

# PTVA047002EV

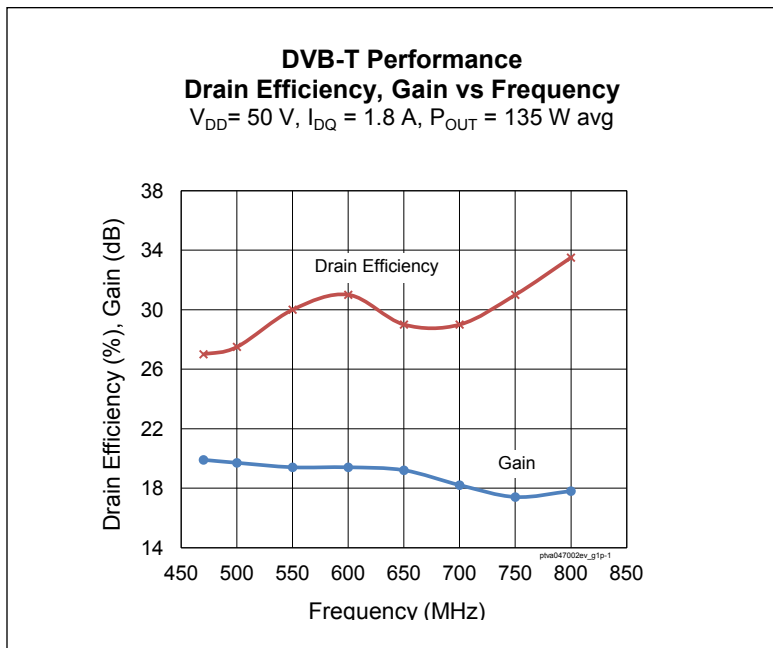
## Thermally-Enhanced High Power RF LDMOS FET 700 W, 50 V, 470 – 806 MHz

### Description

The PTVA047002EV LDMOS FET is designed for use in power amplifier applications in the 470 MHz to 806 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.



PTVA047002EV  
Package H-36275-4



### Features

- Input matched
- Integrated ESD protection
- Low thermal resistance
- High gain
- Thermally enhanced package
- RoHS compliant
- Capable of withstanding a 10:1 VSWR at 130 W average power under DVB-T signal condition
- Human Body Model Class 2 (per ANSI/ESDA/ JEDEC JS-001)

### RF Characteristics

#### DVB-T (8K OFDM, 64QAM) Characteristics (tested in the test fixture, narrowband 806 MHz)

$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 1200\text{ mA}$ ,  $f = 806\text{ MHz}$ , input PAR = 10.5 dB (unclipped), output PAR = 7.8 dB @ 0.01% CCDF probability

Characteristic	Symbol	Min	Typ	Max	Unit
Average Output Power	$P_{OUT}$	—	130	—	W
Gain	$G_{ps}$	16.5	17.5	—	dB
Drain Efficiency	$\eta_D$	24	29	—	%
Adjacent Channel Power Ratio (ACPR integrated over 200 KHz BW at + 4.3 MHz offset from center frequency)	ACPR	—	-29.5	-25	dBc

## RF Characteristics

**Typical DVB-T (8K OFDM, 64QAM) Performance** (not subject to production test, verified by design/characterization in the test fixture)

$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 600\text{ mA}$  per side,  $t_f = 25\text{ }^\circ\text{C}$ , DVB-T signal, BW = 8MHz, Mode = 8k, Modulation = 64-QAM, Guard = 1/4, Code rate = 1/2, PAR= 10.5 dB, ACPR integrated over 200 KHz BW at +4.3 MHz offset from center frequency

Freq (MHz)	Gain (dB)	IRL (dB)	I (A)	Eff (%)	P <sub>OUT</sub> Avg (W)	ACPR Up	ACPR Low
470	21.45	3.35	10.4	26.5	138	32	33
550	20.6	4.6	9.03	30.6	138	29	29
650	19.6	4.26	9.53	28.7	137	31	31
750	19.2	3.92	9.25	29.3	136	30	31
806	20	6.36	9.07	29.5	134	28	29

## DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$ , $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	105	—	—	V
Drain Leakage Current	$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	1.0	$\mu\text{A}$
	$V_{DS} = 111\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	10.0	$\mu\text{A}$
On-State Resistance	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.1	—	$\Omega$
Operating Gate Voltage	$V_{DS} = 50\text{ V}$ , $I_{DQ} = 1200\text{ mA}$	$V_{GS}$	—	3.6	—	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	1.0	$\mu\text{A}$

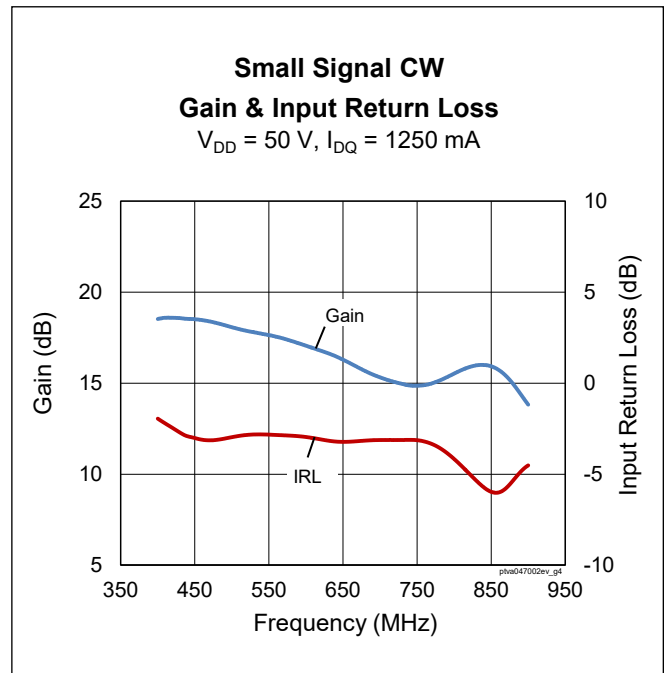
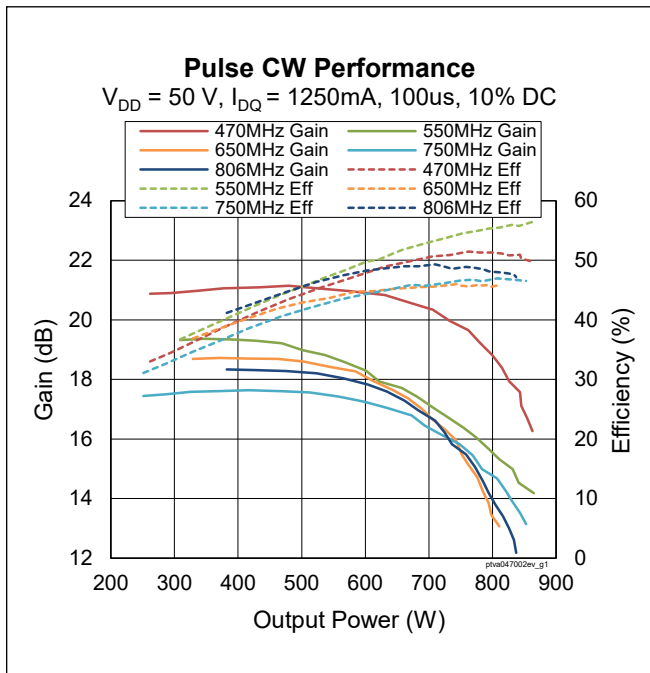
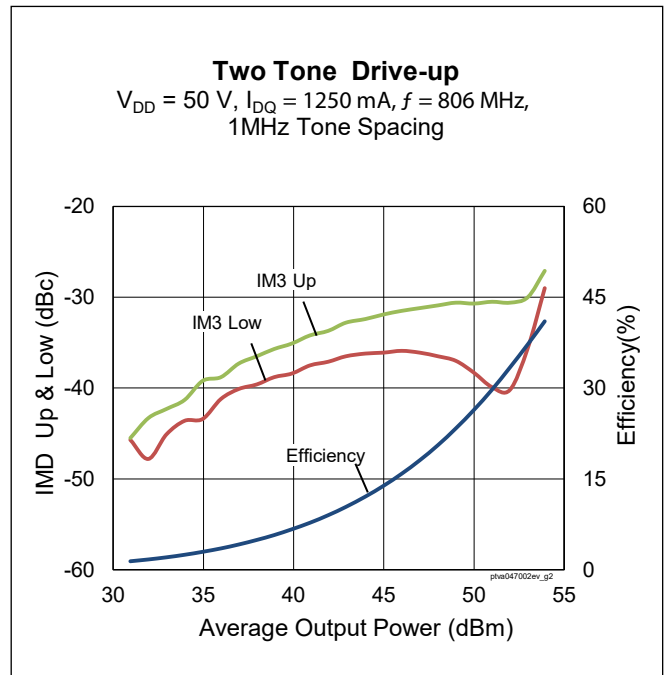
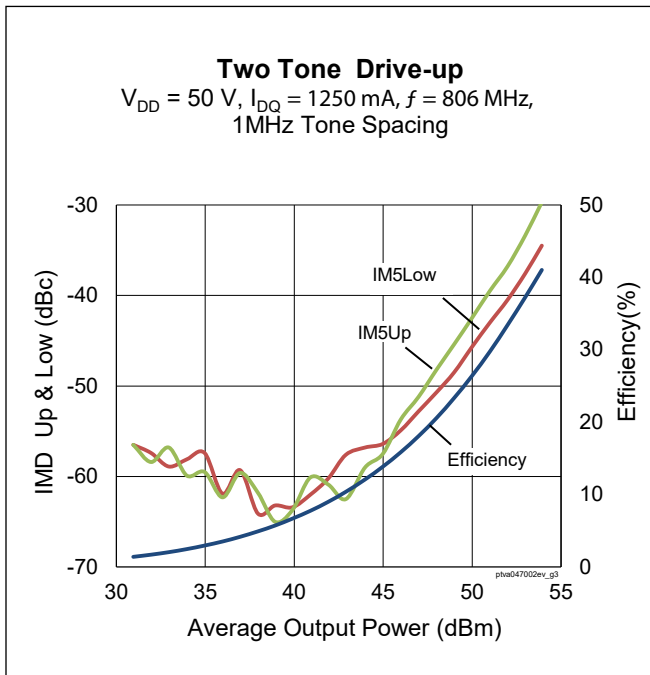
## Maximum Ratings

