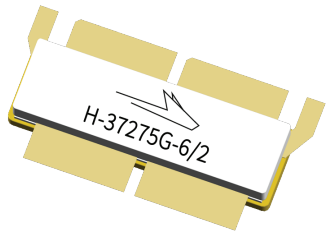
PXAC192908FV

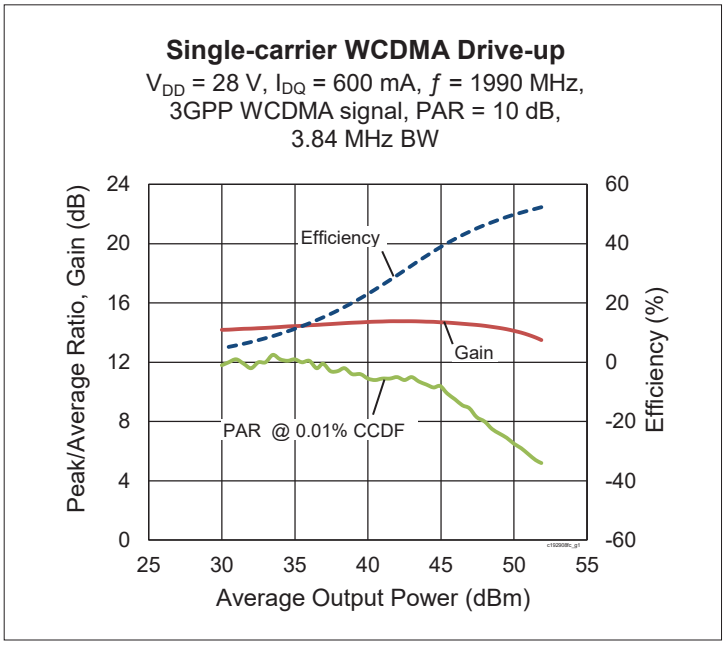
Thermally-Enhanced High Power RF LDMOS FET
240 W, 28 V, 1930 – 1995 MHz

Description

The PXAC192908FV is a 240-watt LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 1930 to 1995 MHz frequency band. Features include dual-path design, 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.

PXAC192908FV
Package H-37275G-6/2





Features

- Broadband internal input and output matching
- Asymmetric Doherty design
  - Main: P_{1dB} = 120 W Typ
  - Peak: P_{1dB} = 220 W Typ
- Typical Pulsed CW performance, 1990 MHz, 28 V, combined outputs
  - Output power at P_{1dB} = 240 W
  - Efficiency = 54%
  - Gain = 14 dB
- Capable of handling 10:1 VSWR @28 V, 240 W (CW) output power
- Integrated ESD protection
- Human Body Model, Class 2 (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 V, I_{DQ} = 0.6 A, $V_{GS(PEAK)}$ = 0.55 V, P_{OUT} = 70 W avg, f_1 = 1990 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	13	14	—	dB
Drain Efficiency	η_D	45	49	—	%
Adjacent Channel Power Ratio	ACPR	—	–28	–25	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
On-State Resistance (main)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.11	—	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} = 0.6 A	V_{GS}	2.5	2.65	2.75	V
(peak)	V_{DS} = 28 V, I_{DQ} = 0 A	V_{GS}	0.45	0.55	0.75	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1	µA

Maximum Ratings

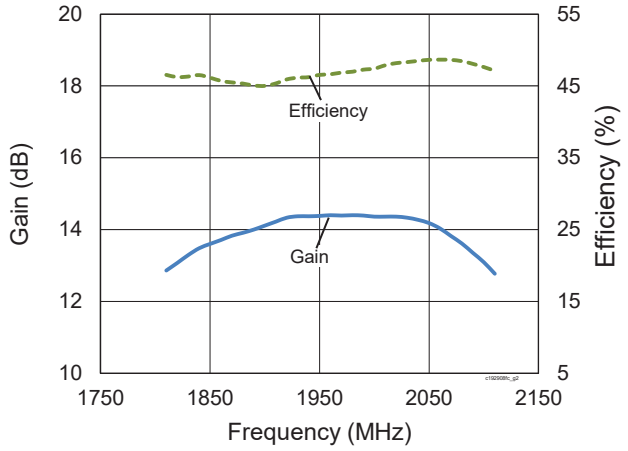
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Operating Voltage	V_{DD}	0 to +32	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (Doherty, T_{CASE} = 70°C, 200 W CW, 1960 MHz, 28V, $I_{DQ\ (main)}$ = 600 mA, $V_{GS\ (peak)}$ = 0.55 V)	$R_{\theta JC}$	0.32	°C/W

