

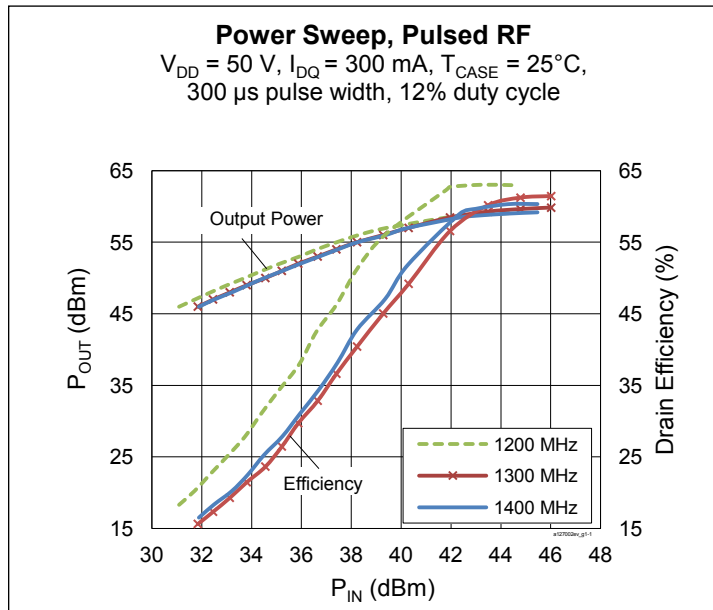
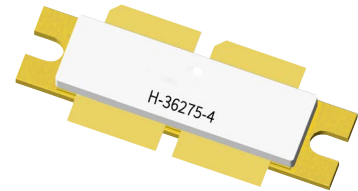
# PTVA127002EV

## Thermally-Enhanced High Power RF LDMOS FET 700 W, 50 V, 1200 – 1400 MHz

### Description

The PTVA127002EV LDMOS FET is designed for use in power amplifier applications in the 1200 to 1400 MHz frequency band. Features include high gain and thermally-enhanced package with bolt-down flange. Manufactured with an advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PTVA127002EV  
Package H-36275-4



### Features

- Broadband input and output matching
- High gain and efficiency
- Integrated ESD protection
- Human Body Model 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 700 W peak under RF pulse, 300  $\mu\text{s}$ , 10% duty cycle.

### RF Characteristics

#### Pulsed RF Performance (tested in the test fixture)

$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 150\text{ mA}$  per side,  $P_{OUT} = 700\text{ W}$ ,  $f_1 = 1200\text{ MHz}$ ,  $f_2 = 1300\text{ MHz}$ ,  $f_3 = 1400\text{ MHz}$ , 300  $\mu\text{s}$  pulse width, 12% duty cycle

Characteristic	Symbol	Min	Typ	Max	Unit
Gain	$G_{ps}$	15.5	16	—	dB
Drain Efficiency	$\eta_D$	50	56	—	%
Gain Flatness	$\Delta G$	—	1.0	1.3	dB
Return Loss	IRL	—	-20	-11	dB

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!



## RF Characteristics

**Typical RF Performance** (not subject to production test, verified by design/characterization in the test fixture)  
 $I_{DQ} = 150$  mA per side, Input signal ( $t_r = 7$  ns,  $t_f = 5$  ns), 300  $\mu$ s pulse width, 12% duty cycle, class AB test

$V_{DD} = 50$  V,

Mode of Operation	f (MHz)	IRL (dB)	P <sub>1dB</sub>			P <sub>3dB</sub>			Max P <sub>droop</sub> (pulse) @ P <sub>1dB</sub>	t <sub>r</sub> (ns) @ P <sub>1dB</sub>	t <sub>f</sub> (ns) @ P <sub>1dB</sub>
			Gain (dB)	Eff (%)	P <sub>OUT</sub> (W)	Gain (dB)	Eff (%)	P <sub>OUT</sub> (W)			
300 $\mu$ s, 12% Duty Cycle	1200	-20	16.6	57	710	14.6	57	810	0.2	5	<2
	1300	-16	15.8	54	840	13.8	55	950	0.3	5	<2
	1400	-20	15.7	54	730	13.7	53	820	0.2	5	<2

**Typical RF Performance** (tested on LTN/PTVA127002EV E5 the test fixture)

$V_{DD} = 50$  V,  $I_{DQ} = 150$  mA per side, Input signal ( $t_r = 7$  ns,  $t_f = 5$  ns), 32 ms pulse width, 50% duty cycle, class AB test

Mode of Operation	Compression	f (MHz)	P <sub>IN</sub> (dBm)	Gain (dB)	IRL (dB)	I (A)	Eff (%)	P <sub>OUT</sub> (dBm)	P <sub>OUT</sub> (W)
32 ms, 50% Duty Cycle	P <sub>1dB</sub>	1300	42.0	16.1	22.6	22.7	56.6	58.1	641
	P <sub>3dB</sub>	1300	44.4	14.1	19.0	25.2	55.8	58.5	703

