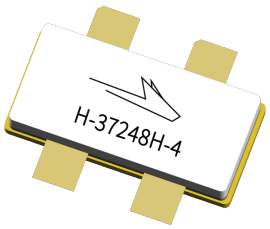
PTAC260302FC

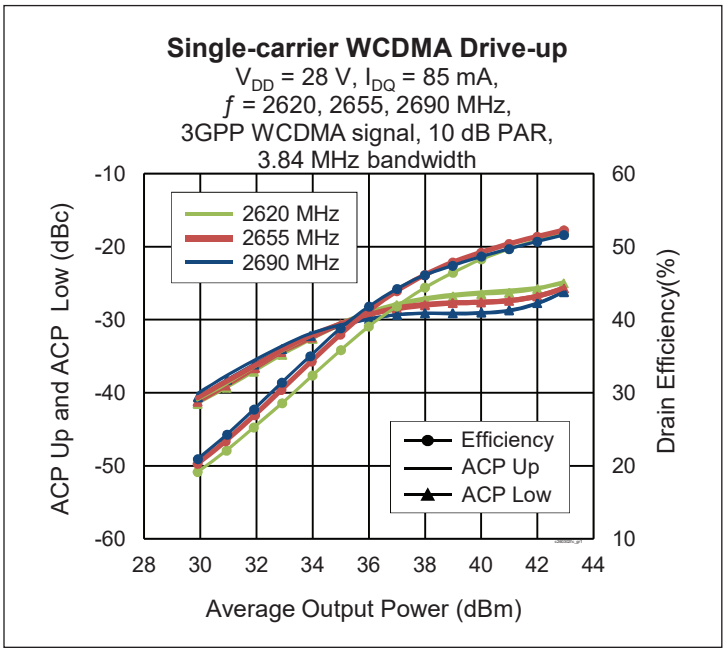
Thermally-Enhanced High Power RF LDMOS FET
30 W, 28 V, 2620 – 2690 MHz

Description

The PTAC260302FC is a 30-watt LDMOS FET intended for use in multi-standard cellular power amplifier applications in the 2620 to 2690 MHz frequency band. This device integrates a 10-W (main) and a 20-W (peak) transistor, making it ideal for asymmetric Doherty amplifier designs. Features include input matching, high gain and thermally-enhanced package with earless flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTAC260302FC
Package H-37248H-4



Features

- Asymmetric design
- Broadband internal matching
- Typical CW performance, 2690 MHz, 28 V (Doherty configuration, combined output)
  - Output power @ P_{3dB} = 30 W
  - Efficiency = 54%
  - Gain = 13 dB
- Typical single-carrier WCDMA performance, 2690 MHz, 28 V, 10 dB PAR
  - Output power = 37.5 dBm avg
  - Gain = 15.5 dB
  - Efficiency = 45%
- Capable of handling 10:1 VSWR @ 32 V, 30 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1B (per ANSI/ESDA/JEDEC JS-001)
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed Doherty test fixture)
V_{DD} = 28 V, I_{DQ} = 85 mA, V_{GS1} = 1.1 V, P_{OUT} = 5.6 W avg, f = 2690 MHz,
3GPP WCDMA signal, 3.84 MHz channel bandwidth, 10 dB peak/average @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	G_{ps}	14.5	15.5	—	dB
Drain Efficiency	η_D	42	45	—	%
Adjacent Channel Power Ratio	ACPR	—	–27	–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
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	$R_{DS(on)}$	—	0.8	—	Ω
	(peak)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.6	—	Ω
Operating Gate Voltage	(main)	V_{DS} = 28 V, I_{DQ} = 0.085 A	V_{GS}	2	2.7	3.5	V
	(peak)	V_{DS} = 28 V, I_{DQ} = 0 A	V_{GS}	0.4	1.1	1.8	V

