

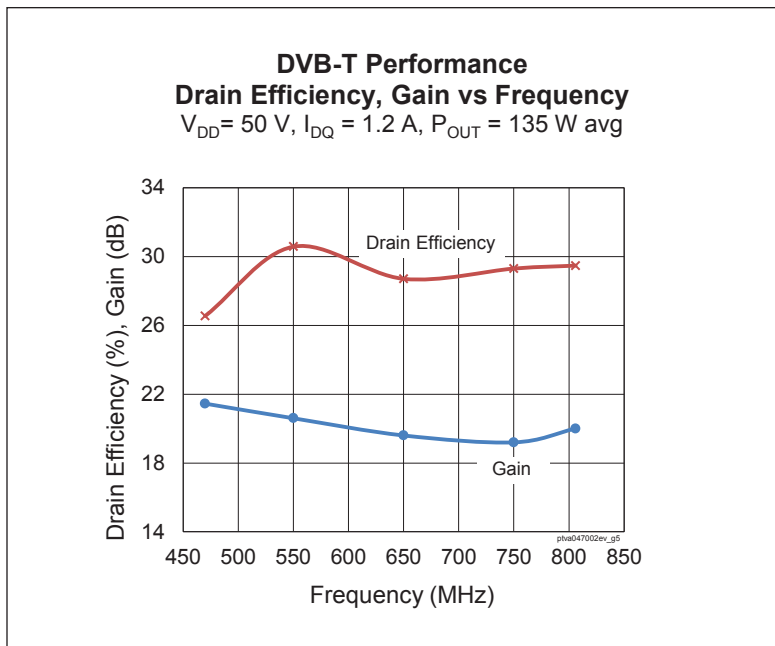
# Thermally-Enhanced High Power RF LDMOS FET 700 W, 50 V, 470 – 806 MHz

## 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 Infineon's 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 Infineon 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<br>(ACPR integrated over 200 KHz BW at + 4.3 MHz offset from center frequency) | ACPR      | —    | -29.5 | -25 | dBc  |

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

**ESD:** Electrostatic discharge sensitive device—observe handling precautions!

## RF Characteristics

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

$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 600\text{ mA}$  per side,  $t_f = 25\text{ °C}$ , 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  | $\mu\text{A}$ |