Ordering Information

Type and Version	Order Code	Package Description	Shipping
PXAC192908FV V1 R0	PXAC192908FV-V1-R0	H-37275G-6/2, earless flange	Tape & Reel, 50 pcs
PXAC192908FV V1 R250	PXAC192908FV-V1-R250	H-37275G-6/2, earless flange	Tape & Reel, 250 pcs

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

Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 600 mA, P_{OUT} = 48.45dBm,
3GPP WCDMA signal, PAR = 10 dB



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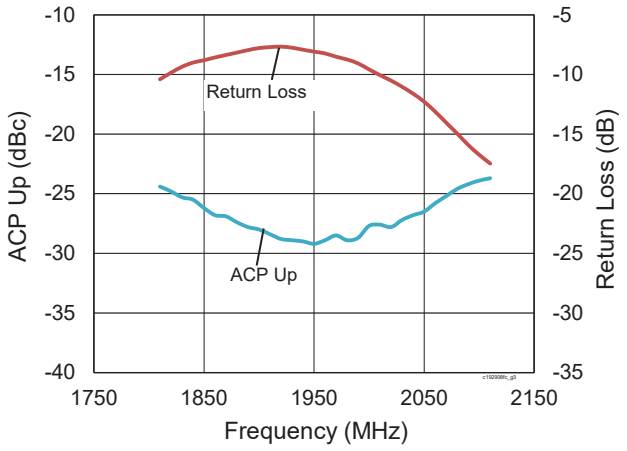
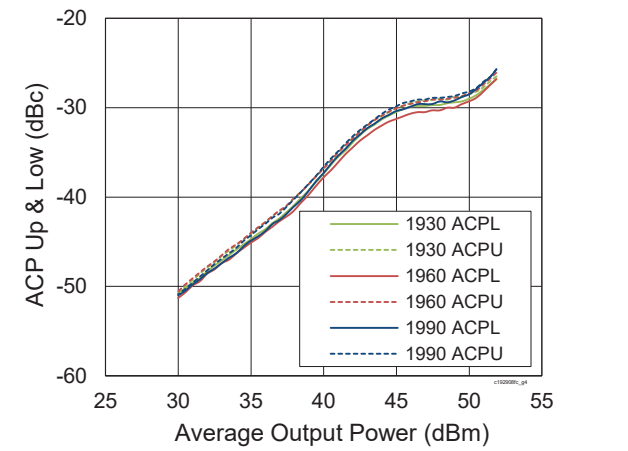
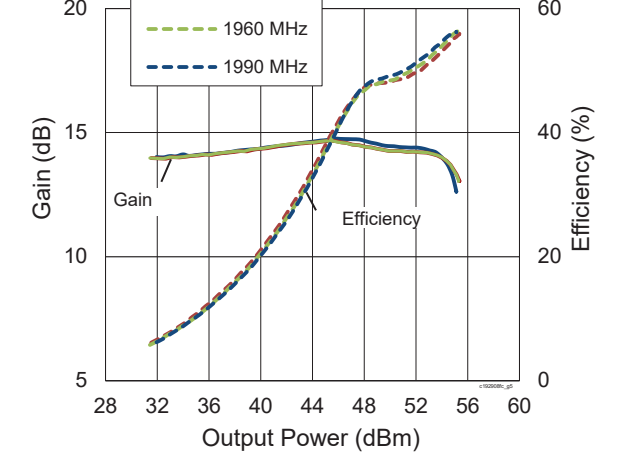


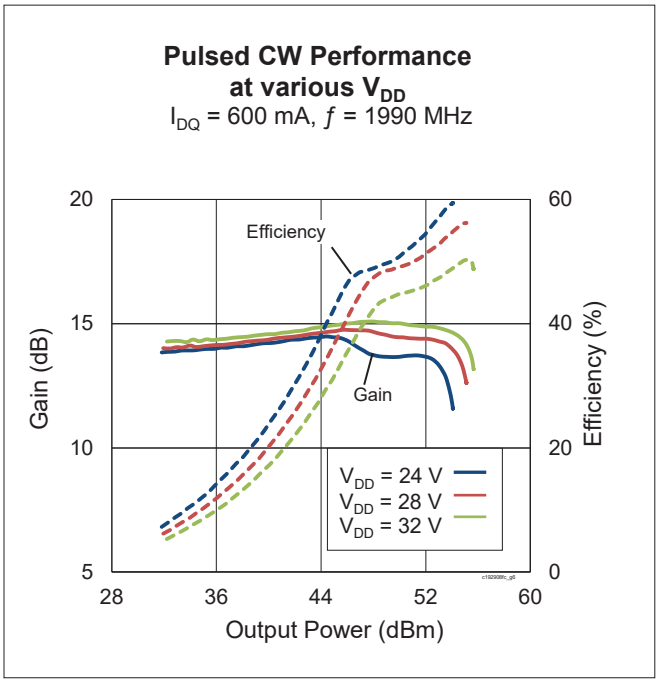
Single-carrier WCDMA 3GPP Drive-up
V_{DD} = 28 V, I_{DQ} = 600 mA,
3GPP WCDMA signal, PAR = 10 dB,
10 MHz carrier spacing, BW = 3.84 MHz

