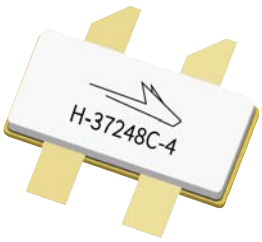
PXAC241002FC

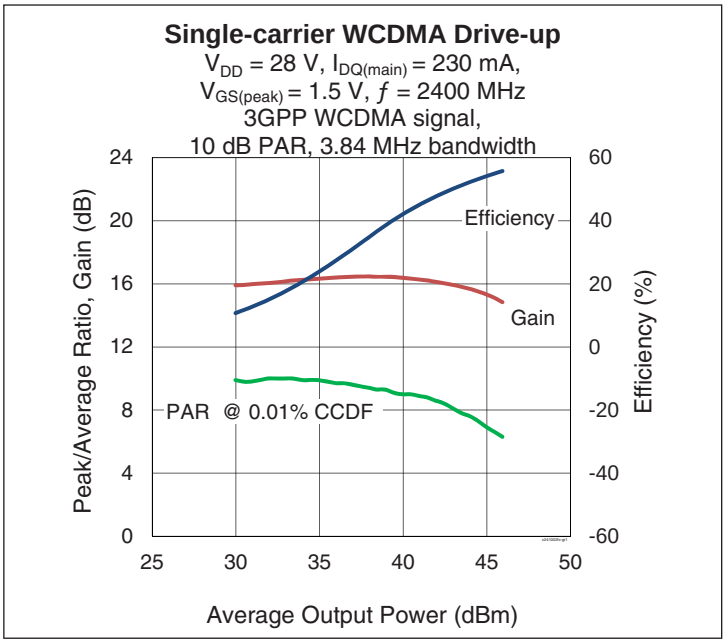
Thermally-Enhanced High Power RF LDMOS FET
100 W, 28 V, 2300 – 2400 MHz

Description

The PXAC241002FC is a 100-watt LDMOS FET with an asymmetric design, intended for use in multi-stantdard cellular power amplifier applications in the 2300 to 2400 MHz frequency band. Features include dual-path design, input and output matching, high gain and a thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAC241002FC
Package H-37248C-4



Features

- Broadband internal input and output matching
- Asymmetric Doherty design
  - Main: P_{1dB} = 40 W Typ
  - Peak: P_{1dB} = 60 W Typ
- Typical Pulsed CW performance, 2400 MHz, 28 V, 160 µsec pulse width, 10% duty cycle (Doherty configuration)
  - Output power at P_{1dB} = 34 W
  - Output power at P_{3dB} = 81 W
  - Efficiency = 53%
  - Gain = 15.7 dB
- Capable of handling 10:1 VSWR @28 V, 80 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 production test fixture)
V_{DD} = 28 V, I_{DQ} = 230 mA, $V_{GS(PEAK)}$ = 1.5 V, P_{OUT} = 15 W avg, f = 2400 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	14.8	15.5	—	dB
Drain Efficiency	η_D	43	45	—	%
Adjacent Channel Power Ratio	ACPR	—	–28	–26	dBc
Output PAR@0.01% CCDF	OPAR	7.0	7.6	—	dB

All published data at T_{CASE} = 25°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 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current		V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1	µA
		V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10	µA
Gate Leakagte Current		V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1	µA
On-State Resistance	(Main)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.20	—	Ω
	(Peak)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.15	—	Ω
Operating Gate Voltage	(Main)	V_{DS} = 28 V, I_{DQ} = 150 mA	V_{GS}	—	2.7	—	V
	(Peak)	V_{DS} = 28 V, I_{DQ} = 0 mA	V_{GS}	—	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
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C

