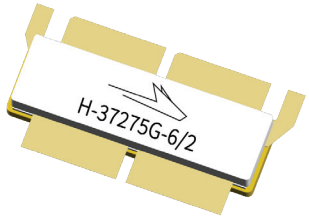
PXAC213308FV

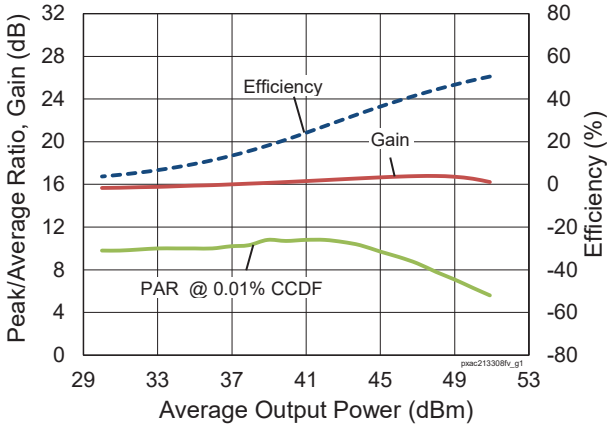
Thermally-Enhanced High Power RF LDMOS FET
320 W, 28 V, 2110 – 2200 MHz

Description

The PXAC213308FV is a 320-watt (P_{3dB}) LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 2100 to 2200 MHz frequency band. Features include dual-path design, broadband 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.



PXAC213308FV
Package H-37275G-6/2



Features

- Broadband internal input and output matching
- Asymmetrical Doherty design
  - Main : P_{1dB} = 140 W Typ
  - Peak : P_{1dB} = 190 W Typ
- Typical Pulsed CW performance, 2170 MHz, 28 V, combined outputs
  - Output power at P_{3dB} = 320 W
  - Efficiency = 53% @ P_{3dB}
  - Gain = 16 dB@ P_{3dB}
- Capable of handling 10:1 VSWR @ 28 V, 170 W CW output power
- Integrated ESD protection
- 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} = 820 mA, V_{GSPEAK} = 1.3 V, P_{OUT} = 55 W avg, f = 2170 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	G_{ps}	15.5	16.5	—	dB
Drain Efficiency	η_D	40	43.5	—	%
Adjacent Channel Power Ratio	ACPR	—	–31	–27	dBc

All published data at T_{CASE} = 25°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 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 Leakage 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	$R_{DS(on)}$	—	0.08	—	Ω
(Peak)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.06	—	Ω
Operating Gate Voltage (Main)	V_{DS} = 28 V, I_{DQ} = 850 mA	V_{GS}	2.5	2.67	2.8	V
(Peak)	V_{DS} = 28 V, I_{DQ} = 0 mA	V_{GS}	1	1.30	1.5	V

Maximum Ratings

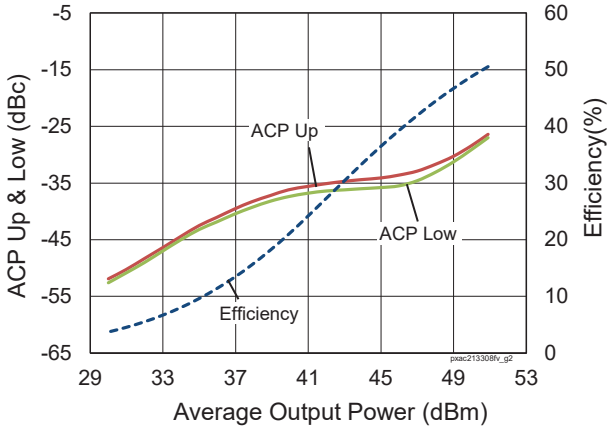
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (Main, T_{CASE} = 70°C, 56 W CW)	$R_{\theta JC}$	0.50	°C/W
(Peak, T_{CASE} = 70°C, 140 W CW)	$R_{\theta JC}$	0.24	°C/W