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	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to +150	$^\circ\text{C}$
Thermal Resistance ( $T_{CASE} = 70\text{ }^\circ\text{C}$ , 135 W CW)	$R_{\theta JC}$	0.215	$^\circ\text{C/W}$

## Ordering Information

Type and Version	Order Code	Package Description	Shipping
PTVA047002EV V1 R0	PTVA047002EV-V1-R0	H-36275-4, bolt-down	Tape & Reel, 50pcs
PTVA047002EV V1 R250	PTVA047002EV-V1-R250	H-36275-4, bolt-down	Tape & Reel, 250pcs

### Typical Performance

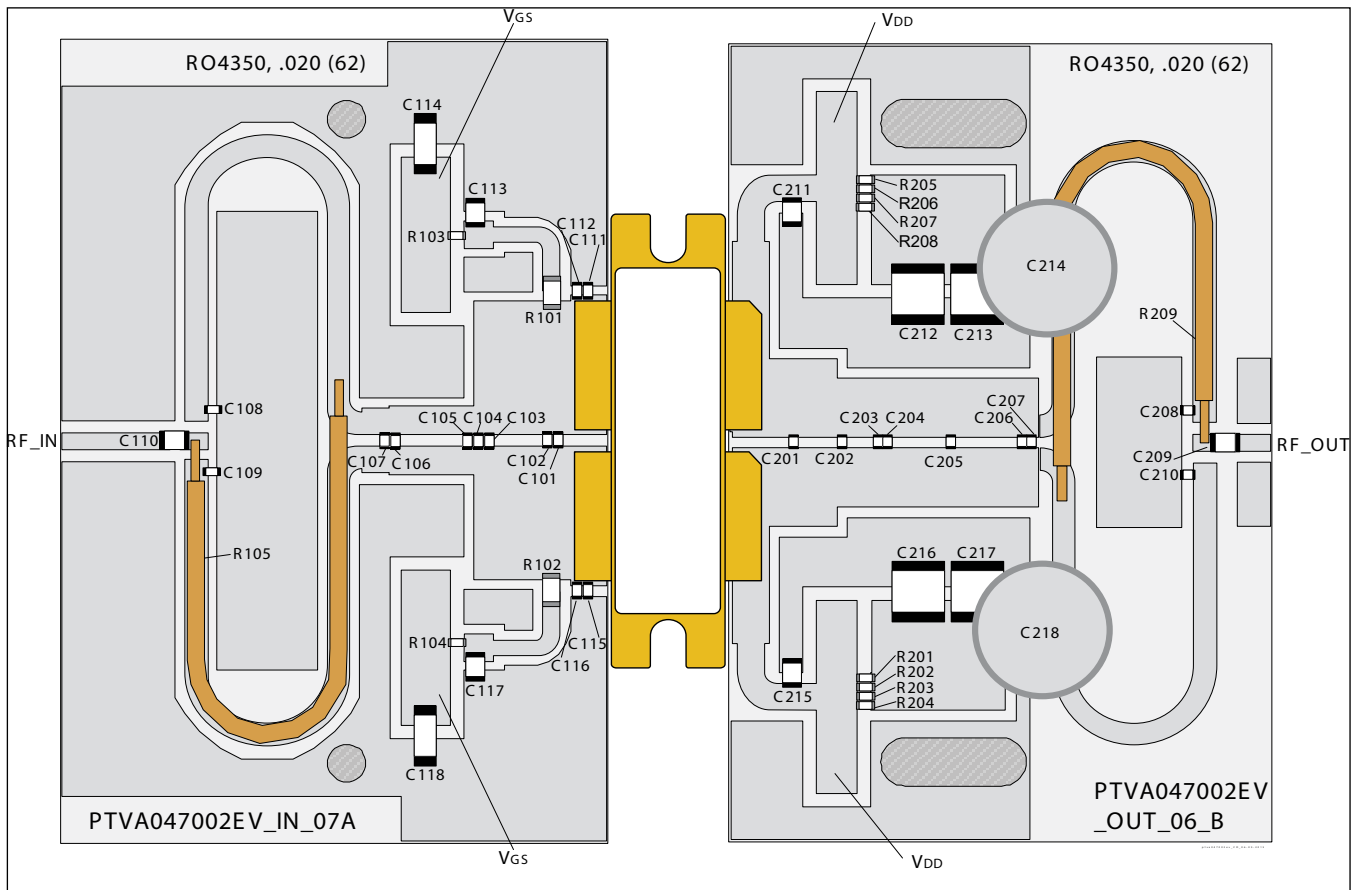


### Load Pull Performance

Each Side Load Pull Performance – Pulsed CW signal: 16  $\mu$ s, 10% duty cycle, 50 V, 600 mA

Freq [MHz]	Zs [ $\Omega$ ]	P <sub>3dB</sub>									
		Max Output Power					Max PAE				
		ZI [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]	ZI [ $\Omega$ ]	Gain [dB]	P <sub>OUT</sub> [dBm]	P <sub>OUT</sub> [W]	PAE [%]
400	0.35-j1.06	1.35+j1.51	20.0	57.40	550	50.4	2.57+j5.13	24.1	53.00	200	75.1
500	0.69+j0.71	1.54-j0.06	19.7	57.30	537	56.8	2.00+j1.63	21.5	55.10	324	73.0
600	0.85-j0.46	1.10+j1.06	16.5	57.80	603	55.0	1.56+j2.24	19.3	55.80	380	71.0
700	0.97-j0.88	1.37+j1.18	17.3	57.50	562	53.2	1.38+j2.31	19.3	56.10	407	65.1
860	0.77-j0.80	1.08+j1.04	16.9	57.50	562	50.6	1.04+j1.82	19.7	55.30	339	64.0

### Reference Circuit , 470 – 806 MHz



Reference circuit assembly diagram (not to scale)

