

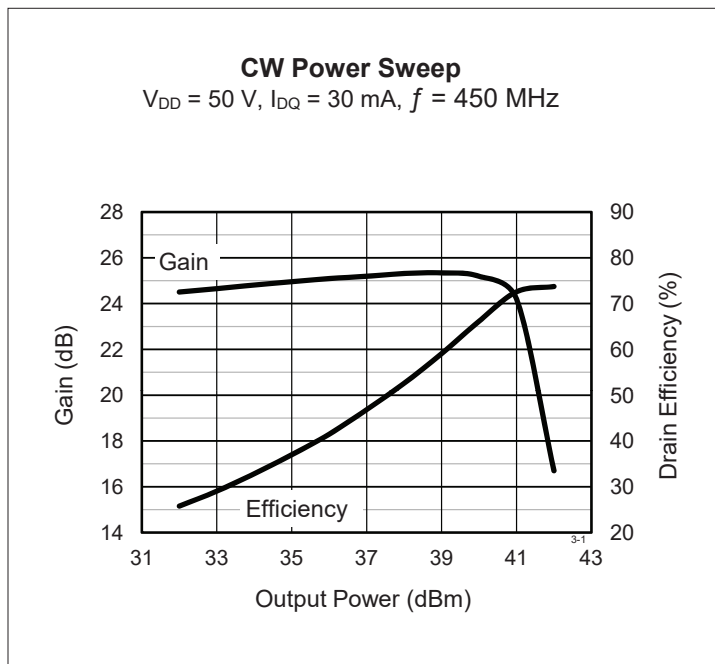
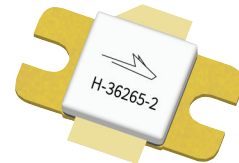
PTVA030121EA

Thermally-Enhanced High Power RF LDMOS FET 12 W, 50 V, 390 – 450 MHz

Description

The PTVA030121EA is an LDMOS FET characterized for use in power amplifier applications in the 390 MHz to 450 MHz frequency band. Features include high gain and a thermally-enhanced package. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PTVA030121EA
Package H-36265-2



Features

- Unmatched input and output
- Integrated ESD protection
- Human Body Model Class 1C (per ANSI/ESDA/JEDEC JS-001)
- High gain, low thermal resistance
- Excellent ruggedness
- Capable of withstanding a 13:1 load mismatch at 50 V, 12 W, CW conditions
- Pb-free and RoHS compliant

RF Characteristics

CW Measurements

$V_{DD} = 50\text{ V}$, $I_{DQ} = 50\text{ mA}$, $P_{OUT} = 12\text{ W}$, $f = 450\text{ MHz}$

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	Gps	23	25	—	dB
Drain Efficiency	η_D	66	69	—	%

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 1\text{ mA}$	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current	$V_{DS} = 50\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
	$V_{DS} = 105\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	10.0	μA
On-State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	2.8	—	Ω
Operating Gate Voltage	$V_{DS} = 50\text{ V}$, $I_{DQ} = 50\text{ mA}$	V_{GS}	—	3.6	—	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

