

PTVA084007NF

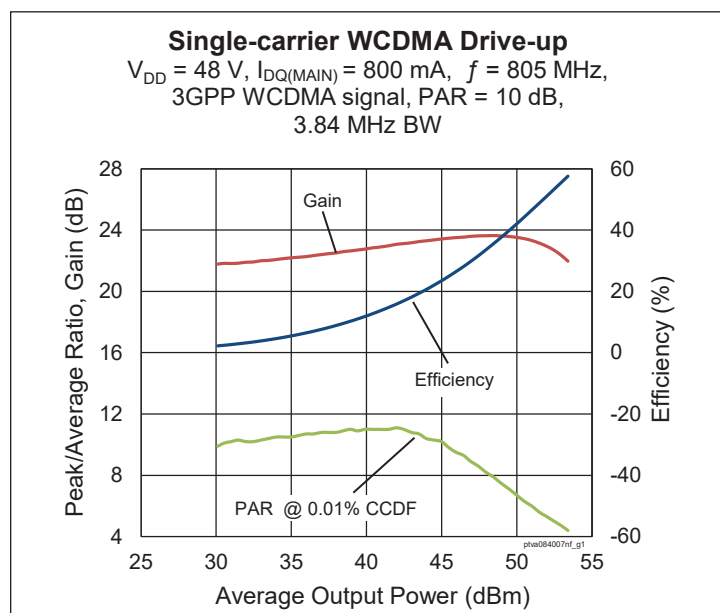
Thermally-Enhanced High Power RF LDMOS FET 370 W, 48 V, 755 – 805 MHz

Description

The PTVA084007NF is a 370-watt (P_{3dB}) 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 and output matching that allow for use from 755 MHz to 805 MHz.



PTVA084007NF
Package PG-HBSOF-4-2



Features

- Broadband internal input and output matching
- Target CW performance, 805 MHz, 48 V, single side
 - Output power at $P_{3dB} = 370\text{ W}$
 - Efficiency = 64%
 - Gain = 20.8 dB
- Capable of handling 10:1 VSWR @ 48 V, 100 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)

$V_{DD} = 48\text{ V}$, $I_{DQ} = 800\text{ mA}$, $P_{OUT} = 80\text{ W avg}$, $f_1 = 805\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF.

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---------------------------------|----------|-----|-------|-------|------|
| Gain | G_{ps} | 22 | 23.6 | — | dB |
| Drain Efficiency | η_D | 37 | 39 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -31.6 | -28.5 | dBc |
| Output PAR @ 0.01% CCDF, 20 MHz | OPAR | 6.4 | 7 | — | dB |

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 | $V_{DS} = 48\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1 | μA |
| | $V_{DS} = 105\text{ V}$, $V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 10 | μA |
| Gate Leakage Current | $V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1 | μA |
| On-State Resistance | $V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.12 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 48\text{ V}$, $I_{DQ} = 0.7\text{ A}$ | V_{GS} | 3.07 | 3.67 | 4.27 | 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 | $^{\circ}\text{C}$ |

