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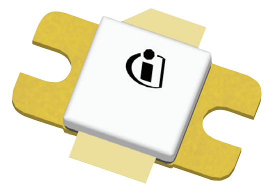
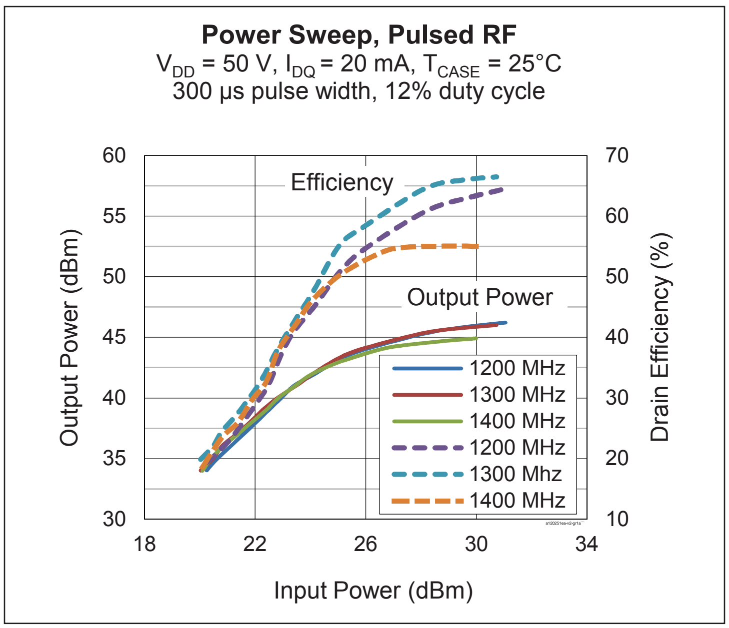
Thermally-Enhanced High Power RF LDMOS FET
25 W, 50 V, 500 – 1400 MHz

Description

The PTVA120251EA LDMOS FET is designed for use in power amplifier applications in the 500 MHz to 1400 MHz frequency band. Features include high gain and a thermally-enhanced package with bolt-down flange. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PTVA120251EA
Package H-36265-2





Features

- Unmatched input and output
- High gain and efficiency
- Integrated ESD protection
- ESD HBM Class 2, per ANSI/ESDA/JEDEC JS-001
- Low thermal resistance
- Excellent ruggedness
- Pb-free and RoHS-compliant
- Capable of withstanding a 10:1 load mismatch (all phase angles) at P_{OUT} = 25 W, under CW conditions

RF Characteristics

Typical RF Performance (not subject to production test, verified by design/characterization in Infineon test fixture)
V_{DD} = 50 V, I_{DQ} = 0.02 A, Input signal (t_r = 5 ns, t_f = 6.5 ns), 300 µs pulse width, 12% duty cycle, class AB test

Mode of operation	*f*	IRL	P_{1dB}			P_{3dB}			$P_{droop(pulse)}$	t_r	t_f
	(MHz)	(dB)	Gain (dB)	Eff (%)	P_{OUT} (W)	Gain (dB)	Eff (%)	P_{OUT} (W)	dB @ 30 W	(ns)	(ns)
Pulsed RF	1200	12	16.4	52	31	14.4	56	41	0.27	6	8
Pulsed RF	1300	11	16.0	56	32	14.0	59	40	0.20	6	8
Pulsed RF	1400	14	15.8	53	34	13.8	56	38	0.24	6	8

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics

Pulsed RF Performance (tested in Infineon test fixture)

V_{DD} = 50 V, I_{DQ} = 0.02 A, P_{OUT} = 25 W, f_1 = 1200 MHz, f_2 = 1300 MHz, f_3 = 1400 M Hz, 300 µs pulse width, 10% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	17	18	—	dB
Drain Efficiency	η_D	47	54	—	%
Return Loss	IRL	—	–13	–9	dB

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current	V_{DS} = 50 V, V_{GS} = 0 V	I_{DSS}	—	—	1.0	µA
	V_{DS} = 105 V, V_{GS} = 0 V	I_{DSS}	—	—	10.0	µA
On-State Resistance	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	1.4	—	Ω
Operating Gate Voltage	V_{DS} = 50 V, I_{DQ} = 150 mA	V_{GS}	3	3.35	4	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA

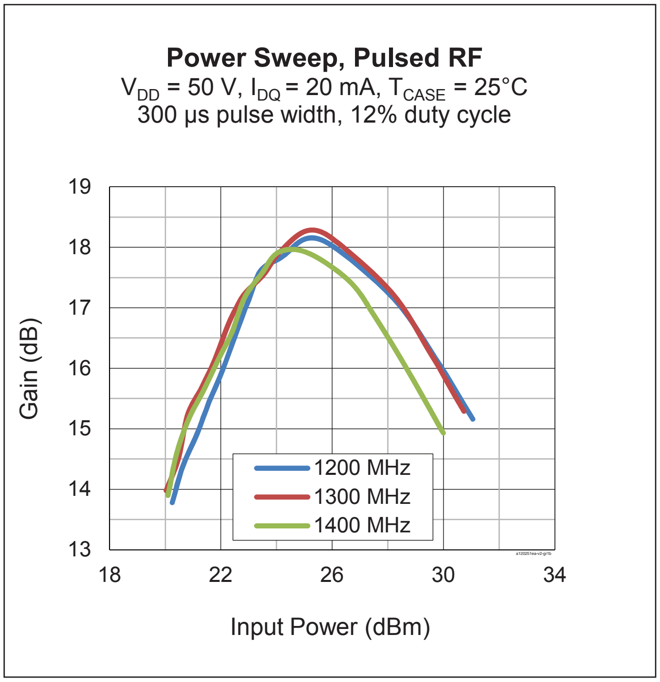
Maximum Ratings

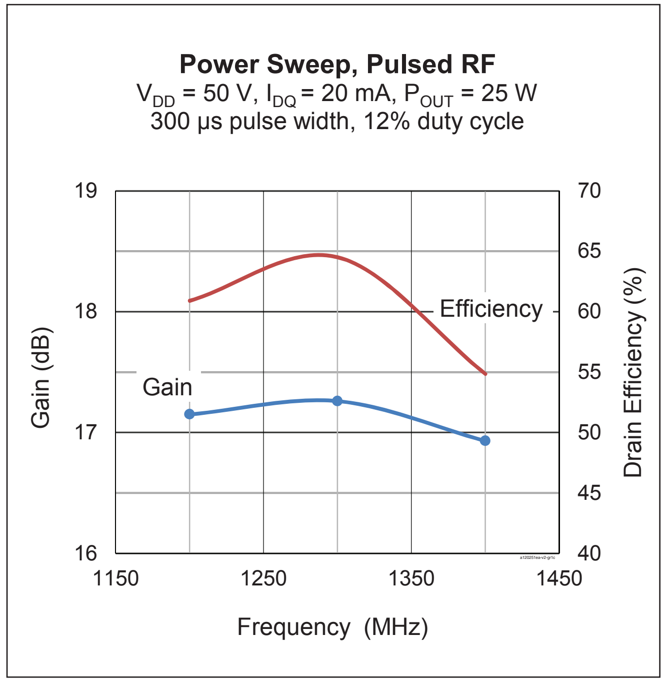
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	105	V
Gate-Source Voltage	V_{GS}	–6 to +12	V
Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, V_{DD} = 50 V, 25 W CW)	$R_{\theta JC}$	3.7	°C/W

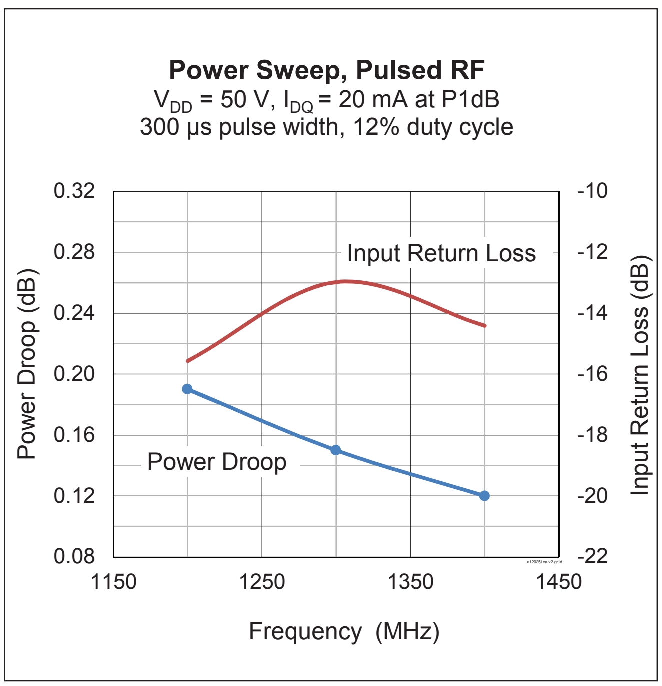
Ordering Information

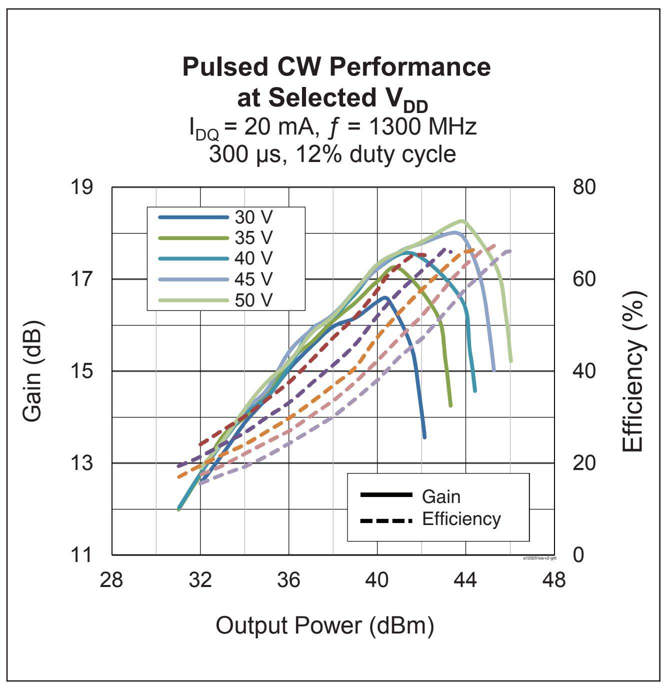
Type and Version	Order Code	Package and Description	Shipping
PTVA120251EA V2	PTVA120251EAV2XWSA1	H-36265-2, ceramic open-cavity, single-ended, bolt-down	Tray
PTVA120251EA V2 R250	PTVA120251EAV2R250XTMA1	H-36265-2, ceramic open-cavity, single-ended, bolt-down	Tape & Reel, 250 pcs

Typical RF Performance (data taken in production test fixture)



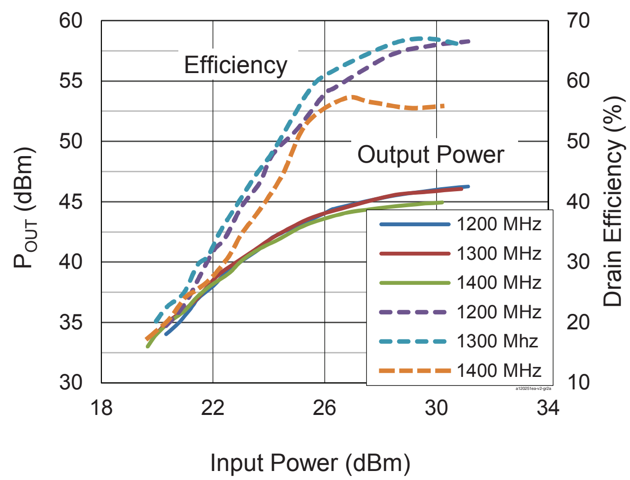




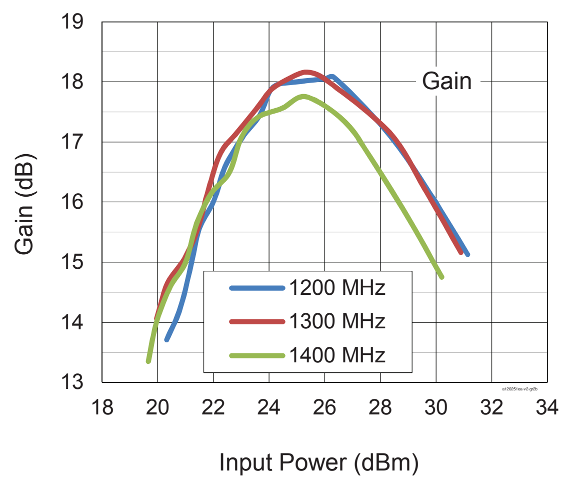


Typical RF Performance (cont.)