Thermal Characteristics

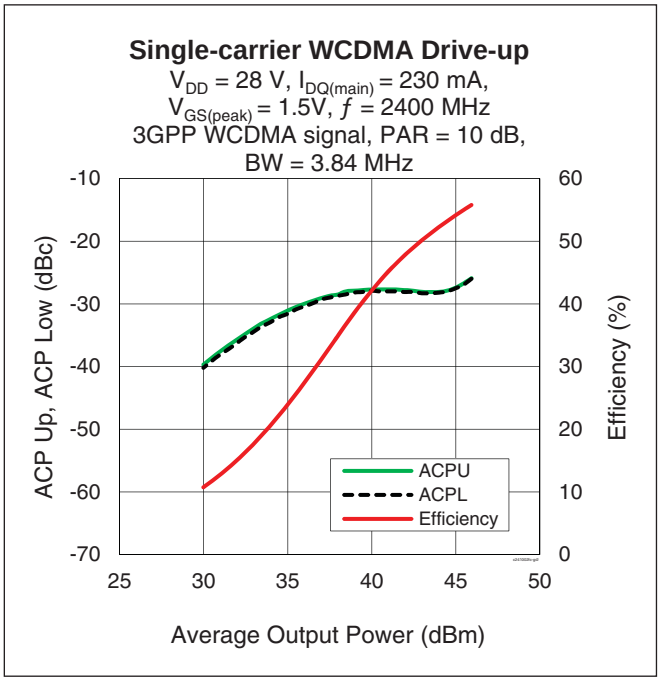
T_{CASE} = 70°C, 15.8 W (CW), 28 V, = 240 mA I_{DQ}, 1.5 V $V_{GS(peak)}$, 2350 MHz

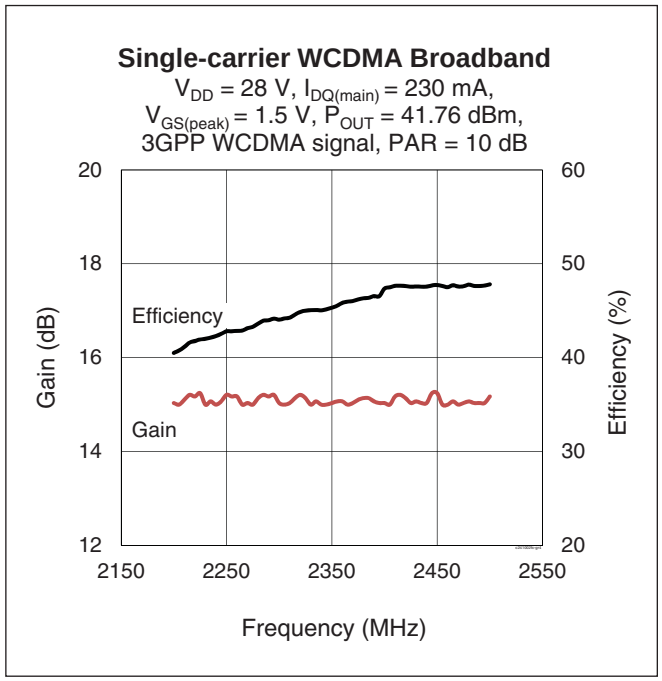
Characteristic		Symbol	Value	Unit
Thermal Resistance	(Main)	$R_{\theta JC}$	1.7	°C/W
	(Peak)	$R_{\theta JC}$	1.4	°C/W

