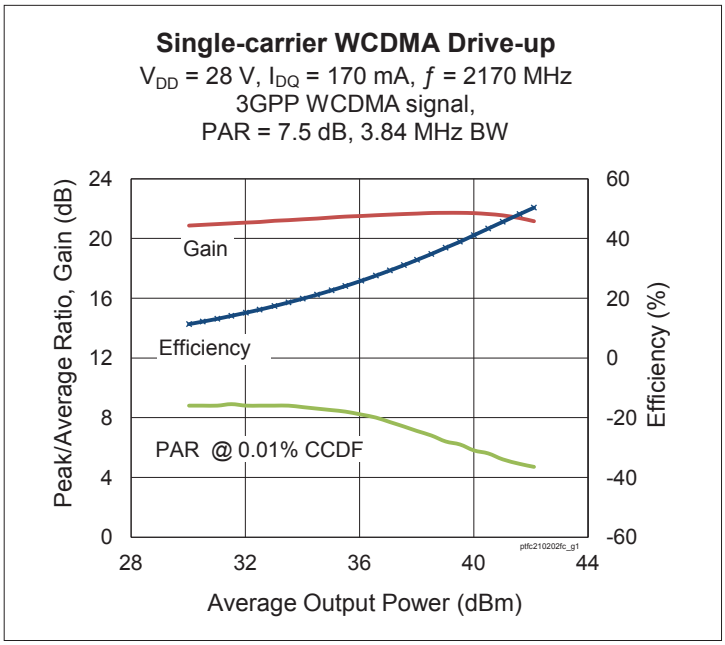
PTFC210202FC

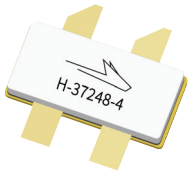
Thermally-Enhanced High Power RF LDMOS FET
28 W, 28 V, 1800 – 2200 MHz

Description

The PTFC210202FC integrates two independent 10-watt LDMOS FETs and is designed for use in cellular amplifier applications in the 2110 to 2170 MHz frequency band. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTFC210202FC
Package H-37248-4



Features

- Input matched
- Typical CW performance, 2170 MHz, 28 V, combined outputs
  - Output power at P_{1dB} = 28 W
  - Efficiency = 62%
  - Gain = 20.9 dB
- Capable of handling 10:1 VSWR @28 V, 28 W (CW) output power
- Integrated ESD protection : Human Body Model, Class 1C (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed test fixture)
V_{DD} = 28 V, I_{DQ} = 170 mA, P_{OUT} = 5 W avg, f_1 = 2160 MHz, f_2 = 2170 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	G_{ps}	20	21	—	dB
Drain Efficiency	η_D	26.5	29	—	%
Adjacent Channel Power Ratio	ACPR	—	–31	–28	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}	—	—	0.1	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.05	—	Ω
Operating Gate Voltage	V_{DS} = 28 V, I_{DQ} = 0.17	V_{GS}	2.40	2.70	3.05	V

Maximum Ratings

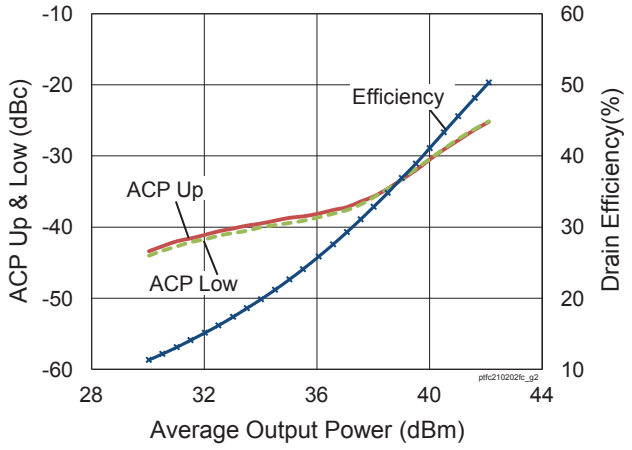
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Operating Voltage	V_{DD}	0 to +32	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 25 W CW)	$R_{\theta JC}$	2.2	°C/W