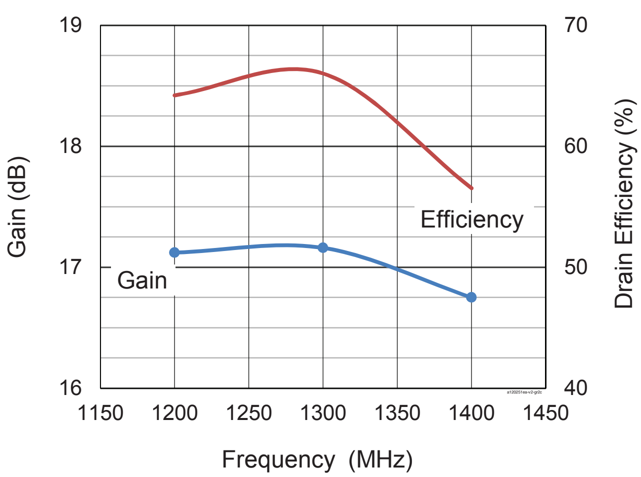
Power Sweep, Pulsed RF
V_{DD} = 50 V, I_{DQ} = 20 mA
2 ms pulse width, 10% duty cycle



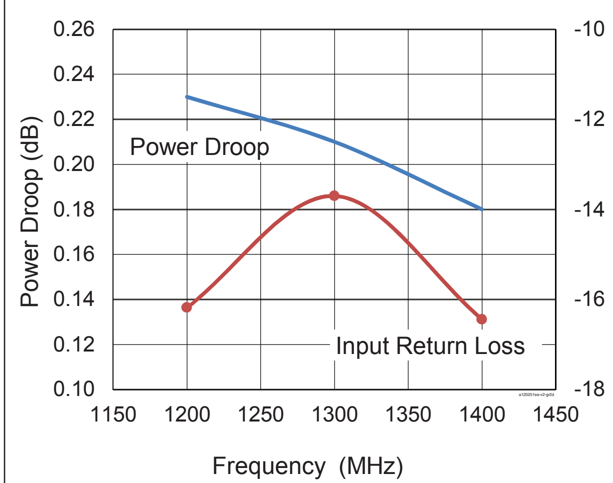
Power Sweep, Pulsed RF
V_{DD} = 50 V, I_{DQ} = 20 mA
2 ms pulse width, 10% duty cycle



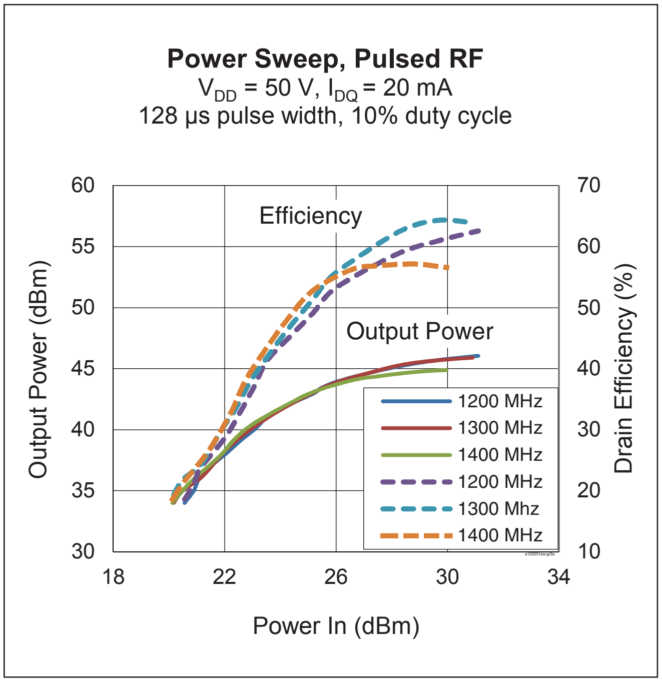
Power Sweep, Pulsed RF
V_{DD} = 50 V, I_{DQ} = 20 mA, P_{OUT} = 25 W
2 ms pulse width, 10% duty cycle