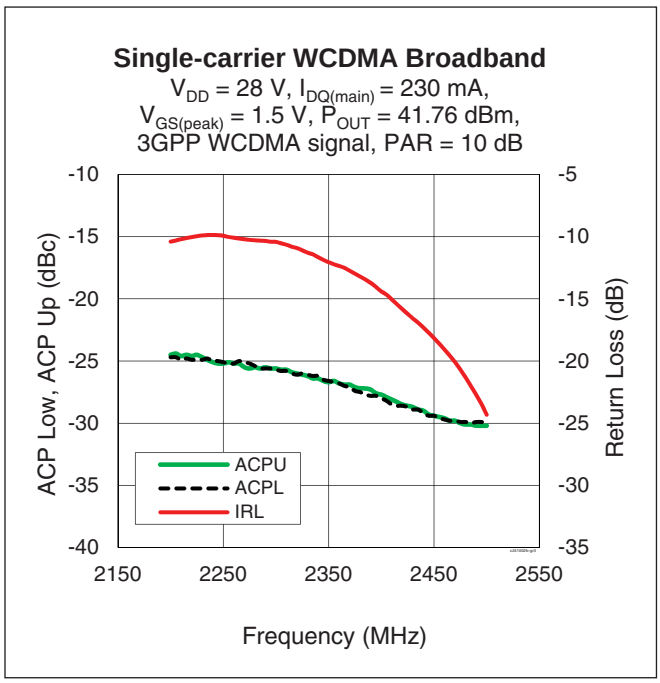
Ordering Information

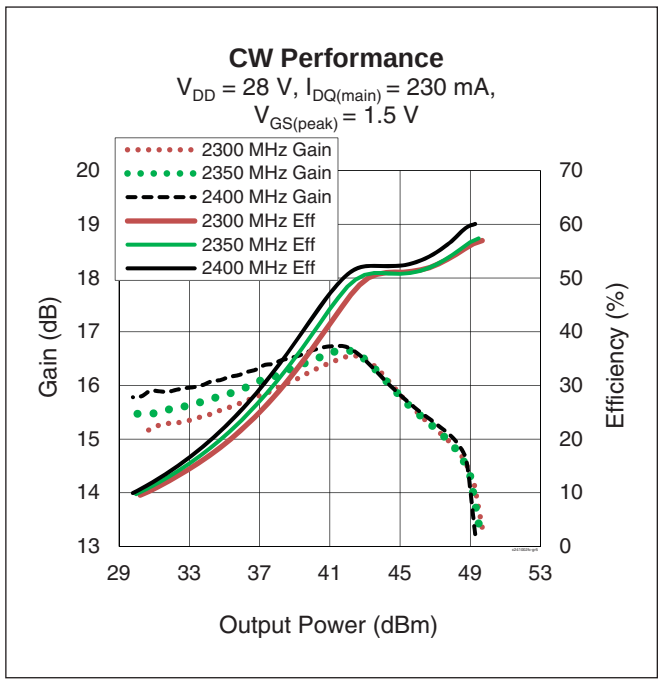
Type and Version	Order Code	Package	Shipping
PXAC241002FC V1 R0	PXAC241002FC-V1-R0	H-37248C-4, PP, earless	Tape & Reel, 50 pcs
PXAC241002FC V1 R2	PXAC241002FC-V1-R2	H-37248C-4, PP, earless	Tape & Reel, 250 pcs

Typical RF Performance (data taken in production test fixture)