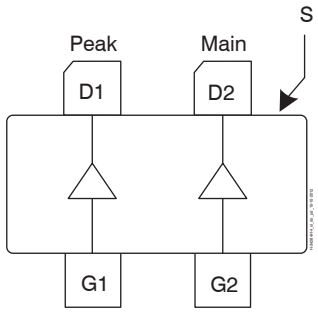
Maximum Ratings

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, 30 W CW)	R_{qJC}	1.5	°C/W
	(peak)	(T_{CASE} 70°C, 30 W CW)	R_{qJC}	1.7	°C/W

Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PTAC260302FC V1 R0	PTAC260302FC-V1-R0	H-37248H-4, Ceramic open-cavity, earless	Tape & Reel, 50 pcs
PTAC260302FC V1 R250	PTAC260302FC-V1-R250	H-37248H-4, Ceramic open-cavity, earless	Tape & Reel, 250 pcs

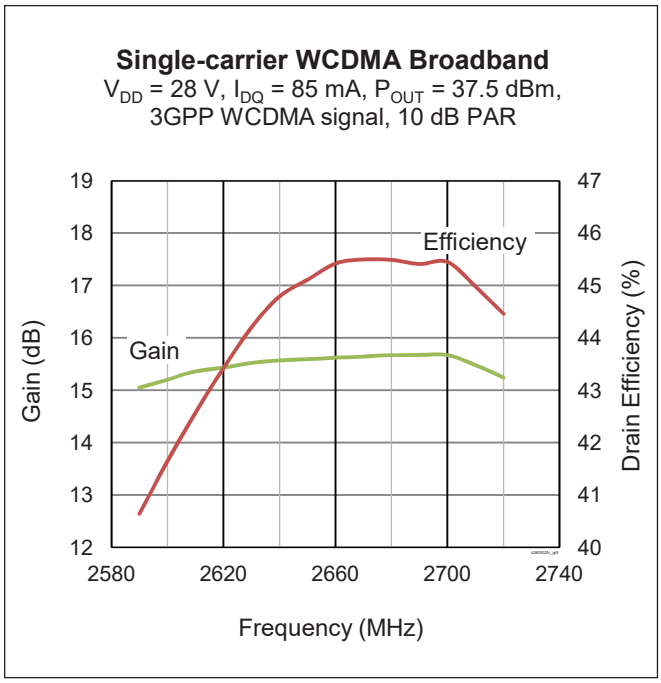
Pinout Diagram (top view)

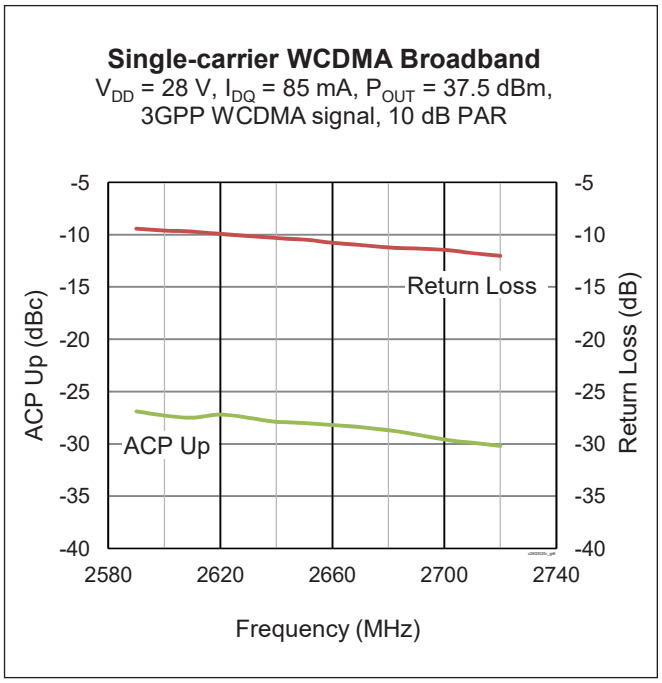


Pin	Description
D1	Drain device 1 (peak)
D2	Drain device 2 (main)
G1	Gate device 1 (peak)
G2	Gate device 2 (main)
S (flange)	Source

