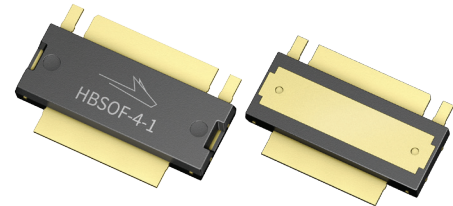


# PTVA082407NF

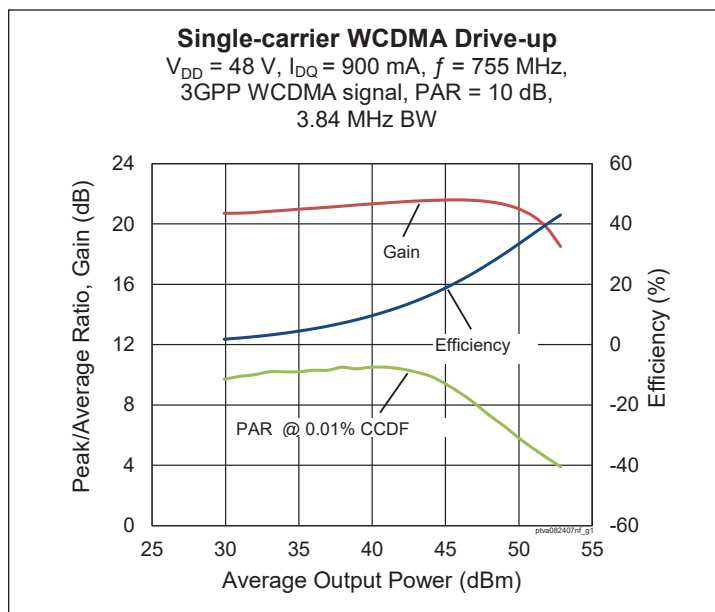
## Thermally-Enhanced High Power RF LDMOS FET 240 W, 48 V, 746 – 821 MHz

### Description

The PTVA082407NF is a 240-watt LDMOS FET manufactured with Wolfspeed's 48-V LDMOS process. It is designed for use in multi-standard cellular power amplifier applications. It features a single ended design and input matching that allow for use from 746 MHz to 821 MHz. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA082407NF  
Package PG-HBSOF-4-1



### Features

- Broadband internal input matching
- Typical CW performance, 755 MHz, 48 V
  - Output power at  $P_{1dB} = 225\text{ W}$
  - Output power at  $P_{3dB} = 250\text{ W}$
  - Gain = 20.5 dB
  - Efficiency = 43%
- Capable of handling 10:1 VSWR @ 48 V, 80 W CW output power
- Integrated ESD protection
- Human Body Model class 2 (per ANSI/ESDA/ JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

### RF Characteristics

#### Single-carrier WCDMA Specifications (tested in Wolfspeed production test fixture)

$V_{DD} = 48\text{ V}$ ,  $I_{DQ} = 900\text{ mA}$ ,  $P_{OUT} = 80\text{ W avg}$ ,  $f = 755\text{ MHz}$ , 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

| Characteristic               | Symbol   | Min | Typ   | Max   | Unit |
|------------------------------|----------|-----|-------|-------|------|
| Linear Gain                  | $G_{ps}$ | 21  | 22.5  | —     | dB   |
| Drain Efficiency             | $\eta_D$ | 33  | 35.5  | —     | %    |
| Adjacent Channel Power Ratio | ACPR     | —   | -31.5 | -29.5 | dBc  |

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 | $V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$  | $V_{(BR)DSS}$ | 105 | —    | —   | V             |
| Drain Leakage Current          | $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$   | $I_{DSS}$     | —   | —    | 1   | $\mu\text{A}$ |
|                                | $V_{DS} = 105\text{ V}, V_{GS} = 0\text{ V}$  | $I_{DSS}$     | —   | —    | 10  | $\mu\text{A}$ |
| Gate Leakage Current           | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$   | $I_{GSS}$     | —   | —    | 1   | $\mu\text{A}$ |
| On-State Resistance            | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$  | —   | 0.16 | —   | $\Omega$      |
| Operating Gate Voltage         | $V_{DS} = 48\text{ V}, I_{DQ} = 0.9\text{ A}$ | $V_{GS}$      | 3.0 | 3.78 | 4.0 | V             |