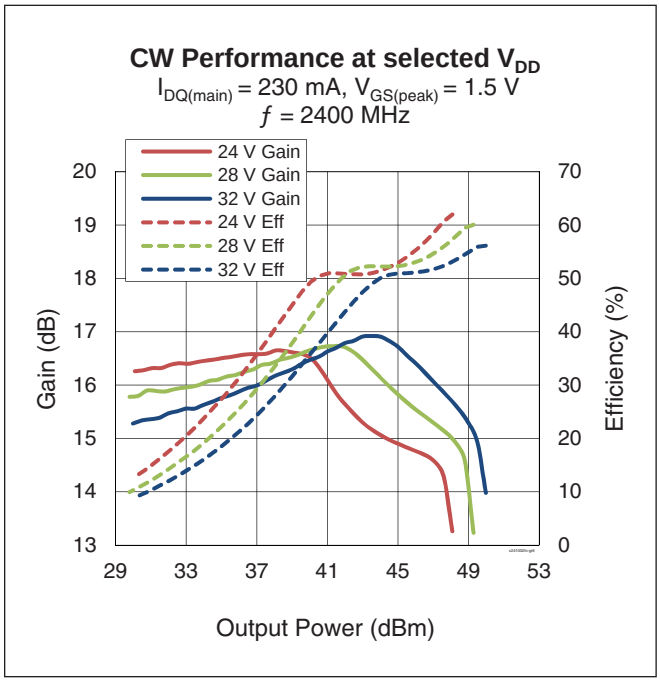


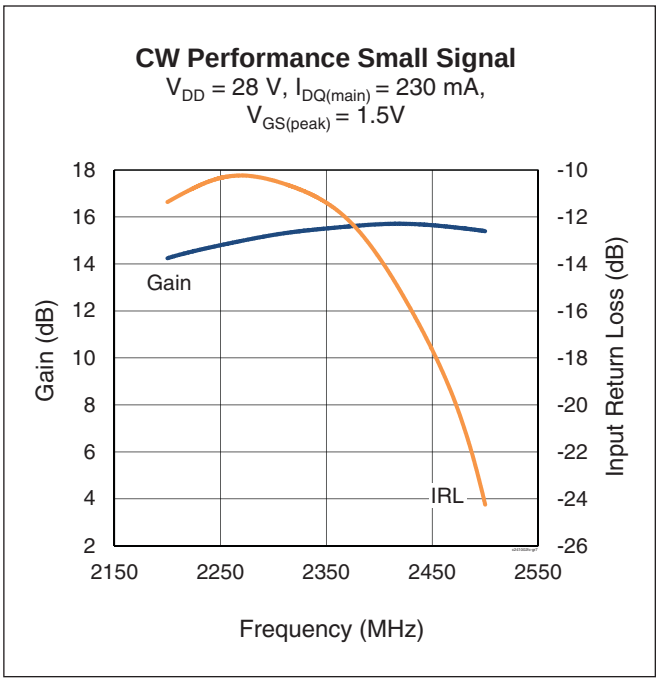






Typical RF Performance (cont.)





Load Pull Performance, Doherty Configuration

Main Side – Pulsed CW` signal: 160 µs, 10% duty cycle, V_{DD} = 28 V, I_{DQ} = 240 mA, class AB

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]
2300	12.95 – j25.61	7.27 – j9.24	18.7	46.81	48	54.9	10.89 – j3.58	20.6	45.4	34	63.7
2350	19.55 – j24.45	7.18 – j9.73	18.3	46.76	47	53.3	10.64 – j3.34	20.5	45.2	33	63.3
2400	24.79 – j25.22	7.26 – j9.51	18.6	46.70	47	54.1	9.41 – j2.55	20.7	44.9	31	63.1