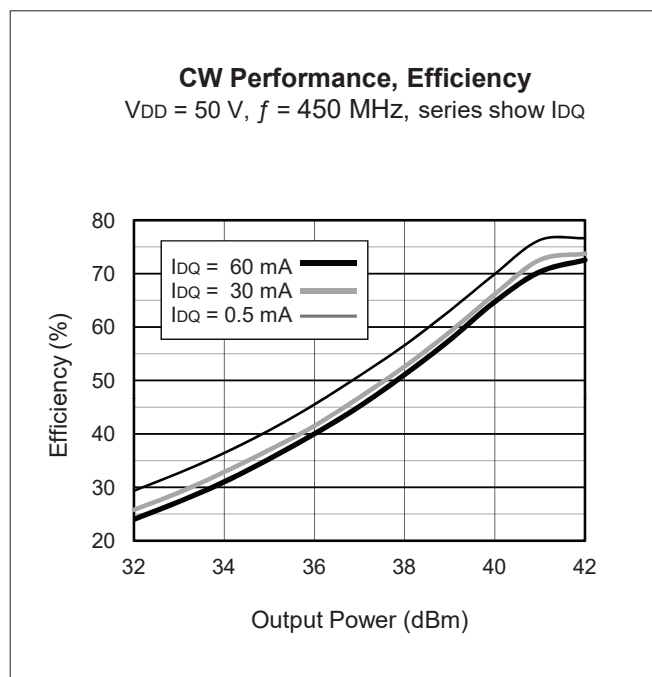
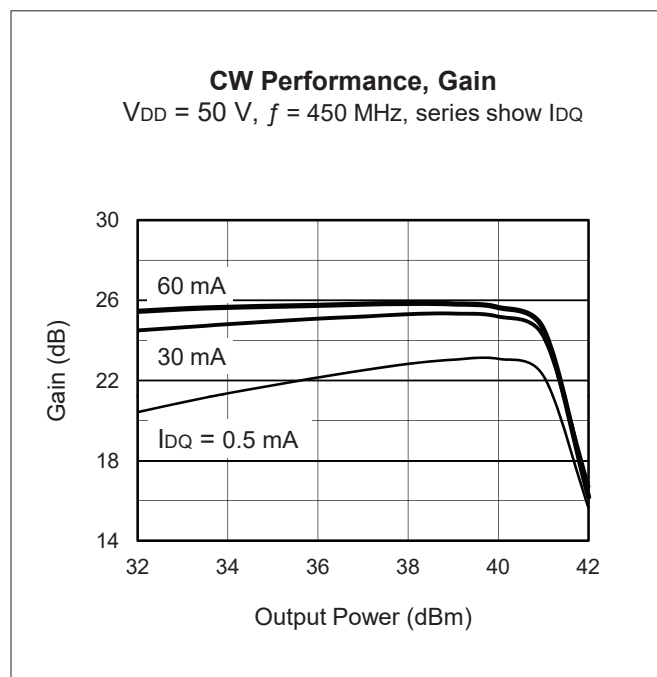
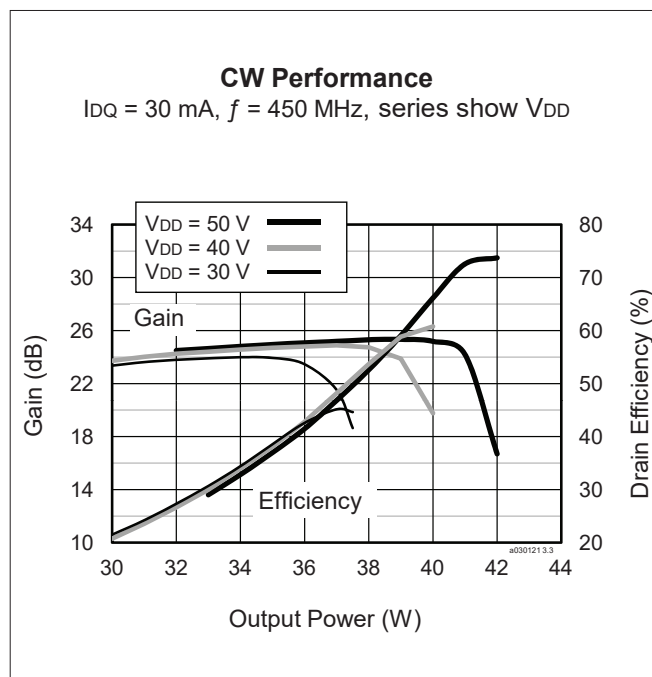
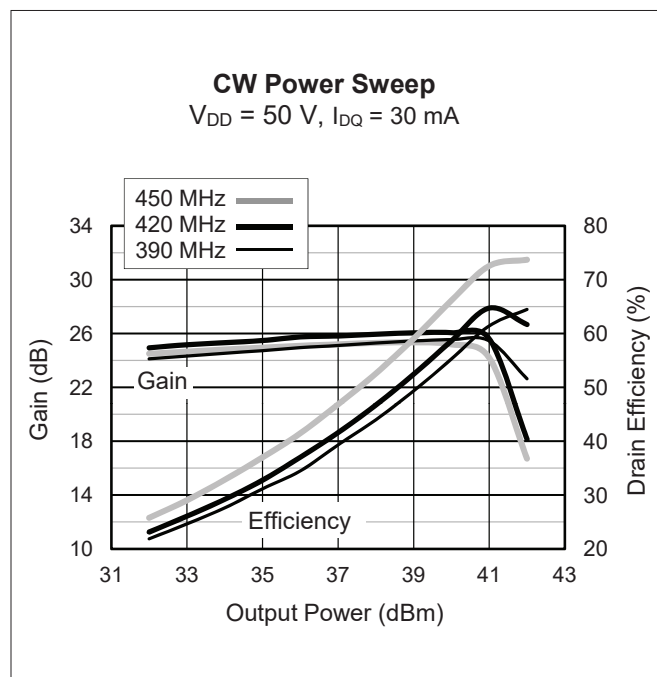
Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	105	V
Gate-Source Voltage	V_{GS}	−6 to +12	V
Operating Voltage	V_{DD}	0 to +55	V
Junction Temperature	T_J	225	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	−65 to +150	$^{\circ}\text{C}$
Thermal Resistance ($T_{CASE} 70^{\circ}\text{C}$, 12 W CW)	$R_{\theta JC}$	6.5	$^{\circ}\text{C/W}$