## DC Characteristics (single side)

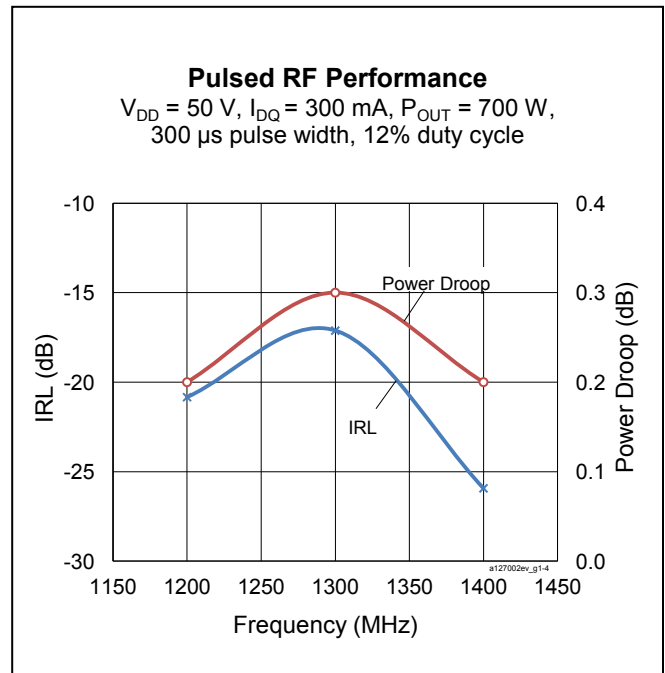
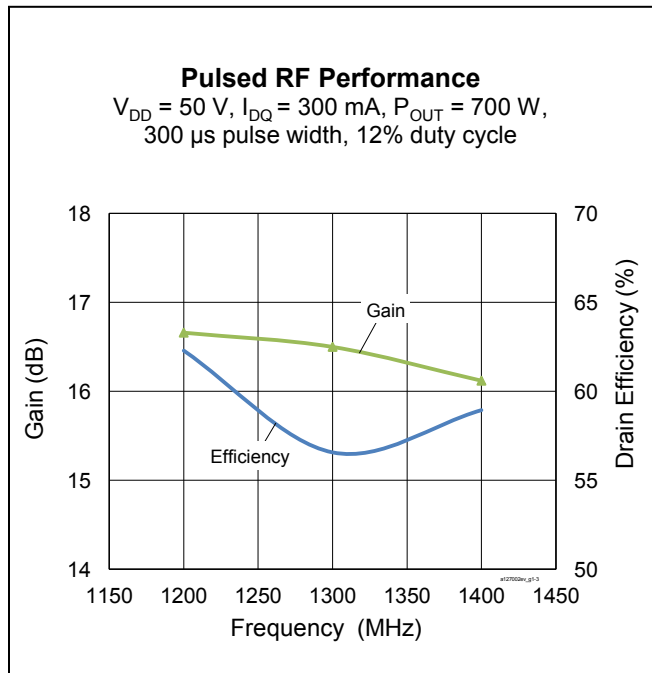
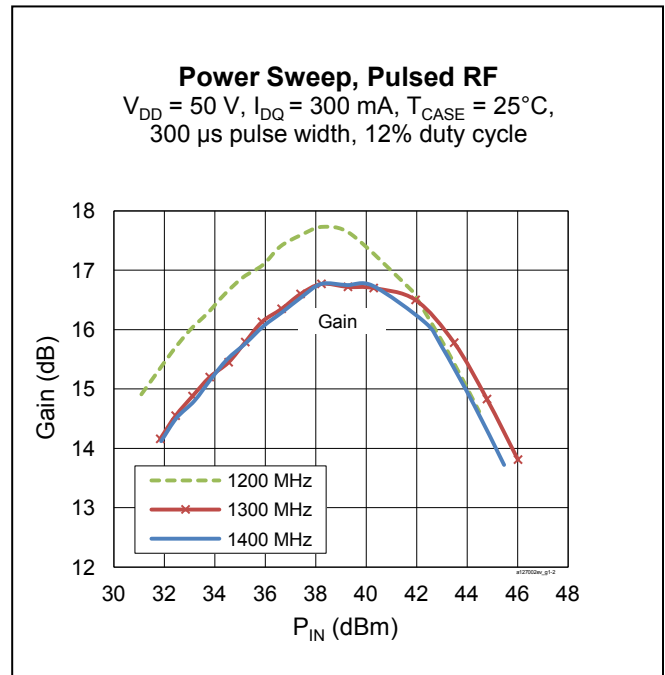
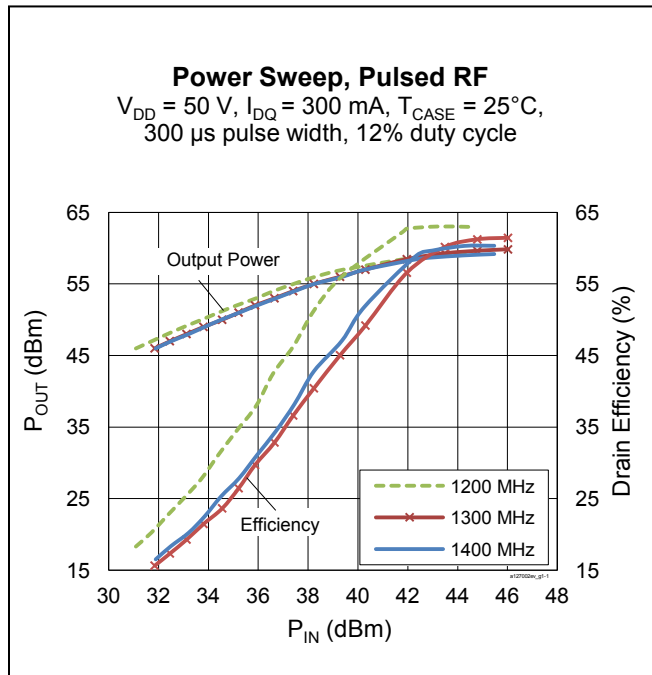
Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0$ V, $I_{DS} = 10$ mA	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current	$V_{DS} = 50$ V, $V_{GS} = 0$ V	$I_{DSS}$	—	—	1.0	$\mu$ A
	$V_{DS} = 105$ V, $V_{GS} = 0$ V	$I_{DSS}$	—	—	10.0	$\mu$ A
On-State Resistance	$V_{GS} = 10$ V, $V_{DS} = 0.1$ V	$R_{DS(on)}$	—	0.1	—	$\Omega$
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	$\mu$ A

