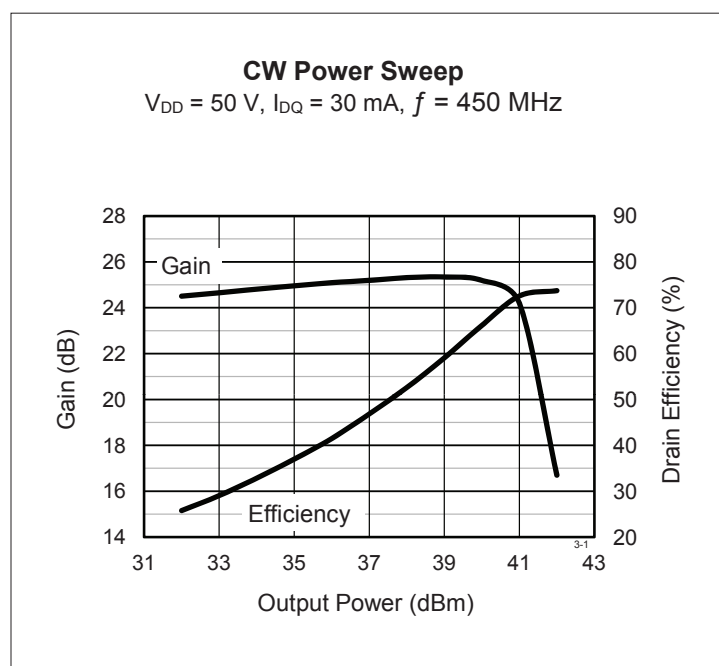
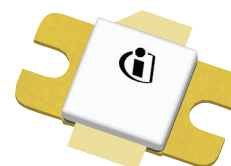


## Thermally-Enhanced High Power RF LDMOS FET 12 W, 50 V, 390 – 450 MHz

### Description

The PTVA030121EA is an LDMOS FET characterized for use in power amplifier applications in the 390 MHz to 450 MHz frequency band. Features include high gain and a thermally-enhanced package. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PTVA030121EA  
Package H-36265-2



### Features

- Unmatched input and output
- Integrated ESD protection
- High gain, low thermal resistance
- Excellent ruggedness
- Capable of withstanding a 13:1 load mismatch at 50 V, 12 W, CW conditions
- Pb-free and RoHS compliant

### RF Characteristics

#### CW Measurements

$V_{DD} = 50\text{ V}$ ,  $I_{DQ} = 50\text{ mA}$ ,  $P_{OUT} = 12\text{ W}$ ,  $f = 450\text{ MHz}$

| Characteristic   | Symbol   | Min | Typ | Max | Unit |
|------------------|----------|-----|-----|-----|------|
| Gain             | Gps      | 23  | 25  | —   | dB   |
| Drain Efficiency | $\eta_D$ | 66  | 69  | —   | %    |

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

ESD: Electrostatic discharge sensitive device—observe handling precautions!

## DC Characteristics

| Characteristic                 | Conditions                                       | Symbol        | Min | Typ | Max  | Unit          |
|--------------------------------|--------------------------------------------------|---------------|-----|-----|------|---------------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}$ , $I_{DS} = 1\text{ mA}$   | $V_{(BR)DSS}$ | 105 | —   | —    | V             |
| Drain Leakage Current          | $V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$   | $I_{DSS}$     | —   | —   | 1.0  | $\mu\text{A}$ |
|                                | $V_{DS} = 105\text{ V}$ , $V_{GS} = 0\text{ V}$  | $I_{DSS}$     | —   | —   | 10.0 | $\mu\text{A}$ |
| On-State Resistance            | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$  | —   | 2.8 | —    | $\Omega$      |
| Operating Gate Voltage         | $V_{DS} = 50\text{ V}$ , $I_{DQ} = 50\text{ mA}$ | $V_{GS}$      | —   | 3.6 | —    | V             |
| Gate Leakage Current           | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$   | $I_{GSS}$     | —   | —   | 1.0  | $\mu\text{A}$ |