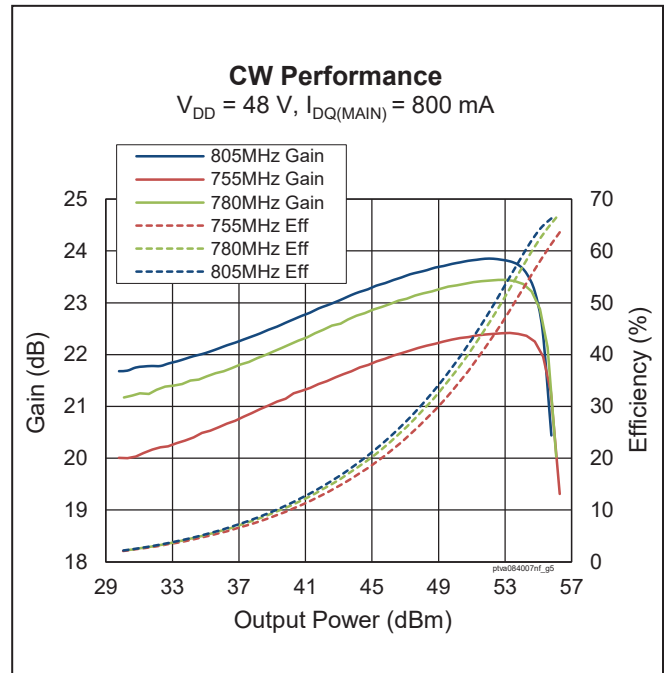
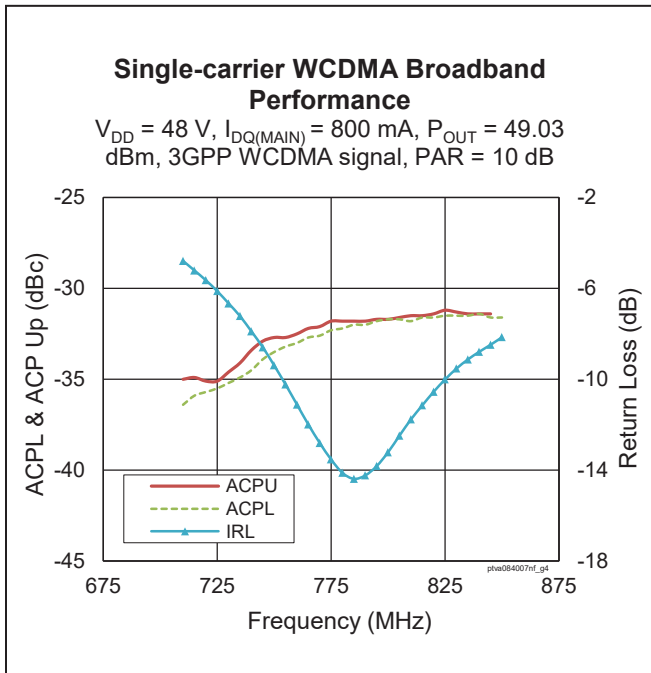
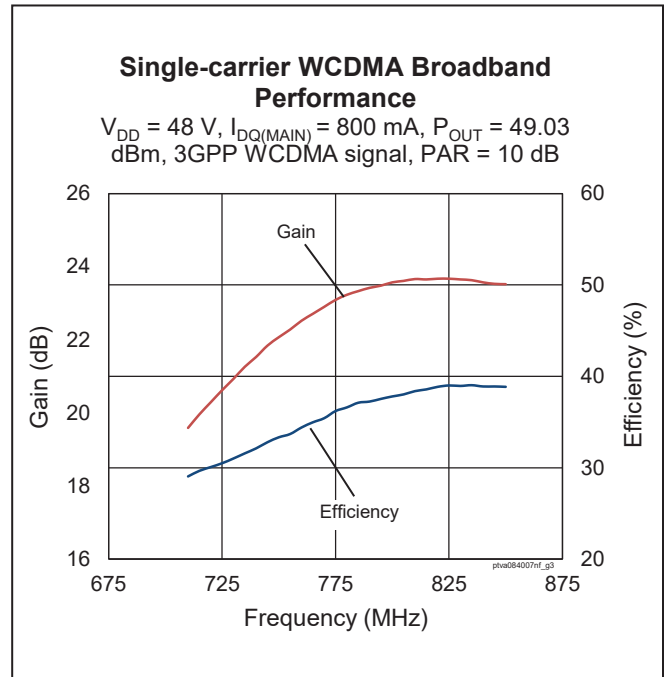
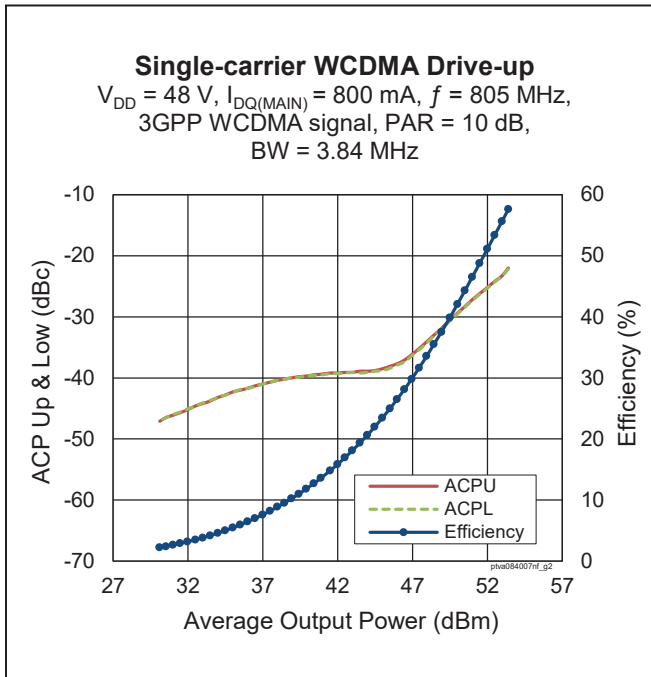
Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|----------------------|
| Thermal Resistance ($T_{CASE} = 70\text{ }^{\circ}\text{C}$, 370 W CW) | $R_{\theta JC}$ | 0.21 | $^{\circ}\text{C/W}$ |