Ordering Information

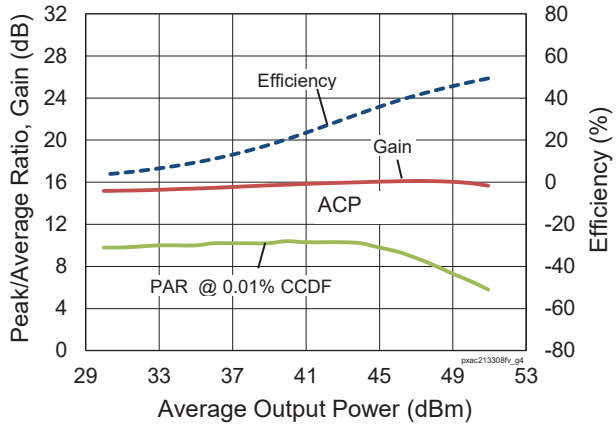
Type and Version	Order Code	Package Description	Shipping
PXAC213308FV V1 R0	PXAC213308FV-V1-R0	H-37275G-6/2, earless flange	Tape & Reel, 50 pcs
PXAC213308FV V1 R2	PXAC213308FV-V1-R2	H-37275G-6/2, earless flange	Tape & Reel, 250 pcs

Typical RF Performance (data taken in production test fixture)

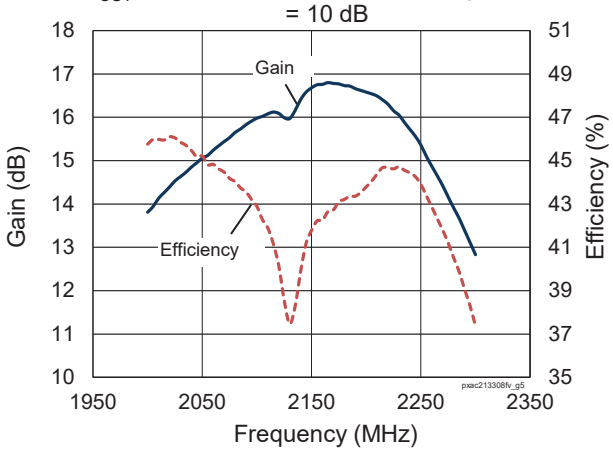
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, $I_{DQ(M)}$ = 820 mA, $V_{GS(PK)}$ = 1.3V,
f = 2170 MHz, 3GPP WCDMA signal,
PAR = 10 dB, BW = 3.84 MHz



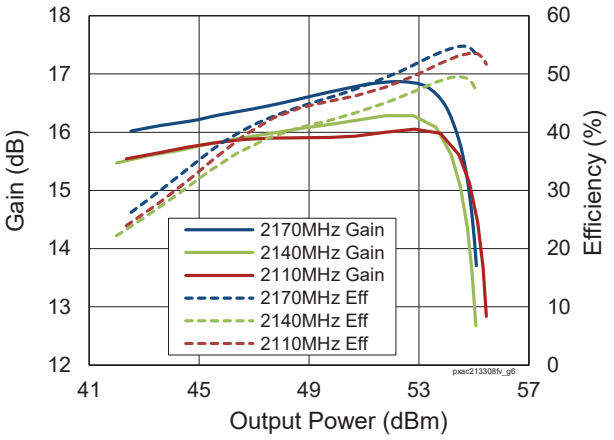
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, $I_{DQ(M)}$ = 820 mA, $V_{GS(PK)}$ = 1.3 V,
f = 2110 MHz, 3GPP WCDMA signal,
PAR = 10 dB, BW = 3.84 MHz



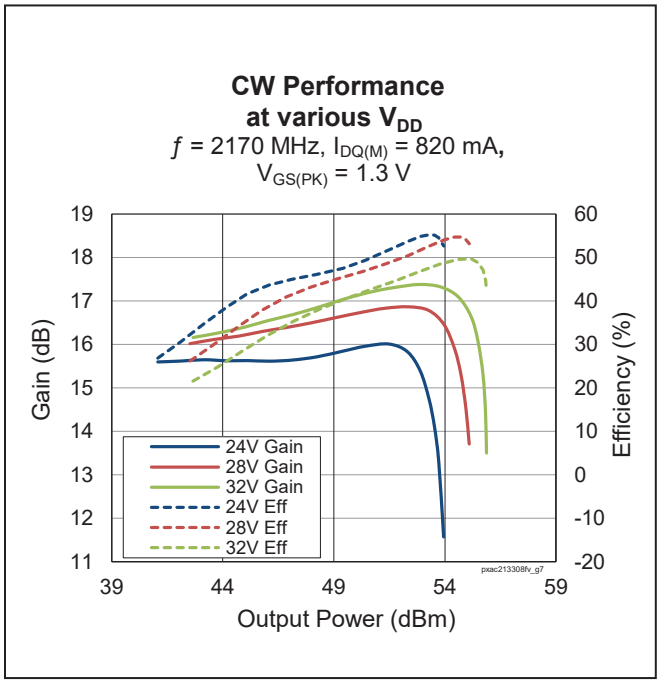
Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, $I_{DQ(M)}$ = 820 mA, $V_{GS(PK)}$ = 1.3 V,
P_{OUT} = 47.4 dBm, 3GPP WCDMA signal, PAR = 10 dB

