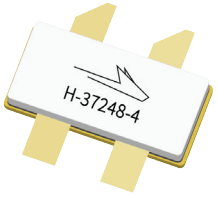
PXAC201202FC

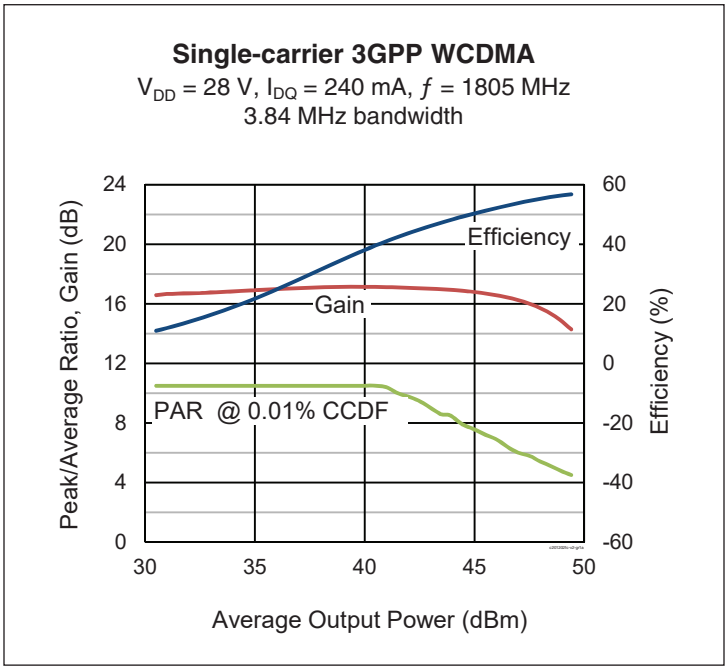
Thermally-Enhanced High Power RF LDMOS FET
120 W, 28 V, 1800 – 2200 MHz

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 P_{1dB}
  - 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 V, $V_{GS(peak)}$ = 1.4 V, I_{DQ} = 240 mA, P_{OUT} = 16 W average, f = 1880 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	η_D	43	46	—	%
Adjacent Channel Power Ratio	ACPR	—	–29	–26	dBc

All published data at T_{CASE} = 25°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 V, $V_{GS(peak)}$ = 1.2 V, I_{DQ} = 240 mA, P_{OUT} = 16 W average, f = 2140 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	η_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 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current		V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
		V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
Gate Leakage Current		V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA
On-state Resistance	(main)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.3	—	Ω
	(peak)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.16	—	Ω
Operating Gate Voltage	(main)	V_{DS} = 28 V, I_{DQ} = 242 mA	V_{GS}	2.5	2.69	2.8	V
	(peak)	V_{DS} = 28 V, I_{DQ} = 0 A	V_{GS}	0.5	0.7	1.6	V

Maximum Ratings

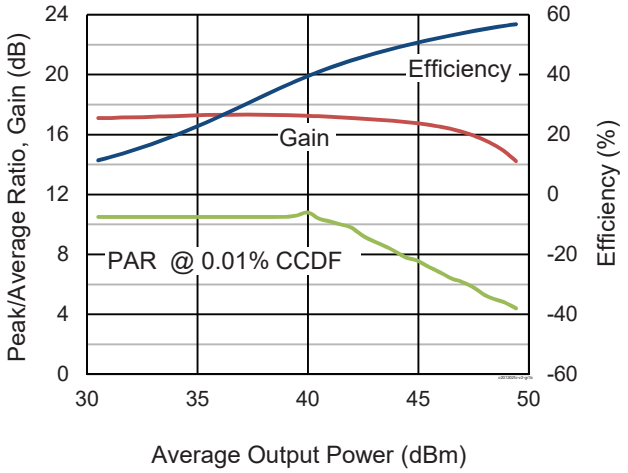
Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	65	V
Gate-source Voltage	V_{GS}	–6 to +10	V
Operating Voltage	V_{DD}	0 to +32	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 100 W CW)	$R_{\theta JC}$	0.7	°C/W