## 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 Characteristics

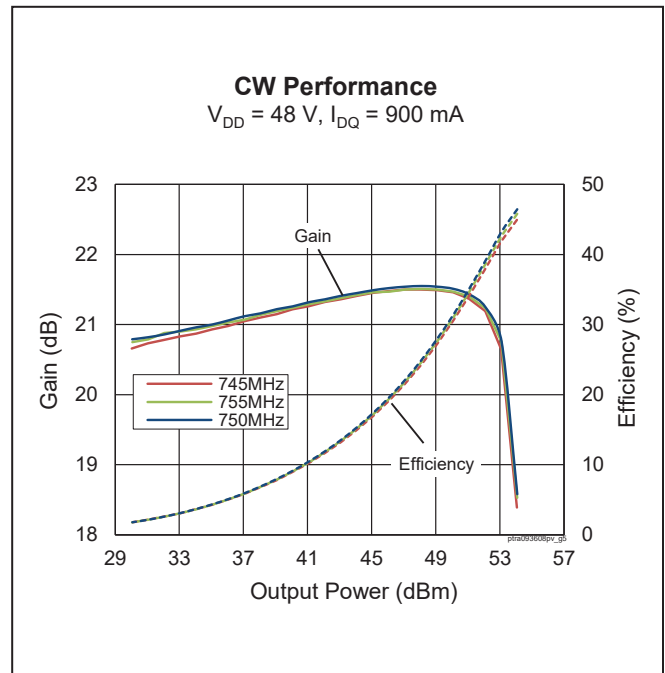
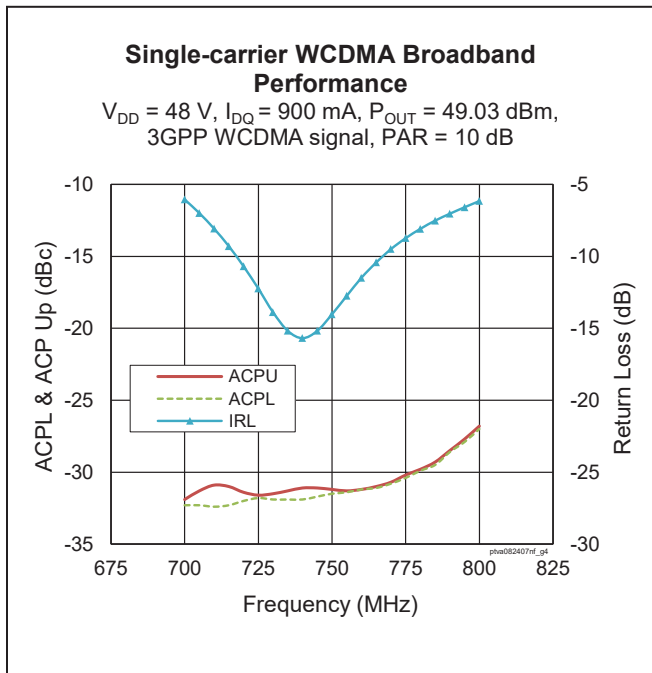
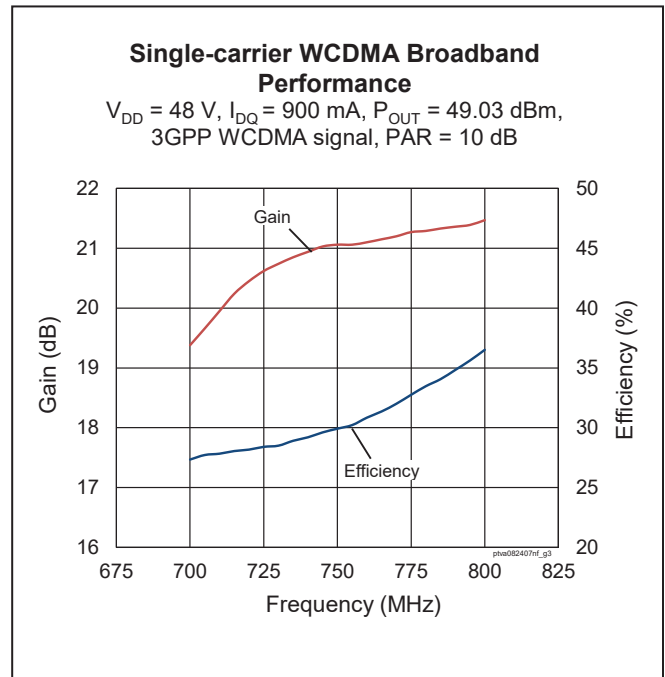
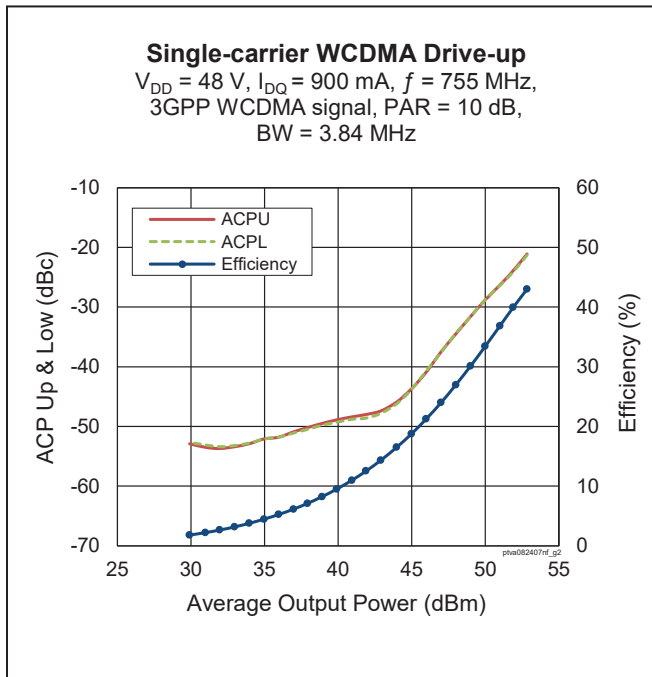
| Parameter   | Symbol          | Value | Unit                 |
|---|-----------------|-------|----------------------|
| Thermal Resistance ( $T_{CASE} = 70^{\circ}\text{C}, 240\text{ W CW}$ ) | $R_{\theta JC}$ | 0.32  | $^{\circ}\text{C/W}$ |

