

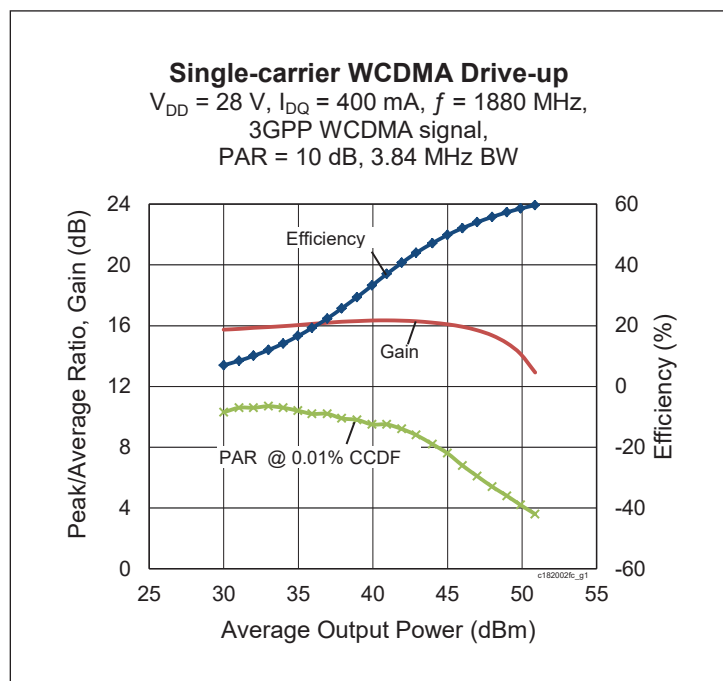
# PXAC182002FC

## Thermally-Enhanced High Power RF LDMOS FET 180 W, 28 V, 1805 – 1880 MHz

### Description

The PXAC182002FC is a 180-watt LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 1805 to 1880 MHz frequency band. Features include dual-path design, input and output matching, high gain and thermally-enhanced package with earless flanges. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PXAC182002FC  
Package H-37248-4



### Features

- Broadband internal input and output matching
- Asymmetrical Doherty design
  - Main: 70 W Typ ( $P_{1dB}$ )
  - Peak: 110 W Typ ( $P_{1dB}$ )
- Typical pulsed CW performance, 1880 MHz, 28 V, combined outputs
  - Output power at  $P_{3dB} = 194\text{ W}$
  - Efficiency = 64%
  - Gain = 14 dB
- Capable of handling 10:1 VSWR @ 28 V, 110 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1C (per ANSI/ESDA/ JEDEC/JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

### RF Characteristics

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

$V_{DD} = 28\text{ V}$ ,  $I_{DQ} = 400\text{ mA}$ ,  $V_{GSPEAK} = 1.1\text{ V}$ ,  $P_{OUT} = 28.2\text{ W avg}$ ,  $f = 1880\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	15.5	16.5	—	dB
Drain Efficiency	$\eta_D$	48.5	51	—	%
Adjacent Channel Power Ratio	ACPR	—	-30	-26	dBc

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	$V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	0.1	$\mu\text{A}$
	$V_{DS} = 63\text{ V}, V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	1.0	$\mu\text{A}$
On-State Resistance (main)	$V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.18	—	$\Omega$
	(peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.135	—	$\Omega$
Operating Gate Voltage (main)	$V_{DS} = 28\text{ V}, I_{DQ} = 400\text{ mA}$	$V_{GS}$	2.55	2.65	2.75	V
	(peak) $V_{DS} = 28\text{ V}, I_{DQ} = 0\text{ A}$	$V_{GS}$	0.9	1.2	1.3	V
Gate Leakage Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	0.1	$\mu\text{A}$