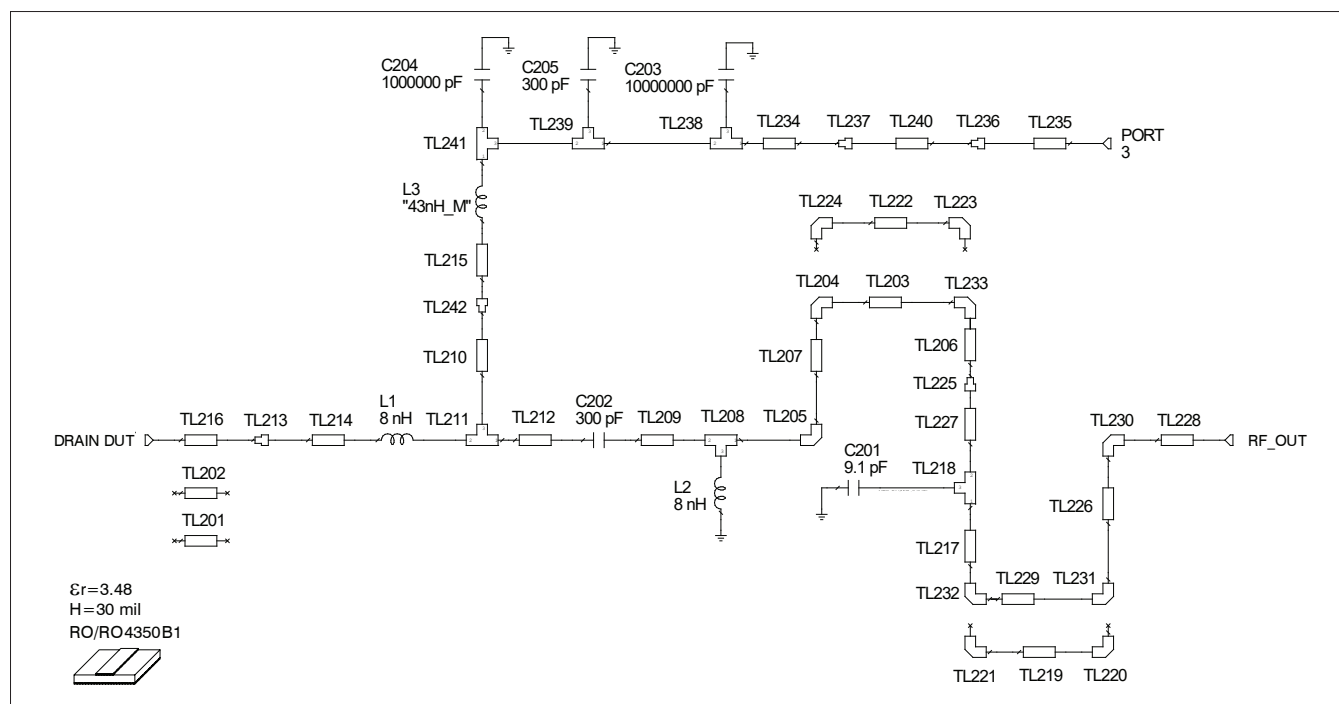
Ordering Information

Type and Version	Order Code	Package and Description	Shipping
PTVA030121EA V1 R0	PTVA030121EA-V1-R0	H-36265-2, bolt-down	Tape & Reel, 50pcs
PTVA030121EA V1 R250	PTVA030121EA-V1-R250	H-36265-2, bolt-down	Tape & Reel, 250pcs

Typical Performance (data taken in a production test circuit)



Reference Circuit (cont.)