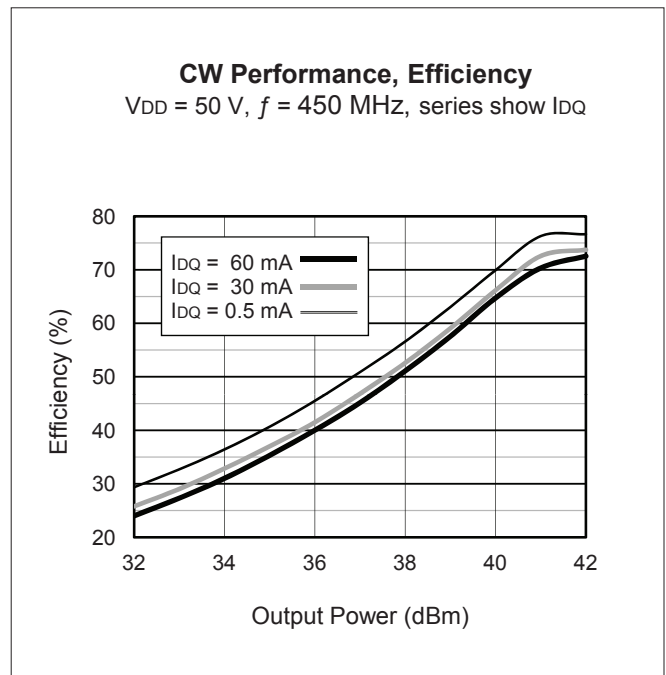
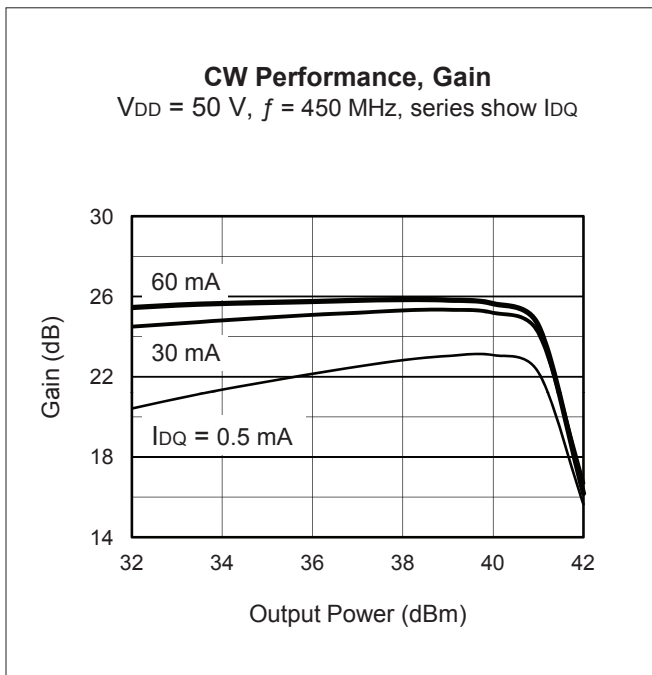
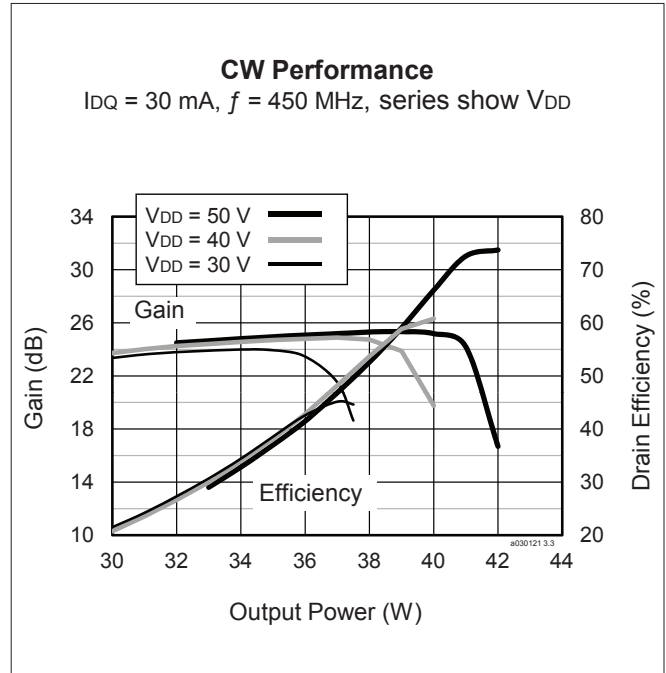
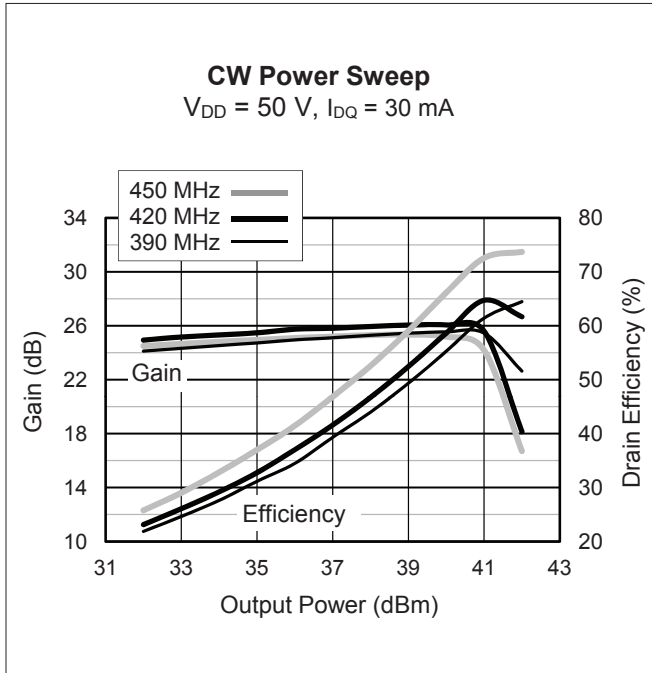
## Maximum Ratings