## Maximum Ratings

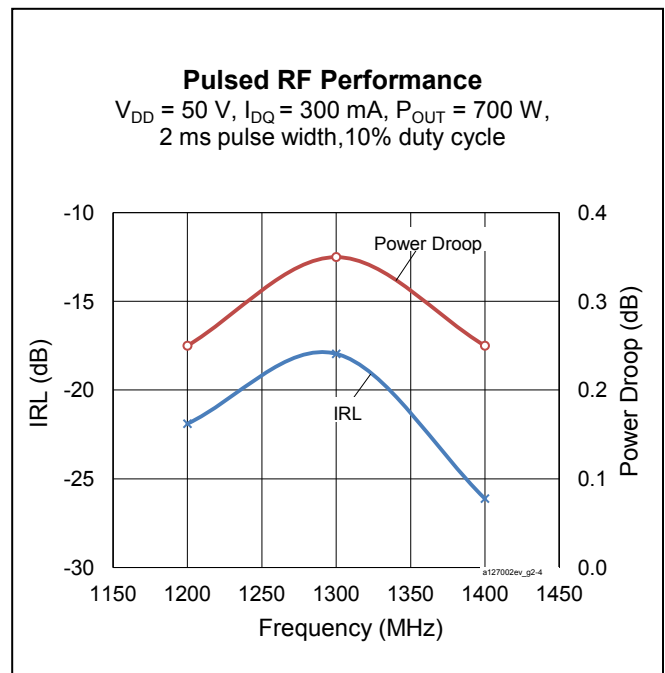
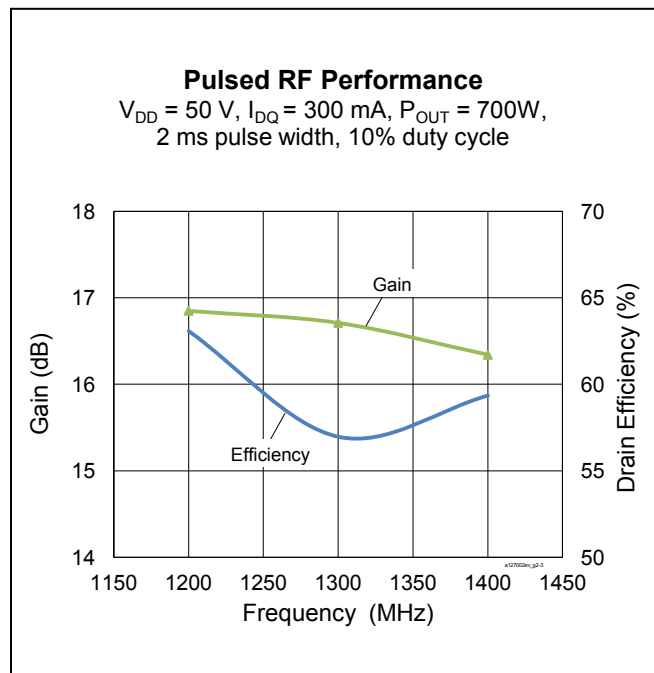
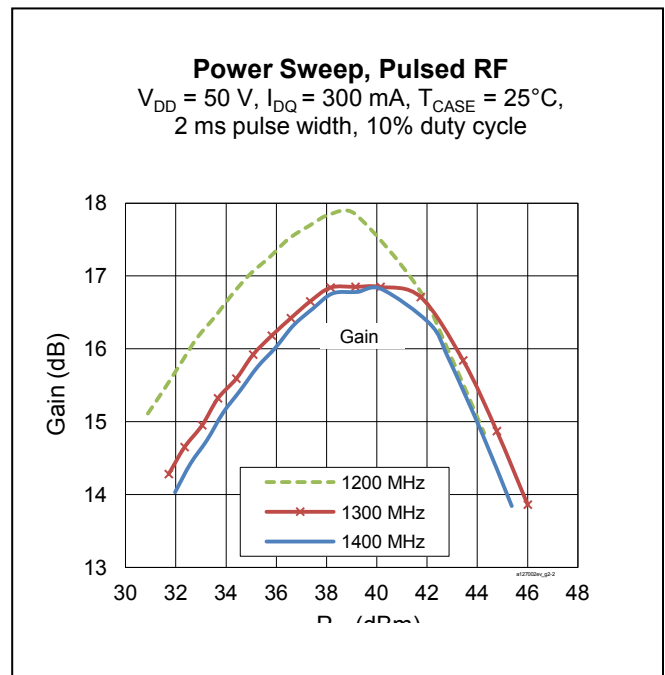
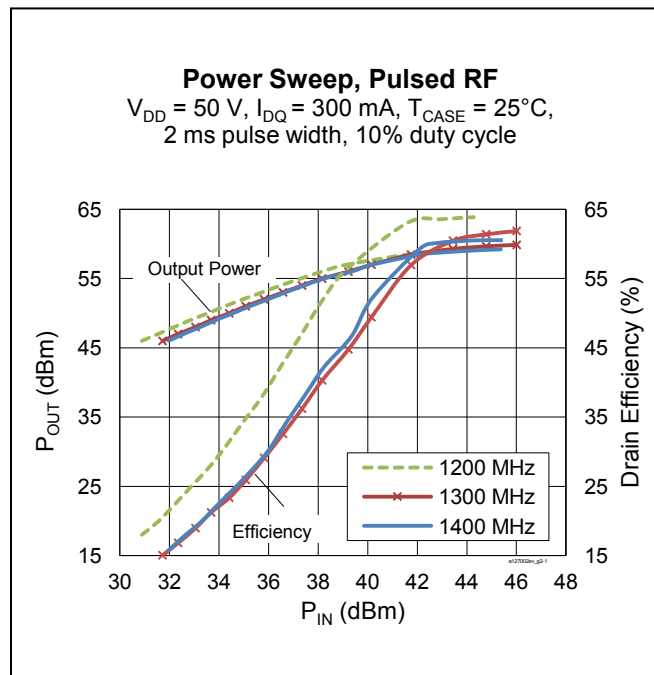
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	105	V
Gate-Source Voltage	$V_{GS}$	-6 to +12	V
Operating Voltage	$V_{DD}$	0 to +55	V
Junction Temperature	$T_J$	225	$^{\circ}$ C
Storage Temperature Range	$T_{STG}$	-65 to +150	$^{\circ}$ C
Thermal Resistance ( $T_{CASE} = 70^{\circ}$ C, 700 W CW)	$R_{\theta JC}$	~0.36	$^{\circ}$ C/W