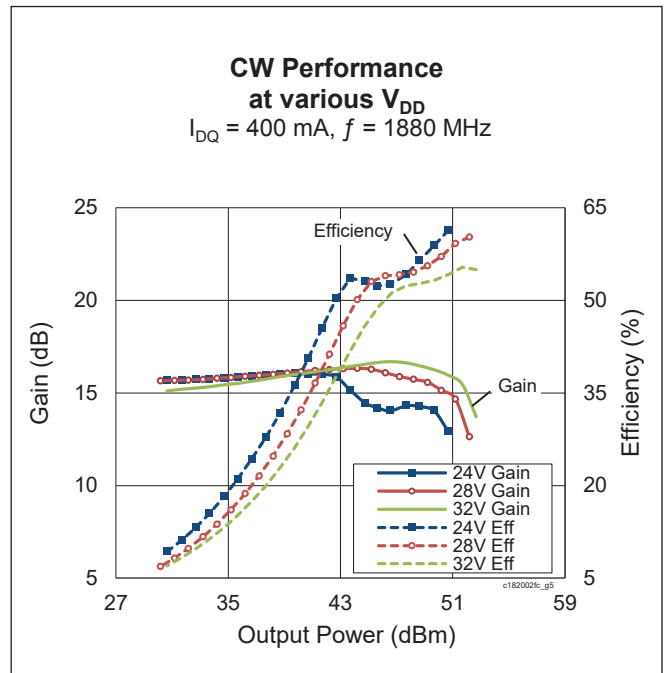
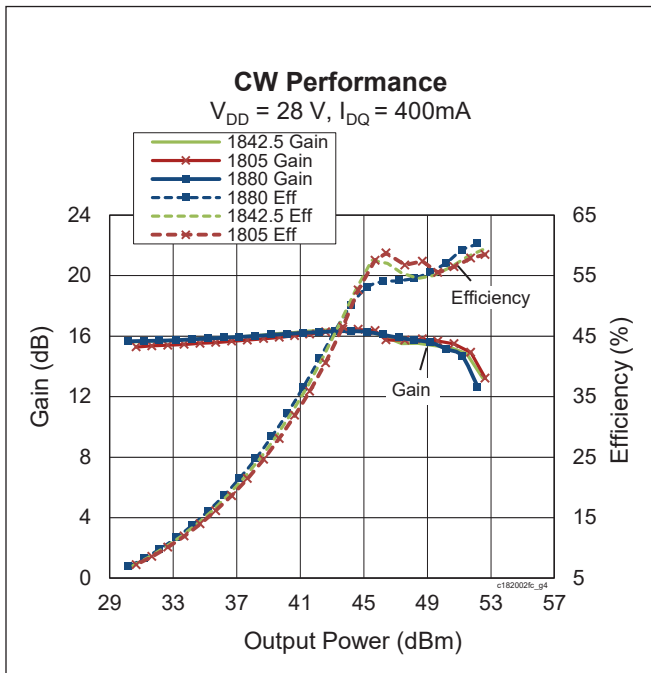
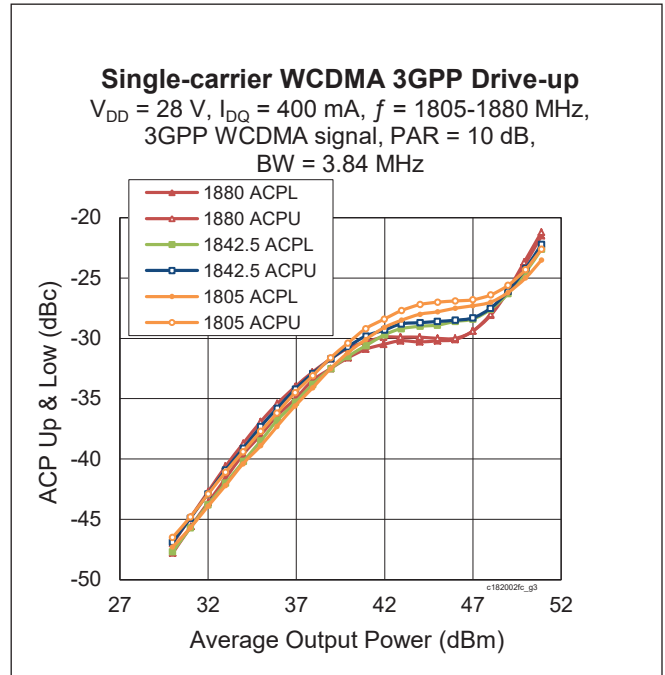
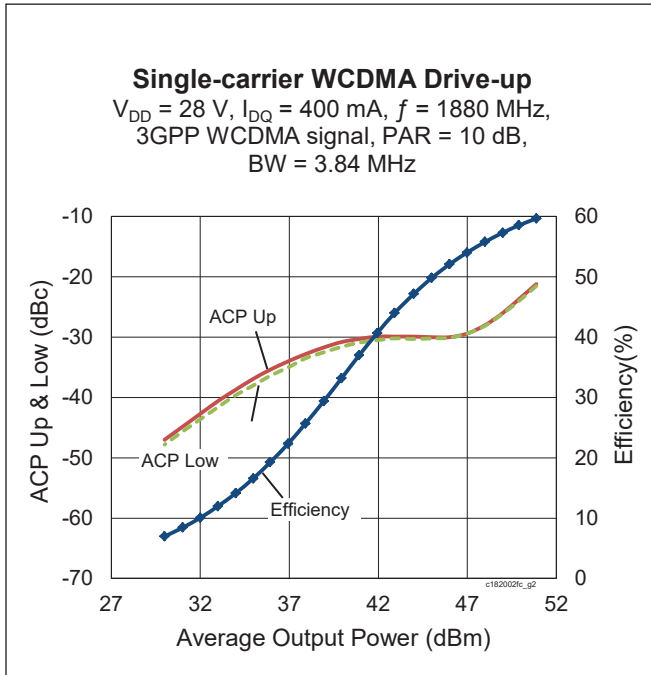
**Maximum Ratings**