Reference circuit output schematic for $f = 450 \text{ MHz}$

Reference Circuit Assembly

DUT PTFA030121EA

Test Fixture Part No. LTN/PTFA030121EA

PCB Rogers RO4350, 0.508 mm [0.020"] thick, 1 oz. copper, $\epsilon_r = 3.48$ Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF

Electrical Characteristics at 450 MHz

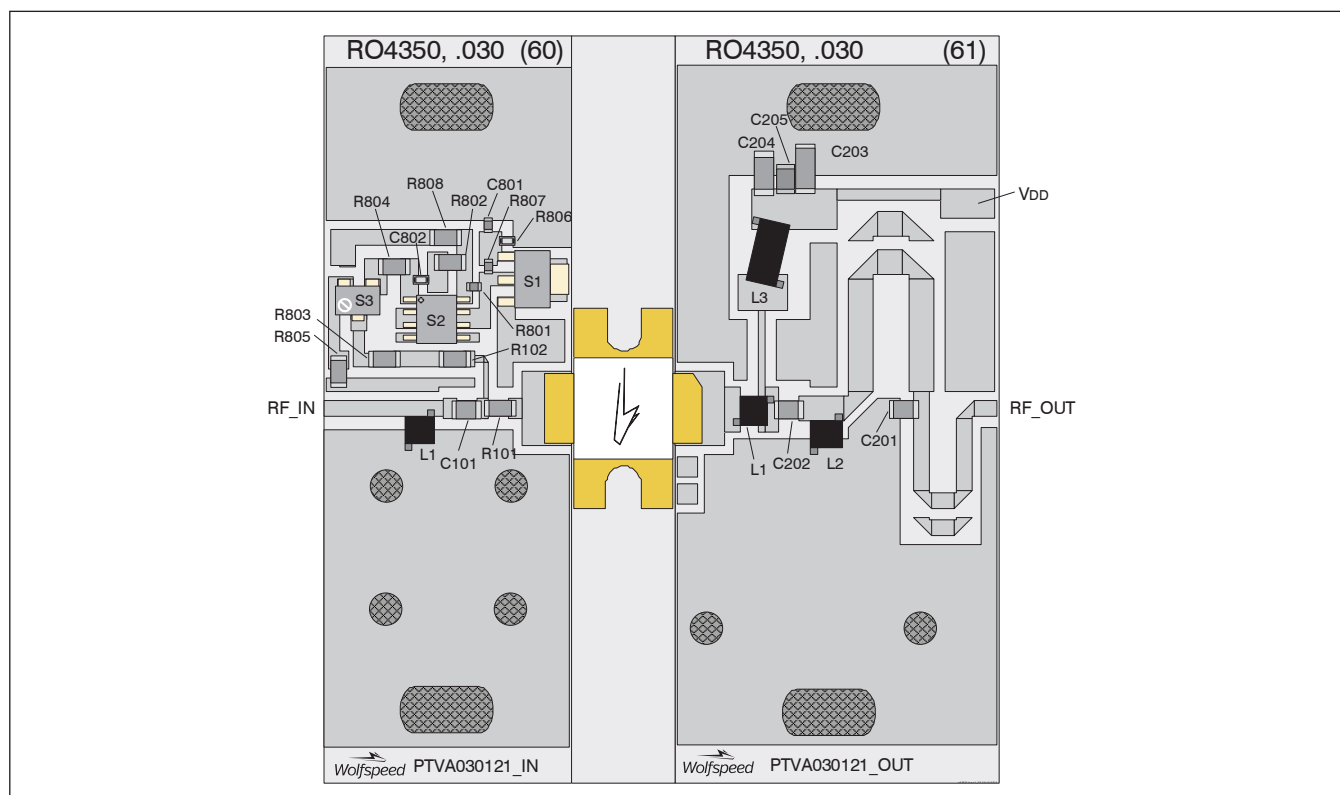
Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Input			
TL101	0.009λ , 92.76Ω	$W = 0.51$, $L = 3.81$	$W = 20$, $L = 150$
TL102	0.001λ , 45.29Ω	$W1 = 2.03$, $W2 = 2.03$, $W3 = 0.51$	$W1 = 80$, $W2 = 80$, $W3 = 20$
TL103	0.001λ , 52.21Ω	$W = 1.63$, $L = 0.43$	$W = 64$, $L = 17$
TL105	0.025λ , 52.21Ω	$W = 1.63$, $L = 10.13$	$W = 64$, $L = 39$
TL106, TL109	0.003λ , 45.29Ω	$W = 2.03$, $L = 1.27$	$W = 80$, $L = 50$
TL107	0.002λ , 45.29Ω	$W = 2.03$, $L = 0.76$	$W = 80$, $L = 30$
TL110	0.013λ , 16.51Ω	$W = 7.62$, $L = 5.08$	$W = 300$, $L = 200$
TL113	0.002λ , 92.76Ω	$W = 0.51$, $L = 1.02$	$W = 20$, $L = 40$
TL115	0.013λ , 54.31Ω	$W = 1.52$, $L = 5.08$	$W = 60$, $L = 200$
TL116	0.003λ , 54.31Ω	$W = 1.52$, $L = 1.02$	$W = 60$, $L = 40$