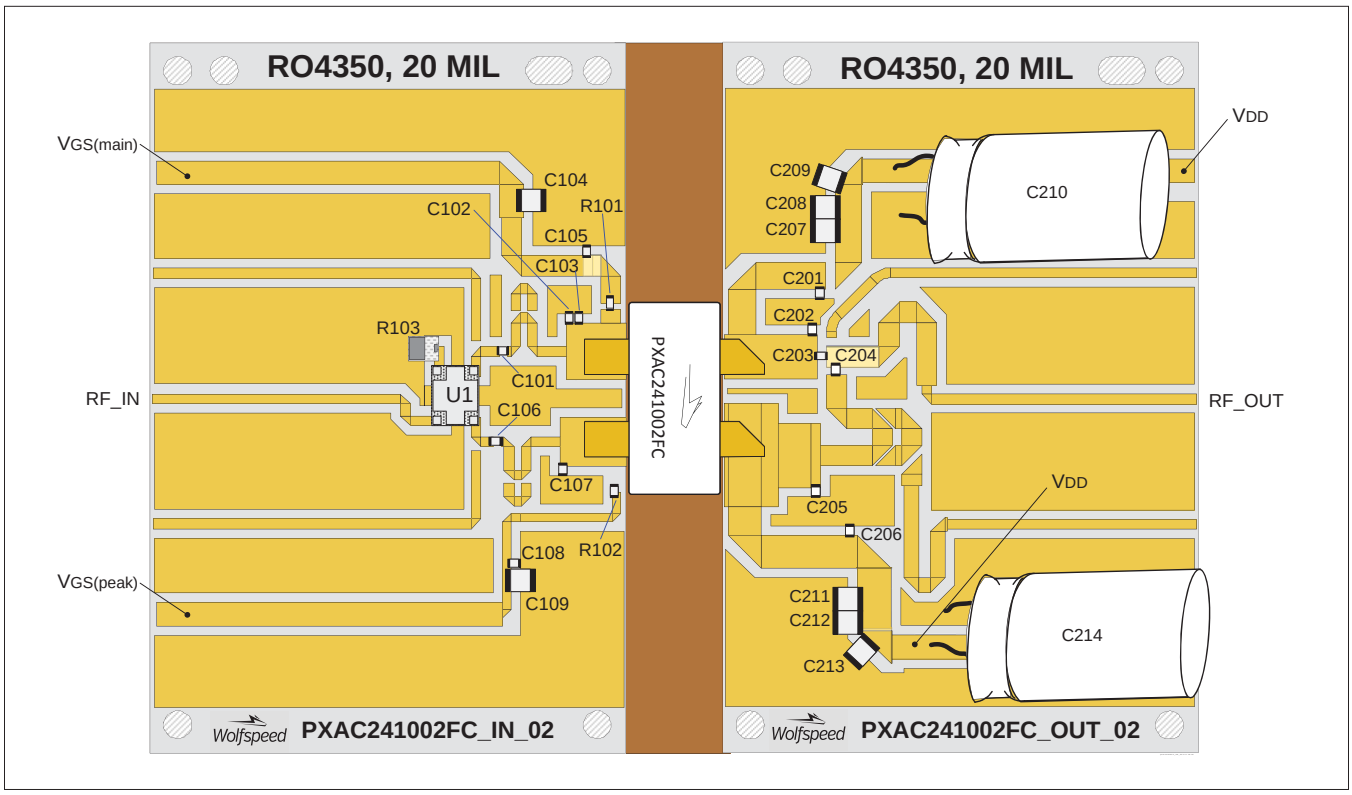
Peak Side – Pulsed CW signal: 160 µs, 10% duty cycle, V_{DD} = 28 V, $V_{DGS(peak)}$ = 1,400 mA, class C

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{3dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{3dB} [W]	η_D [%]
2300	8.50 – j15.45	3.77 – j6.16	14.5	48.67	74	59.2	7.27 – j0.08	15.6	45.8	38	68.9
2350	12.98 – j14.49	3.53 – j6.59	14.0	48.58	72	56	6.05 – j0.44	15.2	46.0	40	68.3
2400	16.77 – j15.19	3.73 – j6.81	14.0	48.40	69	54.5	5.26 – j1.22	15.5	46.5	44	69.3

Reference Circuit, 2300 – 2400 MHz

Reference Circuit Assembly

DUT	PXAC241002FC V1
Test Fixture Part No.	LTA/PXAC241002FC V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66



Reference circuit assembly diagram (not to scale)

Components Information for Circuit Assembly

Component	Description	Manufacturer	P/N
Input			
C101, C105, C106, C108	Capacitor, 18 pF	ATC	ATC600F180JW250T
C102, C103, C107	Capacitor, 0.5 pF	ATC	ATC600F0R5CW250T
C104, C109	Capacitor, 10 µF, 50 V	Taiyo Yuden	UMK325C7106MM-T
R101, R102	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-3GEYJ100V
R103	Resistor, 50 Ω	Anaren	C8A50Z4A
U1	Hybrid coupler	Anaren	1P603AS

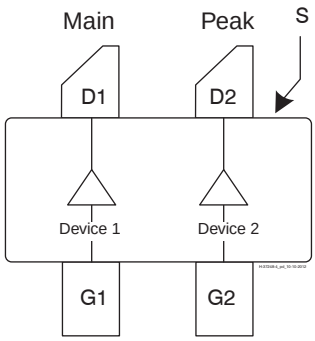
table continued next page

Reference Circuit (cont.)

Components Information for circuit assembly (cont.)

