

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$       | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------|------------------------------------------------|
| 100V          | 122mΩ @ $V_{GS} = 10\text{V}$  | 2.9A                                           |
|               | 133mΩ @ $V_{GS} = 4.5\text{V}$ | 2.7A                                           |

## 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

- Backlighting
- Power Management Functions
- DC-DC Converters

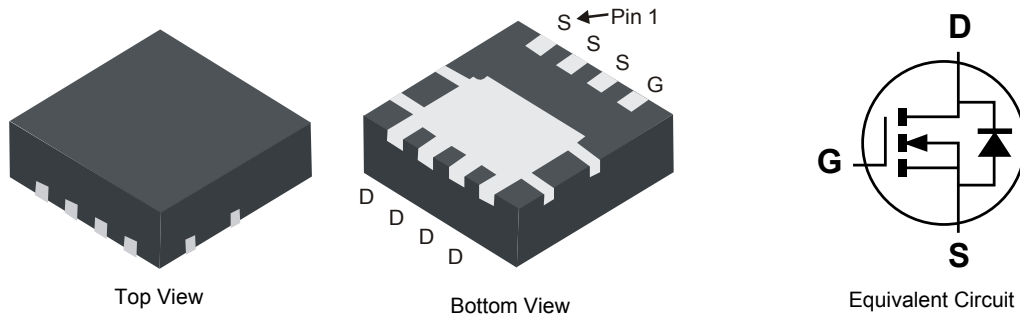
## Features

- 100% Unclamped Inductive Switch (UIS) test in production
- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: POWERDI3333
- 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 @3
- Weight: 0.034 grams (approximate)

POWERDI3333

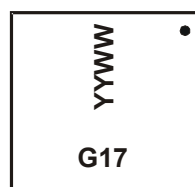


## Ordering Information (Note 4)

| Part Number     | Compliance | Case        | Packaging        |
|-----------------|------------|-------------|------------------|
| DMN10H170SFG-7  | Standard   | POWERDI3333 | 2000/Tape & Reel |
| DMN10H170SFG-13 | Standard   | POWERDI3333 | 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



G17 = Product marking code  
YYWW = Date code marking  
YY = Last digit of year (ex: 10 for 2010)  
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> | 100   | V     |
| Gate-Source Voltage                                     |              |                        | V <sub>GSS</sub> | ±20   | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 2.9   | A     |
|                                                         |              | T <sub>A</sub> = +70°C |                  | 2.4   |       |
|                                                         |              | T <sub>C</sub> = +25°C |                  | 8.5   |       |
|                                                         | t < 10s      | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 3.7   | A     |
|                                                         |              |                        |                  | 3.0   | A     |
| Maximum Continuous Body Diode Forward Current (Note 6)  |              |                        | I <sub>S</sub>   | 3.0   | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)      |              |                        | I <sub>DM</sub>  | 16    | A     |
| Avalanche Current (Note 7)                              |              |                        | I <sub>AR</sub>  | 5.3   | A     |
| Avalanche Energy (Note 7)                               |              |                        | E <sub>AR</sub>  | 20    | 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>                    | 0.94        | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 0.6         |       |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State           | R <sub>θJA</sub>                  | 137         | °C/W  |
|                                                  | t < 10s                |                                   | 82          |       |
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.0         | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 1.3         |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 60          | °C/W  |
|                                                  | t < 10s                |                                   | 36          |       |
| Thermal Resistance, Junction to Case (Note 6)    |                        | R <sub>θJC</sub>                  | 7.0         | °C/W  |
| 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 8)</b>        |                     |     |       |      |      |                                                                                               |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 100 | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA                                                  |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 1.0  | µA   | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                                  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —     | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                  |
| <b>ON CHARACTERISTICS (Note 8)</b>         |                     |     |       |      |      |                                                                                               |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1.0 | —     | 3.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                    |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 99    | 122  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.3A                                                  |
|                                            |                     | —   | 104   | 133  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.0A                                                 |
| Forward Transfer Admittance                | Y <sub>fs</sub>     | —   | 4.4   | —    | S    | V <sub>DS</sub> = 10V, I <sub>D</sub> = 3.3A                                                  |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.7   | 1.0  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3.3A                                                   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>    |                     |     |       |      |      |                                                                                               |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 870.7 | —    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                       |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 40.8  | —    | pF   |                                                                                               |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 24.6  | —    | pF   |                                                                                               |
| Gate resistance                            | R <sub>g</sub>      | —   | 1.1   | —    | 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>      | —   | 7.0   | —    | nC   | V <sub>DS</sub> = 50V, I <sub>D</sub> = 3.3A                                                  |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 14.9  | —    | nC   |                                                                                               |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 3.3   | —    | nC   |                                                                                               |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 3.0   | —    | nC   |                                                                                               |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 4.4   | —    | ns   | V <sub>DD</sub> = 50V, V <sub>GEN</sub> = 10V, R <sub>GEN</sub> = 6.0Ω, I <sub>D</sub> = 3.3A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 2.3   | —    | ns   |                                                                                               |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 13.9  | —    | ns   |                                                                                               |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 3.4   | —    | ns   |                                                                                               |
| Reverse Recovery Time                      | t <sub>rr</sub>     | —   | 22.4  | —    | ns   | I <sub>S</sub> = 3.3A, dI/dt = 100A/µs                                                        |
| Reverse Recovery Charge                    | Q <sub>rr</sub>     | —   | 19.7  | —    | nC   |                                                                                               |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - UIS in production with L = 1.43mH, T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