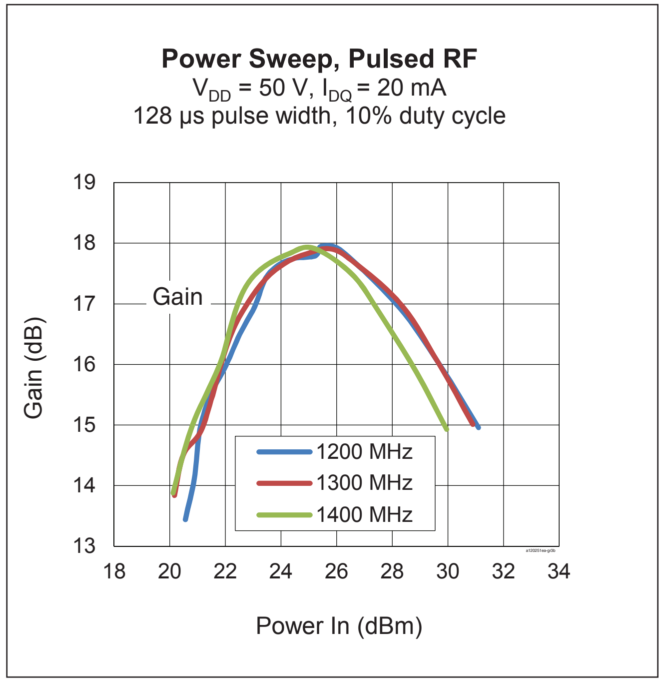


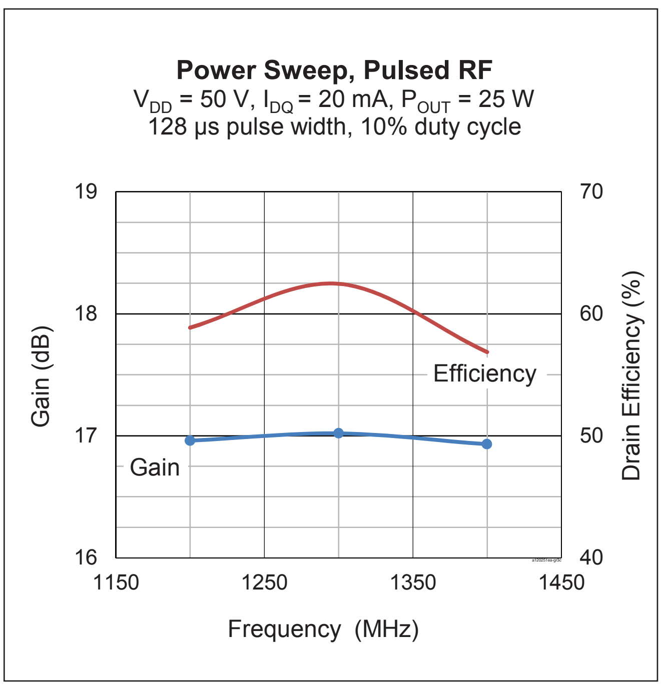
Power Sweep, Pulsed RF
V_{DD} = 50 V, I_{DQ} = 20 mA at P1dB
2 ms pulse width, 10% duty cycle

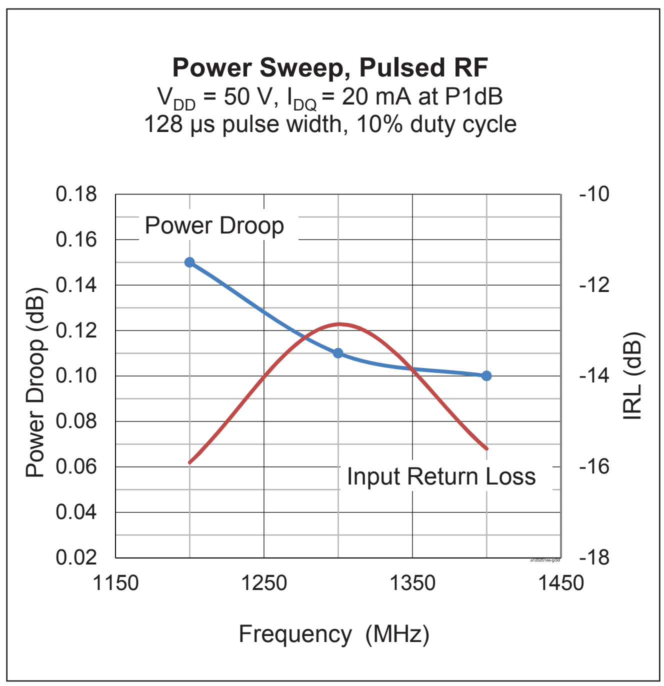


Typical RF Performance (cont.)