table continued next page

Reference Circuit (cont.)**Electrical Characteristics at 450 MHz**

Transmission Line	Electrical Characteristics	Dimensions: mm	Dimensions: mils
Output			
TL201, TL202	0.005 λ , 45.29 Ω	W = 2.03, L = 2.04	W = 80, L = 81
TL203	0.006 λ , 38.92 Ω	W = 2.54, L = 2.54	W = 100, L = 100
TL206, TL207	0.029 λ , 38.92 Ω	W = 2.54, L = 11.43	W = 100, L = 450
TL209	0.009 λ , 38.92 Ω	W = 2.54, L = 3.56	W = 100, L = 140
TL210	0.018 λ , 78.46 Ω	W = 0.76, L = 7.62	W = 30, L = 300
TL211	0.002 λ , 25.11 Ω	W1 = 4.57, W2 = 4.57, W3 = 0.76	W1 = 180, W2 = 180, W3 = 30
TL212	0.003 λ , 25.11 Ω	W = 4.57, L = 1.27	W = 180, L = 50
TL214	0.004 λ , 25.11 Ω	W = 4.57, L = 1.52	W = 180, L = 60
TL215	0.010 λ , 23.09 Ω	W = 5.08, L = 3.81	W = 200, L = 150
TL216	0.013 λ , 16.51 Ω	W = 7.62, L = 5.08	W = 300, L = 200
TL217	0.018 λ , 52.21 Ω	W = 1.63, L = 7.29	W = 64, L = 287
TL219	0.006 λ , 52.21 Ω	W = 1.63, L = 2.41	W = 64, L = 95
TL222	0.006 λ , 38.92 Ω	W = 2.54, L = 2.54	W = 100, L = 100
TL226	0.018 λ , 52.21 Ω	W = 1.63, L = 7.34	W = 64, L = 289
TL227	0.002 λ , 52.21 Ω	W = 1.63, L = 0.84	W = 64, L = 33
TL228	0.006 λ , 52.21 Ω	W = 1.63, L = 2.30	W = 64, L = 91
TL229	0.006 λ , 52.21 Ω	W = 1.63, L = 2.41	W = 64, L = 95
TL234	0.005 λ , 27.14 Ω	W = 4.14, L = 2.12	W = 163, L = 84
TL235	0.014 λ , 34.38 Ω	W = 3.02, L = 5.51	W = 119, L = 2 17
TL240	0.026 λ , 61.53 Ω	W = 1.23, L = 10.63	W = 48, L = 419
TL241	0.010 λ , 38.92 Ω	W1 = 2.54, W2 2.54, W3 = 4.14	W1 = 100, W2 = 100, W3 = 163

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

Component ID	Description	Suggested Supplier	P/N
Input			
C101	Chip capacitor, 300 pF	ATC	ATC100B301JW200XB
C801, C802	Capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
L1	Inductor, 5 nH	Coilcraft	A02TGLB
R101	Resistor, 2.2 Ω	Panasonic Electronic Components	ERJ-8GEYJ2R2V
R102	Resistor, 1000 Ω	Panasonic Electronic Components	ERJ-8GEYJ102V
R801, R807	Resistor, 1200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R802	Resistor, 6200 Ω	Panasonic Electronic Components	ERJ-8GEYJ622V
R803	Resistor, 10 Ω	Panasonic Electronic Components	ERJ-8GEYJ100V
R804, R805, R808	Resistor, 2000 Ω	Panasonic Electronic Components	ERJ-8GEYJ202V
R806	Resistor, 1300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
S1	Transistor	Infineon Technologies	BCP56
S2	Voltage regulator	Fairchild Semiconductor	LM7805CT
S3	Potentiometer, 2K Ω	Bourns Inc.	3224W-1-202E

table continued next page

Reference Circuit (cont.)