Ordering Information

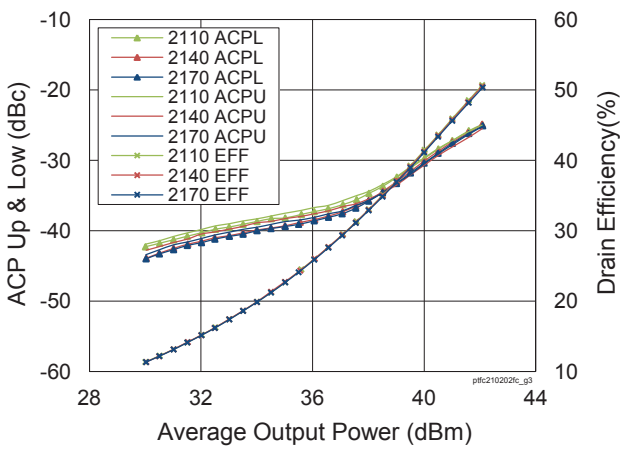
Type and Version	Order Code	Package Description	Shipping
PTFC210202FC V1 R0	PTFC210202FC-V1-R0	H-37248-4, earless flange	Tape & Reel, 50 pcs
PTFC210202FC V1 R250	PTFC210202FC-V1-R250	H-37248-4, earless flange	Tape & Reel, 250 pcs

Typical Performance (data taken in a production test fixture)

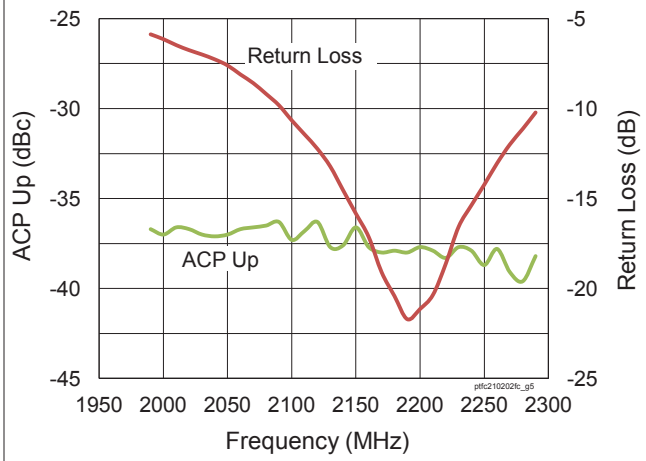
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 170 mA, f = 2170 MHz,
3GPP WCDMA signal, PAR = 7.5 dB,
BW = 3.84 MHz



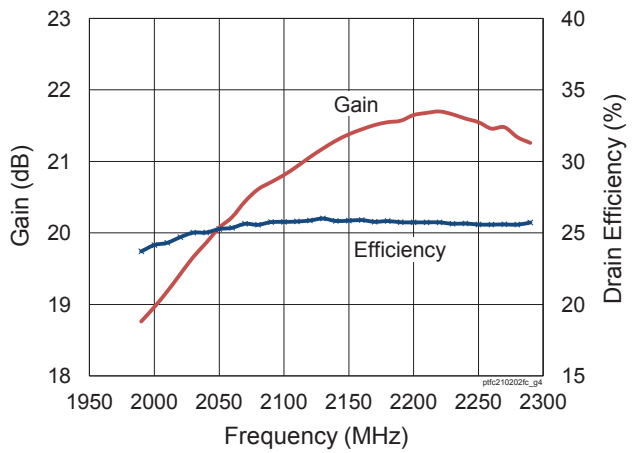
Single-carrier WCDMA 3GPP Drive-up
V_{DD} = 28 V, I_{DQ} = 170 mA,
3GPP WCDMA signal,
PAR = 7.5 dB, BW = 3.84 MHz



Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 170 mA, P_{OUT} = 36dBm,
3GPP WCDMA signal, PAR = 7.5 dB

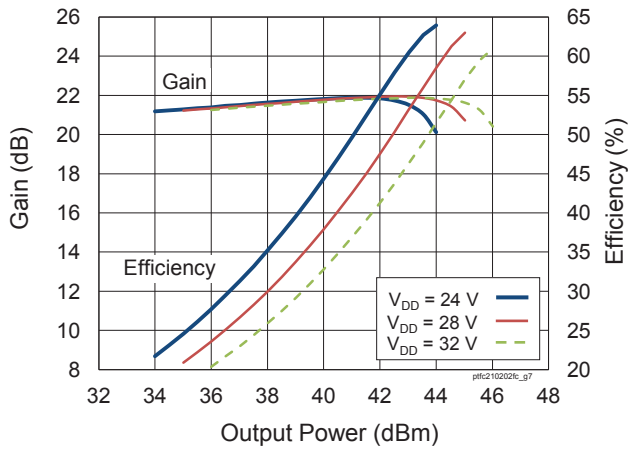


Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, I_{DQ} = 170 mA, P_{OUT} = 36dBm,
3GPP WCDMA signal, PAR = 7.5 dB