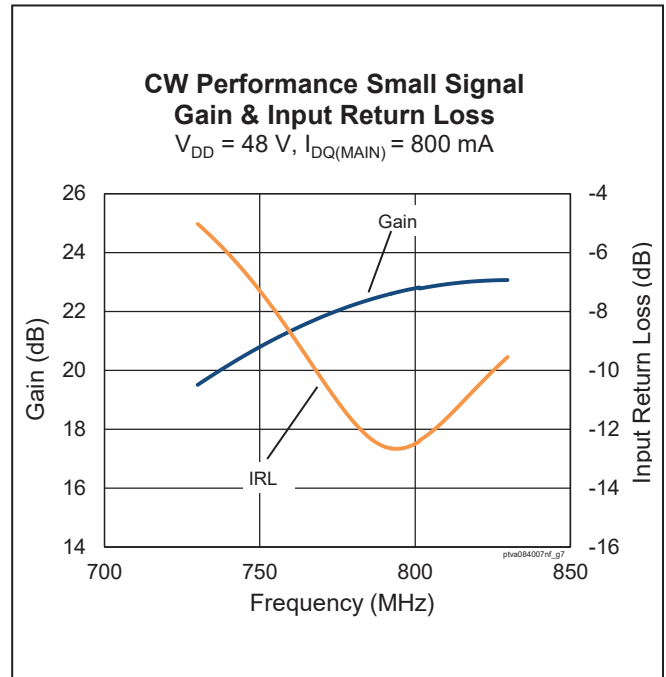
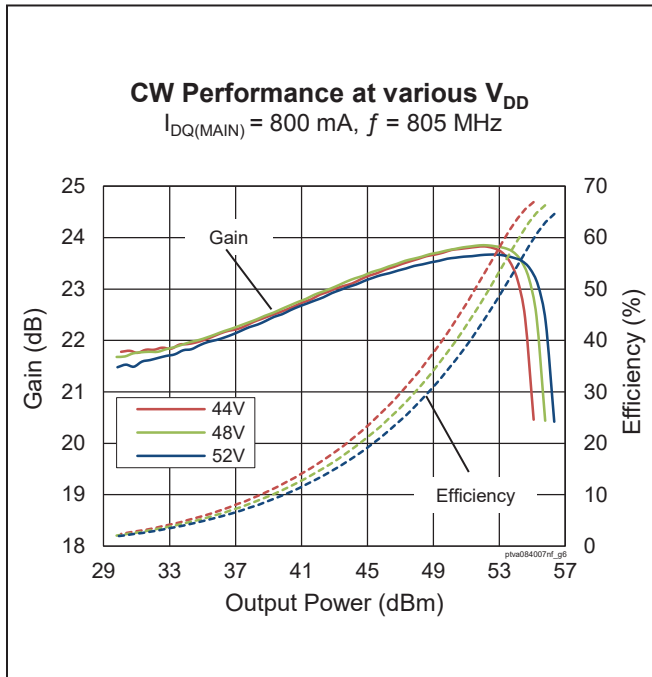
Ordering Information

| Type and Version | Order Code | Package Description | Shipping |
|--------------------|--------------------|-------------------------------|----------------------|
| PTVA084007NF V1 R5 | PTVA084007NF-V1-R5 | PG-HBSOF-4-2, plastic package | Tape & Reel, 500 pcs |

Typical RF Performance (data taken in production test fixture)



Typical RF Performance (cont.)