| 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 ( $T_{CASE} 70^{\circ}\text{C}$ , 12 W CW) | $R_{\theta JC}$ | 6.5         | $^{\circ}\text{C/W}$ |

## Ordering Information

| Type and Version     | Order Code              | Package and Description | Shipping            |
|----------------------|-------------------------|-------------------------|---------------------|
| PTVA030121EA V1      | PTVA030121EAV1XWSA1     | H-36265-2, bolt-down    | Tray                |
| PTVA030121EA V1 R250 | PTVA030121EAV1R250XTMA1 | H-36265-2, bolt-down    | Tape & Reel, 250pcs |

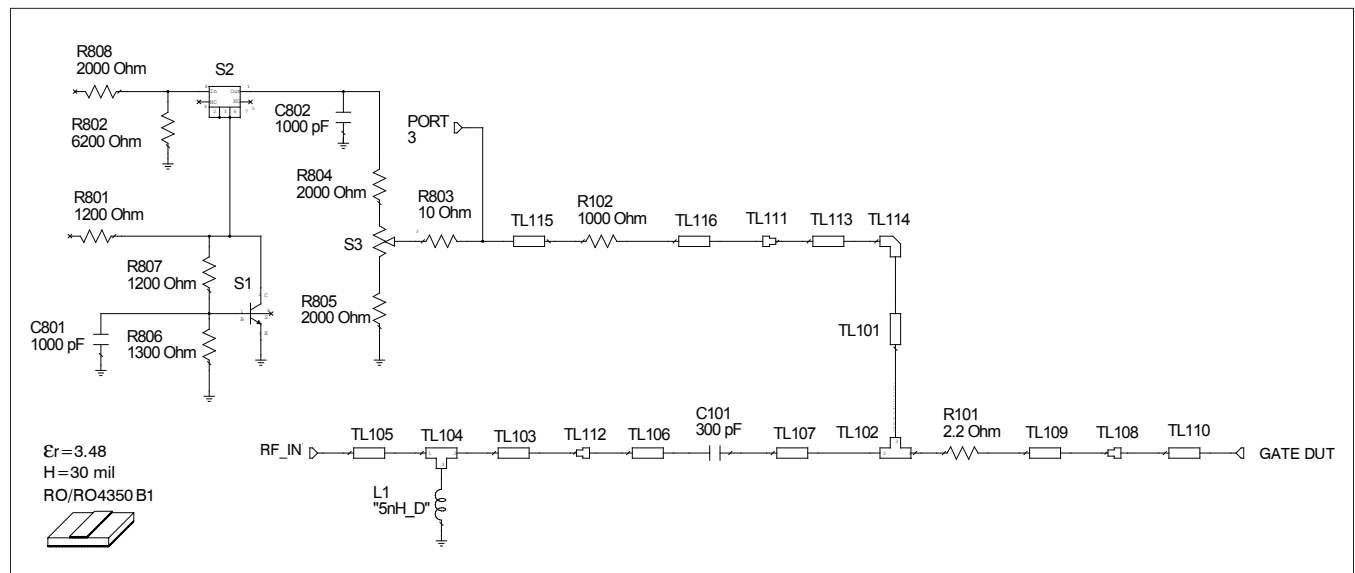
# Typical Performance (data taken in a production test circuit)