## Ordering Information

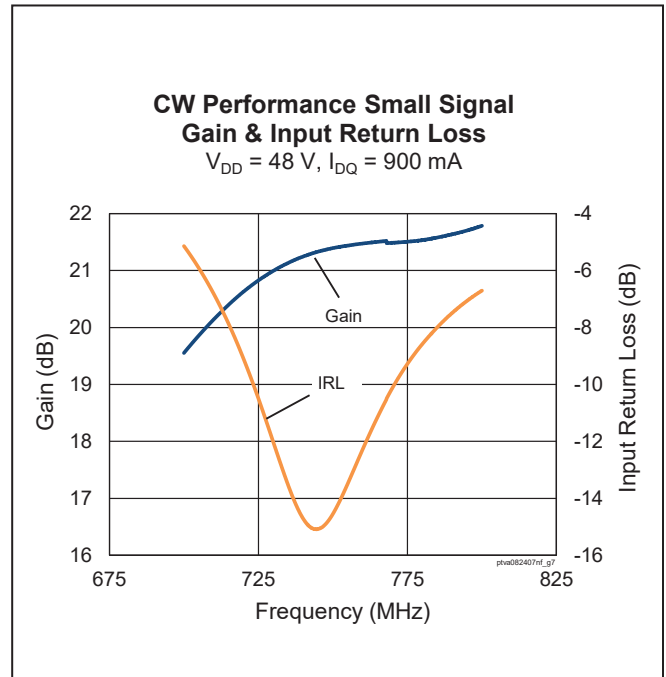
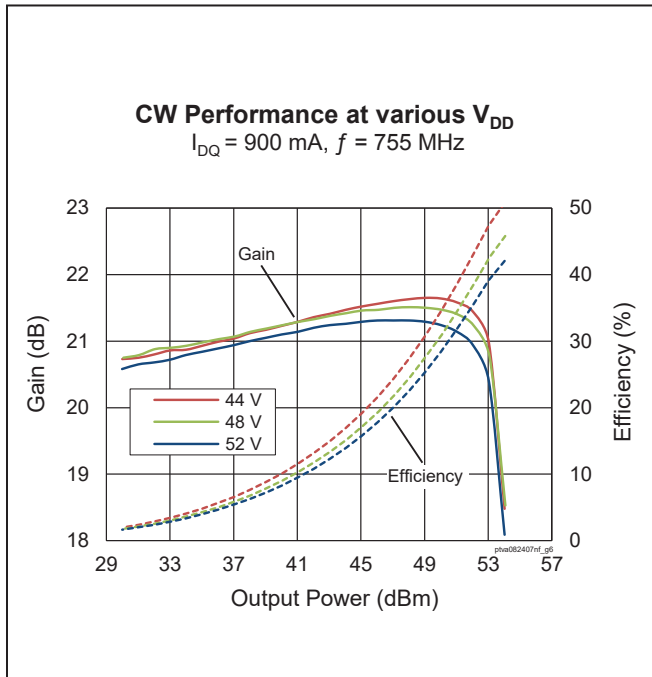
| Type and Version   | Order Code         | Package Description           | Shipping             |
|--------------------|--------------------|-------------------------------|----------------------|
| PTVA082407NF V1 R5 | PTVA082407NF-V1-R5 | PG-HBSOF-4-1, plastic package | Tape & Reel, 500 pcs |