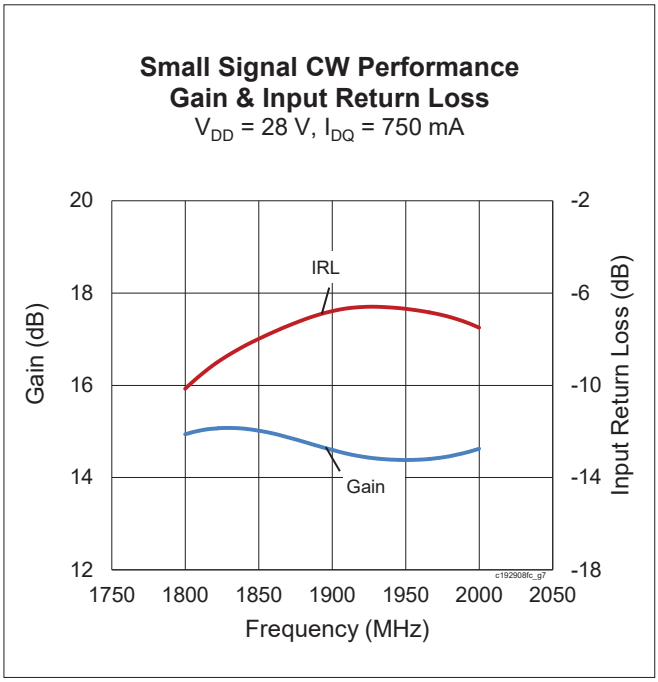


Pulsed CW Performance
V_{DD} = 28 V, I_{DQ} = 600mA



Typical Performance (cont.)





Load Pull Performance

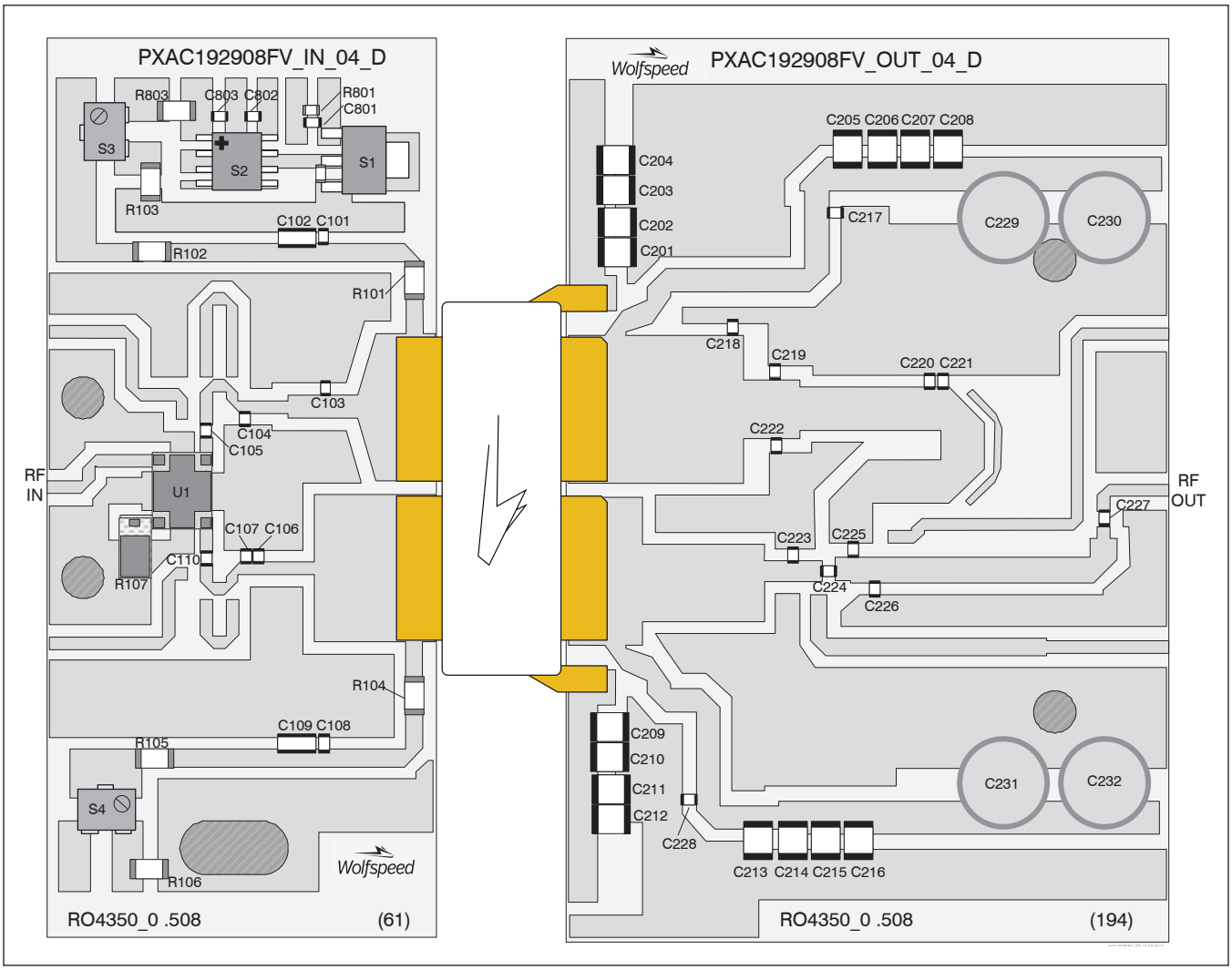
Main Side Load Pull Performance – Pulsed CW signal: 16 µs, 10% duty cycle, V_{DD} = 28 V, I_{DQ} = 600 mA