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 (main, $T_{CASE} = 70^{\circ}\text{C}, 28\text{ W CW}$ )	$R_{\theta JC}$	1.088	$^{\circ}\text{C/W}$
	(peak, $T_{CASE} = 70^{\circ}\text{C}, 100\text{ W CW}$ )	$R_{\theta JC}$	0.587

**Ordering Information**

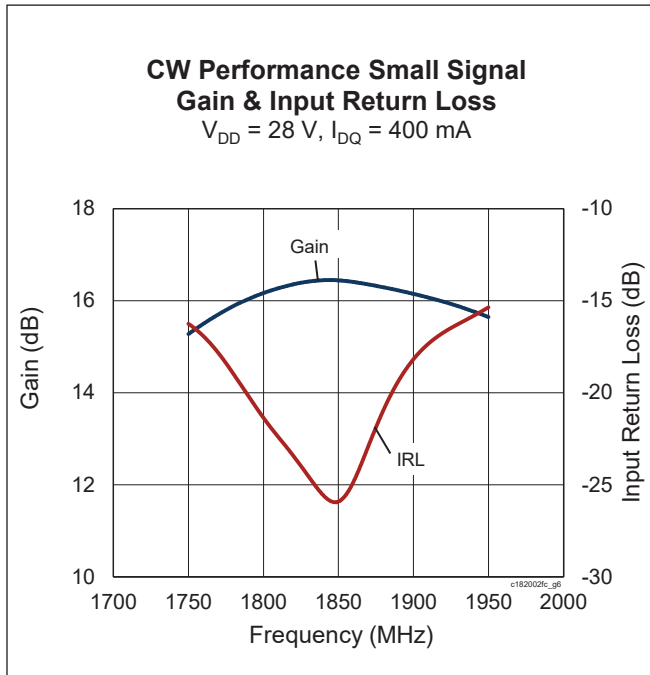
Type and Version	Order Code	Package Description	Shipping
PXAC182002FC V1 R0	PXAC182002FC-V1-R0	H-37248-4, earless flange	Tape & Reel, 50 pcs
PXAC182002FC V1 R250	PXAC182002FC-V1-R250	H-37248-4, earless flange	Tape & Reel, 250 pcs

