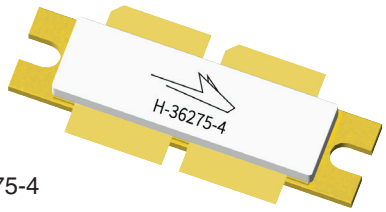
PTVA035002EV

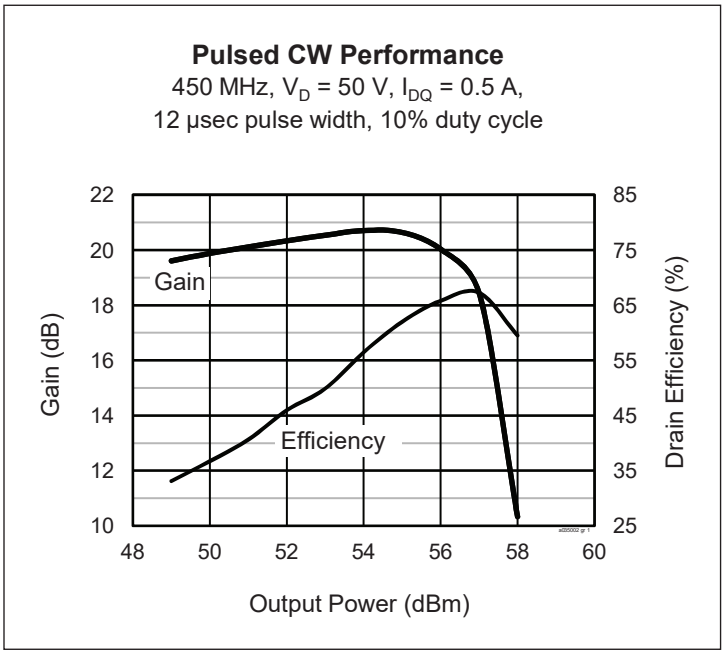
Thermally-Enhanced High Power RF LDMOS FET
500 W, 50 V, 390 – 450 MHz

Description

The PTVA035002EV LDMOS FET is designed for use in power amplifier applications in the 390 MHz to 450 MHz frequency band. Features include high gain and thermally-enhanced package with bolt-down flange. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA035002EV
Package H-36275-4



Features

- Unmatched input and output
- High gain and efficiency
- Integrated ESD protection
- Human Body Model Class 2 (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS-compliant
- Capable of withstanding a 13:1 load mismatch at 57 dBm under pulsed conditions: 12 µsec pulse width, 10% duty cycle

RF Characteristics

Pulsed CW Class AB Characteristics (not subject to production test, verified by design/characterization in Wolfspeed test fixture)
V_{DD} = 50 V, I_{DQ} = 0.5 A, P_{OUT} = 500 W, f = 450 MHz, 12 µsec pulse width, 10% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	—	18	—	dB
Drain Efficiency	η_D	—	64	—	%

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

RF Characteristics

Pulsed CW Characteristics (tested in Wolfspeed test fixture)
V_{DD} = 50 V, V_{GS} = 2.9 V, I_{DQ} = 0.0 A, P_{OUT} = 500 W, f = 450 MHz, 12 µsec pulse width, 10% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	14.75	15.5	—	dB
Drain Efficiency	η_D	63	66	—	%

DC Characteristics (each side)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	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	$R_{DS(on)}$	—	0.1	—	Ω
Operating Gate Voltage	V_{DS} = 50 V, I_{DQ} = 600 mA	V_{GS}	—	3.70	—	V
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1.0	µA