## Broadband Circuit Impedance

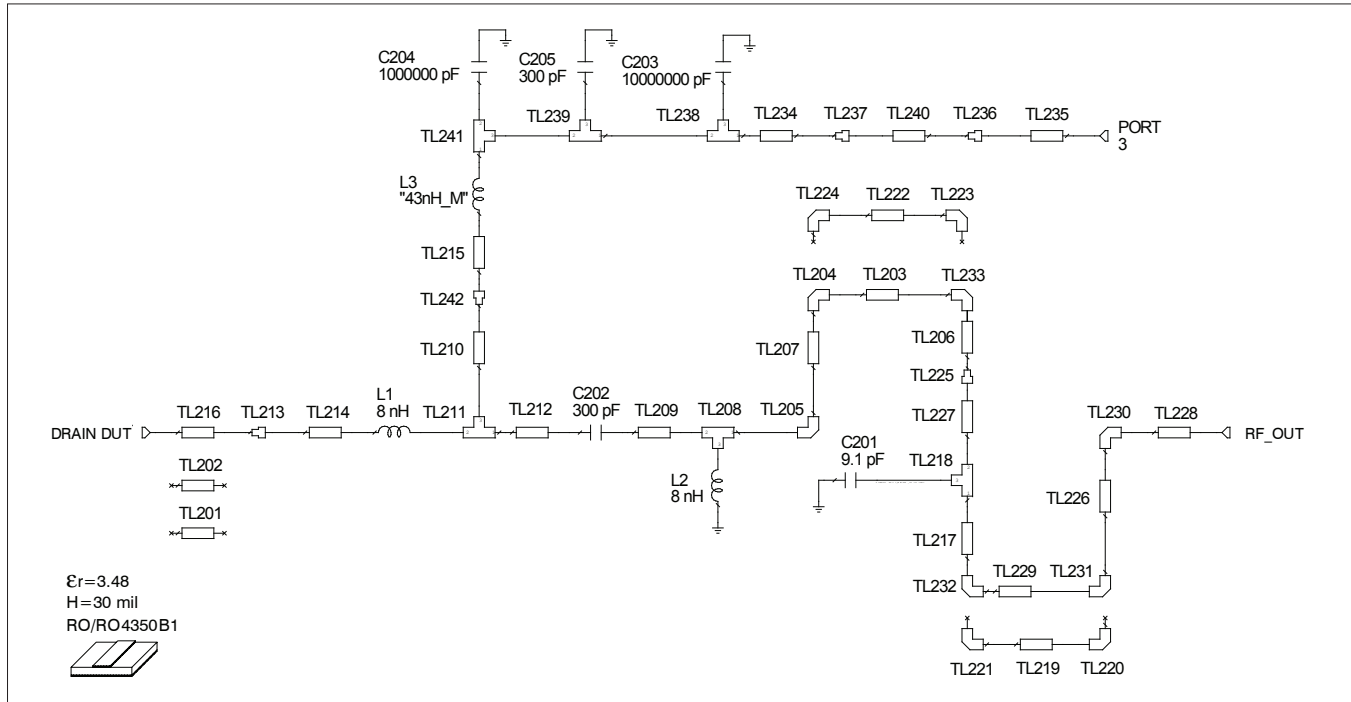
| Frequency<br>MHz | Z Source $\Omega$ |       | Z Load $\Omega$ |       |
|------------------|-------------------|-------|-----------------|-------|
|                  | R                 | jX    | R               | jX    |
| 390              | 22.20             | 34.88 | 4.26            | 15.04 |
| 405              | 21.95             | 34.74 | 4.46            | 15.82 |
| 420              | 21.39             | 34.99 | 4.66            | 16.62 |
| 435              | 20.61             | 35.80 | 4.88            | 17.42 |
| 450              | 19.77             | 37.03 | 5.11            | 18.23 |