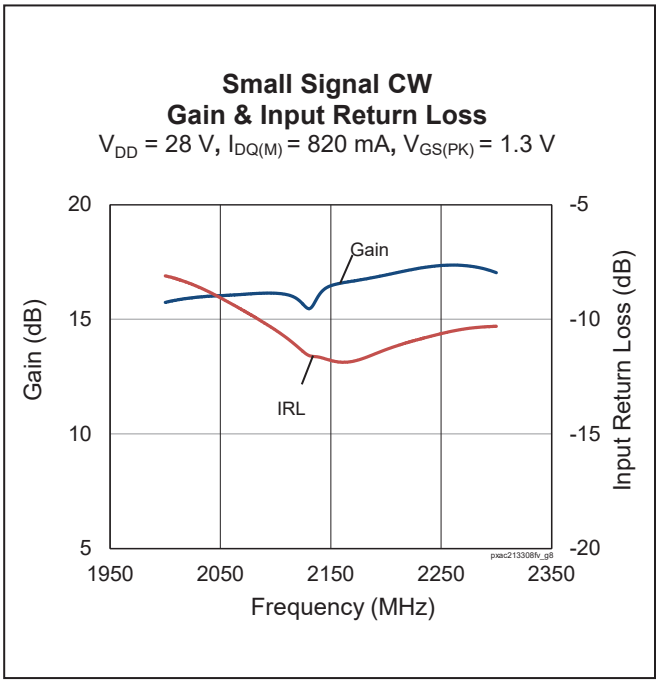


CW Performance
V_{DD} = 28 V, $I_{DQ(M)}$ = 820 mA,
$V_{GS(PK)}$ = 1.3 V



Typical RF Performance (cont.)