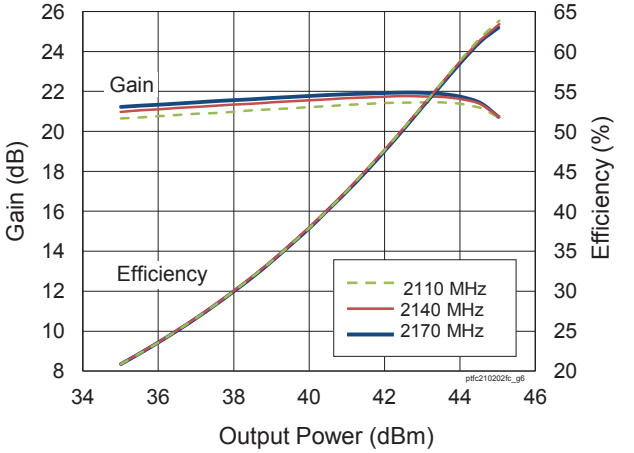


Typical Performance (cont.)

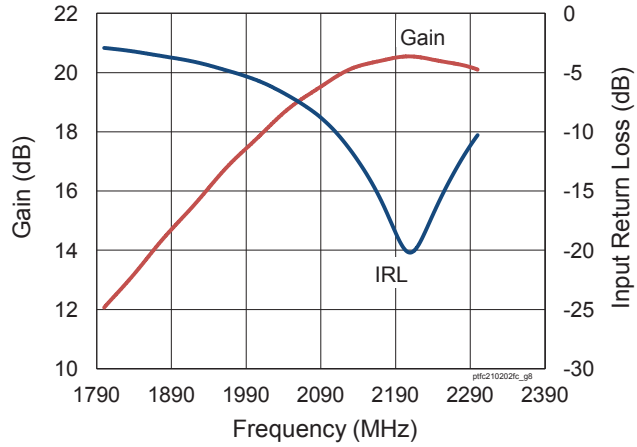
CW Performance at various V_{DD}
I_{DQ} = 170 mA, f = 2170 MHz



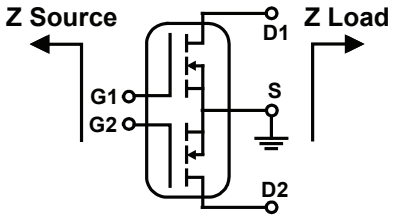
CW Performance
V_{DD} = 28 V, I_{DQ} = 170mA



Small Signal CW
Gain & Input Return Loss, single side
V_{DD} = 28 V, I_{DQ} = 170 mA