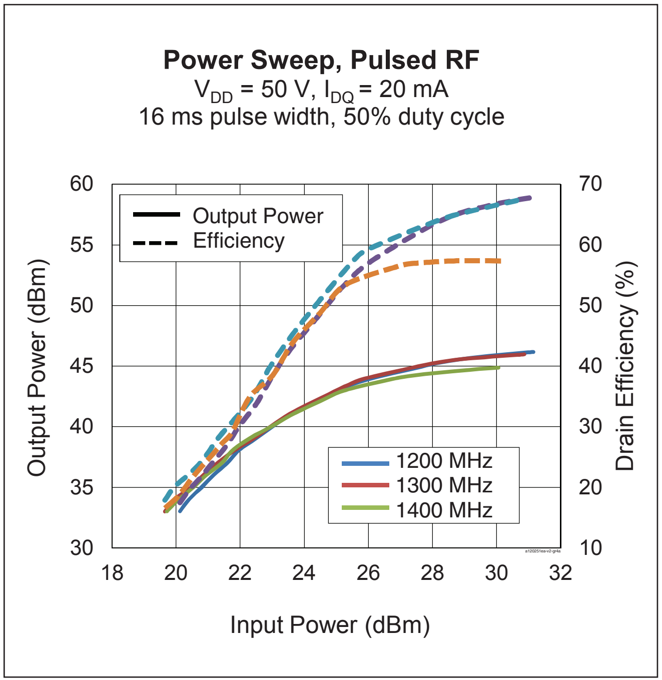


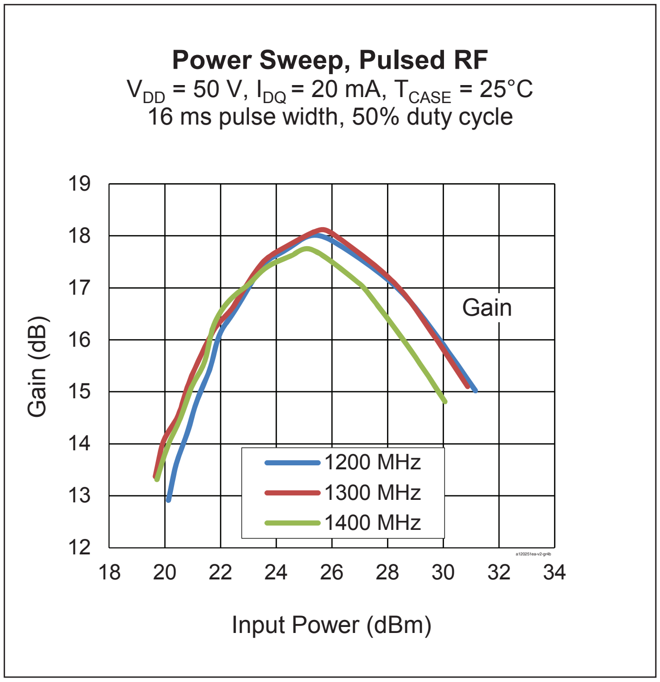


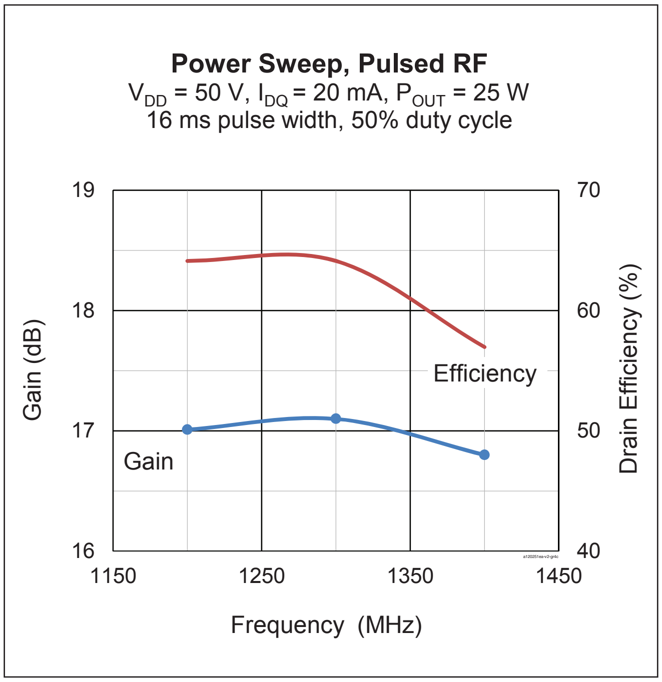


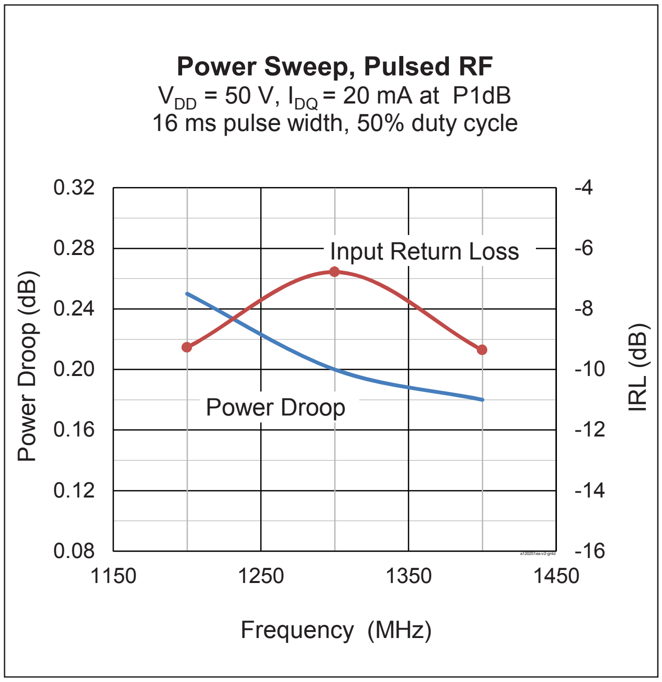


Typical RF Performance (cont.)

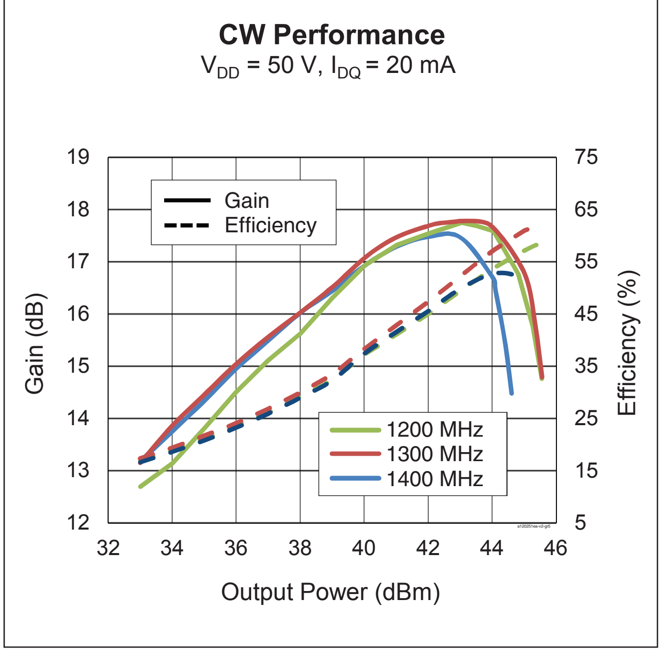


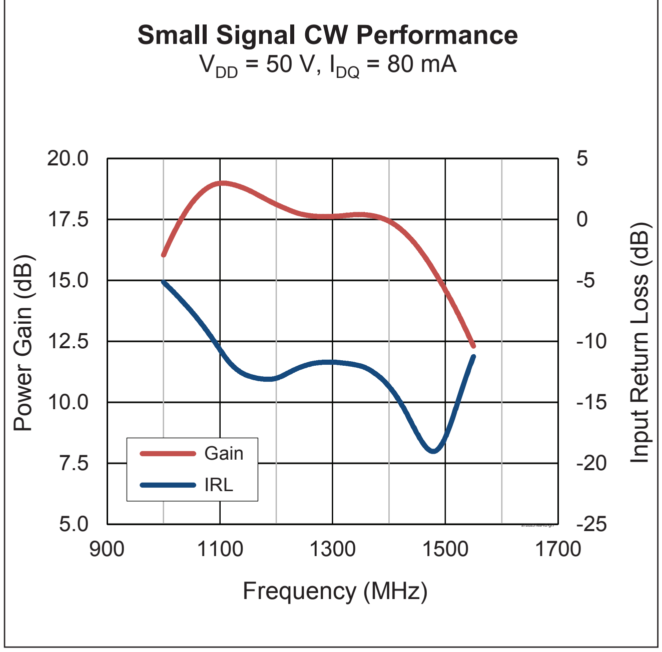






Typical RF Performance (tested with LTN/PTVA120251EA E4 test fixture, 960 MHz – 1215 MHz)

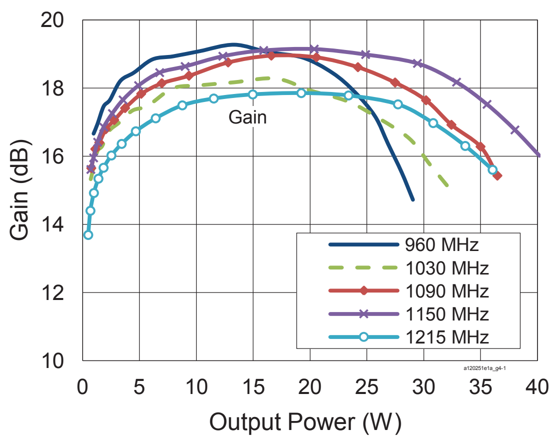




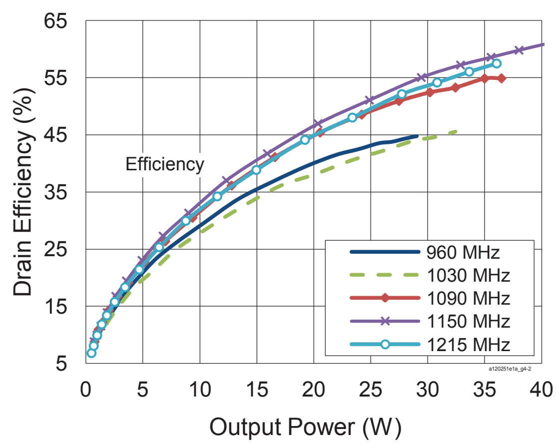
See next page for further performance characterization