## Ordering Information

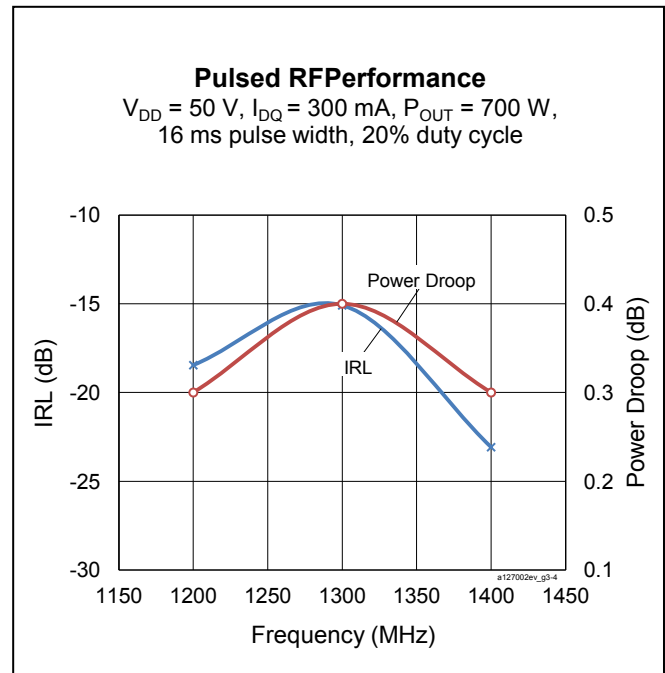
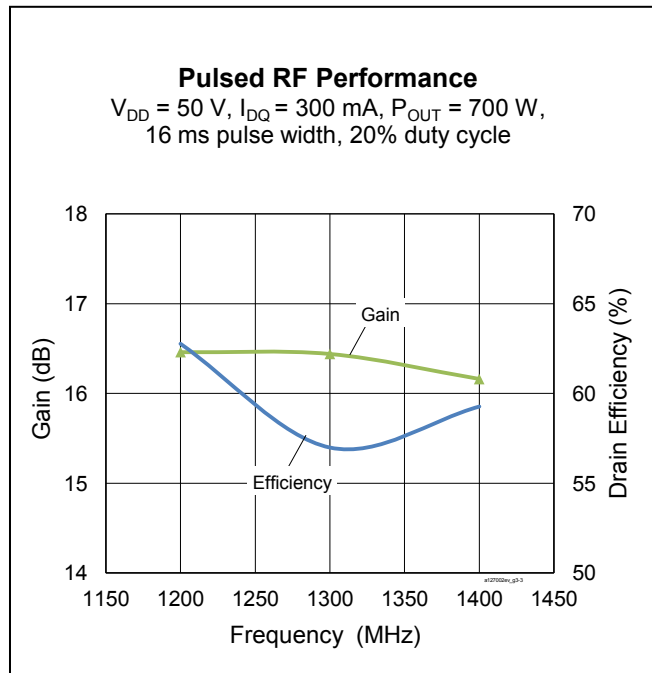
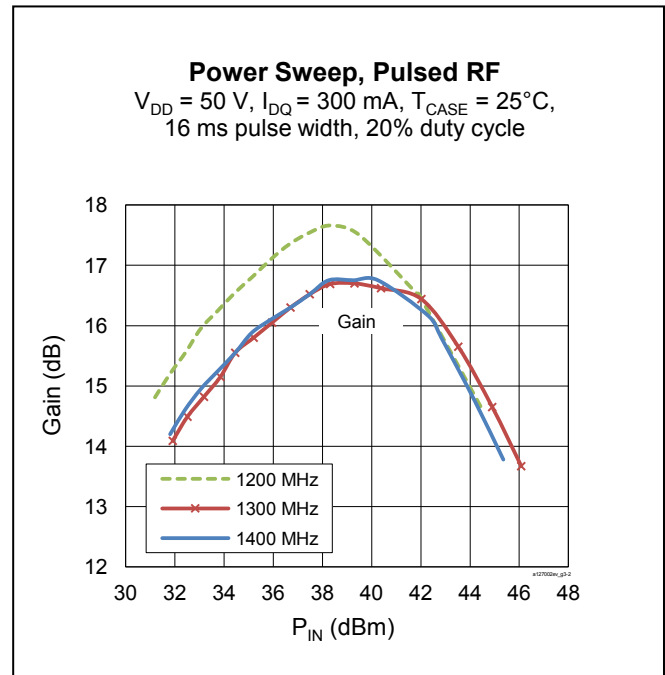
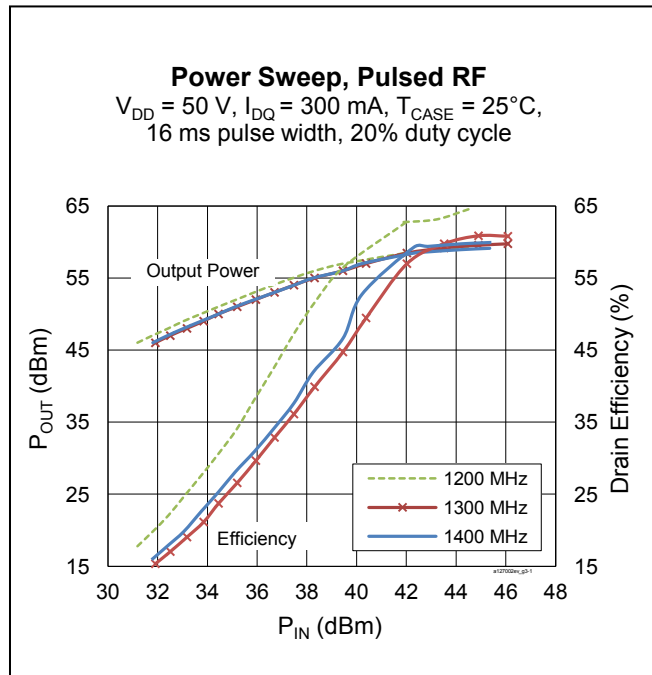
Type and Version	Order Code	Package Description	Shipping
PTVA127002EV V1 R0	PTVA127002EV-V1-R0	H-36275-4, bolt-down	Tape & Reel, 50 pcs
PTVA127002EV V1 R250	PTVA127002EV-V1-R250	H-36275-4, bolt-down	Tape & Reel, 250 pcs