## Reference Circuit



Reference circuit input schematic for  $f = 450$  MHz

## Reference Circuit (cont.)



Reference circuit output schematic for  $f = 450 \text{ MHz}$

## Reference Circuit Assembly

DUT PTFA030121EA

Test Fixture Part No. LTN/PTFA030121EA

PCB Rogers RO4350, 0.508 mm [0.020"] thick, 1 oz. copper,  $\epsilon_r = 3.48$

Find Gerber files for this test fixture on the Infineon Web site at <http://www.infineon.com/rfpower>

## Electrical Characteristics at 450 MHz

| Transmission Line | Electrical Characteristics       | Dimensions: mm                          | Dimensions: mils                  |
|-------------------|----------------------------------|-----------------------------------------|-----------------------------------|
| <b>Input</b>      |                                  |                                         |                                   |
| TL101             | $0.009 \lambda$ , $92.76 \Omega$ | $W = 0.51$ , $L = 3.81$                 | $W = 20$ , $L = 150$              |
| TL102             | $0.001 \lambda$ , $45.29 \Omega$ | $W1 = 2.03$ , $W2 = 2.03$ , $W3 = 0.51$ | $W1 = 80$ , $W2 = 80$ , $W3 = 20$ |
| TL103             | $0.001 \lambda$ , $52.21 \Omega$ | $W = 1.63$ , $L = 0.43$                 | $W = 64$ , $L = 17$               |
| TL105             | $0.025 \lambda$ , $52.21 \Omega$ | $W = 1.63$ , $L = 10.13$                | $W = 64$ , $L = 39$               |
| TL106, TL109      | $0.003 \lambda$ , $45.29 \Omega$ | $W = 2.03$ , $L = 1.27$                 | $W = 80$ , $L = 50$               |
| TL107             | $0.002 \lambda$ , $45.29 \Omega$ | $W = 2.03$ , $L = 0.76$                 | $W = 80$ , $L = 30$               |
| TL110             | $0.013 \lambda$ , $16.51 \Omega$ | $W = 7.62$ , $L = 5.08$                 | $W = 300$ , $L = 200$             |
| TL113             | $0.002 \lambda$ , $92.76 \Omega$ | $W = 0.51$ , $L = 1.02$                 | $W = 20$ , $L = 40$               |
| TL115             | $0.013 \lambda$ , $54.31 \Omega$ | $W = 1.52$ , $L = 5.08$                 | $W = 60$ , $L = 200$              |
| TL116             | $0.003 \lambda$ , $54.31 \Omega$ | $W = 1.52$ , $L = 1.02$                 | $W = 60$ , $L = 40$               |

