

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$        | $I_D \text{ max}$<br>$T_C = +25^\circ\text{C}$ |
|---------------|---------------------------------|------------------------------------------------|
| -20V          | 5.5mΩ @ $V_{GS} = -10\text{V}$  | -40A                                           |
|               | 7.0mΩ @ $V_{GS} = -4.5\text{V}$ | -40A                                           |
|               | 9.0mΩ @ $V_{GS} = -2.5\text{V}$ | -40A                                           |

## Description

This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- Load Switch
- Power Management Functions

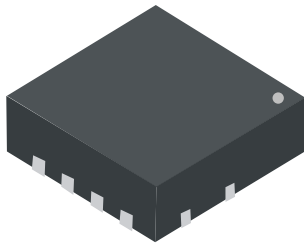
## Features

- Low  $R_{DS(ON)}$  – ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

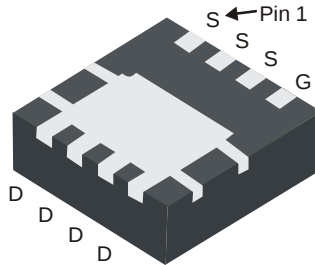
## Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (B3)
- Weight: 0.008 grams (Approximate)

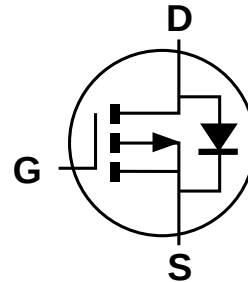
POWERDI3333-8



Top View



Bottom View



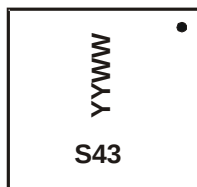
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number   | Case          | Packaging        |
|---------------|---------------|------------------|
| DMP2007UFG-7  | POWERDI3333-8 | 2000/Tape & Reel |
| DMP2007UFG-13 | POWERDI3333-8 | 3000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



S43 = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 14 = 2014)  
WW = Week Code (01 ~ 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                            |              |                                                                            | Symbol           | Value                 | Units |
|-----------------------------------------------------------|--------------|----------------------------------------------------------------------------|------------------|-----------------------|-------|
| Drain-Source Voltage                                      |              |                                                                            | V <sub>DSS</sub> | -20                   | V     |
| Gate-Source Voltage                                       |              |                                                                            | V <sub>GSS</sub> | ±12                   | V     |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C<br>T <sub>C</sub> = +25°C | I <sub>D</sub>   | -18.0<br>-14.5<br>-40 | A     |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)        |              |                                                                            | I <sub>DM</sub>  | -80                   | A     |
| Maximum Continuous Body Diode Forward Current (Note 5)    |              |                                                                            | I <sub>S</sub>   | -2.2                  | A     |
| Avalanche Current L=0.1mH                                 |              |                                                                            | I <sub>AS</sub>  | -30                   | A     |
| Avalanche Energy L=0.1mH                                  |              |                                                                            | E <sub>AS</sub>  | 50                    | mJ    |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          |                        | Symbol                            | Value       | Units |
|-----------------------------------------|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)        | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.3         | W     |
|                                         | T <sub>C</sub> = +25°C |                                   | 41          |       |
| Thermal Resistance, Junction to Ambient | (Note 5)               | R <sub>θJA</sub>                  | 58          | °C/W  |
|                                         | (Note 6)               |                                   | 143         |       |
| Thermal Resistance, Junction to Case    |                        | R <sub>θJC</sub>                  | 3.0         |       |
| Operating and Storage Temperature Range |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol              | Min  | Typ  | Max  | Unit | Test Condition                                                                                 |
|---------------------------------------------|---------------------|------|------|------|------|------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>         |                     |      |      |      |      |                                                                                                |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -20  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                  |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —    | —    | -1   | μA   | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V                                                   |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —    | —    | ±100 | nA   | V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V                                                   |
| <b>ON CHARACTERISTICS (Note 7)</b>          |                     |      |      |      |      |                                                                                                |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -0.4 | —    | -1.3 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                    |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 4.4  | 5.5  | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -15A                                                  |
|                                             |                     | —    | 4.9  | 7.0  |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A                                                 |
|                                             |                     | —    | 6.5  | 9.0  |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -10A                                                 |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.7 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -10A                                                    |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>     |                     |      |      |      |      |                                                                                                |
| Input Capacitance                           | C <sub>iss</sub>    | —    | 4621 | —    | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                     |
| Output Capacitance                          | C <sub>oss</sub>    | —    | 652  | —    |      |                                                                                                |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 403  | —    |      |                                                                                                |
| Gate Resistance                             | R <sub>G</sub>      | —    | 3.2  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                         |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —    | 39   | —    | nC   | V <sub>DD</sub> = -10V, I <sub>D</sub> = -20A                                                  |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 85   | —    |      |                                                                                                |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 8.3  | —    |      |                                                                                                |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 9.6  | —    |      |                                                                                                |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 10.1 | —    | ns   | V <sub>GS</sub> = -4.5V, V <sub>DD</sub> = -10V,<br>R <sub>G</sub> = 1Ω, I <sub>D</sub> = -10A |
| Turn-On Rise Time                           | t <sub>R</sub>      | —    | 9.8  | —    |      |                                                                                                |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 61   | —    |      |                                                                                                |
| Turn-Off Fall Time                          | t <sub>F</sub>      | —    | 51   | —    |      |                                                                                                |
| Reverse Recovery Time                       | t <sub>RR</sub>     | —    | 20.1 | —    | ns   | I <sub>F</sub> = -10A, di/dt = 100A/μs                                                         |
| Reverse Recovery Charge                     | Q <sub>rr</sub>     | —    | 10.1 | —    | nC   | I <sub>F</sub> = -10A, di/dt = 100A/μs                                                         |