Typical RF Performance (cont.) (tested with LTN/PTVA120251EA E4 test fixture, 960 MHz – 1215 MHz)

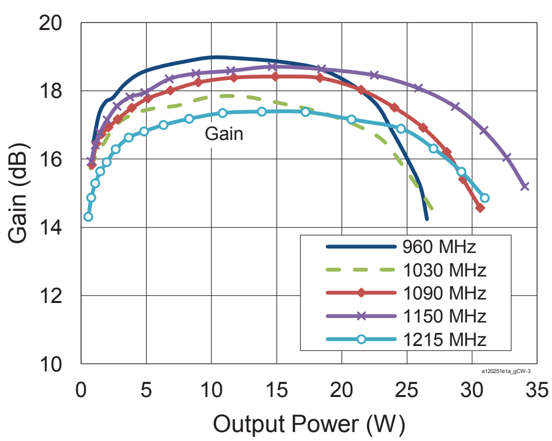
Power Sweep, Pulsed RF
I_{DQ} = 20 mA, V_{DD} = 50 V, T_{CASE} = 25°C,
128 µs pulse width, 10% duty cycle



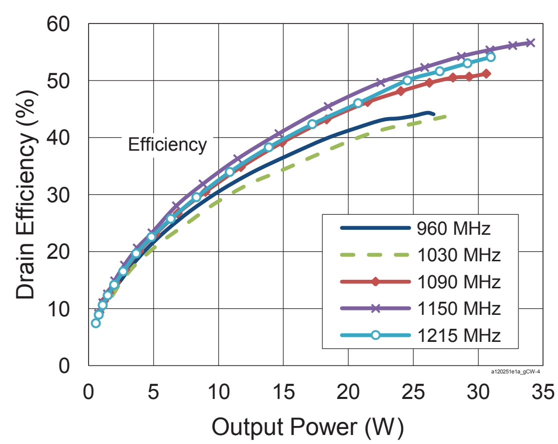
Power Sweep, Pulsed RF
I_{DQ} = 20 mA, V_{DD} = 50 V, T_{CASE} = 25°C,
128 µs pulse width, 10% duty cycle



CW Performance
V_{DD} = 50 V, I_{DQ} = 20 mA

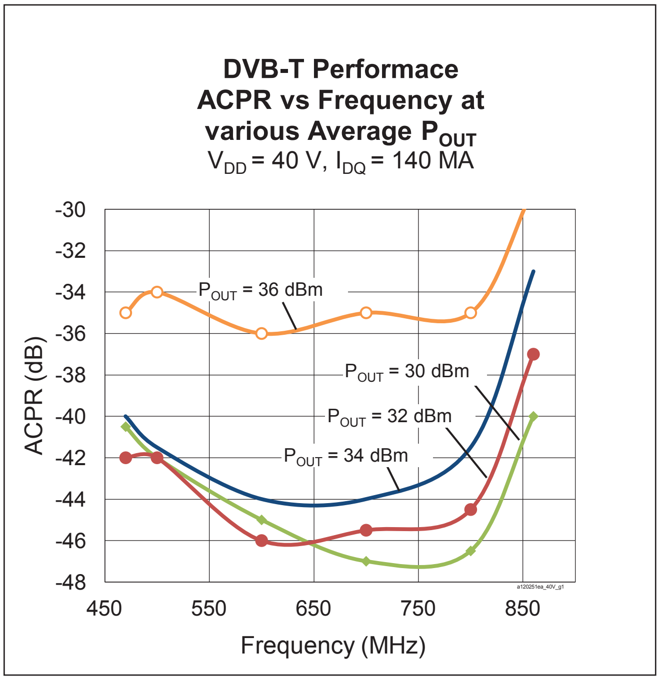


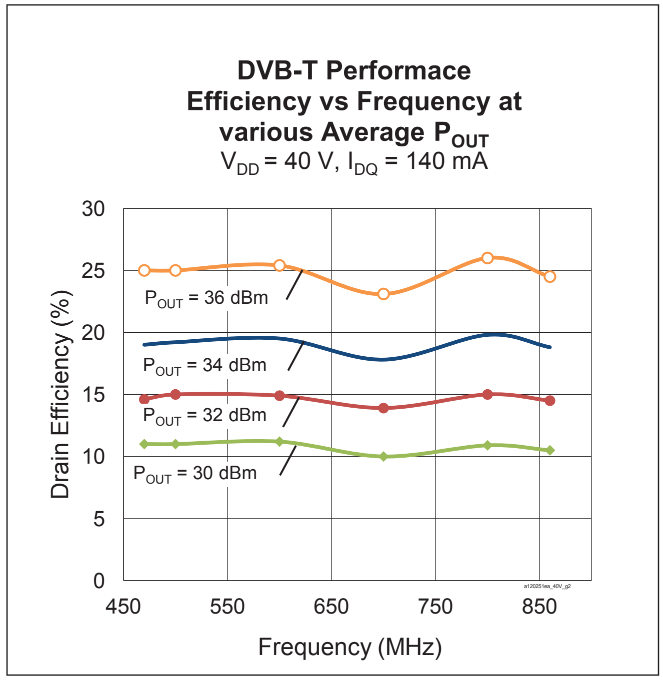
CW Performance
V_{DD} = 50 V, I_{DQ} = 20 mA