**Typical RF Performance** (data taken in production test fixture)


### Typical RF Performance (cont.)

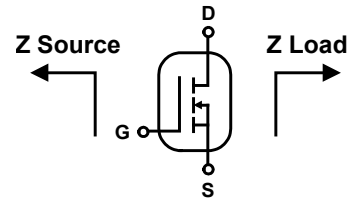


### Typical RF Performance (cont.)



## Broadband Circuit Impedance

Freq [MHz]	Z Source $\Omega$		Z Load $\Omega$	
	R	jX	R	jX
1200	0.84	-1.27	0.90	-0.97
1300	0.97	-1.06	0.72	-0.47
1400	1.35	-1.12	0.63	0.03



## Load Pull Performance (single side)

Load Pull at Max  $P_{OUT}$  Point – 16  $\mu$ s pulse width, 10% duty cycle, class AB,  $V_{DD} = 50$  V, 150 mA

Freq [MHz]	Z <sub>L</sub> [ $\Omega$ ]	P <sub>IN</sub> [dBm]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	P <sub>G</sub> [dB]	PAE Eff [%]	Z <sub>OUT</sub> [ $\Omega$ ]
1200	1.91 – j2.04	41.40	56.40	436.52	15.00	53.80	1.30 – j2.03
1300	2.72 – j3.13	42.24	56.54	450.82	14.30	54.48	1.25 – j1.94
1400	4.83 – j1.46	41.66	56.31	427.56	14.65	53.27	1.03 – j1.94

Load Pull at Max  $G_T$  Point – 16  $\mu$ s pulse width, 10% duty cycle, class AB,  $V_{DD} = 50$  V, 150 mA

Freq [MHz]	Z <sub>L</sub> [ $\Omega$ ]	P <sub>IN</sub> [dBm]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	P <sub>G</sub> [dB]	PAE Eff [%]	Z <sub>OUT</sub> [ $\Omega$ ]
1200	1.91 – j2.04	38.10	54.72	296.48	16.62	57.89	3.03 – j3.11
1300	2.72 – j3.13	38.84	54.83	304.09	15.99	62.54	3.22 – j1.63
1400	4.83 – j1.46	37.21	53.42	219.79	16.21	57.25	2.30 – j0.09

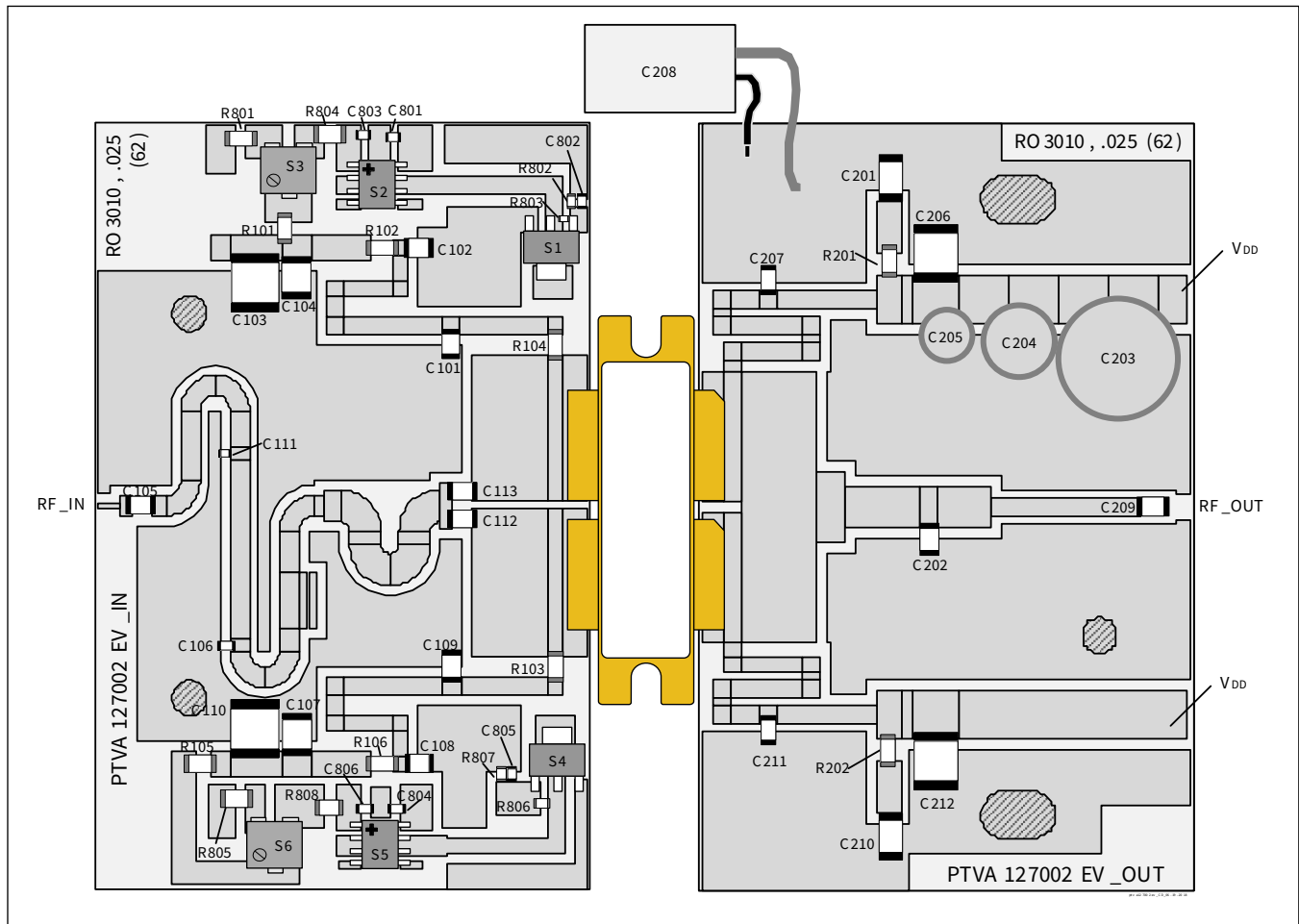
Load Pull at Max Efficiency Point – 16  $\mu$ s pulse width, 10% duty cycle, class AB,  $V_{DD} = 50$  V, 150 mA