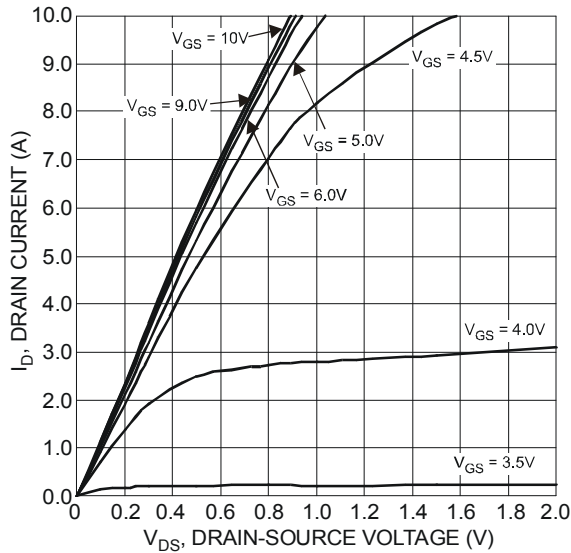


Figure 1 Typical Output Characteristic

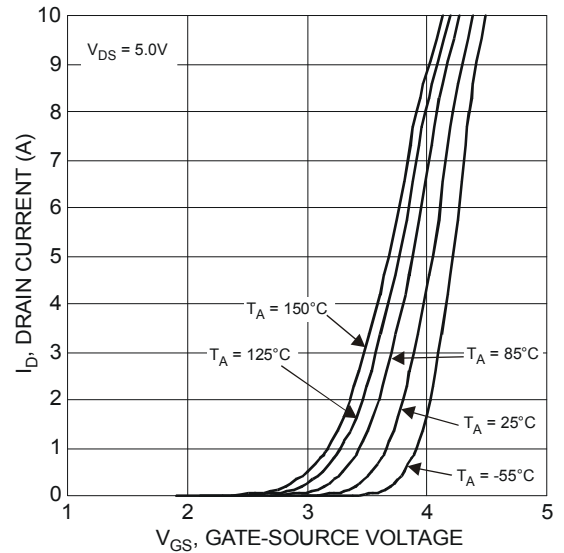


Figure 2 Typical Transfer Characteristics

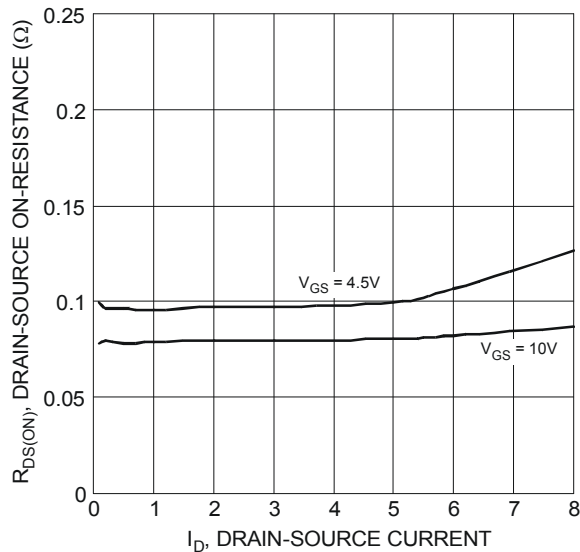


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

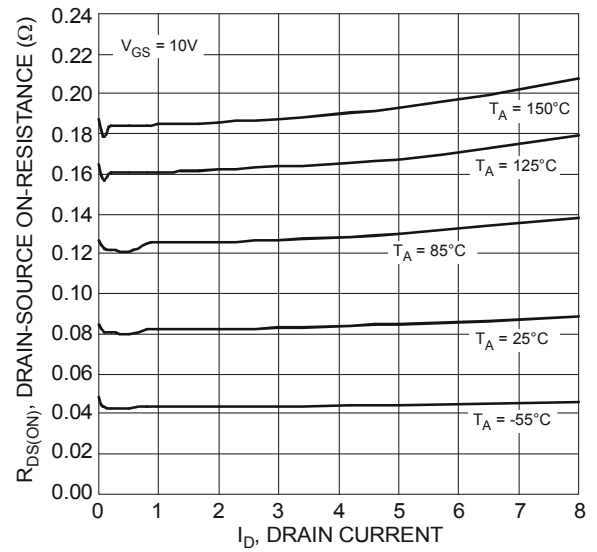