Lead connections for PTAC260302FC

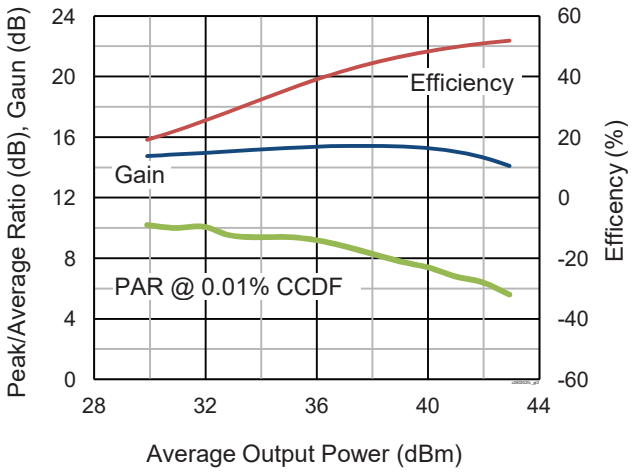
Typical Performance (data taken in a production test fixture)



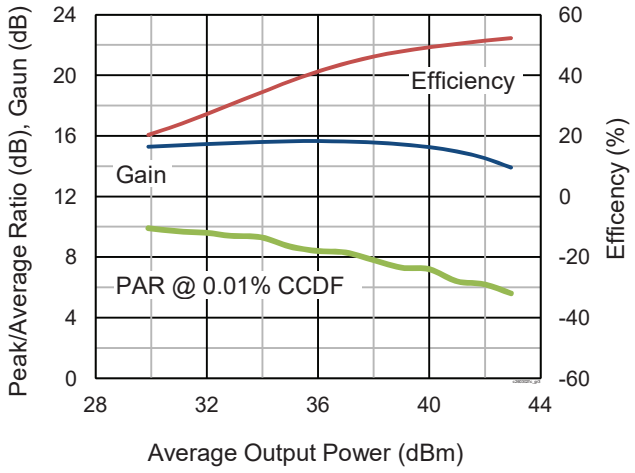


Typical Performance (cont.)

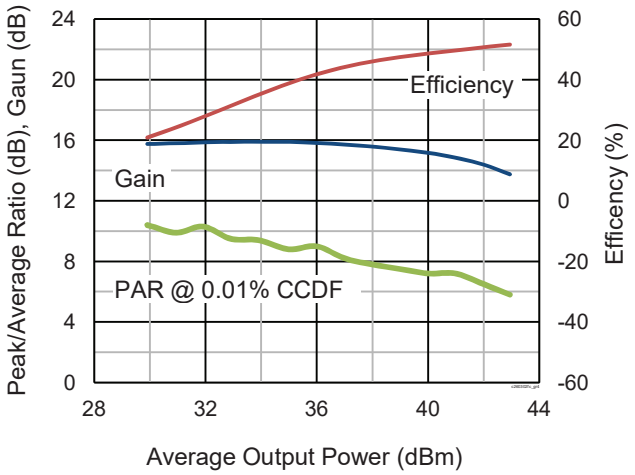
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 85 mA, f = 2620 MHz,
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz bandwidth



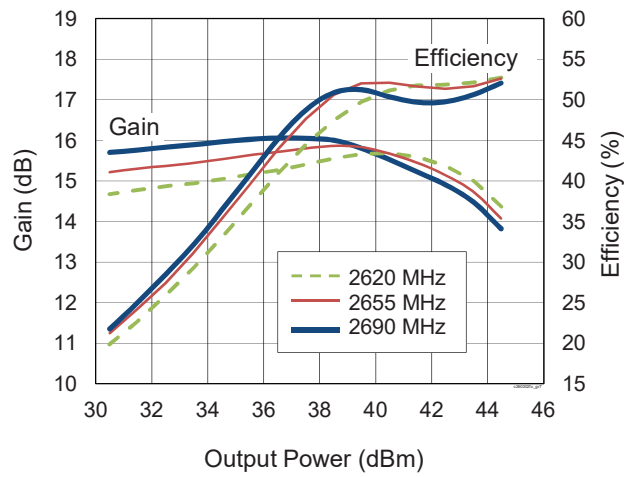
Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 85 mA, f = 2655 MHz,
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz bandwidth