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





**Typical Performance** (cont.)



**Load Pull Performance**

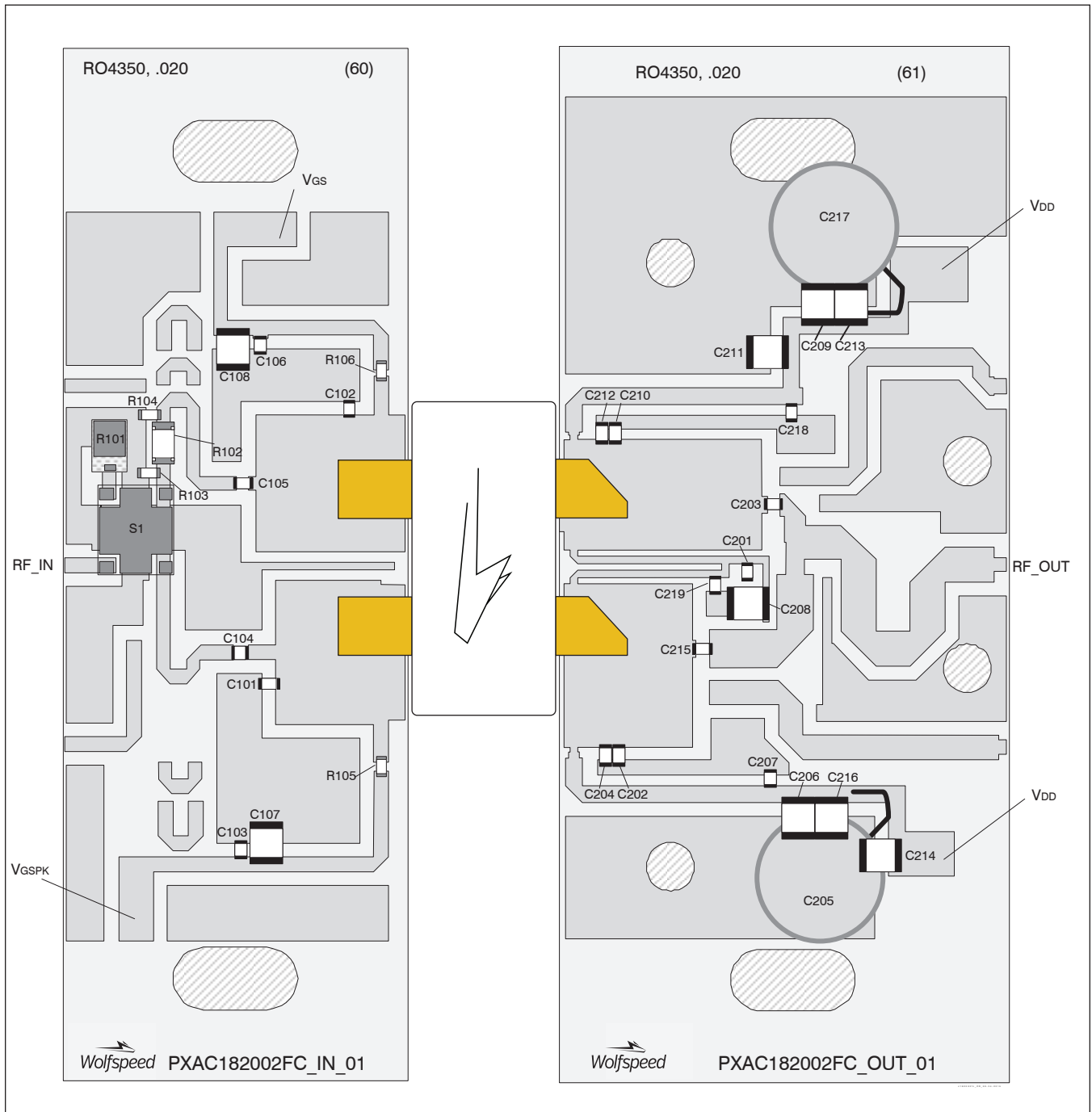
**Main Side Load Pull Performance** – Pulsed CW signal: 160  $\mu\text{s}$ , 10% duty cycle, 28 V,  $I_{DQ} = 405\text{ mA}$

		<b>P<sub>1dB</sub></b>									
		<b>Max Output Power</b>					<b>Max Drain Efficiency</b>				
<b>Freq [MHz]</b>	<b>Z<sub>s</sub> [<math>\Omega</math>]</b>	<b>Z<sub>l</sub> [<math>\Omega</math>]</b>	<b>Gain [dB]</b>	<b>P<sub>OUT</sub> [dBm]</b>	<b>P<sub>OUT</sub> [W]</b>	<b><math>\eta_D</math> [%]</b>	<b>Z<sub>l</sub> [<math>\Omega</math>]</b>	<b>Gain [dB]</b>	<b>P<sub>OUT</sub> [dBm]</b>	<b>P<sub>OUT</sub> [W]</b>	<b><math>\eta_D</math> [%]</b>
1810	3.94 – j10.15	2.92 – j5.27	19.2	49.4	86	54.0	6.49 – j2.19	21.9	47.2	52	66.6
1840	5.13 – j10.93	2.93 – j4.16	19.5	49.3	85	57.6	5.82 – j2.44	21.7	47.5	56	66.3
1880	5.90 – j12.44	2.73 – j5.17	19.2	49.5	89	55.2	4.53 – j2.29	21.5	47.7	59	67.9

**Peak Side Load Pull Performance** – Pulsed CW signal: 160  $\mu\text{s}$ , 10% duty cycle, 28 V,  $I_{DQ} = 685\text{ mA}$