Maximum Ratings

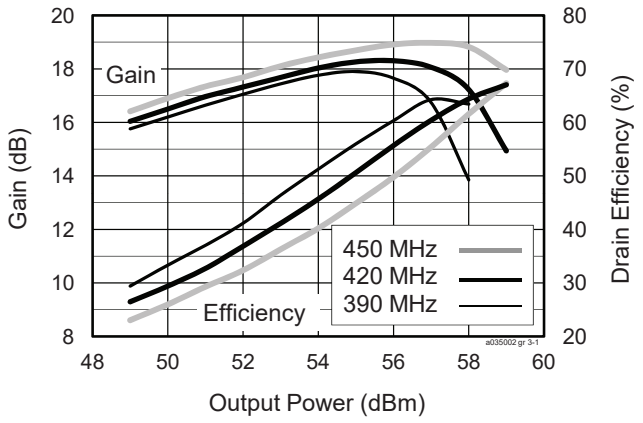
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	105	V
Gate-Source Voltage	V_{GS}	–6 to +12	V
Operating Voltage	V_{DD}	0 to +55	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C
Thermal Resistance (T_{CASE} = 70°C, 300 W CW)	$R_{\theta JC}$	0.20	°C/W

Ordering Information

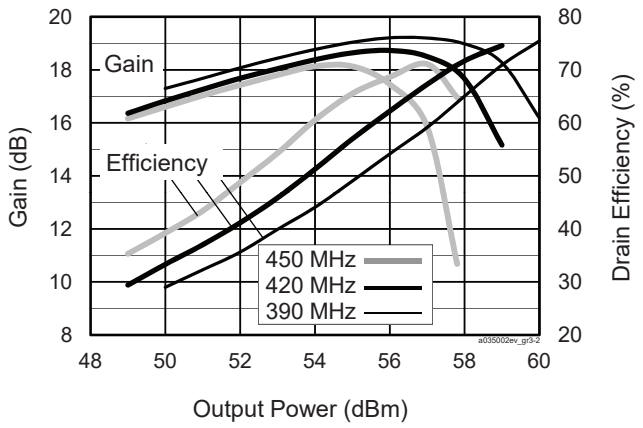
Type and Version	Order Code	Package Description	Shipping
PTVA035002EV V1 R0	PTVA035002EV-V1-R0	H-36275-4, bolt-down	Tape & Reel, 50pcs
PTVA035002EV V1 R250	PTVA035002EV-V1-R250	H-36275-4, bolt-down	Tape & Reel, 250pcs

Typical Performance (data taken in production test fixture)

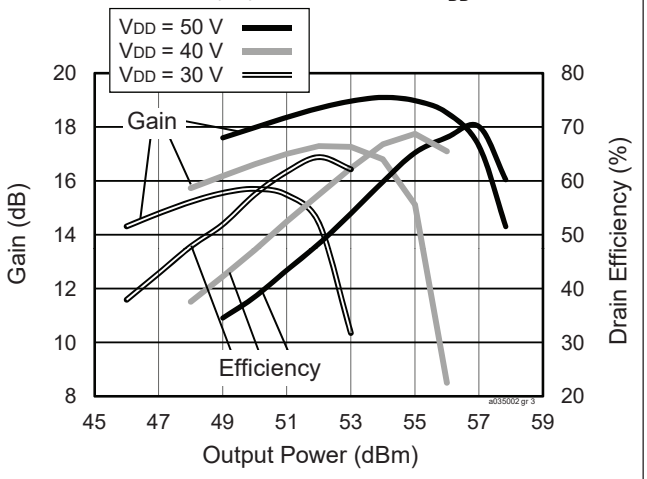
Power Sweep, Pulsed CW
V_{DD} = 50 V, V_G = 2.9 V, 12 µsec pulse width, 10% duty cycle, power optimized



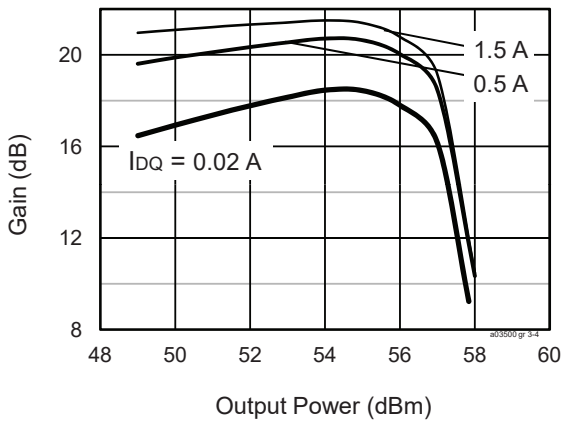
Power Sweep, Pulsed CW
12 µsec pulse width, 10% duty cycle
V_{DD} = 50 V, V_G = 2.9 V, efficiency optimized