		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 [%]
1930	8.0 – j11.0	2.1 – j4.7	18.0	51.10	128.8	50.4	3.6 – j2.7	20.2	50.12	102.8	62.5
1960	11.9 – j11.9	2.1 – j4.7	18.2	51.10	128.8	51.0	3.6 – j2.9	20.2	50.08	101.9	61.6
1990	18.0 – j10.4	2.1 – j4.8	18.3	50.91	123.3	49.7	3.63 – j2.6	20.5	49.78	95.1	61.3

Peak Side Load Pull Performance – Pulsed CW signal: 16 µs, 10% duty cycle, V_{DD} =28 V, I_{DQ} = 90 mA

		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 [%]
1930	1.7 – j5.3	5.3 – j3.8	18.0	54.24	265.5	55.6	2.9 – j2.0	19.6	53.04	201.4	66.3
1960	2.0 – j5.8	5.3 – j3.7	18.4	54.16	260.6	55.7	2.9 – j2.2	20.1	52.90	195.0	66.0
1990	3.2 – j6.9	6.3 – j2.8	18.7	54.08	255.9	54.7	2.9 – j2.2	20.3	52.88	194.1	65.0

Reference Circuit , 1930 – 1990 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

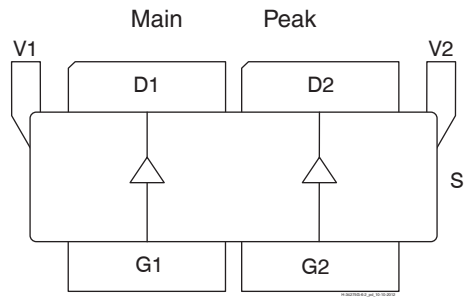
Reference Circuit Assembly

DUT	PXAC192908FV V1
Test Fixture Part No.	LTA/PXAC192908FV V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 1930 – 1990 MHz
Find Gerber files for this test fixture on the Wolfspeed Web site at http://www.wolfspeed.com/RF	