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



**Typical RF Performance** (cont.)



**Load Pull Performance**

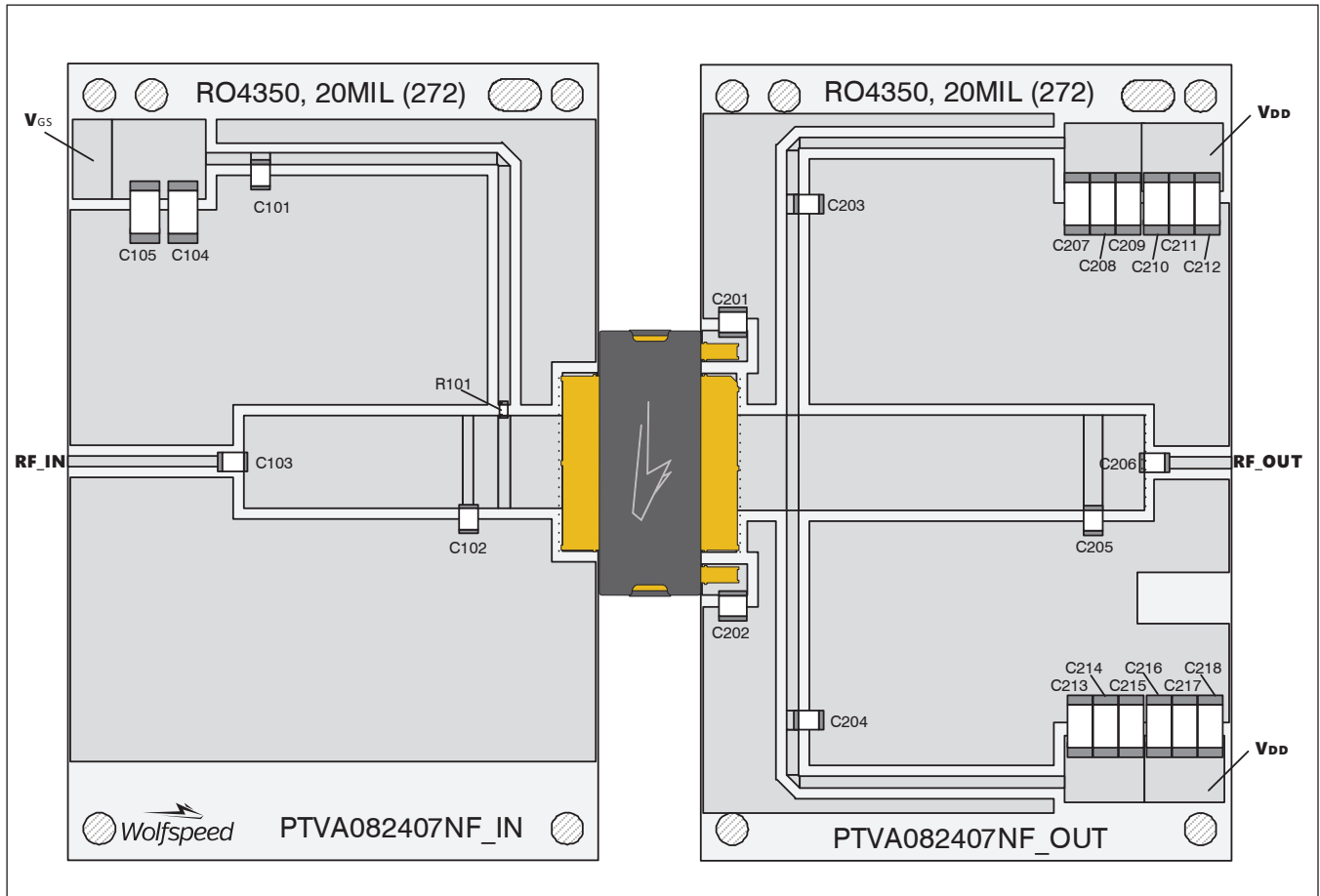
Load Pull Performance – Pulsed CW signal: 10  $\mu\text{s}$ , 10% duty cycle, 48 V,  $I_{DQ} = 480 \text{ mA}$

|                   |  | <b>P<sub>1dB</sub></b>                     |                  |                              |                            |                |  |                  |                              |                            |                |
|-------------------|--|--|------------------|------------------------------|----------------------------|----------------|--|------------------|------------------------------|----------------------------|----------------|
|                   |  | <b>Max Output Power</b>                    |                  |                              |                            |                | <b>Max PAE</b>                             |                  |                              |                            |                |
| <b>Freq [MHz]</b> | <b>Z<sub>s</sub> [<math>\Omega</math>]</b> | <b>Z<sub>l</sub> [<math>\Omega</math>]</b> | <b>Gain [dB]</b> | <b>P<sub>1dB</sub> [dBm]</b> | <b>P<sub>1dB</sub> [W]</b> | <b>PAE [%]</b> | <b>Z<sub>l</sub> [<math>\Omega</math>]</b> | <b>Gain [dB]</b> | <b>P<sub>1dB</sub> [dBm]</b> | <b>P<sub>1dB</sub> [W]</b> | <b>PAE [%]</b> |
| 746               | 0.95 - j2.58                               | 1.54 - j0.17                               | 21.49            | 55.64                        | 366.4                      | 59.7           | 2.53 + j2.11                               | 23.82            | 52.99                        | 199.1                      | 74.8           |
| 756               | 1.08 - j2.75                               | 1.75 - j0.19                               | 22.12            | 55.68                        | 369.5                      | 64.6           | 2.89 + j2.26                               | 23.84            | 52.88                        | 194.2                      | 72.3           |