Freq [MHz]	Z <sub>L</sub> [ $\Omega$ ]	P <sub>IN</sub> [dBm]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	P <sub>G</sub> [dB]	PAE Eff [%]	Z <sub>OUT</sub> [ $\Omega$ ]
1200	1.91 – j2.04	39.60	55.80	380.19	16.20	60.71	2.22 – j2.43
1300	2.72 – j3.13	39.44	55.23	333.43	15.79	63.71	2.81 – j1.90
1400	4.83 – j1.46	39.39	55.19	330.37	15.80	62.26	2.40 – j1.45

Z Optimum – 16  $\mu$ s pulse width, 10% duty cycle, class AB,  $V_{DD} = 50$  V, 150 mA

Freq [MHz]	Z <sub>L</sub> [ $\Omega$ ]	P <sub>IN</sub> [dBm]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	P <sub>G</sub> [dB]	PAE Eff [%]	Z <sub>OUT</sub> [ $\Omega$ ]
1200	1.91 – j2.04	39.18	55.58	361.41	16.40	60.50	2.41 – j2.50
1300	2.72 – j3.13	39.50	55.30	338.84	15.80	62.60	2.73 – j1.51
1400	4.83 – j1.46	40.00	55.60	363.08	15.60	60.70	1.86 – j1.37

## Reference Circuit, 1200 – 1400 MHz



Reference circuit assembly diagram (not to scale)

## Reference Circuit (cont.)

### Reference Circuit Assembly

DUT	PTVA27002EV V1
Test Fixture Part No.	LTN/PTVA127002EV V1
PCB	Rogers 3010, 0.635mm [0.025"] thick, 2 oz. copper, $\epsilon_r = 10.2$ , $f = 1930 - 1990$ MHz

### Components Information

Component	Description	Suggested Manufacturer	P/N
<b>Input</b>			
C101, C102, C108, C109	Capacitor, 39 pF	ATC	ATC100B390KW500XB
C103, C110	Capacitor, 10 $\mu$ F	TDK Corporation	C5750X5R1H106K230KA
C104, C107	Capacitor, 1 $\mu$ F	TDK Corporation	C4532X7R2A105M230KA
C105, C112, C113	Capacitor, 56 pF	ATC	ATC100B560JW500XB
C106	Capacitor, 3.9 pF	ATC	ATC800A3R9CW250
C111	Capacitor, 6.2 pF	ATC	ATC100A6R2CW150XB
C801, C802, C803, C804, C805, C806	Capacitor, 1000 pF	Panasonic Electronic Components	ECJ-1VB1H102K
R101, R105	Resistor, 1000 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ102V
R102, R106	Resistor, 5.6 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ5R6V
R103, R104, R804, R808	Resistor, 10 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ100V
R801, R805	Resistor, 2000 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ202V
R802, R807	Resistor, 1300 $\Omega$	Panasonic Electronic Components	ERJ-3GEYJ132V
R803, R806	Resistor, 1200 $\Omega$	Panasonic Electronic Components	ERJ-3GEYJ122V
S1, S4	Transistor	Infineon Technologies	BCP56
S2, S5	Voltage Regulator	National Semiconductor	LM7805
S3, S6	Potentiometer, 2k $\Omega$	Bourns Inc.	3224W-1-202E
<b>Output</b>			
C201, C210	Capacitor, 1 $\mu$ F	TDK Corporation	C4532X7R2A105M230KA
C202	Capacitor, 2.2 $\mu$ F	ATC	ATC100B2R2CW500
C203	Capacitor, 100 $\mu$ F	Cornell Dubilier Electronics (CDE)	SK101M100ST
C204	Capacitor, 22 $\mu$ F	Cornell Dubilier Electronics (CDE)	SEK220M100ST
C205	Capacitor, 10 $\mu$ F	Cornell Dubilier Electronics (CDE)	SEK100M100ST
C206, C212	Capacitor, 10 $\mu$ F	TDK Corporation	C5750X5R1H106K230KA
C207, C211	Capacitor, 39 pF	ATC	ATC100B390KW500
C208	Capacitor, 6800 $\mu$ F	Panasonic Electronic Components	ECO-S2AP682EA
C209	Capacitor, 56 pF	ATC	ATC100B560JW500
R201, R202	Resistor, 5.6 $\Omega$	Panasonic Electronic Components	ERJ-8RQJ5R6V