Pulsed CW Performance
V_{GG} = 2.9 V, 450 MHz, 2 µsec pulse width, 10% duty cycle, for selected V_{DD}

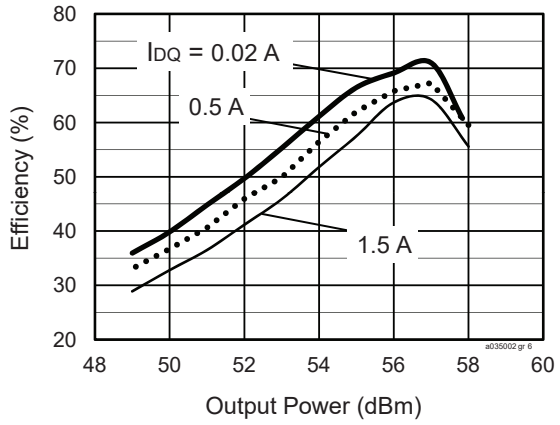


Pulsed CW Gain
V_{DD} = 50 V, 450 MHz,
12 µsec pulse width, 10% duty cycle,
series show I_{DQ}



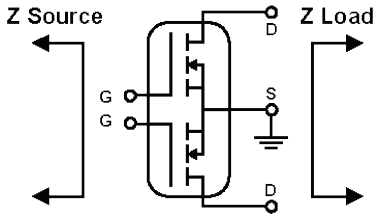
Typical Performance (cont.)

Pulsed CW Efficiency
V_D = 50 V, 450 MHz, 12 µsec pulse width,
10% duty cycle, series show I_{DQ}