|                   |  | <b>P<sub>3dB</sub></b>                     |                  |                              |                            |                |  |                  |                              |                            |                |
|-------------------|--|--|------------------|------------------------------|----------------------------|----------------|--|------------------|------------------------------|----------------------------|----------------|
|                   |  | <b>Max Output Power</b>                    |                  |                              |                            |                | <b>Max PAE</b>                             |                  |                              |                            |                |
| <b>Freq [MHz]</b> | <b>Z<sub>s</sub> [<math>\Omega</math>]</b> | <b>Z<sub>l</sub> [<math>\Omega</math>]</b> | <b>Gain [dB]</b> | <b>P<sub>3dB</sub> [dBm]</b> | <b>P<sub>3dB</sub> [W]</b> | <b>PAE [%]</b> | <b>Z<sub>l</sub> [<math>\Omega</math>]</b> | <b>Gain [dB]</b> | <b>P<sub>3dB</sub> [dBm]</b> | <b>P<sub>3dB</sub> [W]</b> | <b>PAE [%]</b> |
| 746               | 0.95 - j2.58                               | 1.69 - j0.47                               | 19.64            | 56.51                        | 447.9                      | 64.0           | 2.97 + j1.55                               | 21.69            | 54.30                        | 269.2                      | 77.4           |
| 756               | 1.08 - j2.75                               | 1.80 + j0.29                               | 20.14            | 56.44                        | 440.3                      | 67.2           | 2.49 + j0.80                               | 21.36            | 55.12                        | 325.3                      | 73.5           |

### Reference Circuit, 746 – 821 MHz



Reference circuit assembly diagram (not to scale)



**Reference Circuit** (cont.)

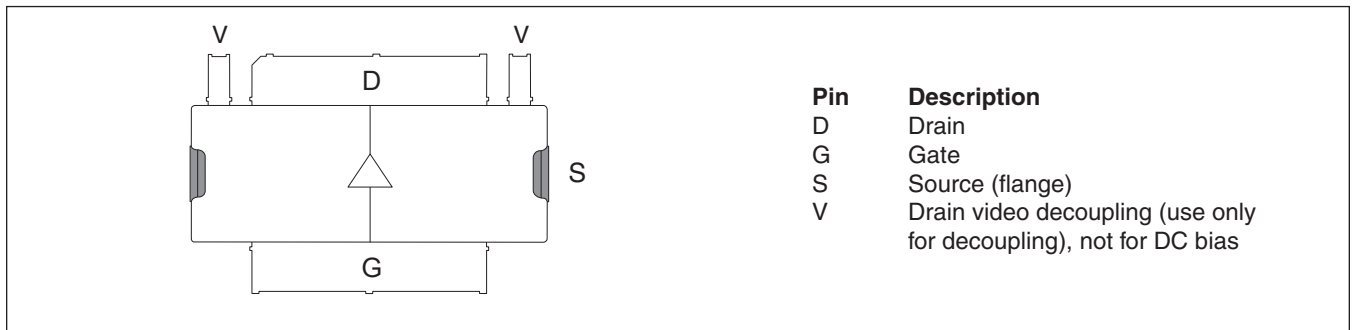
**Reference Circuit Assembly**

|   |   |
|---|---|
| DUT   | PTVA082407NF V1   |
| Test Fixture Part No.   | LTN/PTVA082407NF V1   |
| PCB   | Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 746 - 821$ MHz |
| Find Gerber files for this test fixture on the Wolfspeed Web site at <a href="http://www.wolfspeed.com/RF">www.wolfspeed.com/RF</a> |   |