Component ID	Description	Suggested Supplier	P/N
Output			
C201	Chip capacitor, 9.1 pF	ATC	ATC100B9R1BW500XB
C202	Chip capacitor, 300 pF	ATC	ATC100B301JW200XB
C203	Chip capacitor, 10 μ F	TDK Corporation	C5750X7S2A106M230KB
C204	Capacitor, 1 μ F	TDK Corporation	C4532X7R2A105K230KA
C205	Chip capacitor, 300 pF	ATC	ATC100B301JW200XB
L1, L2	Inductor, 8 nH	Coilcraft	A03TGLB
L3	Inductor, 43 nH	Coilcraft	B10TGLB

See next page for package mechanical specifications

Package Outline Specifications

Package H-36265-2

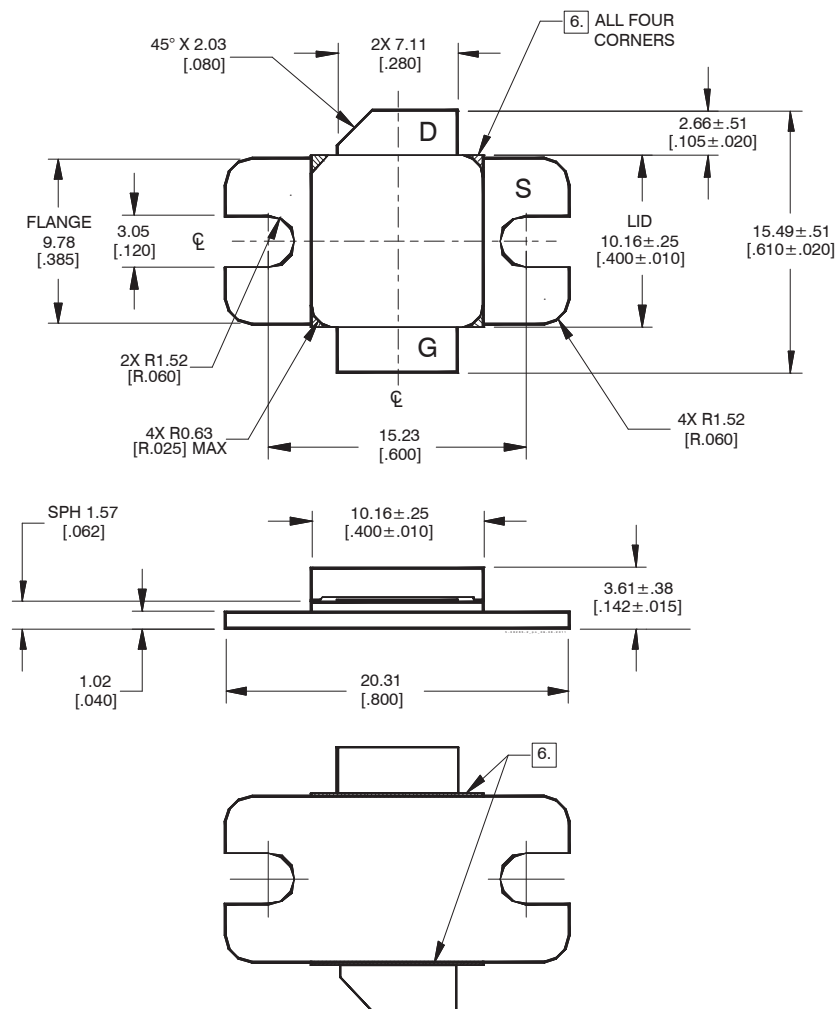


Diagram Notes—unless otherwise specified:

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: D - drain, G - gate, S - source.
5. Lead thickness: 0.10 +0.051/−0.025 [.004 +.002/−.001].
6. Exposed metal plane on top and bottom of ceramic insulator.
7. 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	2010-10-08	Advance	All	Data Sheet reflects advance specification for product development
02	2010-12-13	Advance	All	Change part number
03	2011-05-07	Preliminary	All	Change part number, update to Preliminary, add specifications
04	2011-11-10	Production	All	Data Sheet reflects released product specification
05	2013-07-02	Production	2 7, 8	Update DC Characteristics and Max Ratings table, add order codes Add manufacturer
05.1	2016-04-19	Production	1, 2	Added ESD rating, updated ordering information
05.2	2017-02-02	Production	2	Updated operating voltage and junction temperature
06	2018-06-13	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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