Single-carrier WCDMA Drive-up
V_{DD} = 28 V, I_{DQ} = 85 mA, f = 2690 MHz,
3GPP WCDMA signal,
10 dB PAR, 3.84 MHz bandwidth

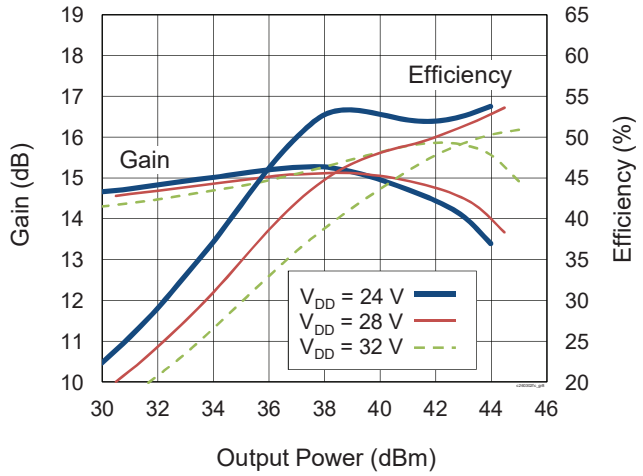


CW Performance
V_{DD} = 28 V, I_{DQ} = 85 mA,
f = 2620, 2655, 2690 MHz

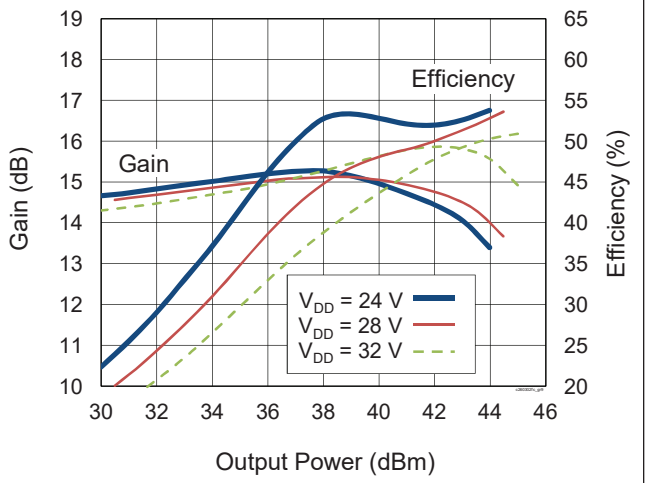


Typical Performance (cont.)

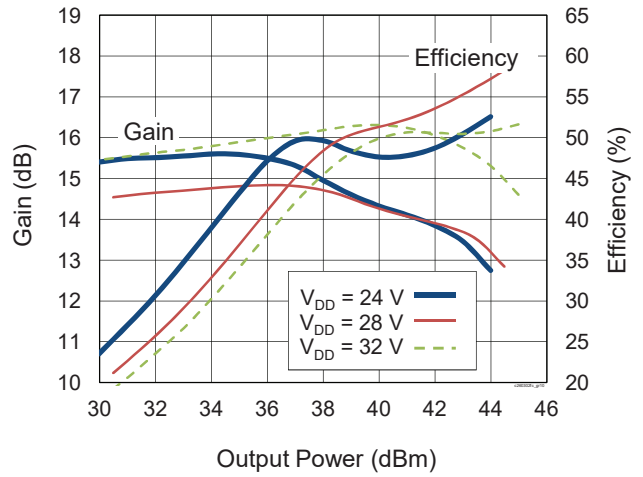
CW Performance at selected V_{DD}
I_{DQ} = 85 mA, f = 2620 MHz