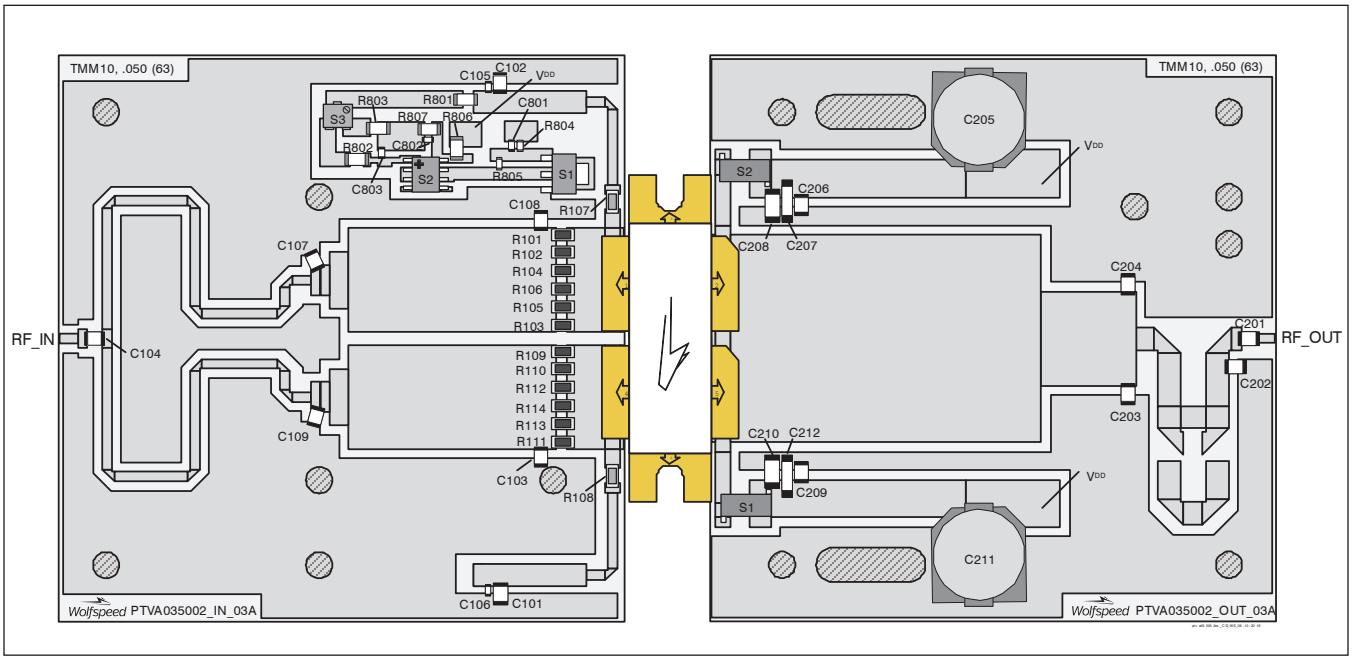


Broadband Circuit Impedance

Frequency	Z Source Ω		Z Load Ω	
MHz	R	jX	R	jX
390	1.28	–0.12	1.80	–2.22
405	1.35	0.18	1.86	–1.91
420	1.43	0.48	1.92	–1.62
435	1.54	0.76	1.98	–1.35
450	1.67	1.04	2.02	–1.11



Reference Circuit, 390 – 450 MHz



*Reference circuit assembly diagram (not to scale)**

Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF

Reference Circuit (cont.)

Reference Circuit Assembly

DUT	PTVA035002EV
Test Fixture Part No.	LTN/PTVA035002EV
PCB	Rogers TMM10, 1.27 mm [0.050"] thick, 2 oz. copper, $\varepsilon_r = 9.2$

Components Information

Component	Description	Suggested Manufacturer	P/N
Input			
C101, C102, C104	Capacitor, 300 pF	ATC	ATC100B301KW200X
C103, C108	Capacitor, 20 pF	ATC	ATC100B200KW500X
C105, C106, C801, C802, C803	Capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
C107, C109	Capacitor, 6.2 pF	ATC	ATC100B6R2CT500X
R101, R102, R103, R104, R105, R106, R109, R110, R111, R112, R113, R114	Resistor, 5.6 Ω	Panasonic Electronic Components	ERJ-8GEYJ5R6V
R107, R108	Resistor, 1000 Ω	Panasonic Electronic Components	ERJ-8GEYJ102V
R801	Resistor, 100 Ω	Panasonic Electronic Components	ERJ-8GEYJ101V
R802	Resistor, 2000 Ω	Panasonic Electronic Components	ERJ-8GEYJ202V
R803	Resistor, 3600 Ω	Panasonic Electronic Components	ERJ-8GEYJ362V
R804	Resistor, 1300 Ω	Panasonic Electronic Components	ERJ-3GEYJ132V
R805	Resistor, 1200 Ω	Panasonic Electronic Components	ERJ-3GEYJ122V
R806	Resistor, 2400 Ω	Panasonic Electronic Components	ERJ-8GEYJ242V
R807	Resistor, 6200 Ω	Panasonic Electronic Components	ERJ-8GEYJ622V
S1	Transistor	Infineon Technologies	BCP56
S2	Voltage regulator	Texas Instruments	LM7805
S3	Potentiometer	Bourns Inc.	3224W-1-202E
Output			
C201, C206, C209	Capacitor, 300 pF	ATC	ATC100B301KW200X
C202	Capacitor, 3 pF	ATC	ATC100B3R0CW500X
C203, C204	Capacitor, 4.3 pF	ATC	ATC100B4R3CW500X
C205, C211	Capacitor, 100 µF	United Chemi-Con	EMVE101ARA101MKE0S
C207, C212	Capacitor, 10 µF	TDK Corporation	C5750X7S2A106M230KB
C208, C210	Capacitor, 2.2 µF	TDK Corporation	C4532X7R2A225K230KA
S1, S2	Inductor, 17.5 nH	Coilcraft	B06TGLB