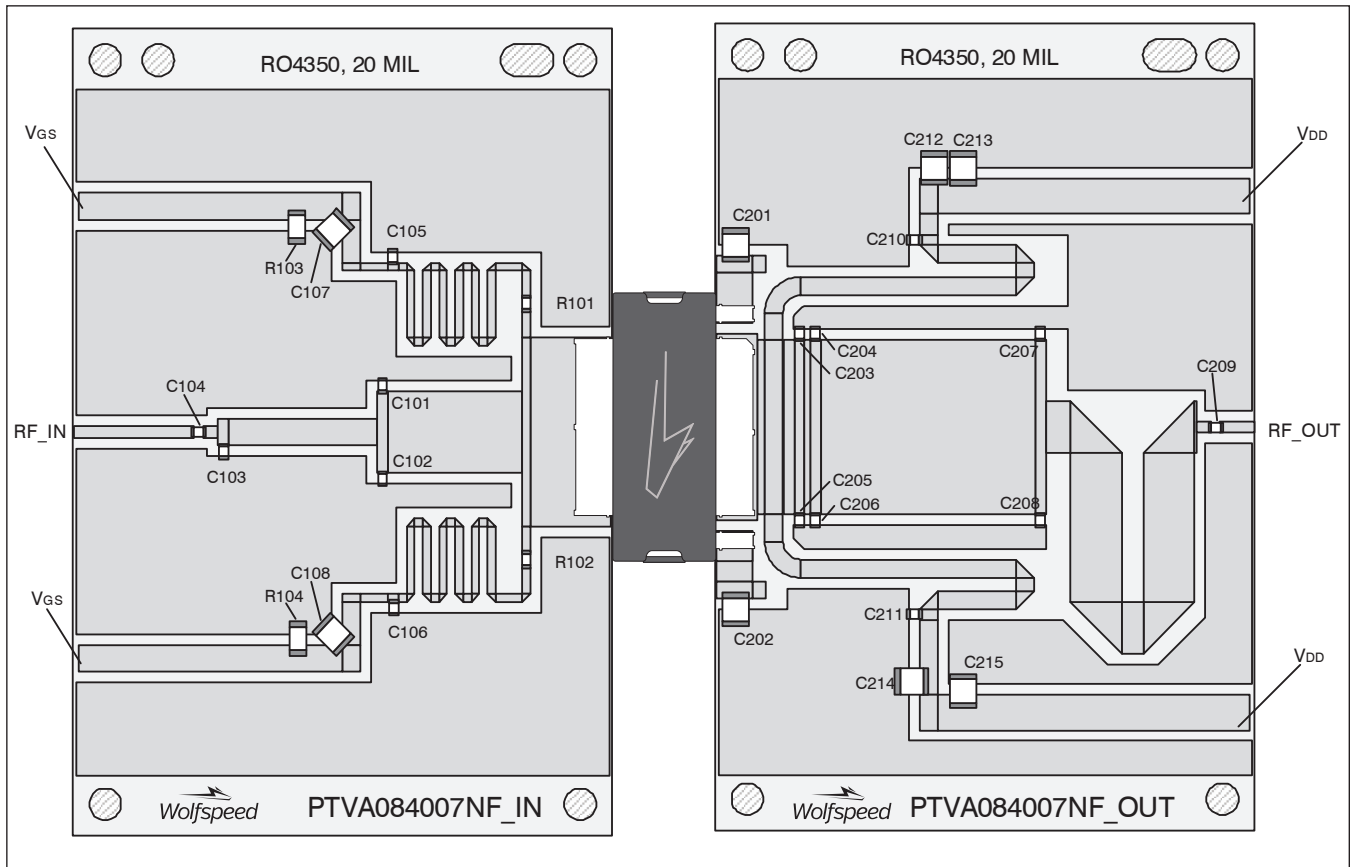
Load Pull Performance

Load Pull Performance – Pulsed CW signal: 160 μs , 10% duty cycle, 48 V, $I_{DQ} = 700 \text{ mA}$

| | | P_{1dB} | | | | | | | | | |
|------------|--------------------|--------------------|-----------|-----------------|---------------|--------------|----------------------|-----------|-----------------|---------------|--------------|
| | | Max Output Power | | | | | Max Drain Efficiency | | | | |
| Freq [MHz] | Z_s [Ω] | Z_l [Ω] | Gain [dB] | P_{1dB} [dBm] | P_{1dB} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{1dB} [dBm] | P_{1dB} [W] | η_D [%] |
| 758 | 1.97-j3.32 | 1.12-j0.53 | 21.7 | 57.00 | 501.2 | 58.6 | 2.02+j0.87 | 23.4 | 54.6 | 287.7 | 73.2 |
| 780 | 2.23-j3.76 | 1.09-j0.43 | 22.0 | 56.80 | 478.6 | 58.3 | 1.87+j0.89 | 23.8 | 54.5 | 281.2 | 72.0 |
| 803 | 3.01-j3.64 | 1.00-j0.42 | 22.0 | 56.78 | 476.4 | 57.6 | 1.83+j0.70 | 23.8 | 54.6 | 286.4 | 71.7 |