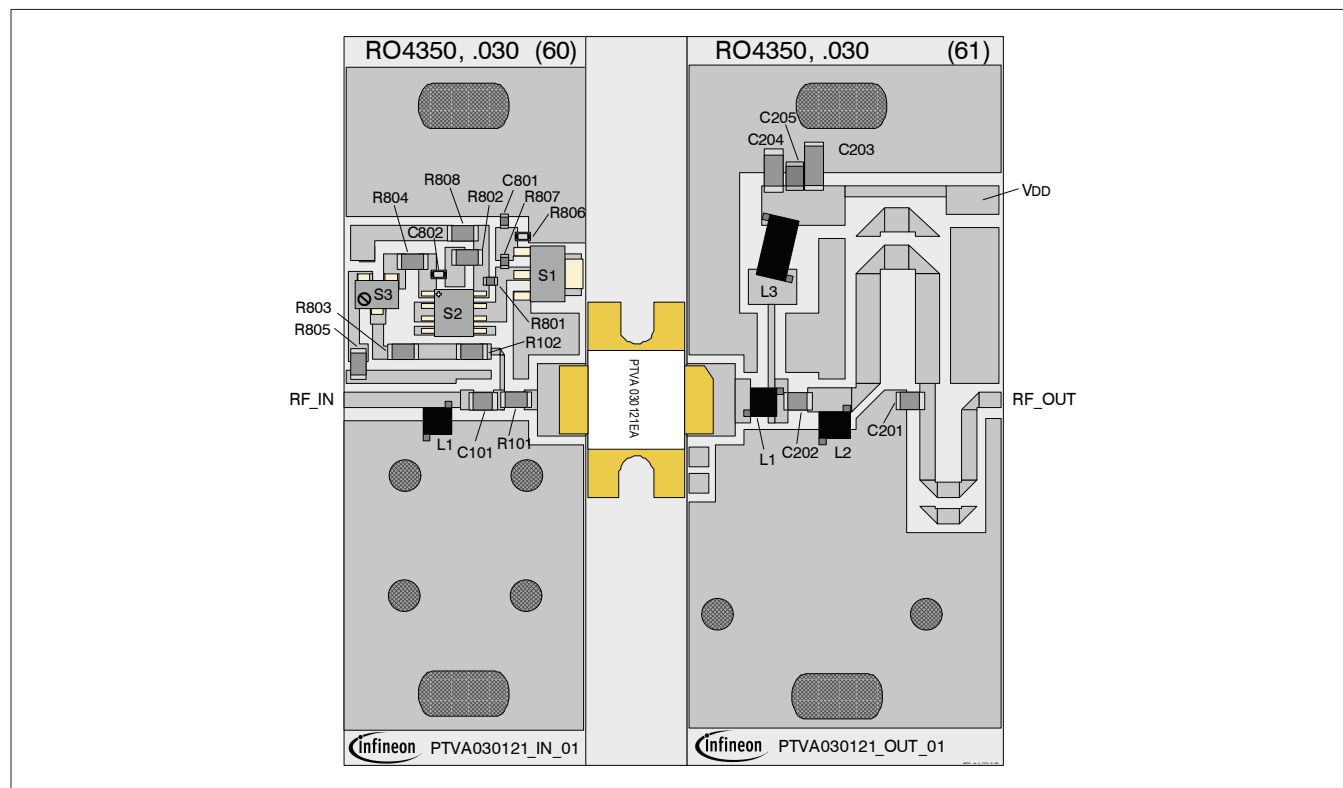
table continued next page

## Reference Circuit (cont.)

### Electrical Characteristics at 450 MHz

| Transmission Line | Electrical Characteristics       | Dimensions: mm                  | Dimensions: mils             |
|-------------------|----------------------------------|---------------------------------|------------------------------|
| <b>Output</b>     |                                  |                                 |                              |
| TL201, TL202      | 0.005 $\lambda$ , 45.29 $\Omega$ | W = 2.03, L = 2.04              | W = 80, L = 81               |
| TL203             | 0.006 $\lambda$ , 38.92 $\Omega$ | W = 2.54, L = 2.54              | W = 100, L = 100             |
| TL206, TL207      | 0.029 $\lambda$ , 38.92 $\Omega$ | W = 2.54, L = 11.43             | W = 100, L = 450             |
| TL209             | 0.009 $\lambda$ , 38.92 $\Omega$ | W = 2.54, L = 3.56              | W = 100, L = 140             |
| TL210             | 0.018 $\lambda$ , 78.46 $\Omega$ | W = 0.76, L = 7.62              | W = 30, L = 300              |
| TL211             | 0.002 $\lambda$ , 25.11 $\Omega$ | W1 = 4.57, W2 = 4.57, W3 = 0.76 | W1 = 180, W2 = 180, W3 = 30  |
| TL212             | 0.003 $\lambda$ , 25.11 $\Omega$ | W = 4.57, L = 1.27              | W = 180, L = 50              |
| TL214             | 0.004 $\lambda$ , 25.11 $\Omega$ | W = 4.57, L = 1.52              | W = 180, L = 60              |
| TL215             | 0.010 $\lambda$ , 23.09 $\Omega$ | W = 5.08, L = 3.81              | W = 200, L = 150             |
| TL216             | 0.013 $\lambda$ , 16.51 $\Omega$ | W = 7.62, L = 5.08              | W = 300, L = 200             |
| TL217             | 0.018 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 7.29              | W = 64, L = 287              |
| TL219             | 0.006 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 2.41              | W = 64, L = 95               |
| TL222             | 0.006 $\lambda$ , 38.92 $\Omega$ | W = 2.54, L = 2.54              | W = 100, L = 100             |
| TL226             | 0.018 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 7.34              | W = 64, L = 289              |
| TL227             | 0.002 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 0.84              | W = 64, L = 33               |
| TL228             | 0.006 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 2.30              | W = 64, L = 91               |
| TL229             | 0.006 $\lambda$ , 52.21 $\Omega$ | W = 1.63, L = 2.41              | W = 64, L = 95               |
| TL234             | 0.005 $\lambda$ , 27.14 $\Omega$ | W = 4.14, L = 2.12              | W = 163, L = 84              |
| TL235             | 0.014 $\lambda$ , 34.38 $\Omega$ | W = 3.02, L = 5.51              | W = 119, L = 2 17            |