## Reference Circuit (cont.)

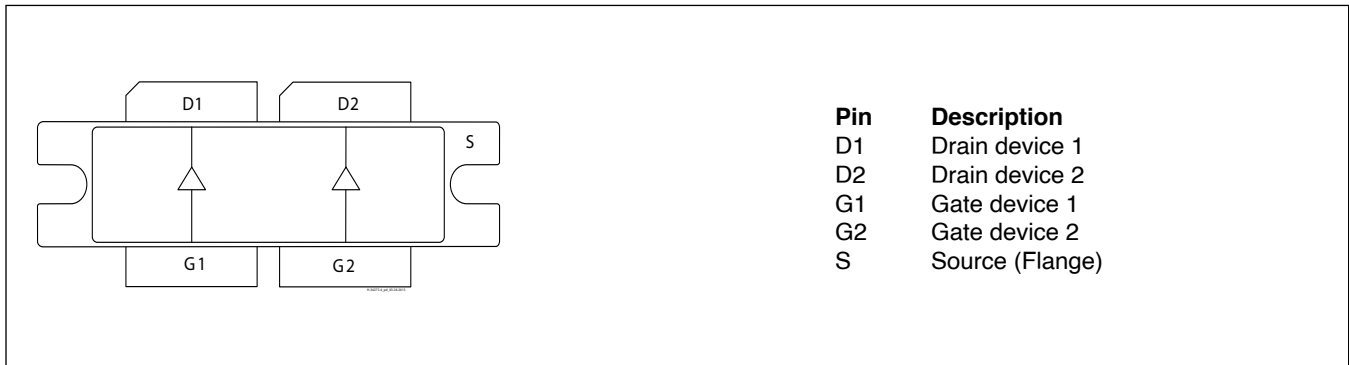
### Reference Circuit Assembly

DUT	PTVA047002EV V1
Test Fixture Part No.	LTN/PTVA047002EV V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 470 - 806$ MHz

### Components Information

Component	Description	Manufacturer	P/N
<b>Input</b>			
C101, C102	Capacitor, 12 pF	ATC	ATC800A120JW150XB
C103, C104, C105, C106, C107	Capacitor, 10 pF	ATC	ATC100A100JW150XB
C108, C109	Capacitor, 100 pF	ATC	ATC100A101JW150XB
C110, C113, C117	Capacitor, 91 pF	ATC	ATC100B910JW500XB
C111, C112, C115, C116	Capacitor, 16 pF	ATC	ATC100A160JW150XB
C114, C118	Capacitor, 10 $\mu$ F	TDK Corporation	C5750X5R1H106K230KA
R101, R102	Resistor, 10 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ100V
R103, R104	Resistor, 5.6 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ5R6V
R105	Coax, 25 $\Omega$	Micro-coax	UT-090C-25
<b>Output</b>			
C201	Capacitor, 8.2 pF	ATC	ATC100A8R2JW150XB
C202	Capacitor, 6.8 pF	ATC	ATC100A6R8JW150XB
C203, C205	Capacitor, 4.7 pF	ATC	ATC100A4R7JW150XB
C204	Capacitor, 4.1 pF	ATC	ATC100A4R1JW150XB
C206	Capacitor, 2 pF	ATC	ATC100A2R0JW150XB
C207	Capacitor, 8.2 pF	ATC	ATC100A8R2JW150XB
C208, C210	Capacitor, 100 pF	ATC	ATC100A101JW150XB
C209, C211, C215	Capacitor, 91 pF	ATC	ATC100B910JW150XB
C212, C213, C216, C217	Capacitor, 10 $\mu$ F	TDK Corporation	C5750X5R1H106K230KA
C214, C218	Capacitor, 100 $\mu$ F	Cornell Dubilier Electronics (CDE)	SK101M100ST
R201, R202, R203, R204, R205, R206, R207, R208	Resistor, 1 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ1R0V
R209	Coax, 25 $\Omega$	Micro-coax	UT-090C-25