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

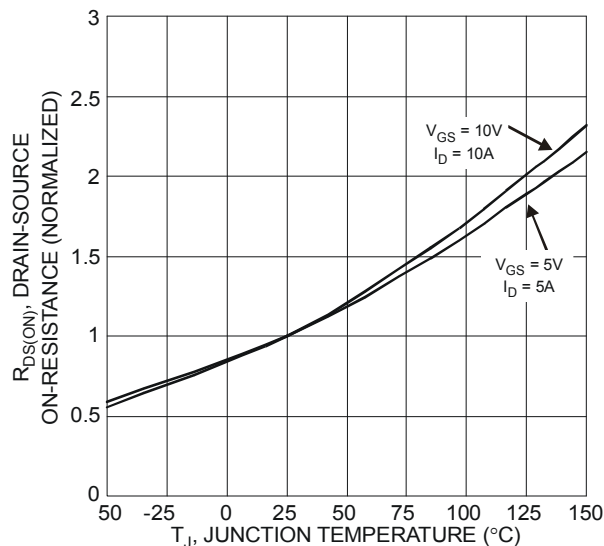


Figure 5 On-Resistance Variation with Temperature

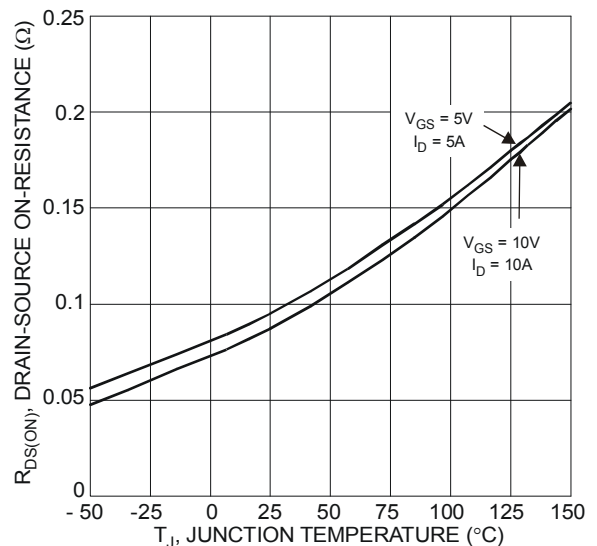


Figure 6 On-Resistance Variation with Temperature

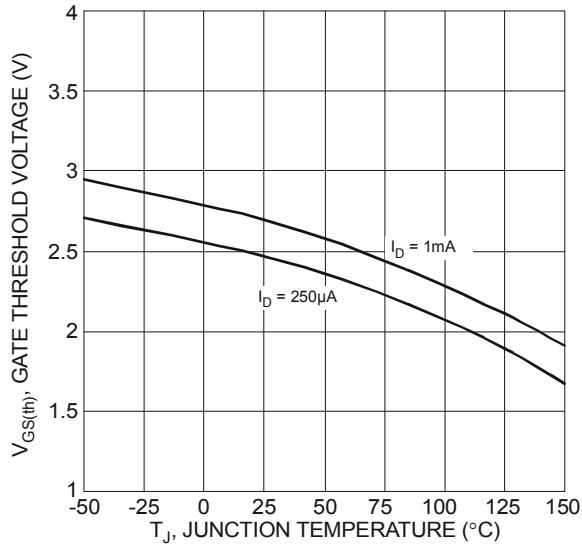