Components Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C108, C105	Capacitor, 18 pF	ATC	ATC600F180JT250X
C102, C109	Capacitor, 10 µF	Murata	LLL31BC70G106MA01L
C103	Capacitor, 1 pF	ATC	ATC600F1R0CT250X
C104	Capacitor, 1.2 pF	ATC	ATC600A1R2CT250X
C106	Capacitor, 0.5 pF	ATC	ATC600F0R5CT250X
C107	Capacitor, 1.1 pF	ATC	ATC600F1R1CT250X
C801, C802, C803	Capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
R101, R104	Resistor, 5600 Ω	Panasonic Electronic Components	ERJ-8RQJ5R6V
R102, R105	Resistor, 1000 Ω	Panasonic Electronic Components	ERJ-8GEYJ102V
R103, R106	Resistor, 5.1 Ω	Panasonic Electronic Components	ERJ-8GEYJ5R1V
R107	Resistor, 50 Ω	Richardson	C16A50Z4
R801	Resistor, 1300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
R802	Resistor, 1200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R803	Resistor, 5100 Ω	Panasonic Electronic Components	ERJ-8GEYJ512V
S1	Voltage Regulator	Texas Instruments	LM78L05ACM
S2	Transistor	Infineon Technologies	BCP56
S3, S4	Potentiometer, 2k Ω	Bourns Inc.	3224W-1-202E
U1	Hybrid coupler	Anaren	X3C19P1-04S
Output			
C201, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C217, C224, C225, C227, C228	Capacitor, 18 pF	ATC	ATC600F180JT250X
C218	Capacitor, 0.5 pF	ATC	ATC600F0R5CT250X
C219	Capacitor, 1.8 pF	ATC	ATC600F1R8CT250X
C220	Capacitor, 0.8 pF	ATC	ATC600F0R8CT250X
C221	Capacitor, 0.4 pF	ATC	ATC600F0R4CT250X
C222, C226	Capacitor, 0.2 pF	ATC	ATC600F0R2CT250X
C223	Capacitor, 1.0 pF	ATC	ATC600F1R0CT250X
C229, C230, C231, 232	Capacitor, 220 µF	Panasonic Electronic Components	EEE-FP1V221AP

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 PXAC192908FV

Package Outline Specifications

Package H-37275G-6/2

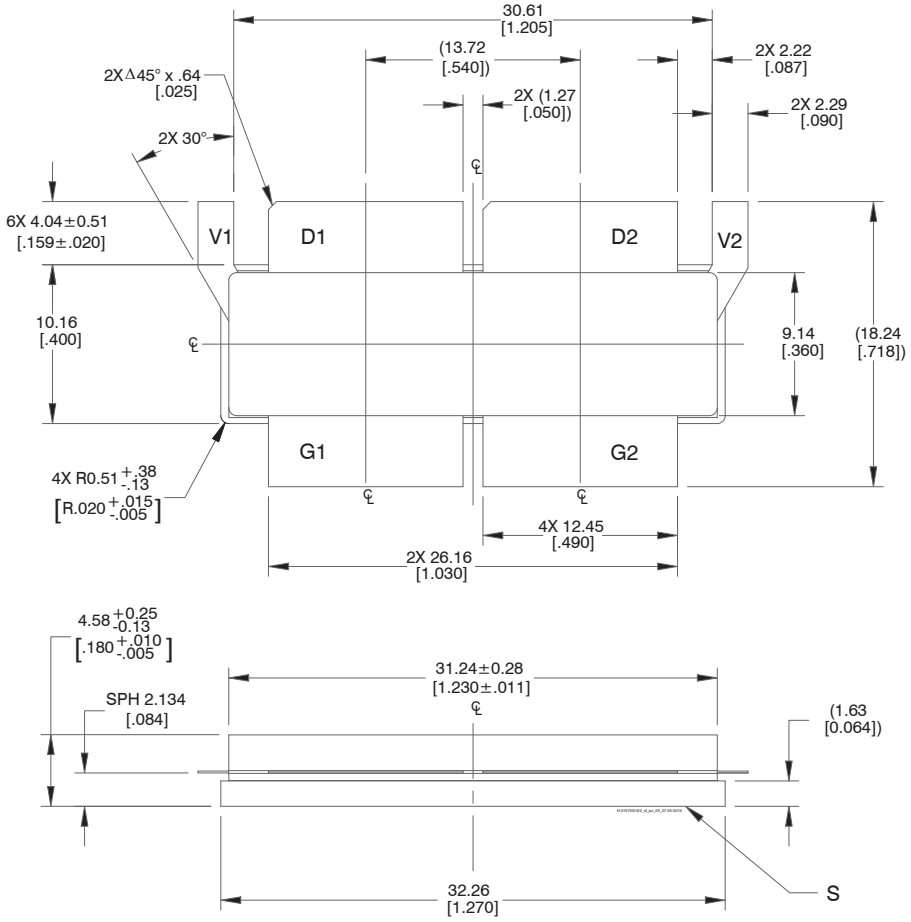


Diagram Notes—unless otherwise specified:

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	2014-06-24	Advance	All	Data Sheet reflects advance specification for product development
01.1	2014-08-27	Advance	2	Updated main and peak side of pinout diagram, added thermal resistance
01.2	2014-09-24	Advance	2	Updated thermal resistance
02	2014-12-08	Production	All	Data Sheet reflects released product specification
02.1	2015-01-13	Production	4	Revised IDQ on main side of Load Pull Performance
02.2	2015-07-14	Production	1	Updated P1dB main & peak in Features
02.3	2016-06-17	Production	2	Updated ordering information to include R0
03	2018-06-25	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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