Ordering Information

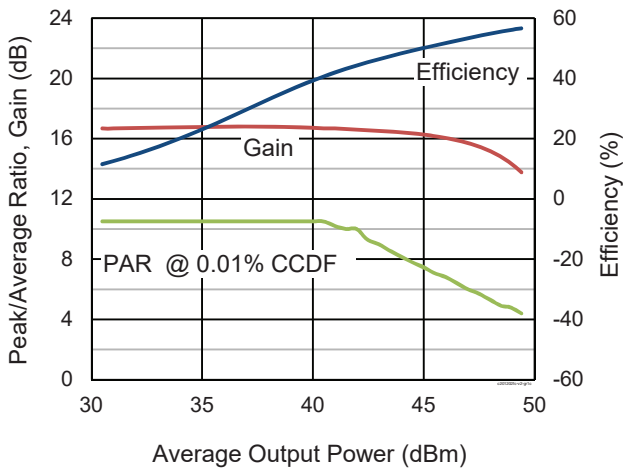
Type and Version	Order Code	Package and Description	Shipping
PXAC201202FC V2 R0	PXAC201202FC-V2-R0	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 50 pcs
PXAC201202FC V2 R250	PXAC201202FC-V2-R250	H-37248-4, ceramic open-cavity, earless	Tape & Reel, 250 pcs

Typical Performance (data taken in an Wolfspeed test fixture)

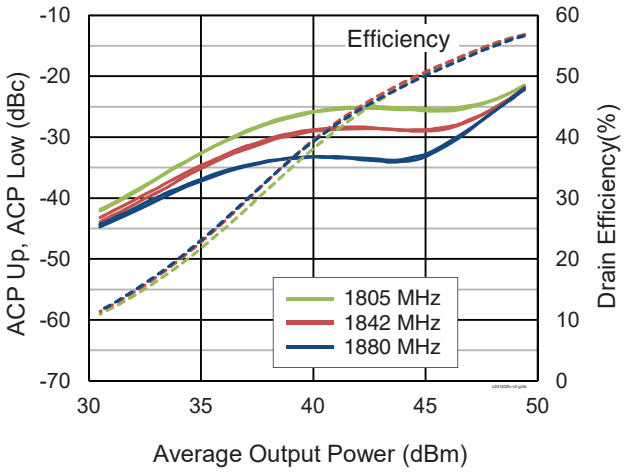
Single-carrier 3GPP WCDMA
V_{DD} = 28 V, I_{DQ} = 240 mA, f = 1842 MHz
3.84 MHz bandwidth



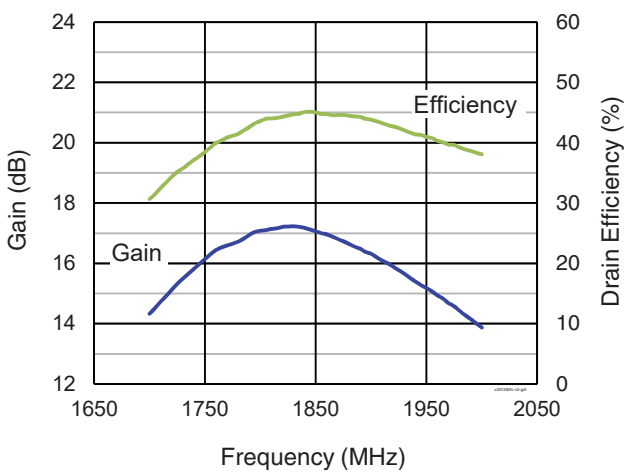
Single-carrier 3GPP WCDMA
V_{DD} = 28 V, I_{DQ} = 240 mA, f = 1880 MHz
3.84 MHz bamdwidth



Single-carrier 3GPP WCDMA
V_{DD} = 28 V, I_{DQ} = 240 mA,
f = 1805 –1880 MHz,
3.84 MHz bandwidth, 10 dB PAR

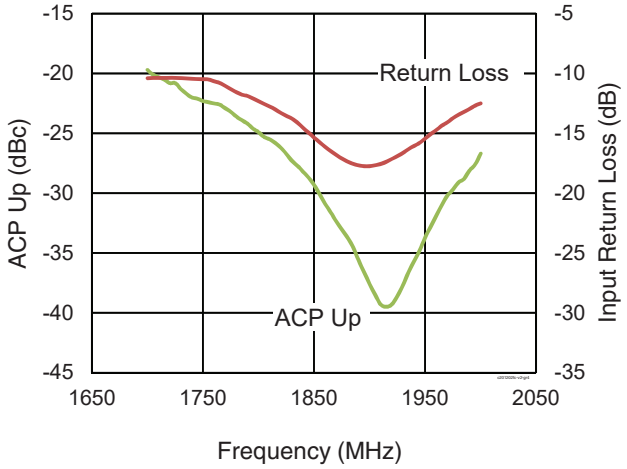


Single-carrier 3GPP WCDMA
Broadband Performance
V_{DD} = 28 V, I_{DQ} = 240 mA, P_{OUT} = 42 dBm,
PAR = 10 dB PAR