| | | P_{3dB} | | | | | | | | | |
|------------|--------------------|--------------------|-----------|-----------------|---------------|--------------|----------------------|-----------|-----------------|---------------|--------------|
| | | Max Output Power | | | | | Max Drain Efficiency | | | | |
| Freq [MHz] | Z_s [Ω] | Z_l [Ω] | Gain [dB] | P_{3dB} [dBm] | P_{3dB} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{3dB} [dBm] | P_{3dB} [W] | η_D [%] |
| 758 | 1.97-j3.32 | 1.14-j0.59 | 19.8 | 57.75 | 595.7 | 61.9 | 2.00+j0.40 | 21.3 | 55.9 | 388.2 | 73.8 |
| 780 | 2.23-j3.76 | 1.09-j0.46 | 20.0 | 57.56 | 570.2 | 60.9 | 1.96+j0.43 | 21.7 | 55.8 | 377.6 | 72.5 |
| 803 | 3.01-j3.64 | 1.03-j0.49 | 20.0 | 57.52 | 564.9 | 60.2 | 1.73+j0.62 | 21.7 | 55.3 | 338.1 | 72.0 |

Reference Circuit, 758 – 803 MHz



Reference circuit assembly diagram (not to scale)



Reference Circuit (cont.)

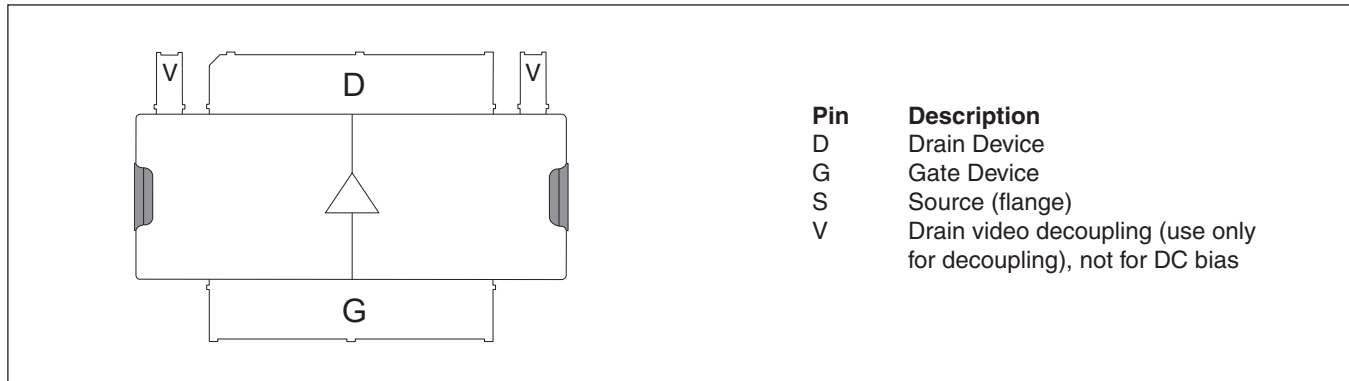
Reference Circuit Assembly

| | |
|---|---|
| DUT | PTVA084007NF V1 |
| Test Fixture Part No. | LTN/PTVA084007NF V1 |
| PCB | Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$, $f = 758 - 803$ MHz |
| Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF | |

Components Information

| Component | Description | Manufacturer | P/N |
|------------------------------------|------------------------------|---------------------------------|---------------------|
| Input | | | |
| C101, C103 | Capacitor, 3.3 pF | ATC | ATC600F3R3CW250T |
| C102 | Capacitor, 4.7 pF | ATC | ATC600F4R7CW250T |
| C104, C105, C106 | Capacitor, 51 pF | ATC | ATC600F510JW250T |
| C107, C108 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| R101, R102 | Resistor, 10 ohms | Panasonic Electronic Components | ERJ-3GEYJ100V |
| R103, R104 | Resistor, 1000 ohms | Panasonic Electronic Components | ERJ-8GEYJ102V |
| Output | | | |
| C201, C202, C212, C213, C214, C215 | Capacitor, 10 μ F, 100 V | TDK Corporation | C5750X7S2A106M230KB |
| C203, C204, C205, C206 | Capacitor, 8.2 pF | ATC | ATC600F8R2CW250T |
| C207, C208 | Capacitor, 3.0 pF | ATC | ATC600F3R0CW250T |
| C209, C210, C211 | Capacitor, 51 pF | ATC | ATC600F510JW250T |

Pinout Diagram (top view)