- Notes:
5. R<sub>θJA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R<sub>θJC</sub> is guaranteed by design while R<sub>θJA</sub> is determined by the user's board design.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.

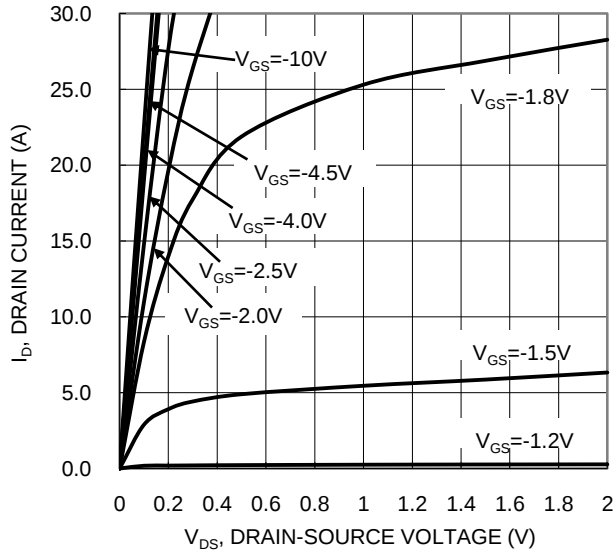


Figure 1. Typical Output Characteristic

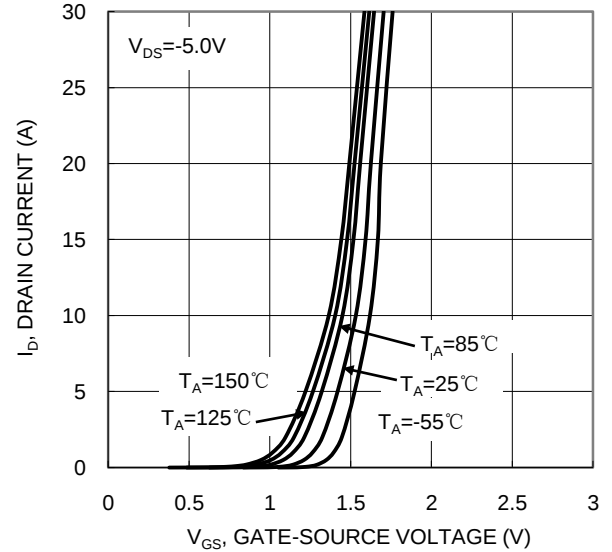


Figure 2. Typical Transfer Characteristic

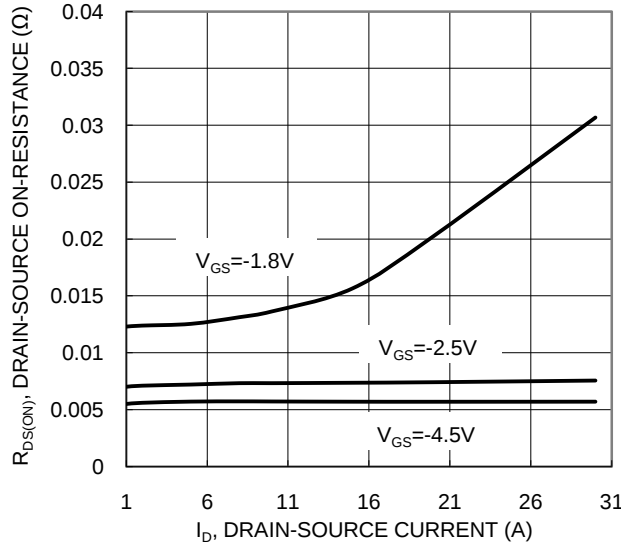


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