Load Pull Performance

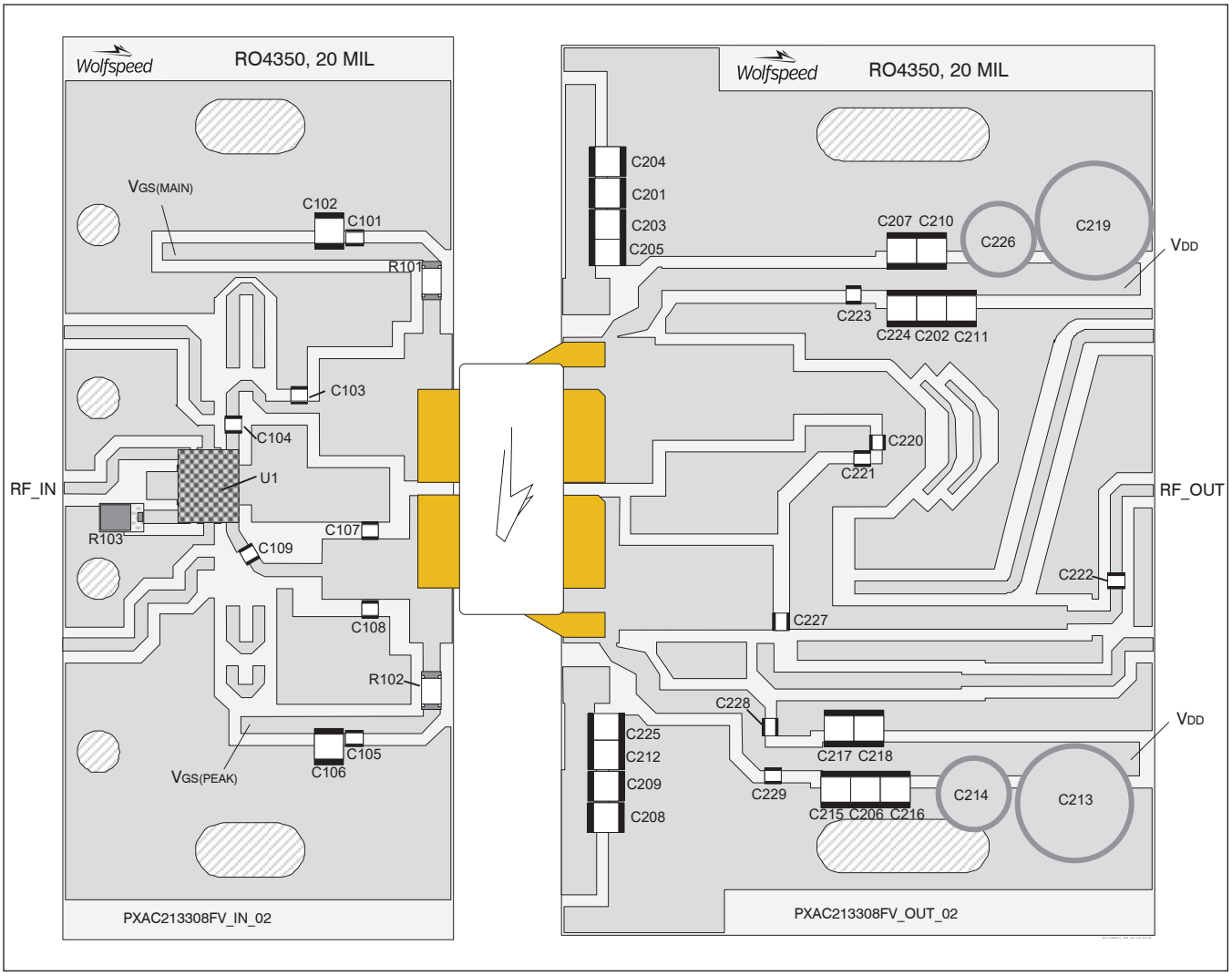
Main Side Load Pull Performance – Pulsed CW signal: 10 µs, 10% duty cycle, 28 V, I_{DQ} = 850 mA, class AB

		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 [%]
2110	3.1 -j3.95	1.35 -j3.44	17.9	52.54	180	55.0	2.48 -j2.92	19.9	51.25	133	63.0
2140	3.24-j3.84	1.3-j3.49	17.7	52.53	179	54.7	2.31-j2.77	19.8	51.20	131	63.0
2170	3.53-j3.59	1.25-j3.52	17.6	52.60	182	54.5	2.23-j2.82	19.7	51.10	129	62.4
2200	3.6-j2.99	1.28-j3.56	17.7	52.44	176	54.0	2.11-j2.92	19.6	51.17	131	61.5

Peak Side Load Pull Performance – Pulsed CW signal: 10 µs, 10% duty cycle, 28 V, $V_{GS(PEAK)}$ = 1.3 V, class C

		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 [%]
2110	2.57-j8	5.37-j1.04	18.6	53.90	245	54.0	2.11-j1.23	20.2	51.99	158	62.9
2140	3.27-j8	3.3-j8.07	18.5	53.81	240	54.4	2.55-j1.2	19.9	52.39	174	62.6
2170	4.78-j8.8	5.54-j0.9	18.4	53.70	238	53.2	2.15-j1.72	20.0	51.76	150	62.7
2200	7.5-j8.4	4.4-j1.47	17.94	53.70	236	50.5	2.62-j1.49	19.8	52.29	169	62.7

Reference Circuit, 2110 – 2170 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

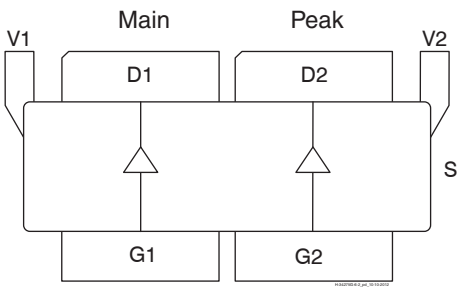
Reference Circuit Assembly

DUT	PXAC213308FV V1
Test Fixture Part No.	LTA/PXAC213308FV V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 2110 – 2170 MHz
Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF	

