC V1
Reference Circuit Part No.	LTA/PXAC201602FC V1
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)

Assembly Information

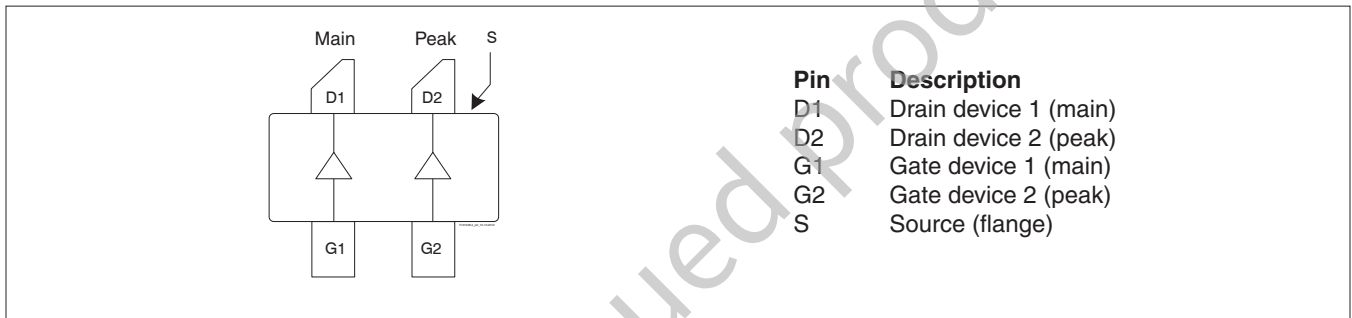
Component	Description	Suggested Manufacturer	P/N
<b>Input</b>			
C101, C104, C106, C107	Chip capacitor, 18 pF	ATC	ATC800A180JT250T
C102	Chip capacitor, 0.4 pF	ATC	ATC600F0R4BT
C103	Chip capacitor, 1.6 pF	ATC	ATC600F1R6BT
C105	Chip capacitor, 2.4 pF	ATC	ATC800A2R4BT250T
C108	Chip capacitor, 0.3 pF	ATC	ATC600F0R3BT
C109, C110	Capacitor, 10 μF	Taiyo Yuden	UMK325C7106MM-T
R101, R102	Resistor, 10 Ohm	Panasonic Electronic Components	ERJ-3GEYJ100V
R103	Resistor, 50 Ohm	Anaren	C16A50Z4
S1	Directional coupler	Anaren	X3C21P1-04S

**Reference Circuit** (cont.)

**Assembly Information** (cont.)

Component	Description	Suggested Manufacturer	P/N
<b>Output</b>			
C201, C202, C204, C206, C208, C214, C216, C219	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
C203, C218	Capacitor, 220 $\mu$ F, 50 V	Cornell Dubilier Electronics (CDE)	SK221M050ST
C205, C210, C211, C212, C215	Chip capacitor, 18 pF	ATC	ATC800A180JT250T
C207	Chip capacitor, 1.5 pF	ATC	ATC600F1R5BT
C209	Chip capacitor, 2.4 pF	ATC	ATC800A2R4BT250T
C213	Chip capacitor, 1.2 pF	ATC	ATC600F1R2BT
C217	Chip capacitor, 2.2 pF	ATC	ATC800A2R2BT250T

**Pinout Diagram** (top view)



Package Outline Specifications