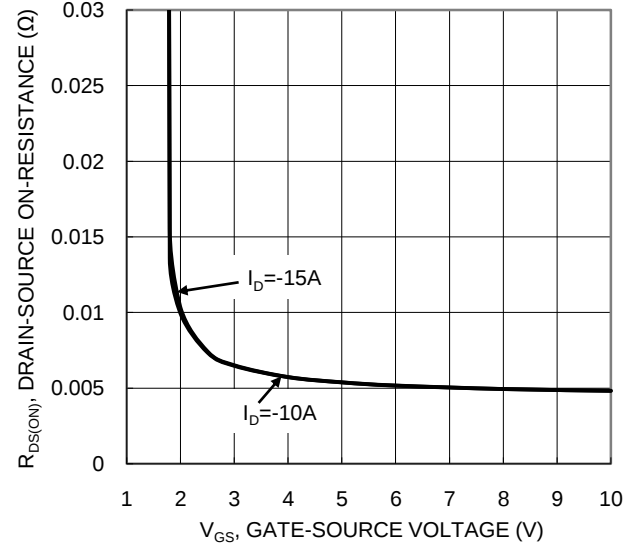


Figure 4. Typical Transfer Characteristic

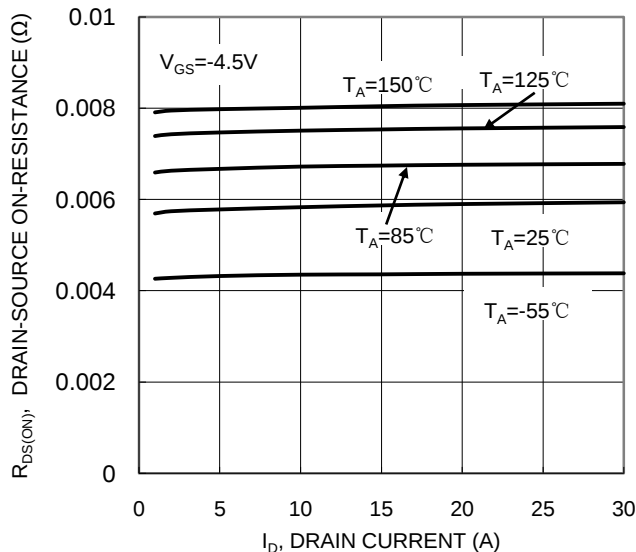


Figure 5. Typical On-Resistance vs Drain Current and Temperature

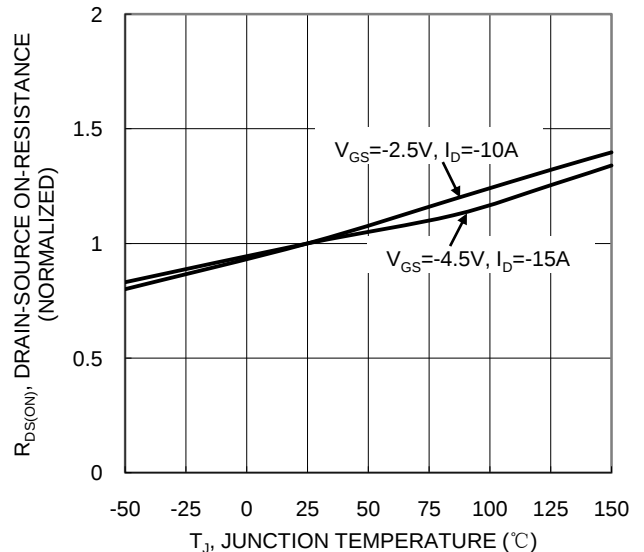


Figure 6. On-Resistance Variation with Temperature

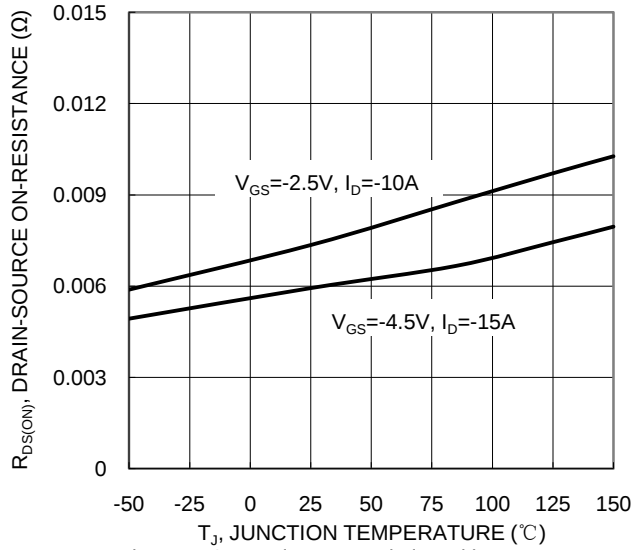


Figure 7. On-Resistance Variation with Temperature

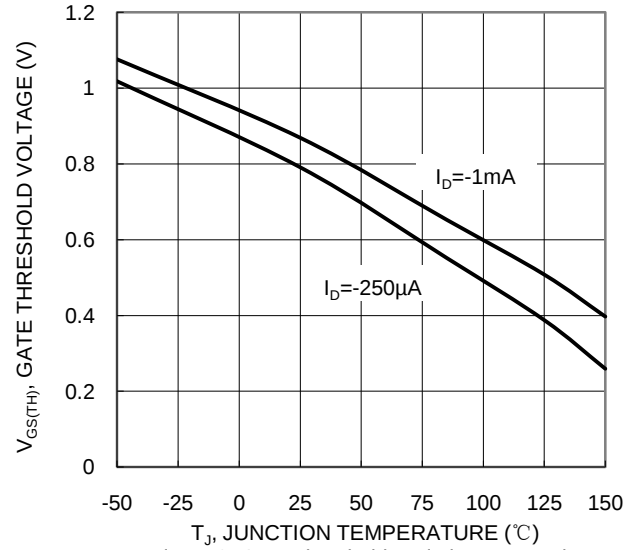


Figure 8. Gate Threshold Variation vs Junction Temperature

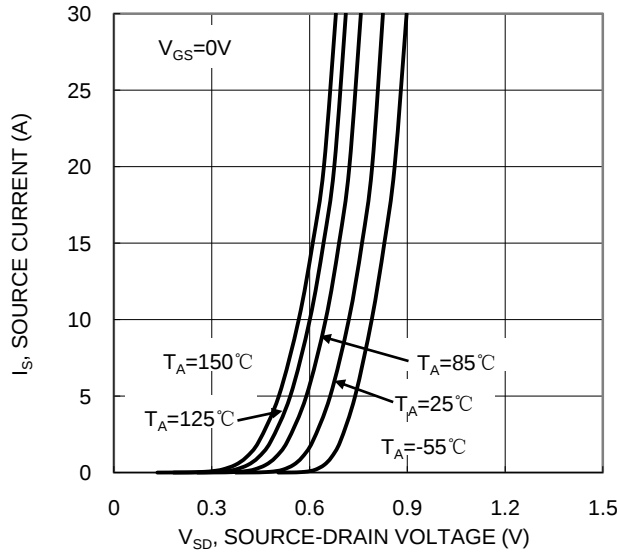