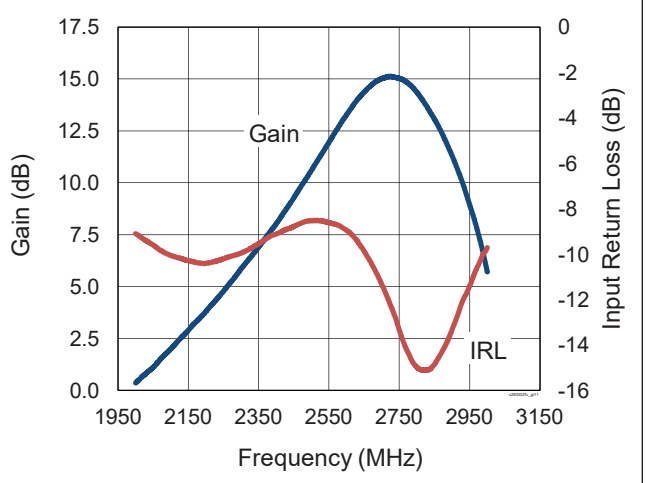
CW Performance at selected V_{DD}
I_{DQ} = 85 mA, f = 2655 MHz



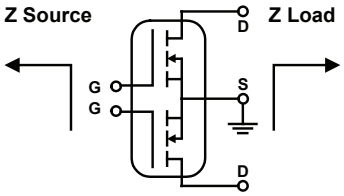
CW Performance at selected V_{DD}
I_{DQ} = 85 mA, f = 2690 MHz



Small Signal CW Gain & Input Return Loss
V_{DD} = 28 V, I_{DQ} = 85 mA



Load Pull Performance



Main Side – Pulsed CW signal: 16 µsec, 10% duty cycle; 28 V, 85 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 %
2620	26 – j22	10.9 – j9.7	19.7	42.36	17.2	61.0	5.9 – j7.0	21.6	40.70	11.7	66.4
2655	33 – j32	12.7 – j9.6	20.0	42.45	17.6	59.8	7.1 – j8.1	21.4	41.36	13.7	65.9
2690	55 – j34	15.2 – j11.4	19.3	42.86	19.3	55.1	6.8 – j9.0	21.2	41.33	13.6	64.4