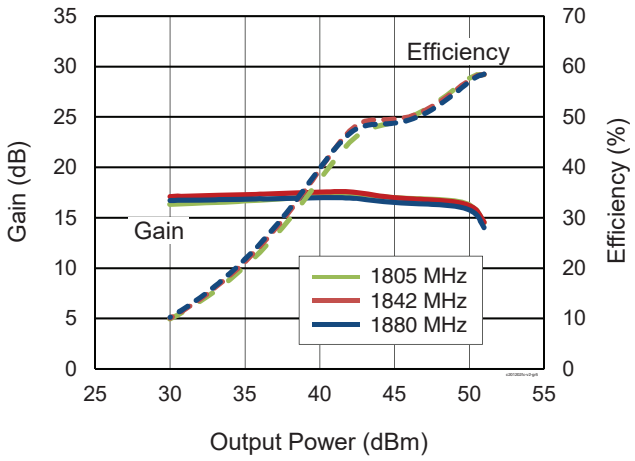


Typical Performance (cont.)

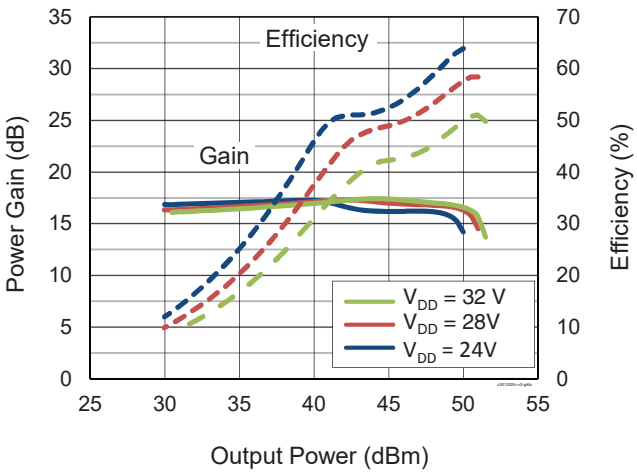
Single-carrier 3GPP WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 240 mA, P_{OUT} = 42 dBm, PAR = 10 dB



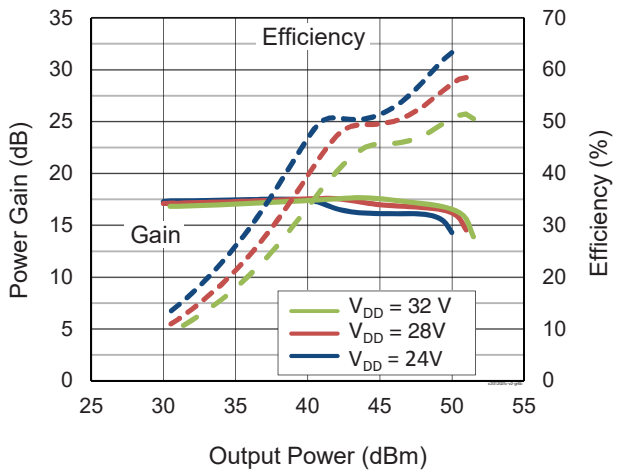
CW Performance
V_{DD} = 28 V, I_{DQ} = 240mA