Figure 7 Gate Threshold Variation vs. Ambient Temperature

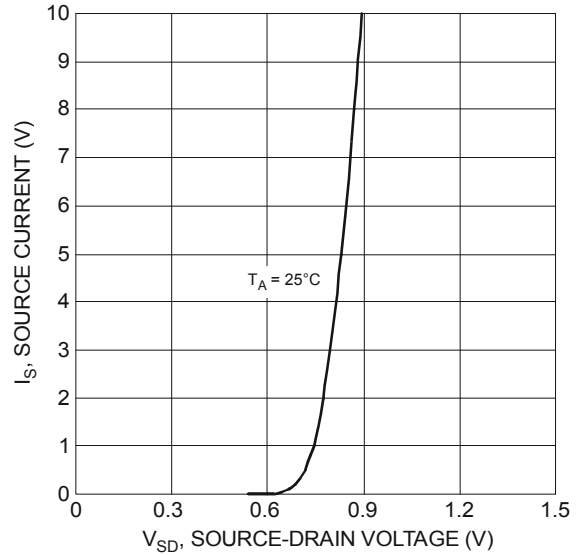


Figure 8 Diode Forward Voltage vs. Current

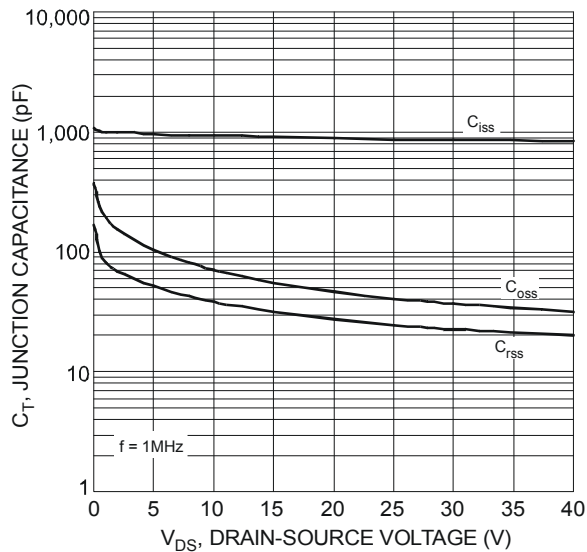


Figure 9 Typical Junction Capacitance

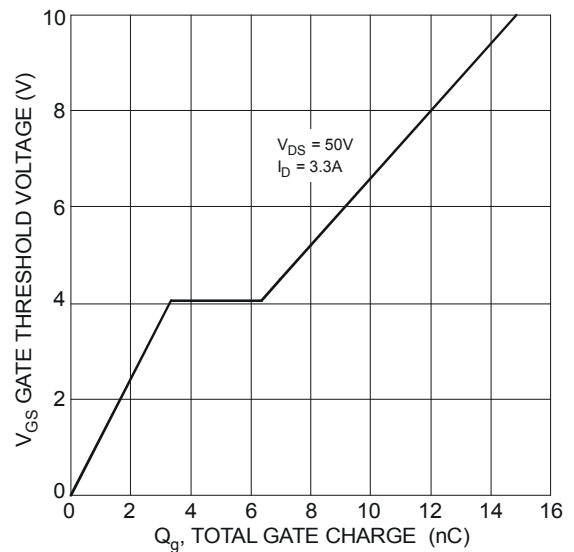


Figure 10 Gate Charge

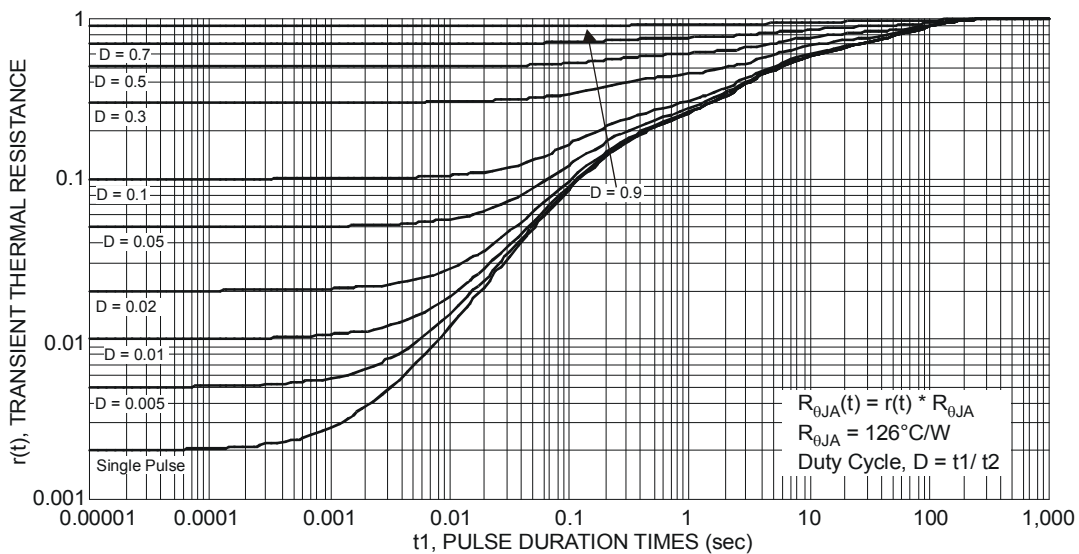
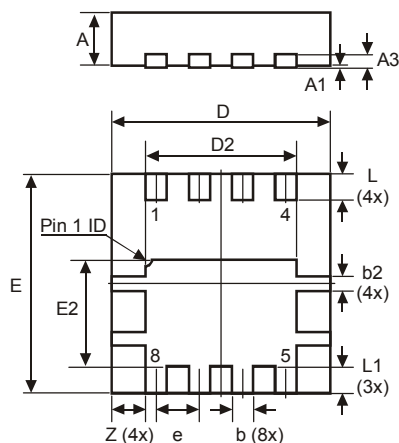


Figure 11 Transient Thermal Resistance

## Package Outline Dimensions

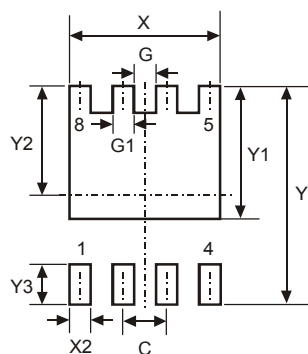
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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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