Figure 9. Diode Forward Voltage vs Current

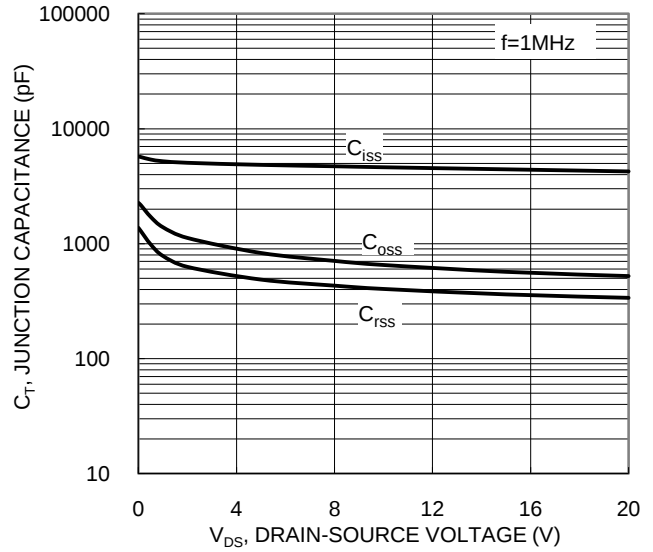


Figure 10. Typical Junction Capacitance

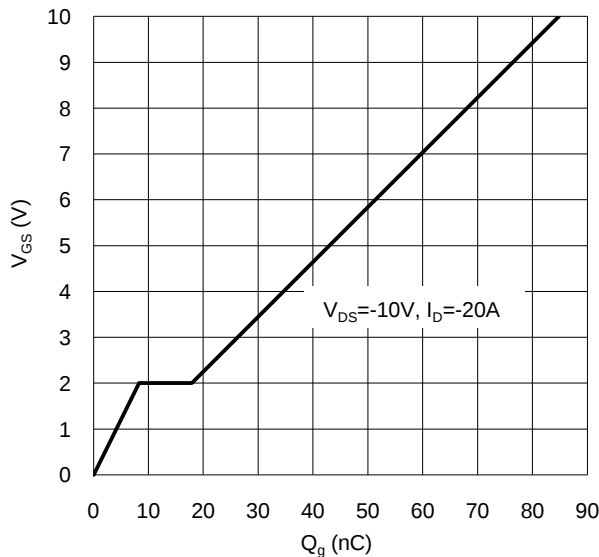


Figure 11. Gate Charge

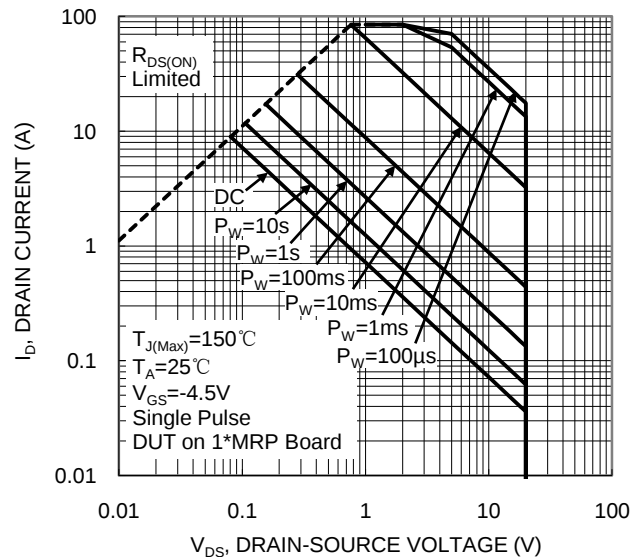


Figure 12. SOA, Safe Operation Area

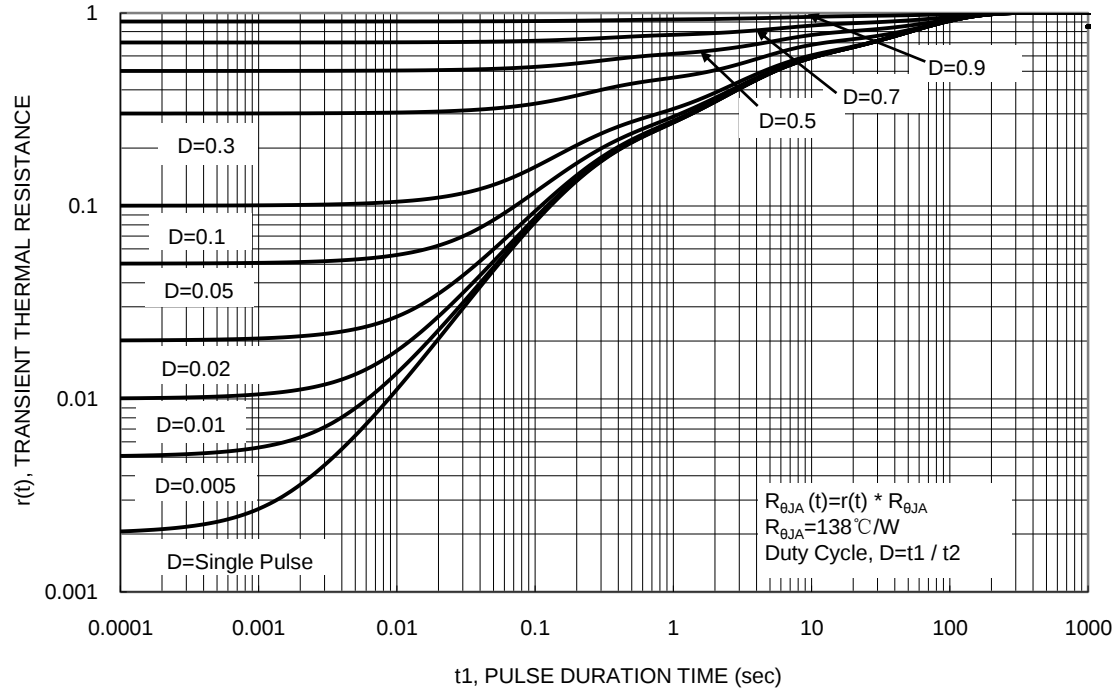
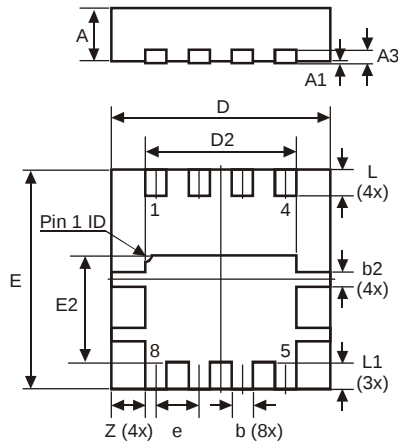


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

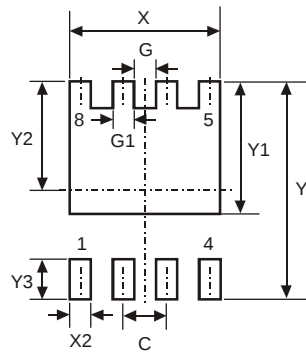
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| POWERDI3333-8        |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| D                    | 3.25 | 3.35 | 3.30  |
| E                    | 3.25 | 3.35 | 3.30  |
| D2                   | 2.22 | 2.32 | 2.27  |
| E2                   | 1.56 | 1.66 | 1.61  |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0    | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 0.27 | 0.37 | 0.32  |
| b2                   | —    | —    | 0.20  |
| L                    | 0.35 | 0.45 | 0.40  |
| L1                   | —    | —    | 0.39  |
| e                    | —    | —    | 0.65  |
| Z                    | —    | —    | 0.515 |
| All Dimensions in mm |      |      |       |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 0.230         |
| G1         | 0.420         |
| Y          | 3.700         |
| Y1         | 2.250         |
| Y2         | 1.850         |
| Y3         | 0.700         |
| X          | 2.370         |
| X2         | 0.420         |

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