		<b>P<sub>1dB</sub></b>									
		<b>Max Output Power</b>					<b>Max Drain Efficiency</b>				
<b>Freq [MHz]</b>	<b>Z<sub>s</sub> [<math>\Omega</math>]</b>	<b>Z<sub>l</sub> [<math>\Omega</math>]</b>	<b>Gain [dB]</b>	<b>P<sub>OUT</sub> [dBm]</b>	<b>P<sub>OUT</sub> [W]</b>	<b><math>\eta_D</math> [%]</b>	<b>Z<sub>l</sub> [<math>\Omega</math>]</b>	<b>Gain [dB]</b>	<b>P<sub>OUT</sub> [dBm]</b>	<b>P<sub>OUT</sub> [W]</b>	<b><math>\eta_D</math> [%]</b>
1810	3.71 – j9.13	4.64 – j5.44	20.5	50.9	123	55.5	3.52 – j2.84	22.7	49.7	94	66.2
1840	4.76 – j8.65	4.66 – j5.68	20.6	50.7	117	54.5	3.39 – j3.01	23.2	49.2	84	64.1
1880	6.40 – j9.13	4.63 – j5.74	20.8	50.7	116	54.3	2.83 – j3.50	23.1	49.2	83	64.3

### Reference Circuit , 1805 – 1880 MHz



Reference circuit assembly diagram (not to scale)



**Reference Circuit** (cont.)

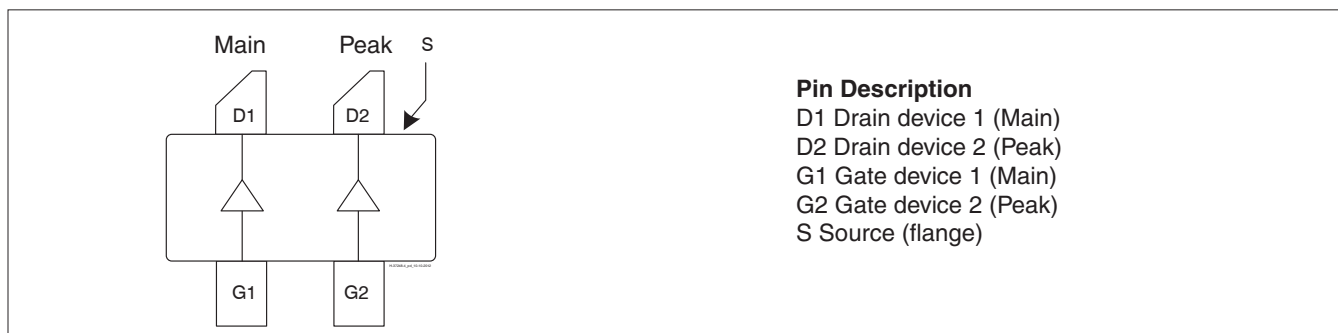
**Reference Circuit Assembly**

DUT	PXAC182002FC V1
Test Fixture Part No.	LTA/PXAC182002FC V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 1805 - 1880$ MHz
Find Gerber files for this test fixture on the Wolfspeed Web site at <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a>	

**Components Information**

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101	Capacitor, 1.2 pF	ATC	ATC600F1R2CW250T
C102	Capacitor, 0.5 pF	ATC	ATC600F0R5CW250T
C103, C104, C105, C106	Capacitor, 18 pF	ATC	ATC600F180JW250T
C107, C108	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
R101	Resistor, 50 $\Omega$	Richardson	C8A50Z4A
R102	Resistor, 18 ohms	Panasonic Electronic Components	ERJ-8GEYJ180V
R103, R104	Resistor, 301 $\Omega$	Venkel	CR0603-16W-3010FT
R105, R106	Resistor, 10 $\Omega$	Panasonic Electronic Components	ERJ-3GEYJ100V
S1	Hybrid Coupler	Anaren	X3C19P1-03S
<b>Output</b>			
C201, C207, C215, C218, C219	Capacitor, 18 pF	ATC	ATC600F180JW250T
C202	Capacitor, 0.8 pF	ATC	ATC600F0R8AW250T
C203	Capacitor, 5.1 pF	ATC	ATC600F5R1AW250T
C204	Capacitor, 1.6 pF	ATC	ATC600F1R6AW250T
C205, C217	Capacitor, 220 $\mu$ F	Cornell Dubilier Electronics	SK221M050ST
C206, C208, C209, C211, C213, C214, C216	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
C210	Capacitor, 0.5 pF	ATC	ATC600F0R5AW250T
C212	Capacitor, 1.6 pF	ATC	ATC600F1R6AW250T