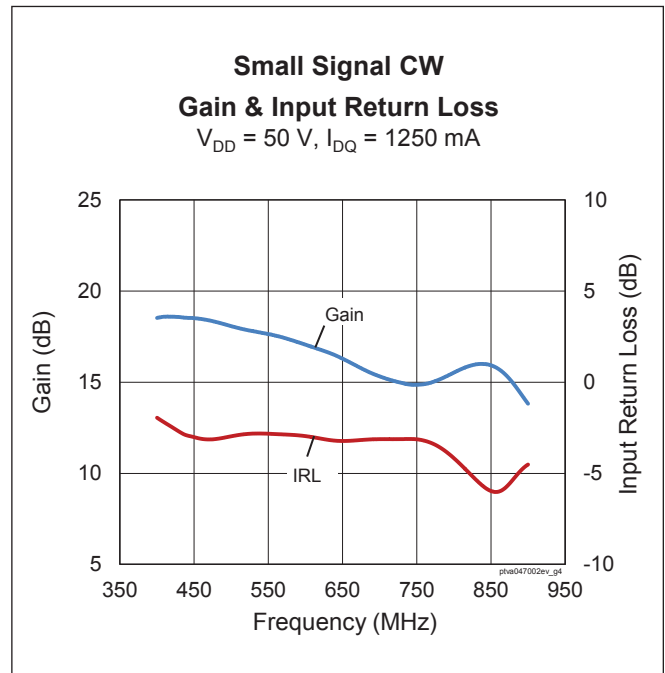
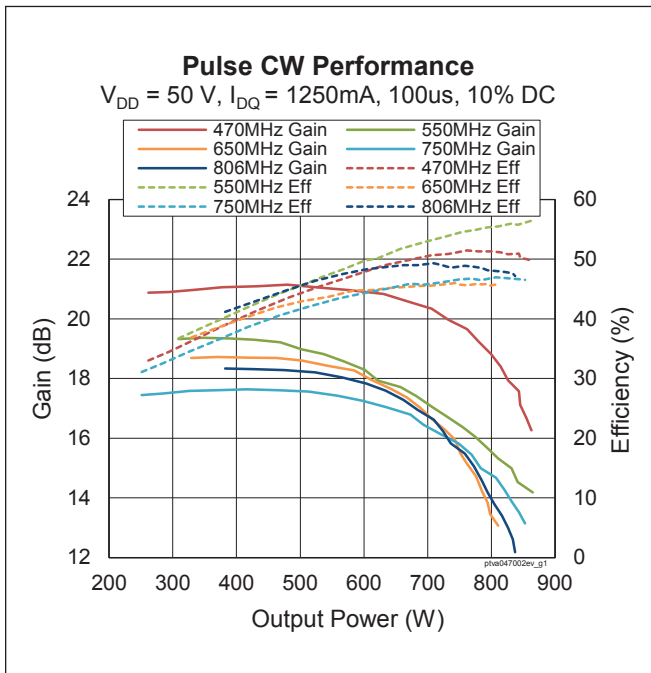
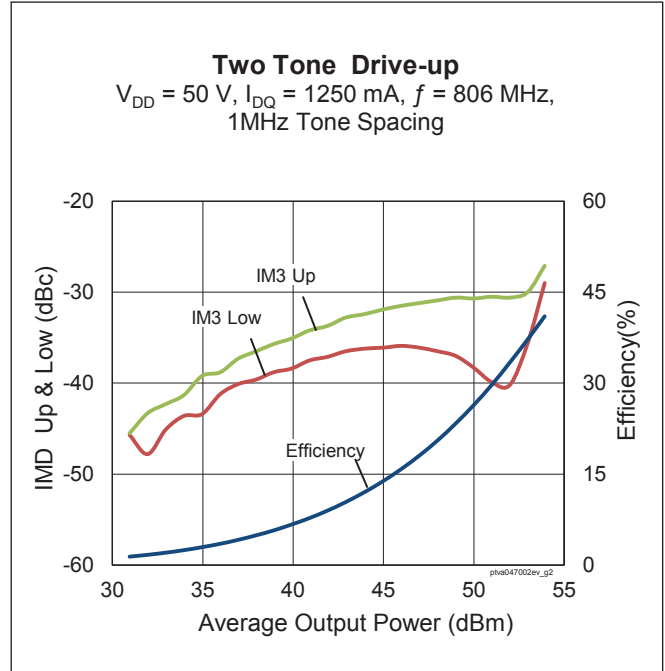
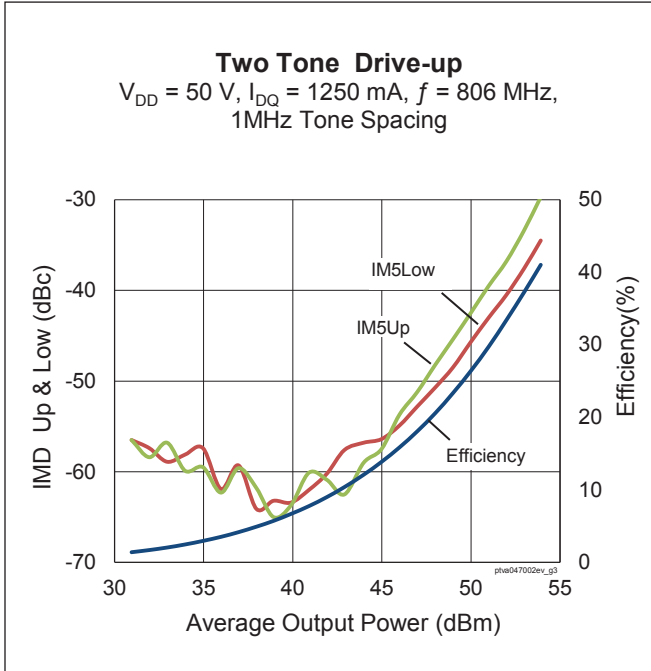
## Maximum Ratings