Broadband Circuit Impedance



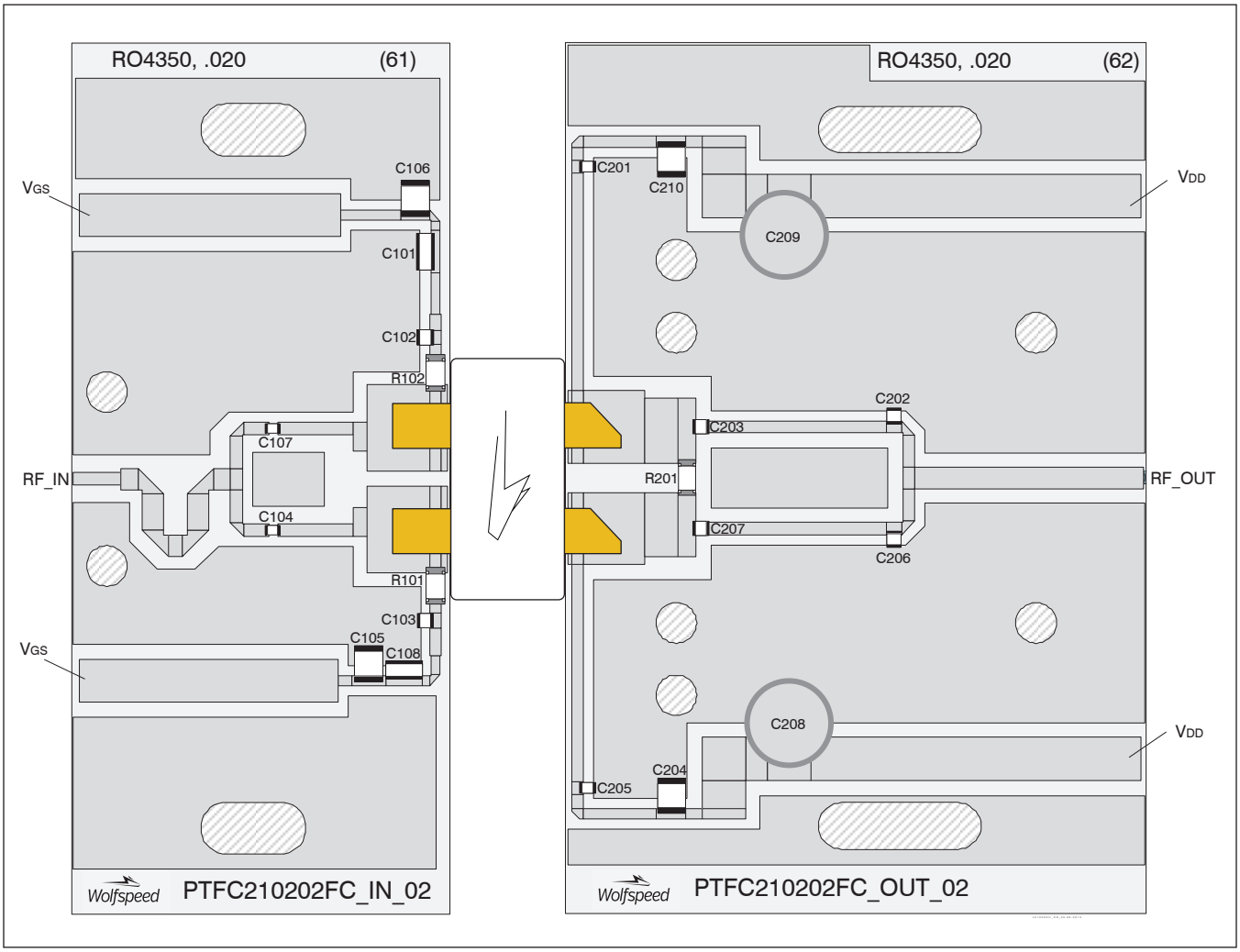
Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
2110	4.86	–0.01	3.59	–2.65
2120	4.89	–0.01	3.63	–2.65
2130	4.92	–0.01	3.68	–2.66
2140	4.95	–0.01	3.72	–2.68
2150	4.98	–0.02	3.76	–2.69
2160	5.00	–0.02	3.81	–2.71
2170	5.03	–0.03	3.85	–2.73

Load Pull Performance

Each Side Load Pull Performance – CW signal; V_{DD} = 28 V, 85 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 [%]
2110	15.9 – j19.7	6.7 – j5.6	21.7	42.67	18.5	58.7	5.3 – j2.3	23.7	41.25	13.3	67.8
2140	15.7 – j18.8	7.6 – j4.9	22.3	42.16	16.4	60.5	4.9 – j2.3	24.1	40.89	12.3	67.3
2170	17.1 – j17.7	7.0 – j5.7	22.1	42.08	16.2	59.2	4.8 – j2.9	23.9	40.87	12.2	66.6

Reference Circuit



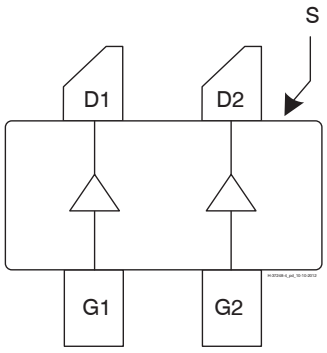
Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

Reference Circuit Assembly	
DUT	PTFC210202FC
Test Fixture Part No.	LTN/PTFC210202FC
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66
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	Capacitor, 10 µF	TDK Corporation	C5750X5R1H106K230KA
C102, C103	Chip capacitor, 20 pF	ATC	ATC100A200JW150XB
C104, C107	Chip capacitor, 5.1 pF	ATC	ATC100A5R1CW250XT
C105, C106	Chip capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
R101, R102	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
Output			
C201, C205	Chip capacitor, 20 pF	ATC	ATC100A200JW250XT
C202, C203, C206, C207	Chip capacitor, 1.6 pF	ATC	ATC800A1R6BT250XT
C204, C210	Chip capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C208, C09	Capacitor, 100 µF	Panasonic Electronic Components	ECA-1HHG101
R201	Resistor, 10 Ω	ATC	CR11206T0100J

Pinout Diagram (top view)



Pin	Description
D1	Drain Device 1
D2	Drain Device 2
G1	Gate Device 1
G2	Gate Device 2
S	Source (flange)