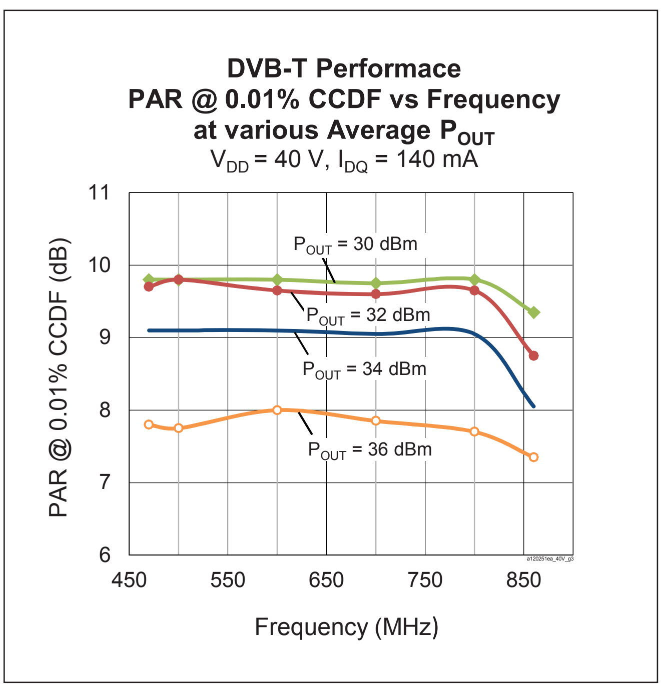


Typical RF Performance (cont.) (tested with LTN/PTVA120251EA E3 test fixture, 470 MHz – 860 MHz)

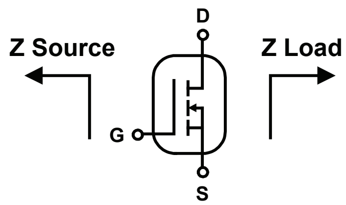
Test Conditions: DVB-T 8 MHz unclipped input signal, output PAR measured at 0.01% point of CCDF curve, ACPR measured over 200 KHz BW at 4.1 MHz offset from carrier center frequency.







Broadband Circuit Impedance



Freq [MHz]	Z Source Ω		Z Load Ω	
	R	jX	R	jX
1200	4.31	–0.22	6.46	7.63
1300	5.06	–0.79	6.29	7.27
1400	4.94	–1.96	6.14	8.72

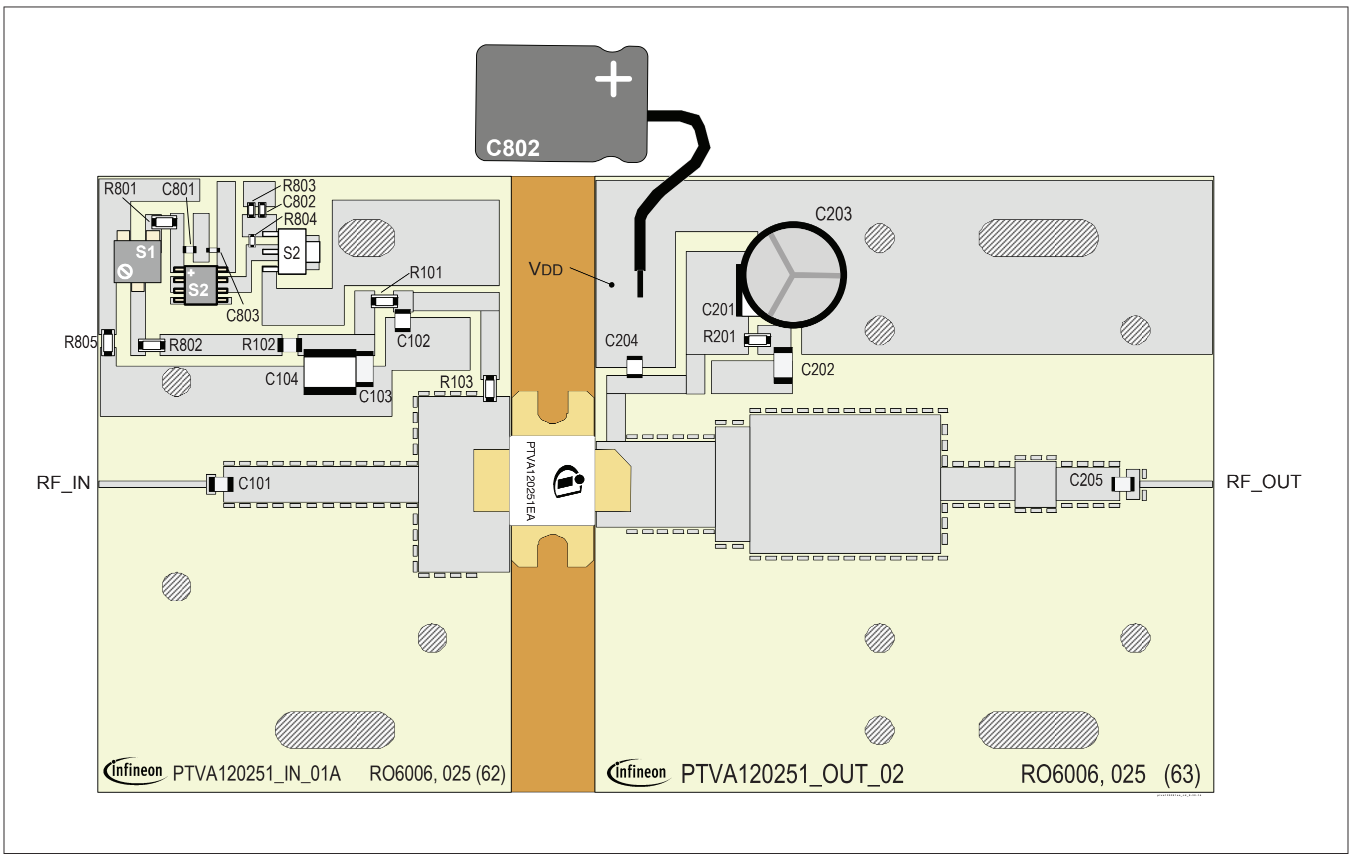
See next page for reference circuit information

Reference Circuits

DUT	Test Fixture Part No.	PCB	Frequency (MHz)
PTVA120251EA	LTN/PTVA120251EA V2 *	Rogers 6006, 0.635 mm [0.025”] thick, 2 oz. copper, ε_r = 6.15	1200 – 1400
PTVA120251EA	LTN/PTVA120251EA E2 †	Rogers 3010, 0.635 mm [0.025”] thick, 2 oz. copper, ε_r = 10.2	1200 – 1400
PTVA120251EA	LTN/PTVA120251EA E3 †	Rogers 4350B, 0.762mm [.030"] thick, 2 oz. copper, ε_r = 3.48	470 – 860
PTVA120251EA	LTN/PTVA120251EA E4 †	Rogers 3010, 0.635 mm [0.025”] thick, 2 oz. copper, ε_r = 10.2	960 – 1215

* See pages 11 – 12 for assembly information. Find Gerber files for this reference circuit on the Infineon Web site at **www.infineon.com/rfpower**

† Gerber files for this reference circuit are available on request.