| TL240             | 0.026 $\lambda$ , 61.53 $\Omega$ | W = 1.23, L = 10.63             | W = 48, L = 419              |
| TL241             | 0.010 $\lambda$ , 38.92 $\Omega$ | W1 = 2.54, W2 2.54, W3 = 4.14   | W1 = 100, W2 = 100, W3 = 163 |

## Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

| Component ID     | Description                | Suggested Supplier              | P/N               |
|------------------|----------------------------|---------------------------------|-------------------|
| <b>Input</b>     |                            |                                 |                   |
| C101             | Chip capacitor, 300 pF     | ATC                             | ATC100B301JW200XB |
| C801, C802       | Capacitor, 1000 pF         | Panasonic Electronic Components | ECJ-1VB1H102K     |
| L1               | Inductor, 5 nH             | Coilcraft                       | A02TGLB           |
| R101             | Resistor, 2.2 $\Omega$     | Panasonic Electronic Components | ERJ-8GEYJ2R2V     |
| R102             | Resistor, 1000 $\Omega$    | Panasonic Electronic Components | ERJ-8GEYJ102V     |
| R801, R807       | Resistor, 1200 $\Omega$    | Panasonic Electronic Components | ERJ-3GEYJ122V     |
| R802             | Resistor, 6200 $\Omega$    | Panasonic Electronic Components | ERJ-8GEYJ622V     |
| R803             | Resistor, 10 $\Omega$      | Panasonic Electronic Components | ERJ-8GEYJ100V     |
| R804, R805, R808 | Resistor, 2000 $\Omega$    | Panasonic Electronic Components | ERJ-8GEYJ202V     |
| R806             | Resistor, 1300 $\Omega$    | Panasonic Electronic Components | ERJ-3GEYJ132V     |
| S1               | Transistor                 | Infineon Technologies           | BCP56             |
| S2               | Voltage regulator          | Fairchild Semiconductor         | LM7805CT          |
| S3               | Potentiometer, 2K $\Omega$ | Bourns Inc.                     | 3224W-1-202E      |

table continued next page

**Reference Circuit** (cont.)

| Component ID  | Description                | Suggested Supplier | P/N                 |
|---------------|----------------------------|--------------------|---------------------|
| <b>Output</b> |                            |                    |                     |
| C201          | Chip capacitor, 9.1 pF     | ATC                | ATC100B9R1BW500XB   |
| C202          | Chip capacitor, 300 pF     | ATC                | ATC100B301JW200XB   |
| C203          | Chip capacitor, 10 $\mu$ F | TDK Corporation    | C5750X7S2A106M230KB |
| C204          | Capacitor, 1 $\mu$ F       | TDK Corporation    | C4532X7R2A105K230KA |
| C205          | Chip capacitor, 300 pF     | ATC                | ATC100B301JW200XB   |
| L1, L2        | Inductor, 8 nH             | Coilcraft          | A03TGLB             |
| L3            | Inductor, 43 nH            | Coilcraft          | B10TGLB             |