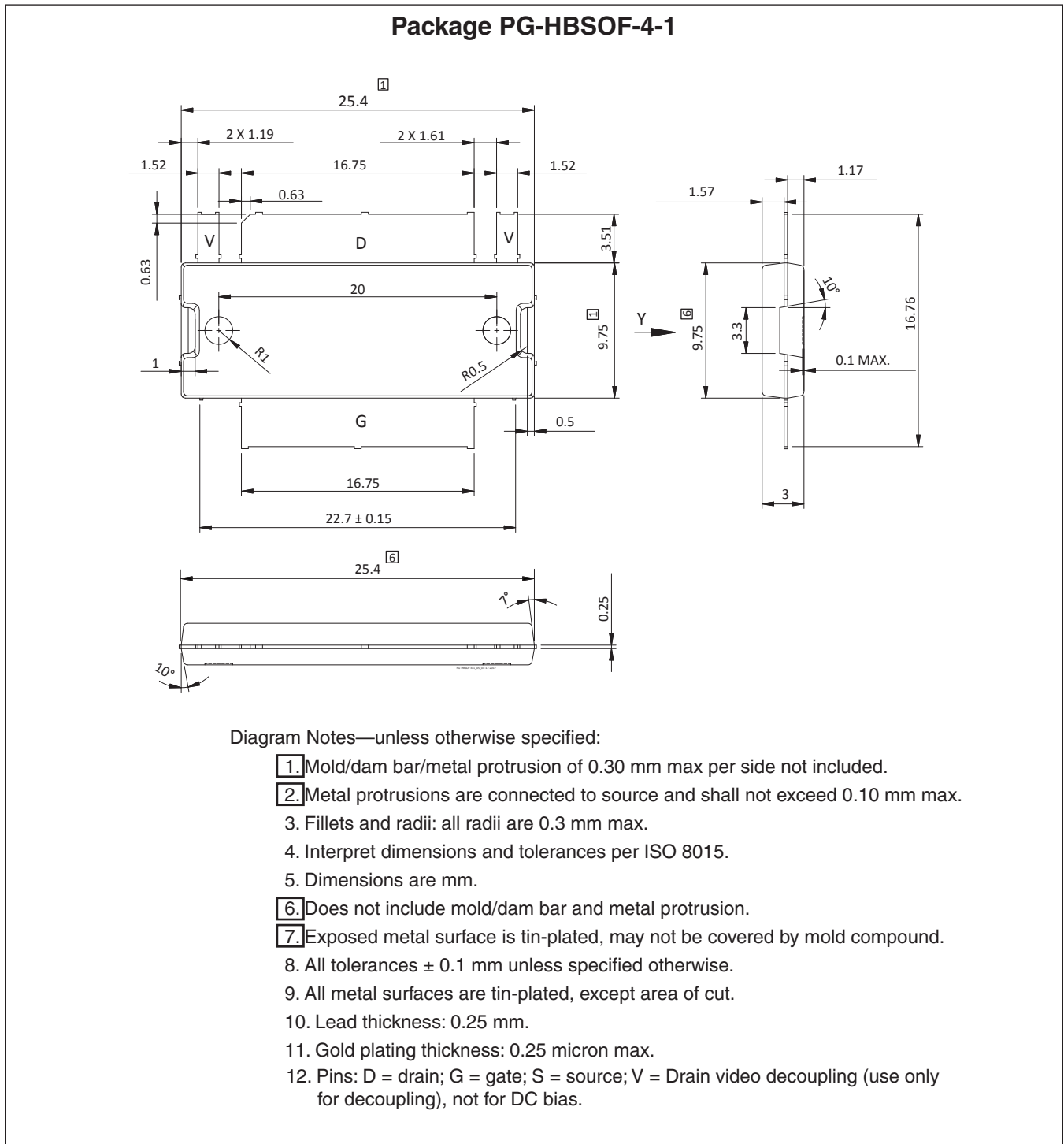
**Components Information**

| Component   | Description                  | Manufacturer                    | P/N                 |
|---|------------------------------|---------------------------------|---------------------|
| <b>Input</b>  |                              |                                 |                     |
| C101, C103  | Capacitor, 56 pF             | ATC                             | ATC100B560KW500XT   |
| C102  | Capacitor, 10 pF             | ATC                             | ATC100B100KW500XT   |
| C104, C105  | Capacitor, 100V, 10 $\mu$ F  | TDK Corporation                 | C5750X7S2A106M230KB |
| R101  | Resistor, 10 ohms            | Panasonic Electronic Components | ERJ-8GEYJ100V       |
| <b>Output</b>   |                              |                                 |                     |
| C201, C202  | Capacitor, 10 $\mu$ F        | Taiyo Yuden                     | UMK325C7106MM-T     |
| C203, C204, C206  | Capacitor, 56 pF             | ATC                             | ATC100B560KW500XT   |
| C205  | Capacitor, 6.8 pF            | ATC                             | ATC100B6R8CW500XB   |
| C207, C208, C209, C210, C211, C212, C213, 214, C215, C216, C217, C218 | Capacitor, 100 V, 10 $\mu$ F | TDK Corporation                 | C5750X7S2A106M230KB |

**Pinout Diagram** (top view)



## Package Outline Specifications



## Package Outline Specifications

### Package PG-HBSOF-4-1

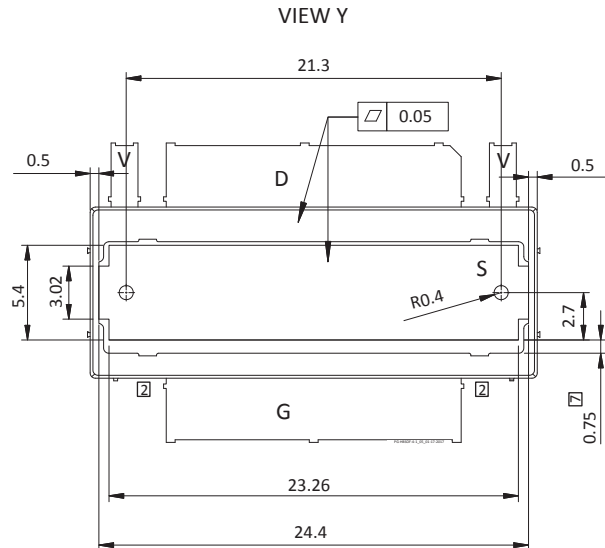


Diagram Notes—unless otherwise specified:

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusions are connected to source and shall not exceed 0.10 mm max.
3. Fillets and radii: all radii are 0.3 mm max.
4. Interpret dimensions and tolerances per ISO 8015.