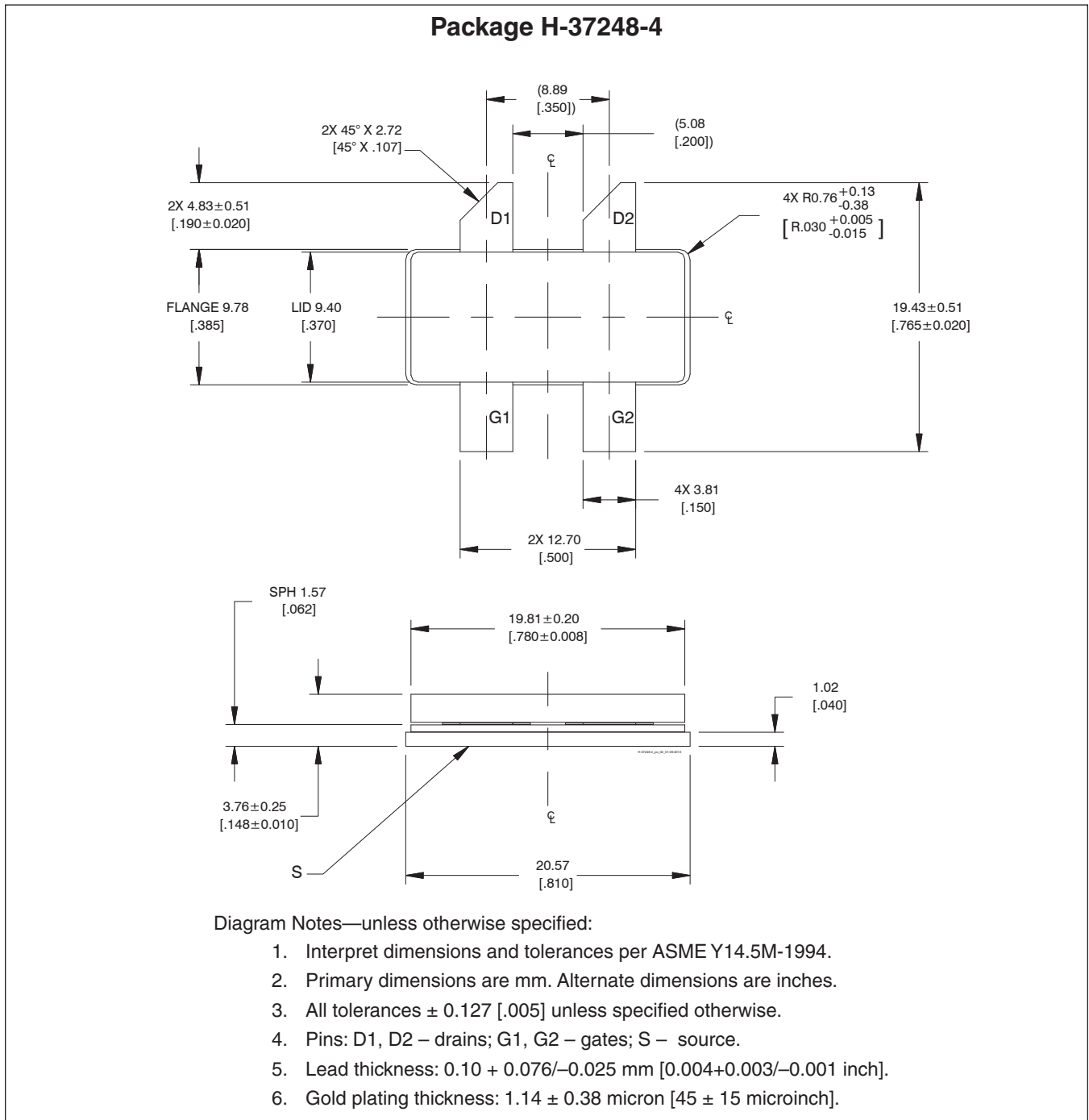
**Pinout Diagram** (top view)



**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)

Lead connections for PXAC182002FC

Package Outline Specifications



## Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2014-09-23	Advance	All	Data Sheet reflects advance specification for product development
02	2015-03-24	Production	All All	Data Sheet reflects released product specification Revised all data and includes updated final specs, typical performance graphs, loadpull, reference circuit, package outline
02.1	2015-05-20	Production	1	Updated single-carrier WCDMA test spec
02.2	2015-06-05	Production	1	Corrected I/O in description paragraph, removed $f_1$ from single-carrier WCDMA test spec condition
02.3	2016-06-17	Production	1, 2	Updated ESD rating and ordering information to include R0
03	2018-06-25	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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