Peak Side – Pulsed CW signal: 16 µsec, 10% duty cycle; 28 V, 115 mA

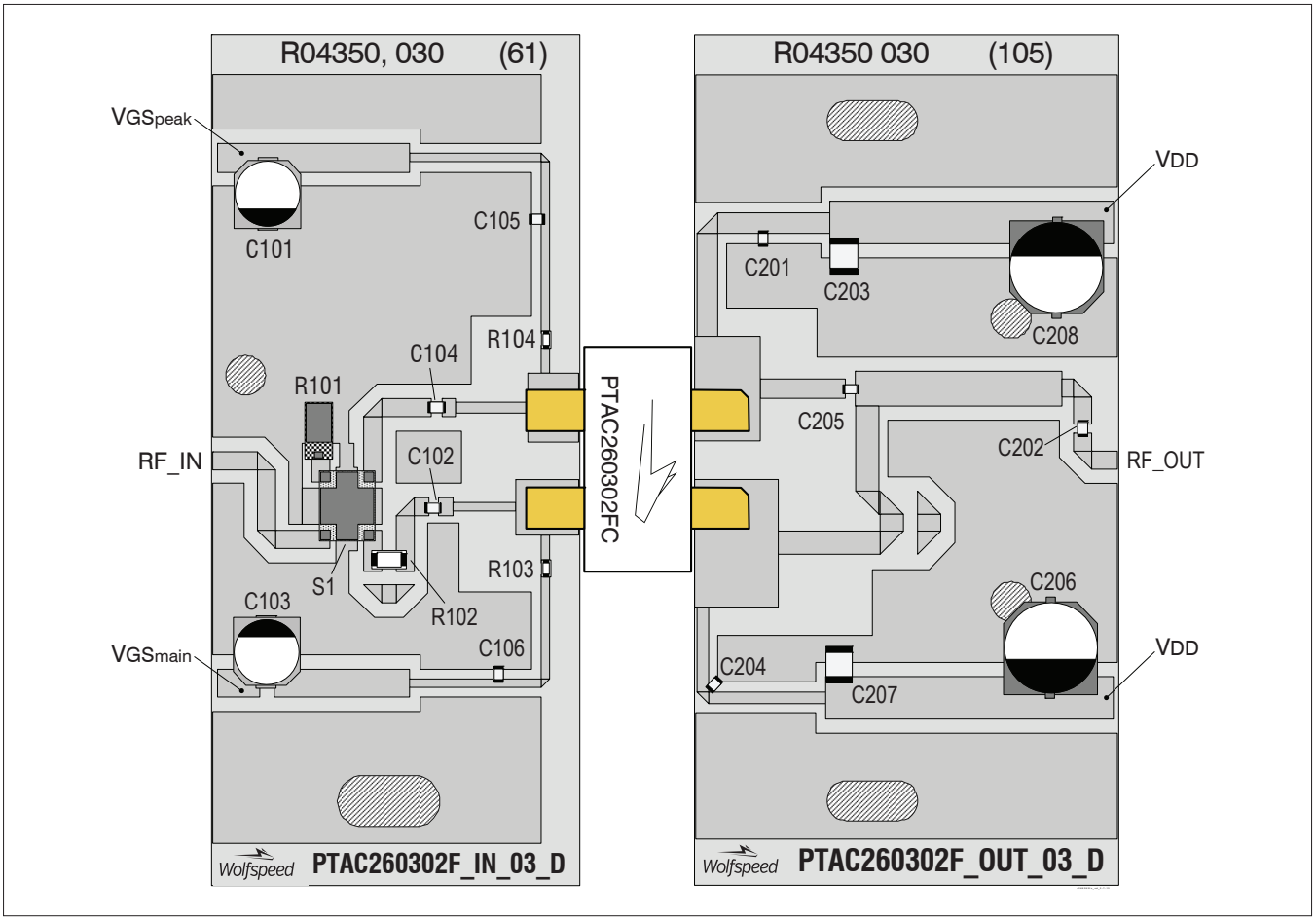
Class AB		P_{1dB}									
		Max Output Power					Max PAE				
Freq [MHz]	Zs Ω	Zl Ω	Gain [dB]	P_{OUT} dBm	P_{OUT} [W]	PAE %	Zl Ω	Gain [dB]	P_{OUT} [dBm]	P_{OUT} [W]	PAE %
2620	36 - j41	11.5 - j14.9	19.6	43.11	20.5	58.8	6.4 - j13.4	20.9	41.92	15.6	63.9
2655	42 - j31	11.9 - j12.7	20	43.09	20.4	61.1	7.0 - j13.9	20.8	42.07	16.1	63.2
2690	55 - j33	12.9 - j15.0	19.5	42.87	19.4	57.2	7.8 - j15.1	20.5	42.16	16.4	61.8

Reference Circuit

DUT	PTAC260302FC
Test Fixture Part No.	LTA/PTAC260302FC
PCB	Rogers 4350, 0.762 mm [.030"] 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**)