CW Performance at selected V_{DD}
I_{DQ} = 240 mA, f = 1805 MHz

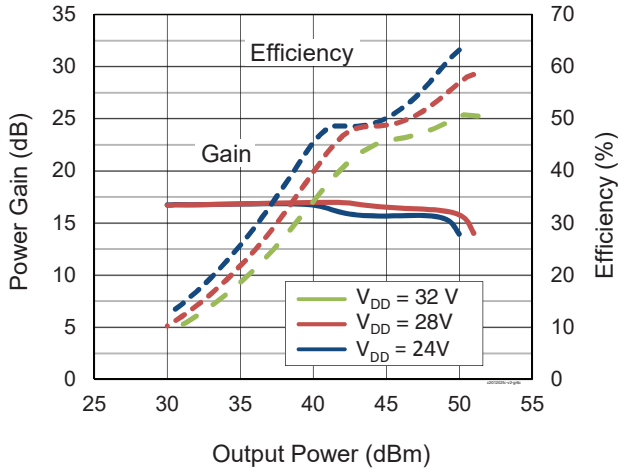


CW Performance at selected V_{DD}
I_{DQ} = 240 mA, f = 1842.5 MHz

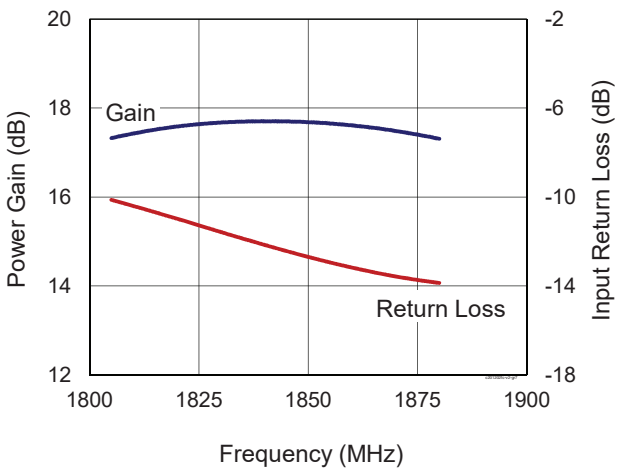


Typical Performance (cont.)

CW Performance
at selected V_{DD}
I_{DQ} = 240 mA, f = 1880 MHz

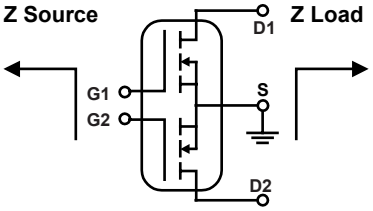


Small Signal CW
Gain & Input Return Loss, single side
V_{DD} = 28 V, I_{DQ} = 350 mA



See next page for load pull performance

Load Pull Performance



Main side pulsed CW signal: 160 µsec, 10% duty cycle; 28 V, 250 mA

Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [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 µsec, 10% duty cycle; 28 V, 540 mA

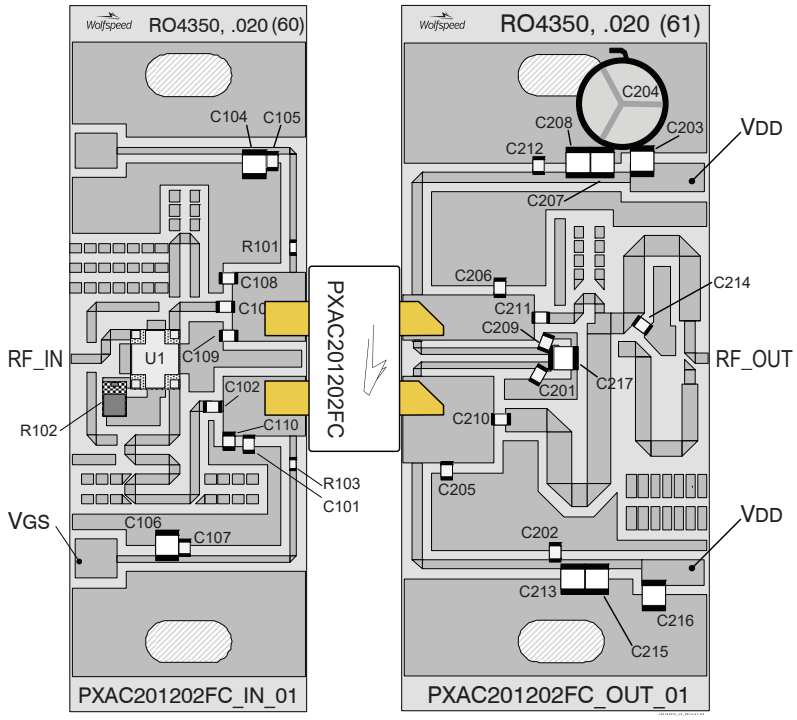
Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]	Zl [Ω]	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE [%]
1810	3.75 – j8.61	2.62 – j5.15	18.47	49.89	97.50	48.3	4.96 – j7.28	20.92	48.49	70.63	59.9
1840	3.69 – j8.66	2.99 – j4.99	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, $\varepsilon_r = 3.66$

Find Gerber files for this reference fixture on the Wolfspeed Web site at (**www.wolfspeed.com/RF**)

Reference Circuit (cont.)