| Parameter  | Symbol          | Value       | Unit                 |
|--|-----------------|-------------|----------------------|
| Drain-Source Voltage                                       | $V_{DSS}$       | 105         | V                    |
| Gate-Source Voltage  | $V_{GS}$        | -6 to +12   | V                    |
| Junction Temperature                                       | $T_J$           | 200         | $^{\circ}\text{C}$   |
| Storage Temperature Range                                  | $T_{STG}$       | -65 to +150 | $^{\circ}\text{C}$   |
| Thermal Resistance ( $T_{CASE} = 70\text{ °C}$ , 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   | PTVA047002EUVV1R0XTMA1   | H-36275-4, bolt-down | Tape & Reel, 50pcs  |
| PTVA047002EV V1 R250 | PTVA047002EUVV1R250XTMA1 | H-36275-4, bolt-down | Tape & Reel, 250pcs |

Typical Performance

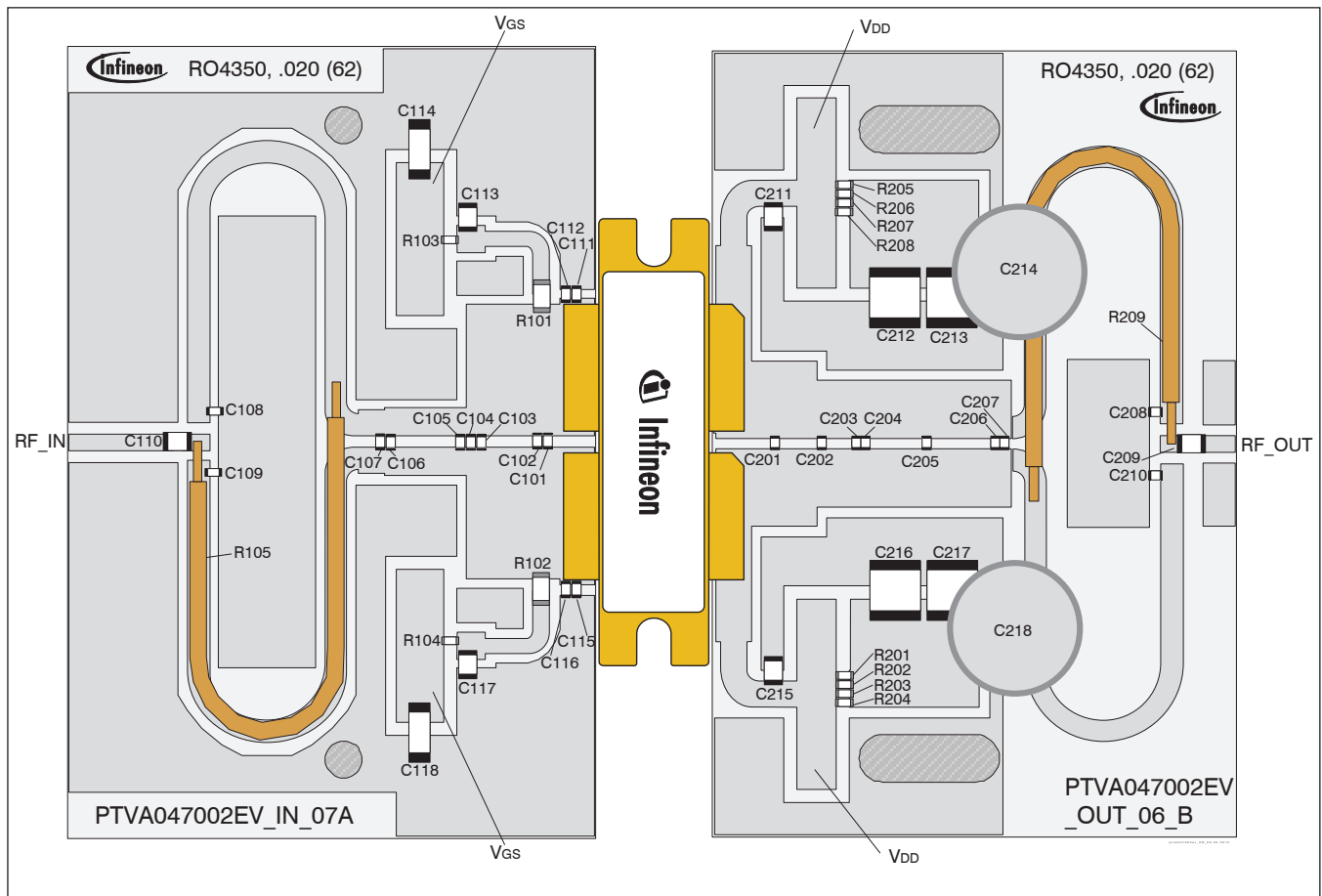


### Load Pull Performance

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.)

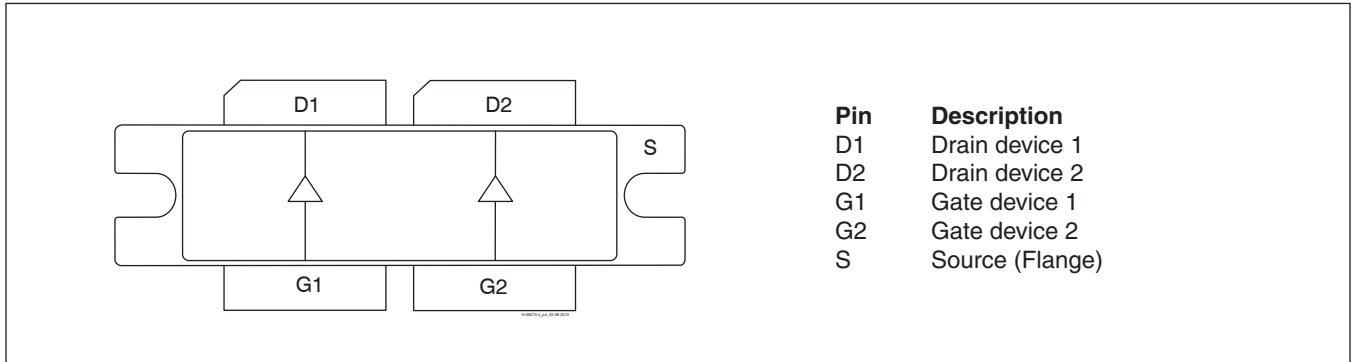
**Reference Circuit Assembly**

|   |   |
|---|---|
| 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 |
| Find Gerber files for this test fixture on the Infineon Web site at <a href="http://www.infineon.com/rfpower">http://www.infineon.com/rfpower</a> |   |