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Component Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C103	Capacitor, 10 µF, 50 V	Panasonic Electronic Components	EEV-HD1H100P
C102, C104, C105, C106	Chip capacitor, 18 pF	ATC	ATC100A180JW150XB
R101	Resistor, 50 Ohm	Anaren	C16A50Z4
R102	Resistor, 20 Ohm	Panasonic Electronic Components	ERJ-8GEYJ200V
R103, R104	Resistor, 10 Ohm	Panasonic Electronic Components	ERJ-3GEYJ100V
S1	Hybrid coupler	Anaren	X3C25P1_05S
Output			
C201, C202	Chip capacitor, 18 pF	ATC	ATC100A180JW150XB
C203, C207	Capacitor, 10 µF	Taiyo Yuden	UMK325C7106MM-T
C204, C205	Chip capacitor, 18 pF	ATC	ATC100A180JW150XB
C206, C208	Capacitor, 220 µF, 35 V	Panasonic Electronic Components	EEE-FP1V221AP

Package Outline Specifications

Package H-37248H-4

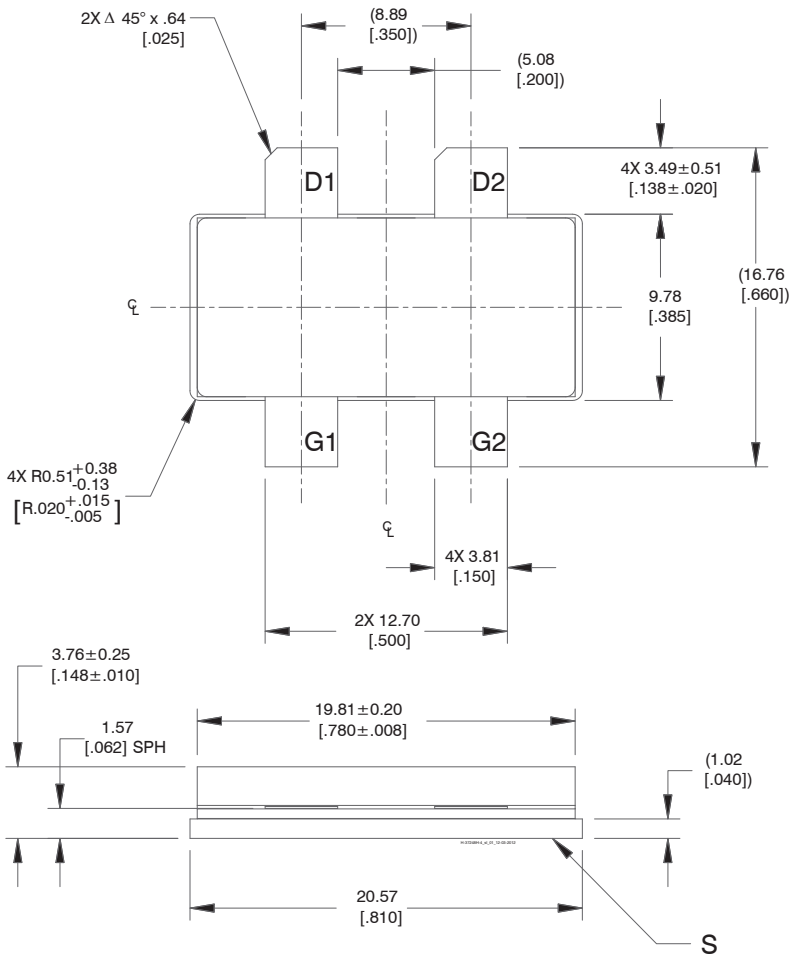


Diagram Notes—unless otherwise specified:

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 + 0.051/-0.025 mm [.004 +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	2012-03-05	Advance	All	New product, proposed only.
02	2012-11-28	Advance	1,3 2	Updated package and Package Outline. Updated Pinout Diagram.
03	2014-02-12	Production	All 3 – 7	Product released to production. All information updated. Performance graphs, load pull and circuit information added.
04	2016-06-21	Production	1 2	Updated ESD rating Maximum junction temperature raised to 225°C, updated ordering info.
05	2018-07-02	Production	All	Converted to Wolfspeed Data Sheet.

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Notes

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