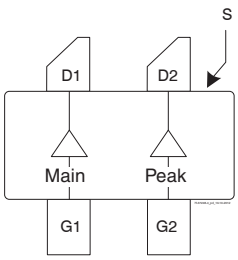


Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Manufacturer	P/N
Input			
C101	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 µF, 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
Output			
C201, C202, C209, C210, C211, C212	Chip capacitor, 18 pF	ATC	ATC600F180JW250T
C203, C207, C208, C213, C215, C216, C217	Capacitor, 10 µF, 50 V	Taiyo Yuden	UMK325C7106MM-T
C204	Capacitor, 220 µF, 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)



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)

See next page for package mechanical specifications

Package Outline Specifications

Package H-37248-4

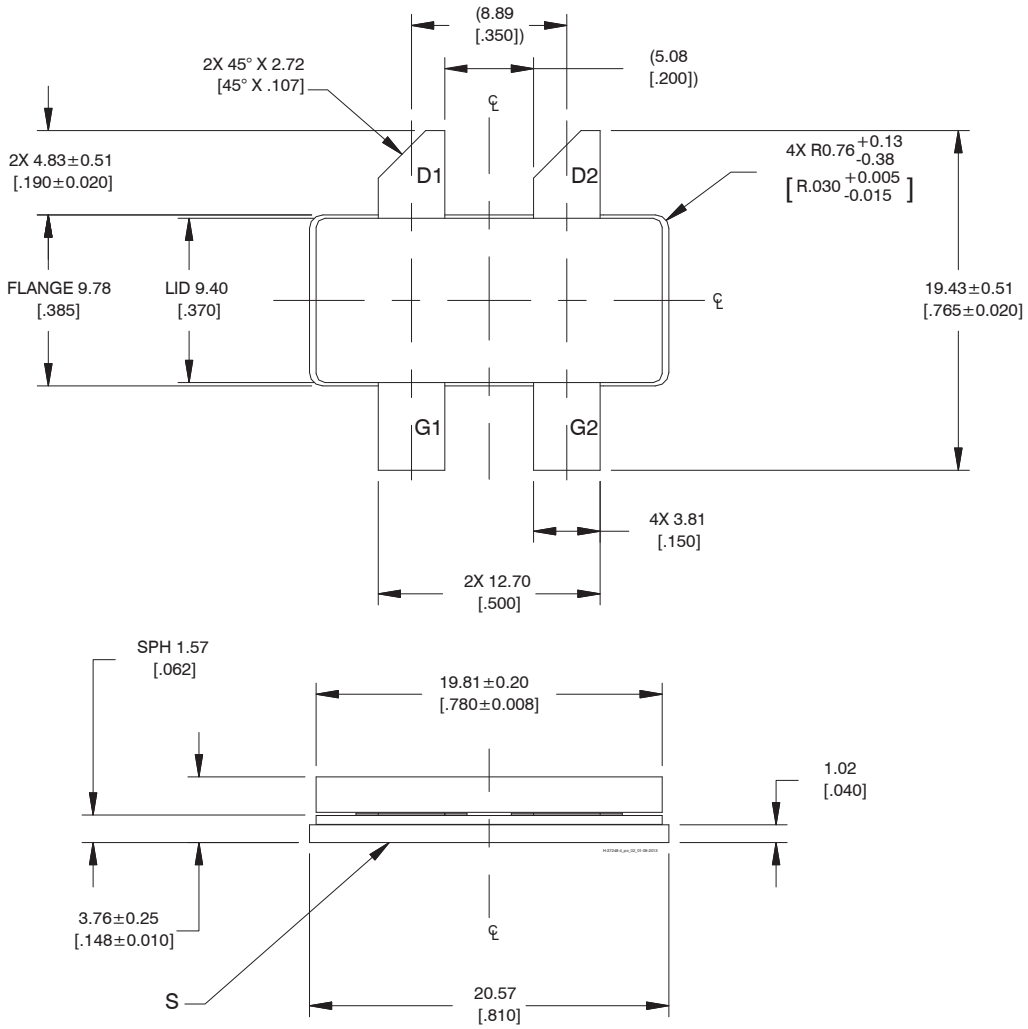


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005].
4. Pins: D1, D2 – drain, S (flange) – source, G1, G2 – gate.
5. Lead thickness: 0.10 +0.076/–0.025 [.004 +.003/–.001].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

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

Sales Contact
RFSales@wolfspeed.com

RF Product Marketing Contact
RFMarketing@wolfspeed.com
919.407.7816

Notes

Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. “Typical” parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer’s technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9