Package Outline Specifications

Package PG-HBSOF-4-2

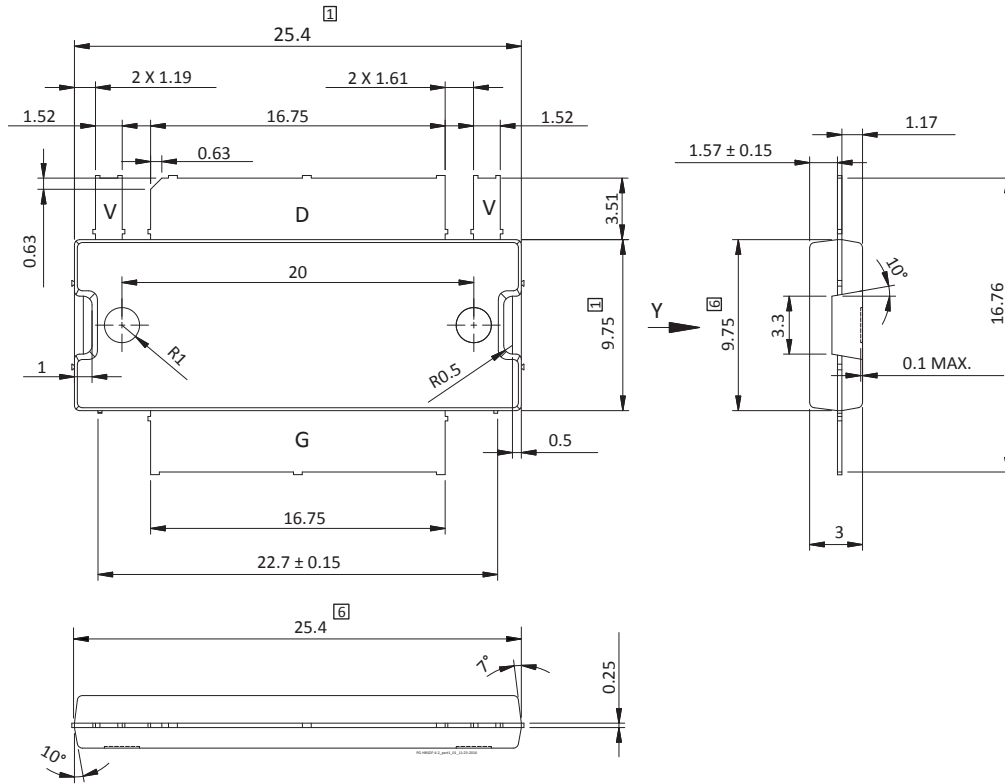


Diagram Notes – unless otherwise specified:

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusion 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/metal protrusion.
7. Exposed metal surface is tin-plated, may not be covered by mold compound.
8. All tolerances ± 0.1 mm unless specified otherwise.
9. All metal surfaces are tin-plated, except area of cut.
10. Lead thickness: 0.25 mm.
11. Pins: D = drain; G = gate; S – source; V = drain video decoupling (use only for decoupling), not for DC bias.

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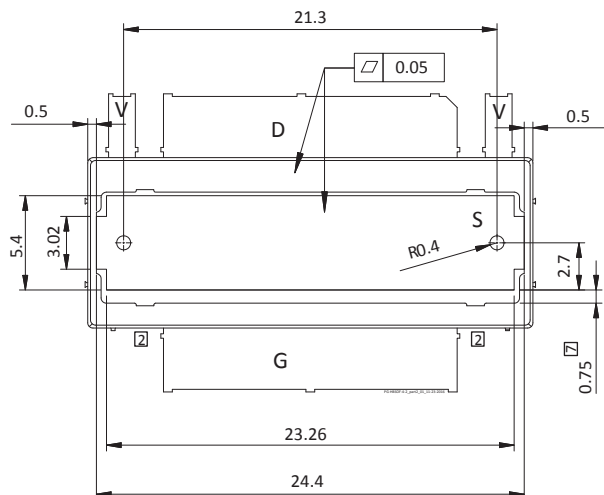


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Revision History

| Revision | Date | Data Sheet Type | Page | Subjects (major changes since last revision) |
|----------|------------|-----------------|------|---|
| 01 | 2016-11-23 | Advance | All | Data Sheet reflects advance specification for product development |
| 02 | 2017-07-06 | Preliminary | All | Data Sheet reflects preliminary specification |
| 03 | 2017-08-30 | Production | All | Data Sheet reflects released product specification |
| 04 | 2018-06-21 | Production | All | Converted to Wolfspeed Data Sheet |

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Notes

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