## Package Outline Specifications

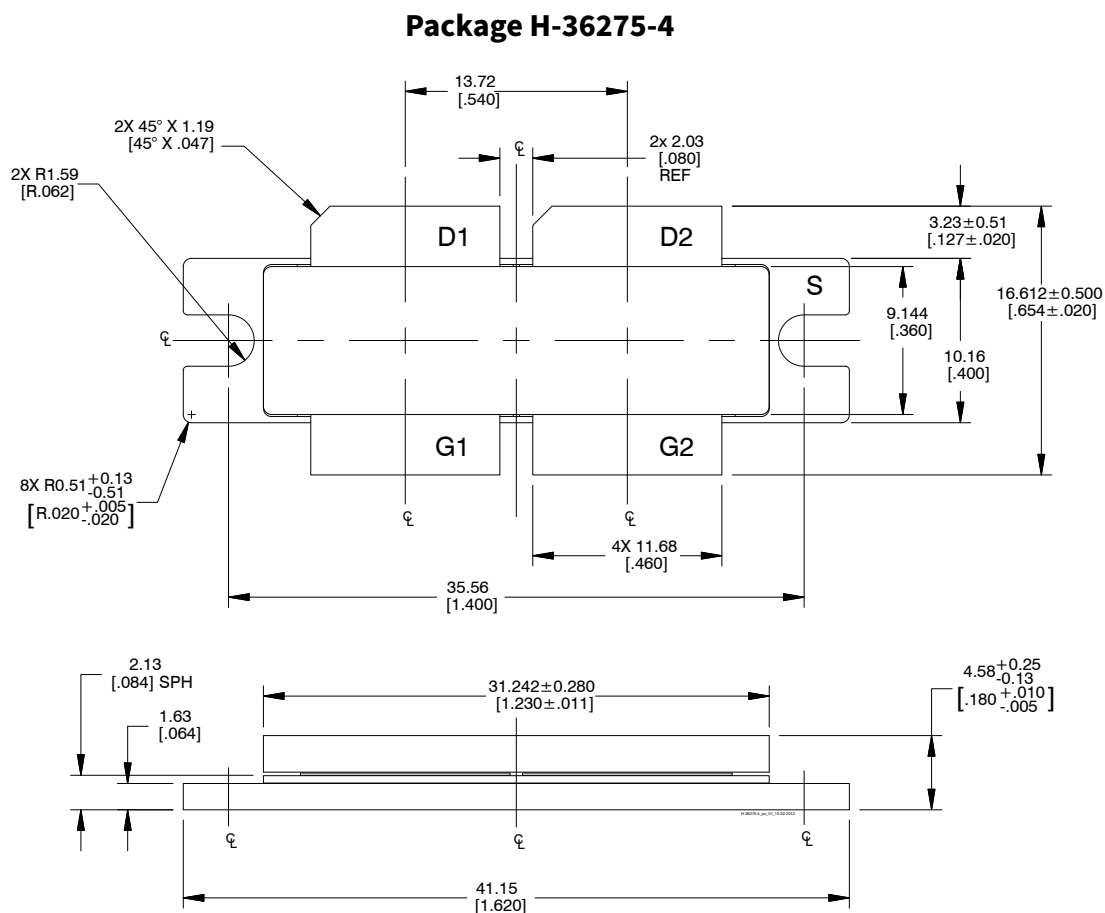


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances  $\pm 0.127$  [0.005] unless specified otherwise.
4. Pins: D1, D2 – drains; G1, G2 – gates; S – source.
5. Lead thickness:  $0.127 \pm 0.051$  mm [ $0.005 \pm 0.002$  inch].
6. Gold plating thickness:  $1.14 \pm 0.38$  micron [ $45 \pm 15$  microinch].

## Notes & Disclaimer

---

MACOM Technology Solutions Inc. ("MACOM"). All rights reserved.

These materials are provided in connection with MACOM's products as a service to its customers and may be used for informational purposes only. Except as provided in its Terms and Conditions of Sale or any separate agreement, MACOM assumes no liability or responsibility whatsoever, including for (i) errors or omissions in these materials; (ii) failure to update these materials; or (iii) conflicts or incompatibilities arising from future changes to specifications and product descriptions, which MACOM may make at any time, without notice. These materials grant no license, express or implied, to any intellectual property rights.

THESE MATERIALS ARE PROVIDED "AS IS" WITH NO WARRANTY OR LIABILITY, EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHT, ACCURACY OR COMPLETENESS, OR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[MACOM:](#)

[PTVA127002EV-V1-R0](#) [PTVA127002EV-V1-R250](#)