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C104, C105, C109	Capacitor, 18 pF	ATC	ATC100A180JW150XB
C102, C106	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C103	Capacitor, 0.9 pF	ATC	ATC100A0R9CW150XB
C107	Capacitor, 0.4 pF	ATC	ATC100A0R4CW150XB
C108	Capacitor, 0.2 pF	ATC	ATC100A0R2CW150XB
R101, R102	Resistor, 5.1 Ω	Panasonic Electronic Components	ERJ-8GEYJ5R1V
R103	Resistor, 50 Ω	Richardson	C8A50Z4A
U1	Hybrid coupler	Anaren	X3C21P1-04S
Output			
C201, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C215, C216, C224, C217, C218, C225	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C213, C219	Capacitor, 220 µF	Panasonic Electronic Components	ECA-2AHG221
C214, C226	Capacitor, 220 µF	Panasonic Electronic Components	EEE-FP1V221AP
C220	Capacitor, 0.4 pF	ATC	ATC100A0R4CW150XB
C221	Capacitor, 0.2 pF	ATC	ATC100A0R2CW150XB
C222, C227	Capacitor, 20 pF	ATC	ATC100A200JW150XB
C223, C228, C229	Capacitor, 18 pF	ATC	ATC100A180JW150XB

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 PXAC213308FV

Package Outline Specifications

Package H-37275G-6/2

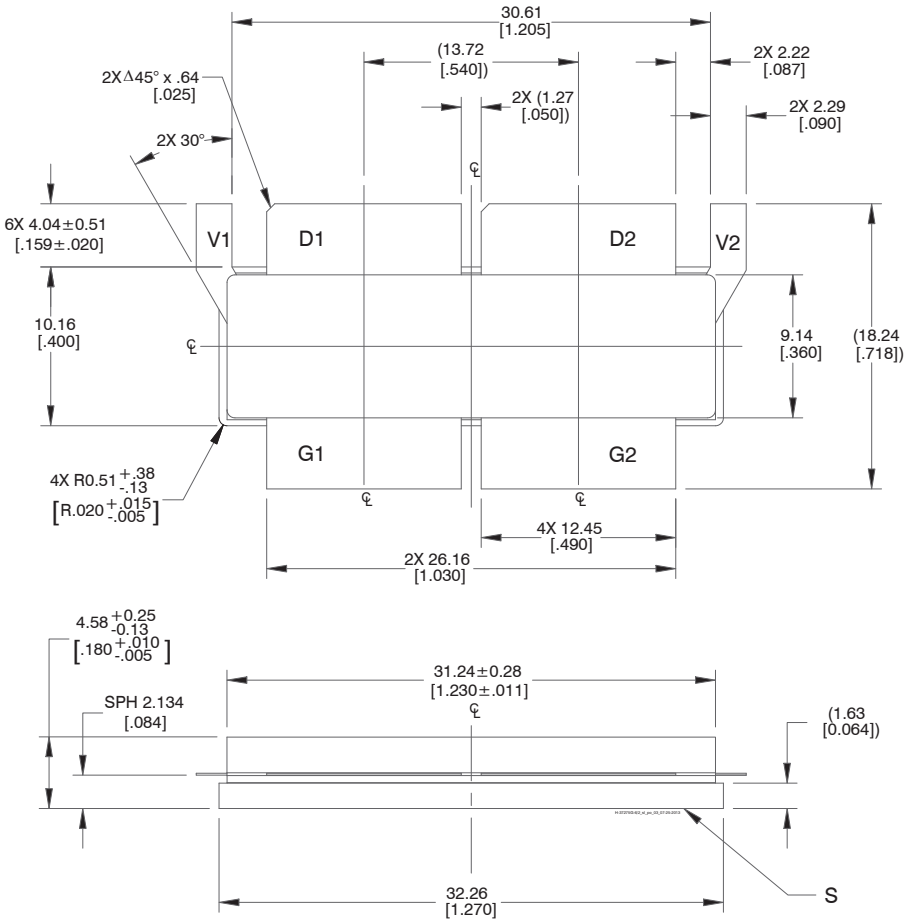


Diagram Notes—unless otherwise specified:

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] unless specified otherwise.
4. Pins: D1, D2 – drains; G1, G2 – gates; S – source; V1, V2 – V_{DD}.
5. Lead thickness: 0.13 + 0.051/–0.025 mm [0.005+0.002/–0.001 inch].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2015-07-23	Advance	All	Data Sheet reflects advance specification for product development
02	2016-05-04	Production	All	Data Sheet reflects released product specification
03	2018-07-02	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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