**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          |

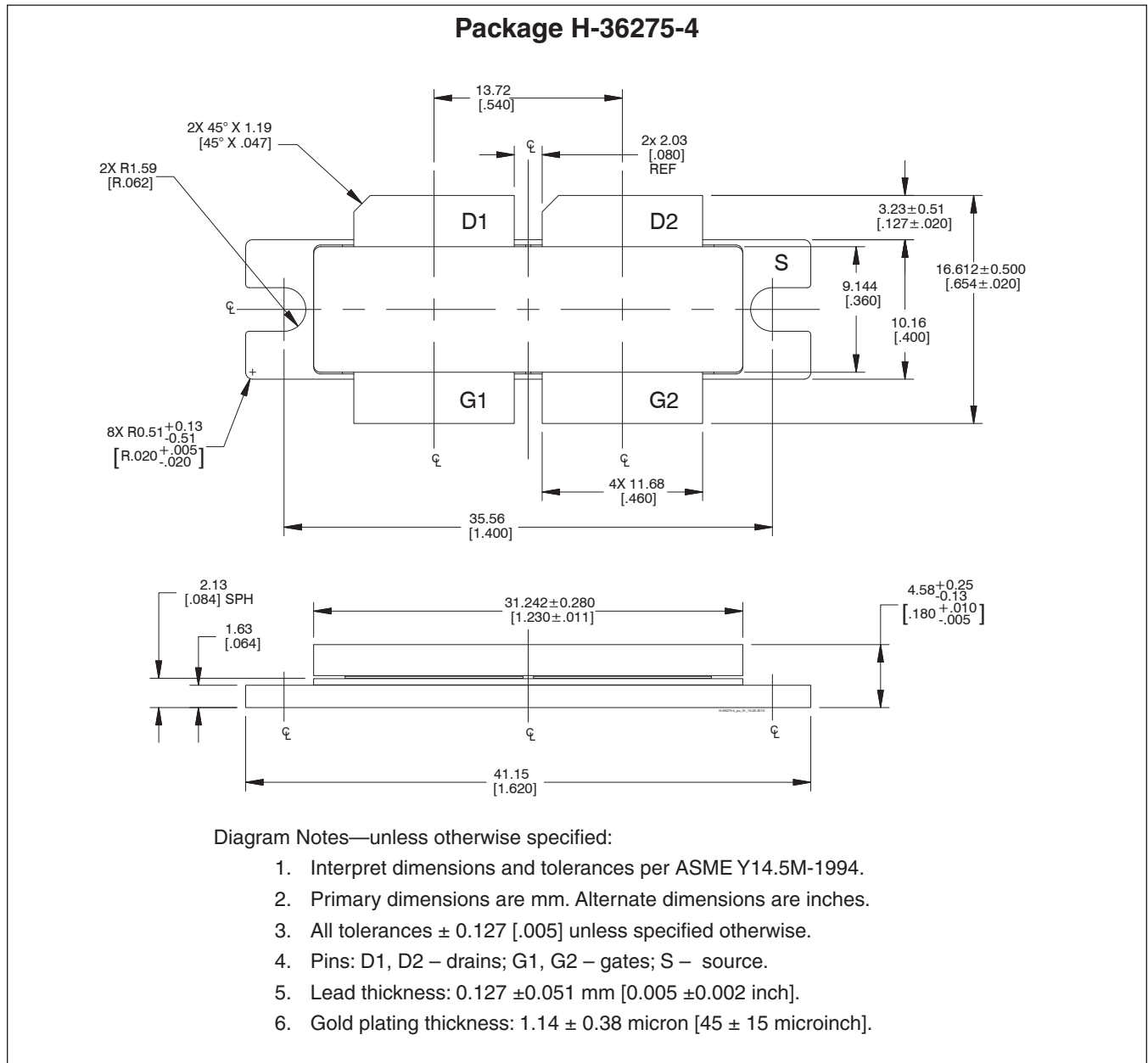
**Pinout Diagram** (top view)



*Lead connections for PTVA047002EV*

**See next page for package outline information**

## Package Outline Specifications



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

## Revision History

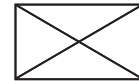
| Revision | Date       | Data Sheet Type | Page    | Subjects (major changes since last revision)   |
|----------|------------|-----------------|---------|--|
| 01       | 2012-05-08 | Preliminary     | All     | Data Sheet reflects preliminary specification  |
| 02       | 2012-05-10 | Preliminary     | 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<br>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.  |

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