**See next page for package mechanical specifications**

## Package Outline Specifications

### Package H-36265-2

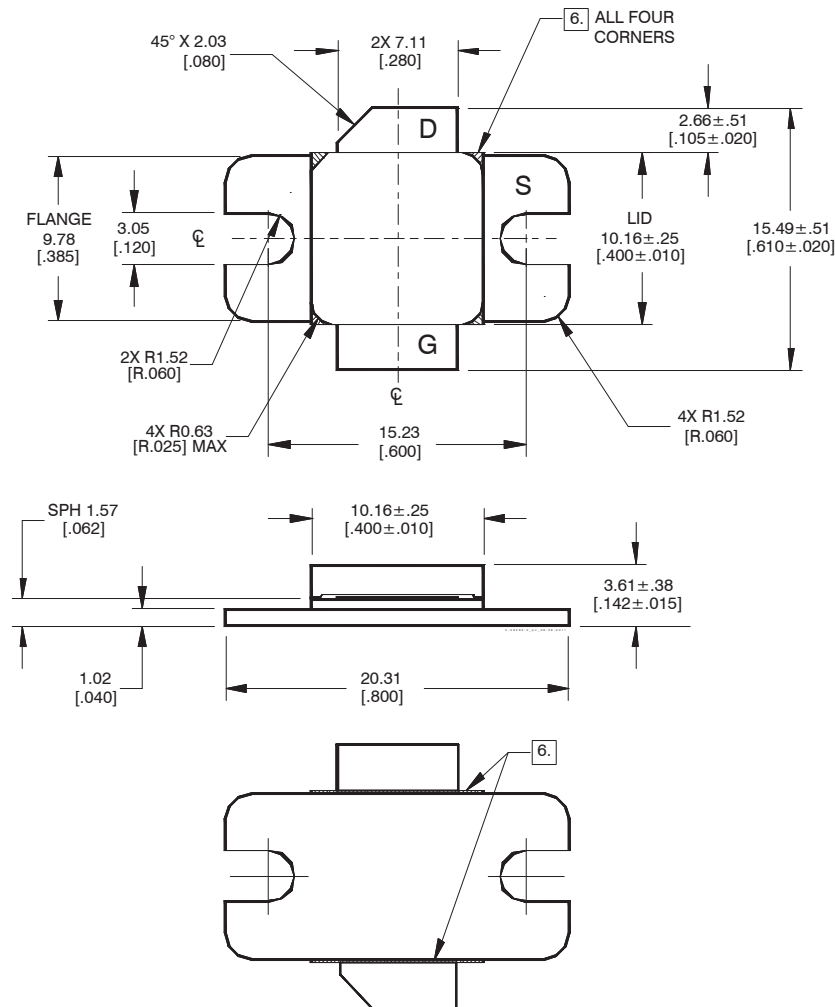


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances  $\pm 0.127$  [.005] unless specified otherwise.
4. Pins: D - drain, G - gate, S - source.
5. Lead thickness:  $0.10 + 0.051 / - 0.025$  [.004 + .002 / -.001].
6. Exposed metal plane on top and bottom of ceramic insulator.
7. Gold plating thickness:  $1.14 \pm 0.38$  micron [ $45 \pm 15$  microinch].

Find the latest and most complete information about products and packaging at the Infineon Internet page [highpowerRF@infineon.com](mailto:highpowerRF@infineon.com)

Revision History: 2013-07-02

Data Sheet

Previous Version: 2011-11-10, Data Sheet

| Page | Subjects (major changes since last revision)                          |
|------|-----------------------------------------------------------------------|
| 2    | Update DC Characteristics and Maximum Ratings table; add Order Codes. |
| 7, 8 | Add manufacturer.                                                     |
|      |                                                                       |
|      |                                                                       |
|      |                                                                       |

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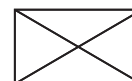
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