5. Dimensions are mm.
6. Does not include mold/dam bar and metal protrusion.
7. Exposed metal surface is tin-plated, may not be covered by mold compound.
8. All tolerances  $\pm 0.1$  mm unless specified otherwise.
9. All metal surfaces are tin-plated, except area of cut.
10. Lead thickness: 0.25 mm.
11. Gold plating thickness: 0.25 micron max.
12. Pins: D = drain; G = gate; S = source; V = Drain video decoupling (use only for decoupling), not for DC bias.



## Revision History

| Revision | Date       | Data Sheet Type | Page        | Subjects (major changes since last revision)                                      |
|----------|------------|-----------------|-------------|---|
| 01       | 2016-03-17 | Advance         | All         | Data Sheet reflects advance specification for product development                 |
| 02       | 2016-09-15 | Production      | All         | Data Sheet reflects released product specification                                |
| 02.1     | 2016-11-23 | Production      | 2           | Revised conditions in DC Characteristics table                                    |
| 02.2     | 2016-12-01 | Production      | 1           | Updated Features list   |
| 02.3     | 2016-12-07 | Production      | 1           | Revised typo in Features  |
| 02.4     | 2017-02-07 | Production      | 2           | Updated operating voltage and junction temperature                                |
| 02.5     | 2017-07-18 | Production      | 1, 9        | Revised typo  |
| 03       | 2018-06-21 | Production      | All<br>5, 6 | Converted to Wolfspeed Data Sheet<br>Revised reference circuit and component list |

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## Notes

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