Lead connections for PTFC210202FC

Package Outline Specifications

Package H-37248-4

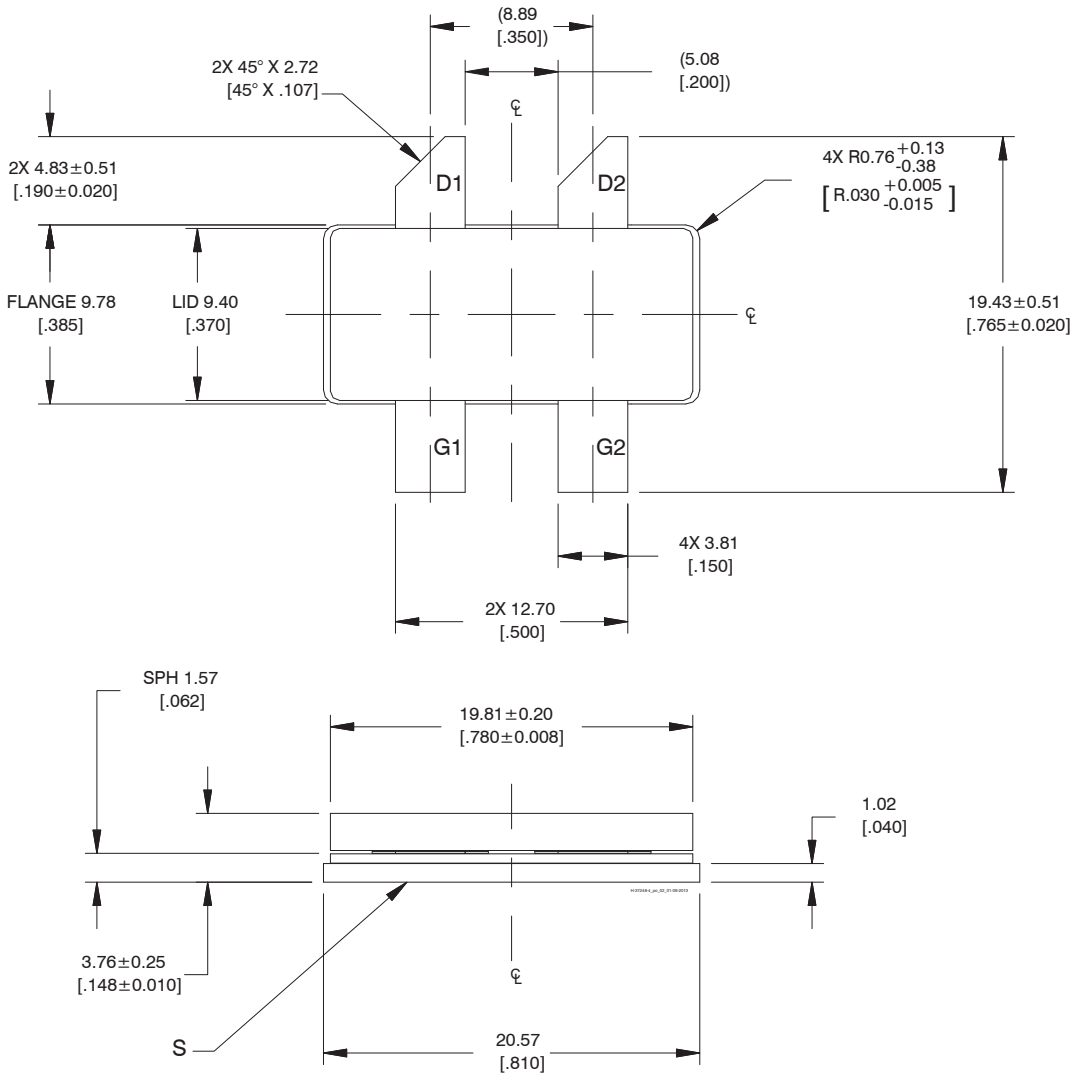


Diagram Notes—unless otherwise specified:

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] unless specified otherwise.
4. Pins: D1, D2 – drains; G1, G2 – gates; S – source.
5. Lead thickness: 0.10 + 0.076/–0.025 mm [0.004+0.003/–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	2012-11-15	Advance	All	Data Sheet reflects advance specification for product development
02p	2012-12-19	Preliminary	All	Data Sheet reflects preliminary specification
03	2013-03-11	Production	All	Data Sheet reflects released product specification
03.1	2013-06-27	Production	1 2	Classified ESD protection Added operating voltage
03.2	2014-05-14	Production	2	Revised juntion temperature in Maximum Ratings table
03.3	2015-12-23	Production	2	DC Chracteristic table
03.4	2016-06-22	Production	2	Updated ordering information
04	2018-06-29	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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