Package Outline Specifications

Package H-36275-4

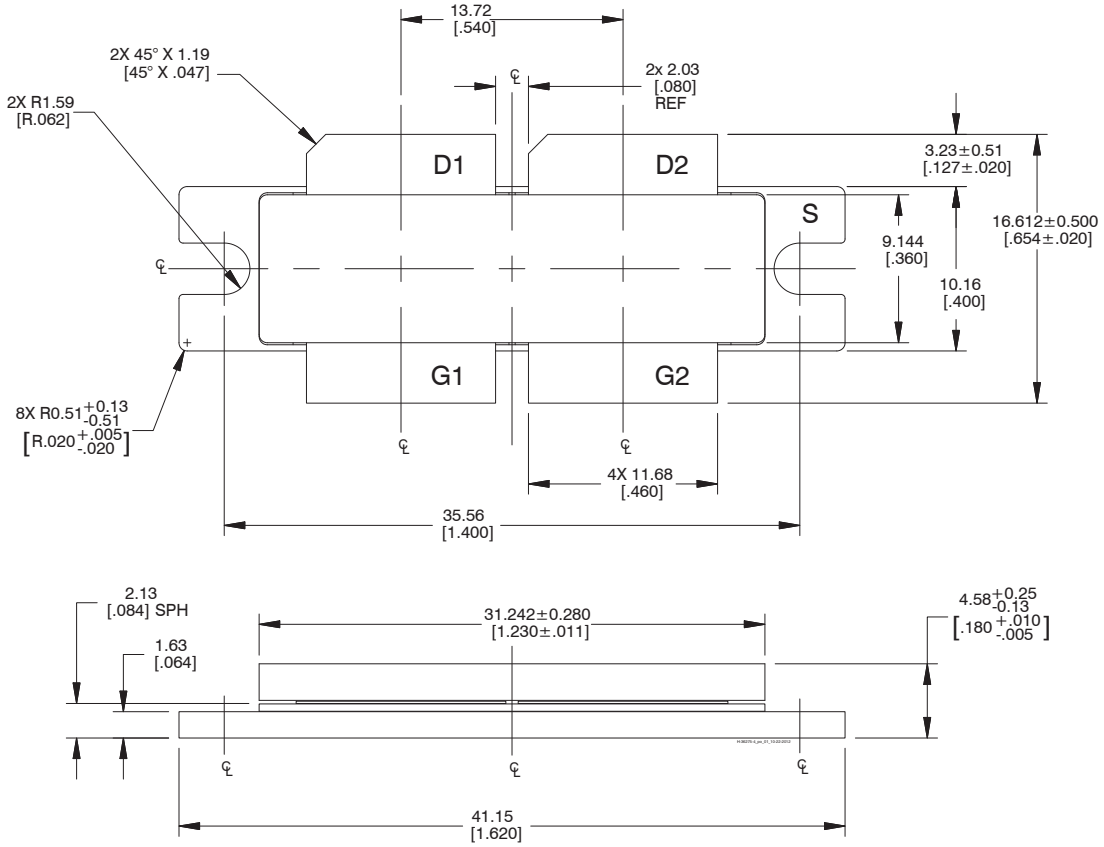


Diagram Notes—unless otherwise specified:

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 - drain, G1, G2 - gate, S - source.
5. Lead thickness: 0.127 +0.051/–0.025 [.005 +.002/–.001].
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	2010-10-07	Advance	All	Data Sheet reflects advance specification for product development
02	2010-12-09	Advance	1, 2	Added ESD and VSWR information and revised conditions of test, Revise conditions of test.
03	2011-04-28	Preliminary	All	Convert to Preliminary Data Sheet, adding performance graphs, substantiating some characterizations.
04	2012-02-24	Production	All 4 – 9	Convert to final Data Sheet for production-released product. Add impedance data, Add reference circuit
05.1	2016-04-19	Production	1, 2	Added ESD rating, updated ordering information
05.2	2016-06-08	Production	2	Updated ordering information to include R250
05.3	2017-02-02	Production	2	Added operating voltage and updated junction temperature
06	2018-06-12	Production	All	Converted to Wolfspeed Data Sheet

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Notes

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