Component	Description	Manufacturer	P/N
Output			
C201, C204, C206	Capacitor, 18 pF	ATC	ATC600F180JW250T
C202	Capacitor, 0.5 pF	ATC	ATC600F0R5CW250T
C203	Capacitor, 5.1 pF	ATC	ATC600F5R1CW250T
C205	Capacitor, 0.8 pF	ATC	ACT600F0R8CW250T
C207, C208, C209, C211, C212, C213	Capacitor, 10 µF, 50 V	Taiyo Yuden	UMK325C7106MM-T
C210, C214	Capacitor, 220 µF	Panasonic Electronic Components	ECA-2AHG221

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)

Package Outline Specifications

Package H-37248C-4

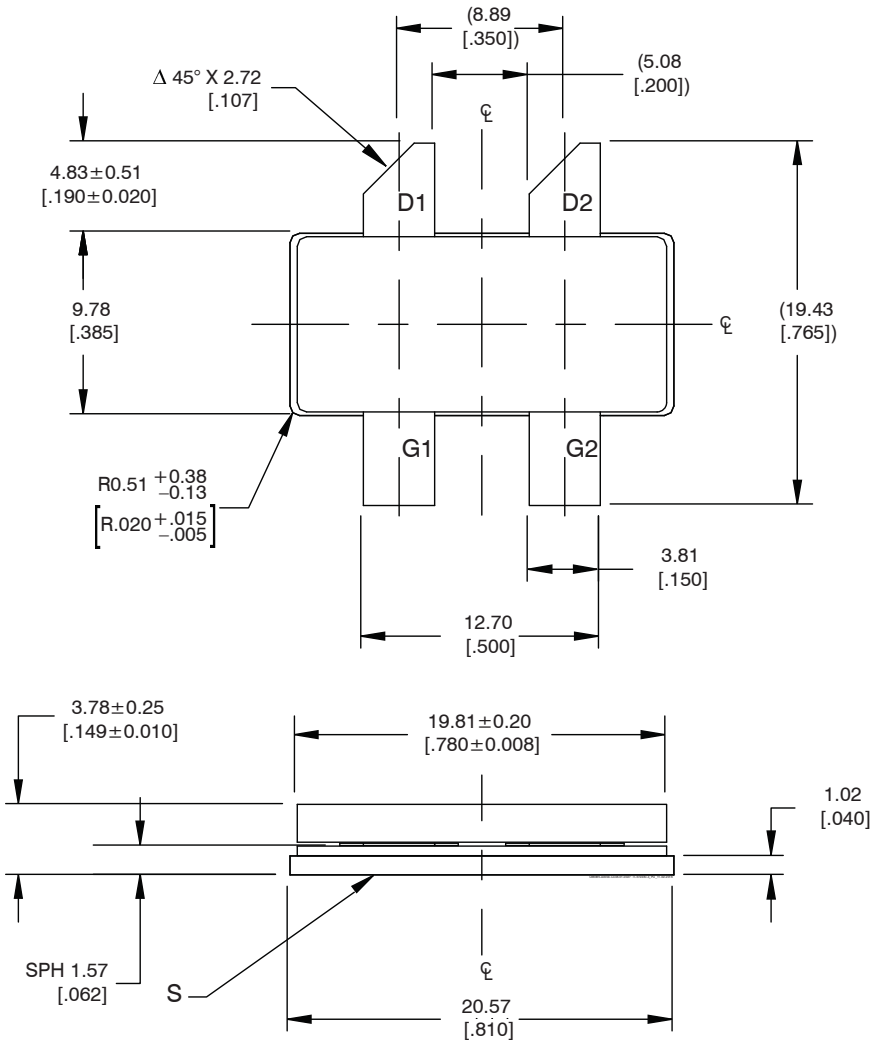


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994
2. Primary dimensions are mm, alternate dimensions are inches
3. All tolerances ± 0.127 [0.005]
4. Pins: D1, D2 – drain, G1, G2 – gate, S – source (flange)
5. Lead thickness: 0.13 ± 0.05 [0.005 ± 0.002]
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch]

Revision History

Revision	Date	Data Sheet	Page	Subjects (major changes at each revision)
01	2014-11-12	Advance	All	Proposed specifications for new product development
02	2017-10-04	Production	All	Information for production-released device, including firm specifications, operating performance, and reference circuit specifications
02	2018-10-04	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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