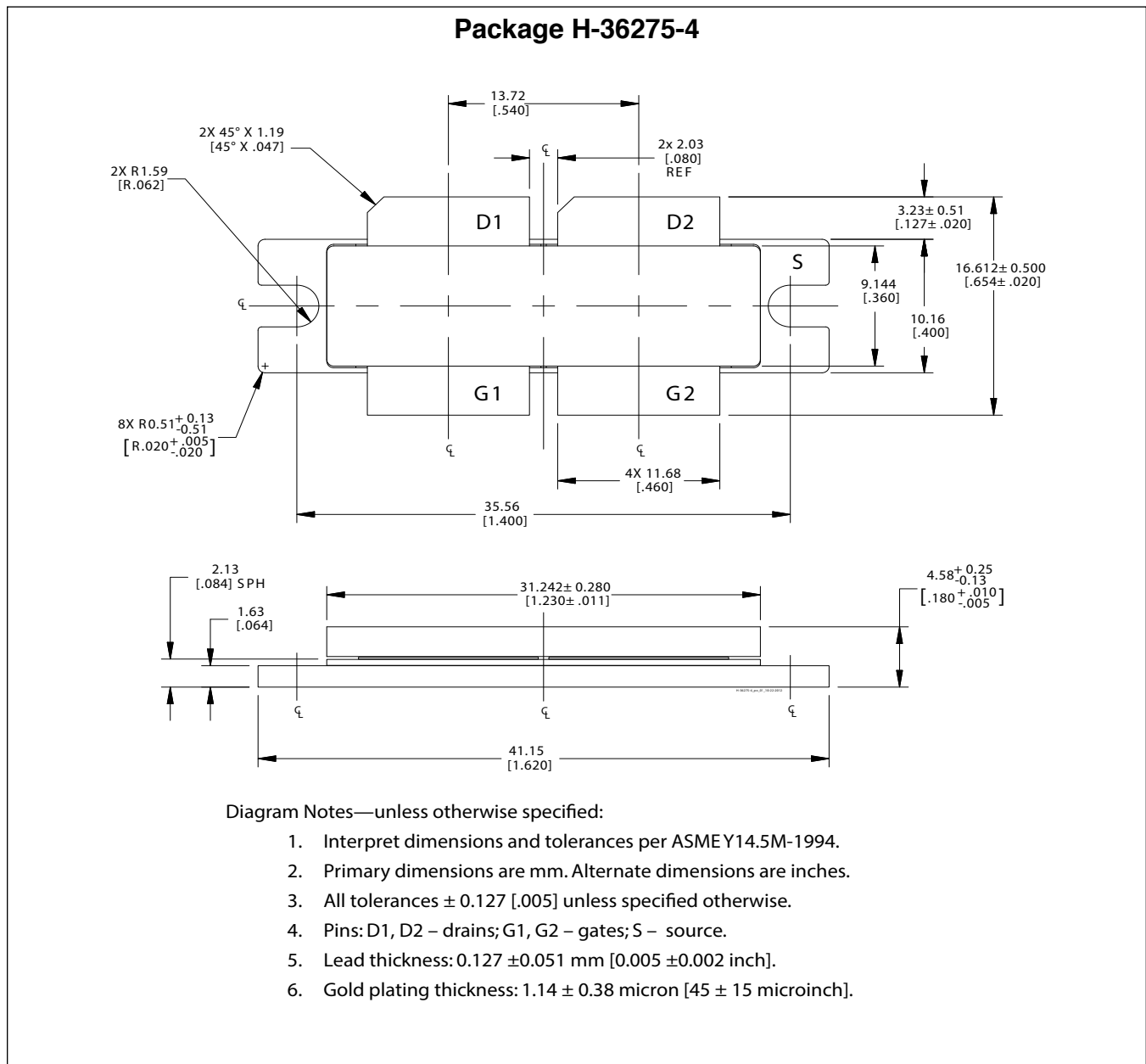
### Pinout Diagram (top view)



Lead connections for PTVA047002EV

**See next page for package outline information**

## Package Outline Specifications



## Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2012-05-08	Preliminary	All	Data Sheet reflects preliminary specification
02	2012-05-10	Preliminary	1	Updated DVB-T Characteristics table
03	2013-10-03	Preliminary	1, 2, 3	Updated DVB-T Characteristics table, eliminate two-tone specification, added DVB-T performance graphs
03.1	2013-10-15	Preliminary	1, 3	Revised frequency in Pulsed CW specifications, removed two-tone and Pulsed CW graphs
04	2015-06-18	Production	All	Data Sheet reflects released product specification Includes loadpull, impedance information & reference circuits, updated test specs & graphs
04.1	2015-07-08	Production	2	Updated ordering information to include Tape & Reel, 50pcs.
04.2	2017-02-08	Production	2	Updated operating voltage and junction temperature
05	2018-08-20	Production	All	Converted to the data sheet



## Notes & Disclaimer

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