Assembly diagram for reference circuit LTN/PTVA120251EA V2, 1200 MHz to 1400 MHz (not to scale)

Reference Circuit (cont.)

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C102	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C103	Capacitor, 1 µF	TDK Corporation	C4532X7R2A105M230KA
C104	Capacitor, 10 µF	TDK Corporation	C5750X5R1H106K230KA
C801, C802, C803	Capacitor, 1000 pF	Kemet	C1812C560KHGACTU
R101	Resistor, 5.6 ohms	Panasonic Electronic Components	ERJ-8RQJ5R6V
R102	Resistor, 0 ohms	Panasonic Electronic Components	ERJ-8RQJ5R6V
R103, R801	Resistor, 10 ohms	Panasonic – ECG	ERJ-3GEYJ100V
R802, R805	Resistor, 2K ohms	Panasonic Electronic Components	ERJ-8GEYJ202V
R803	Chip resistor, 1.3K ohms	Panasonic Electronic Components	ERJ-3GEYJ132V
R804	Chip resistor, 1.2K ohms	Panasonic Electronic Components	ERJ-3GEYJ122V
S1	Potentiometer 2K ohms	Bourns Inc.	3224W-1-202E
S2	Voltage regulator	Fairchild Semiconductor	LM7805
S3	Transistor	Fairchild Semiconductor	BCP56
Output			
C201	Capacitor, 10 µF	TDK Corporation	C5750X5R1H106K230KA
C202	Capacitor, 1 µF	TDK Corporation	C4532X7R2A105M230KA
C203	Capacitor, 100 µF	Cornell Dubilier Electronics	SK101M100ST
C204, C205	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C206	Capacitor, 6800 µF	Panasonic Electronic Components	ECO-S2AP682EA
R101	Resistor, 5.6 ohms	Panasonic Electronic Components	ERJ-8GEYJ5R6V

Package Outline Specifications

Package H-36265-2

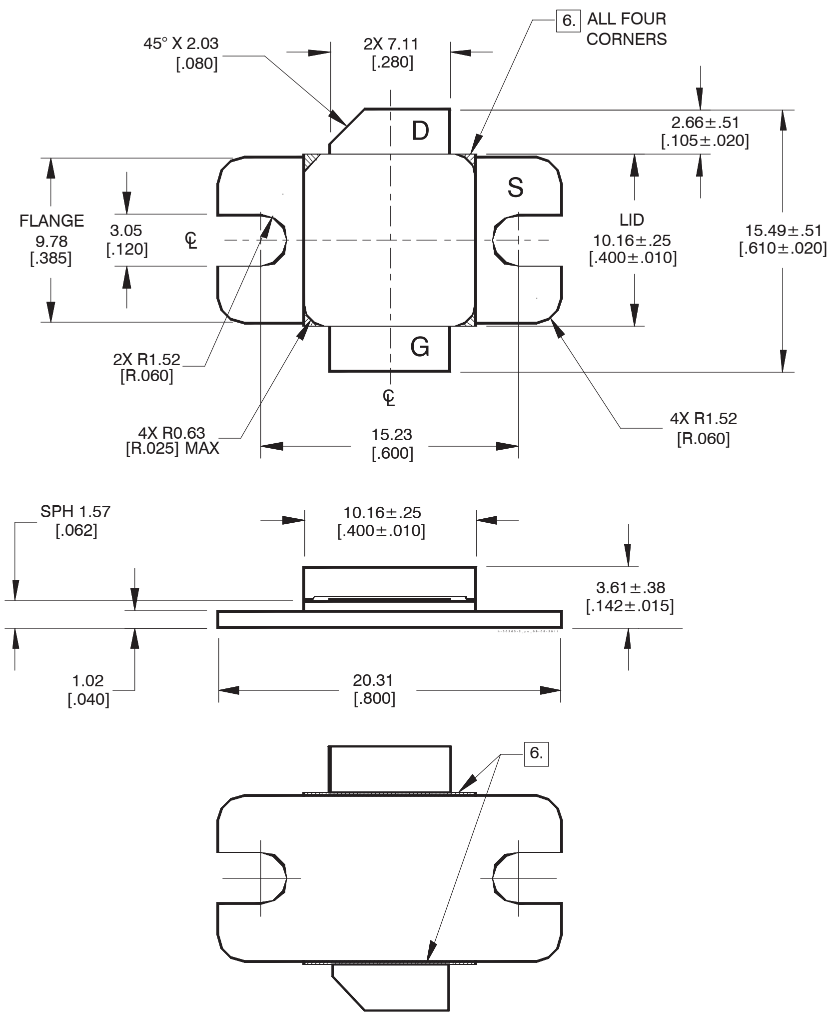


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ±0.127 [0.005] unless specified otherwise.
4. Pins: D – drain; G – gate; S – source
5. Lead thickness: 0.10 + 0.051/–0.025 mm [0.004 + 0.002/–0.001 inch].
6. Exposed metal plane on top and bottom of ceramic insulator.
7. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

Find the latest and most complete information about products and packaging at the Infineon Internet page
http://www.infineon.com/rfpower

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2012-06-04	Preliminary	All	First release of Data Sheet for pre-production product
02	2012-10-29	Preliminary	6	Add DVB-T performance graphs
03	2013-03-25	Production	All 1 – 2 3 – 8 9 – 11	Data Sheet reflects released product specifications and performance Update tables with current data Add further graphs Add load pull performance and reference circuit information
04	2014-10-03	Production	11 – 12 1, 3 – 7	New circuit design. Characterization in new circuit.
04.1	2015-06-15	Production	2	Updated max of IRL in pulsed RF performance table

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Information

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