

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> max        | I <sub>D</sub> max<br>T <sub>C</sub> = +25°C |
|-------------------|--------------------------------|----------------------------------------------|
| 30V               | 4.4mΩ @ V <sub>GS</sub> = 10V  | 62A                                          |
|                   | 5.5mΩ @ V <sub>GS</sub> = 4.5V | 56A                                          |

## Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

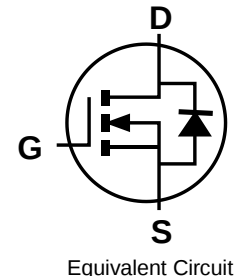
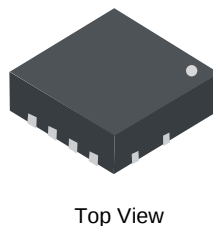
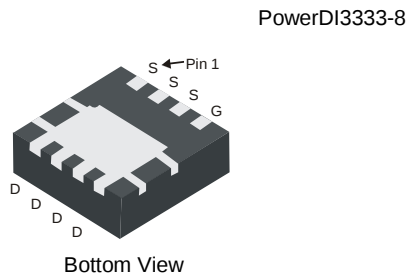
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- Low R<sub>DS(ON)</sub> – Ensures on-state losses are minimized
- Small, form factor thermally efficient package enables higher density end products
- Occupies only 33% of the board area occupied by SO-8 enabling smaller end products
- 100% Unclamped Inductive Switch (UIS) Test in Production
- **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**
- **PPAP Capable (Note 4)**

## 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 
- Weight: 0.072 grams (Approximate)



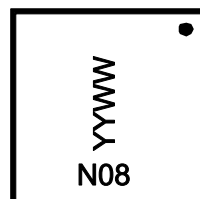
## Ordering Information (Note 5)

| Part Number    | Case          | Packaging         |
|----------------|---------------|-------------------|
| DMN3008SFGQ-7  | PowerDI3333-8 | 2,000/Tape & Reel |
| DMN3008SFGQ-13 | PowerDI3333-8 | 3,000/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

PowerDI3333-8



N08 = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Two Digits of Year (ex: 16 = 2016)  
WW = Week Code (01 to 53)

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

| Characteristic                                          |              |                                                  | Symbol                                           | Value          | Units    |
|---------------------------------------------------------|--------------|--------------------------------------------------|--------------------------------------------------|----------------|----------|
| Drain-Source Voltage                                    |              |                                                  | V <sub>DSS</sub>                                 | 30             | V        |
| Gate-Source Voltage                                     |              |                                                  | V <sub>GSS</sub>                                 | ±20            | V        |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>                                   | 17.6<br>14.1   | A        |
|                                                         | t<10s        | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>                                   | 23.0<br>18.4   | A        |
|                                                         |              | Steady State                                     | T <sub>C</sub> = +25°C<br>T <sub>C</sub> = +70°C | I <sub>D</sub> | 62<br>50 |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%)      |              |                                                  | I <sub>DM</sub>                                  | 80             | A        |
| Maximum Continuous Body Diode Forward Current (Note 7)  |              |                                                  | I <sub>S</sub>                                   | 2              | A        |
| Avalanche Current, L = 0.1mH                            |              |                                                  | I <sub>AS</sub>                                  | 45             | A        |
| Avalanche Energy, L = 0.1mH                             |              |                                                  | E <sub>AS</sub>                                  | 101            | mJ       |

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

| Characteristic                                   |                        | Symbol                            | Value       | Units |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 0.9         | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 0.6         |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 134         | °C/W  |
|                                                  | t < 10s                |                                   | 79          |       |
| Total Power Dissipation (Note 7)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.1         | W     |
|                                                  | T <sub>A</sub> = +70°C |                                   | 1.3         |       |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State           | R <sub>θJA</sub>                  | 58          | °C/W  |
|                                                  | t < 10s                |                                   | 34          |       |
| Thermal Resistance, Junction to Case (Note 7)    |                        | R <sub>θJC</sub>                  | 4.8         | °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</b> (Note 8)        |                     |     |       |      |      |                                                                                                                     |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 30  | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                                        |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 10   | μA   | V <sub>DS</sub> = 30V, 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</b> (Note 8)         |                     |     |       |      |      |                                                                                                                     |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1   | —     | 2.3  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                                          |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 3.9   | 4.4  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A                                                                       |
|                                            |                     | —   | 4.6   | 5.5  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 13.5A                                                                      |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.75  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A                                                                           |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 9)    |                     |     |       |      |      |                                                                                                                     |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 3,690 | —    | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz                                                               |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 530   | —    | pF   |                                                                                                                     |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 459   | —    | pF   |                                                                                                                     |
| Gate Resistance                            | R <sub>g</sub>      | —   | 0.9   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                                                |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 41    | —    | nC   | V <sub>DS</sub> = 24V, I <sub>D</sub> = 27A                                                                         |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 86    | —    | nC   |                                                                                                                     |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 9.2   | —    | nC   |                                                                                                                     |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 18.6  | —    | nC   |                                                                                                                     |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 5.7   | —    | ns   | V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, R <sub>L</sub> = 1.11Ω, R <sub>G</sub> = 4.7Ω, I <sub>D</sub> = 13.5A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 14.0  | —    | ns   |                                                                                                                     |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 63.7  | —    | ns   |                                                                                                                     |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 28.4  | —    | ns   |                                                                                                                     |
| Reverse Recovery Time                      | t <sub>RR</sub>     | —   | 19.3  | —    | ns   | I <sub>F</sub> = 13.5A, di/dt = 100A/μs                                                                             |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     | —   | 10.7  | —    | nC   |                                                                                                                     |

- Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  
8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

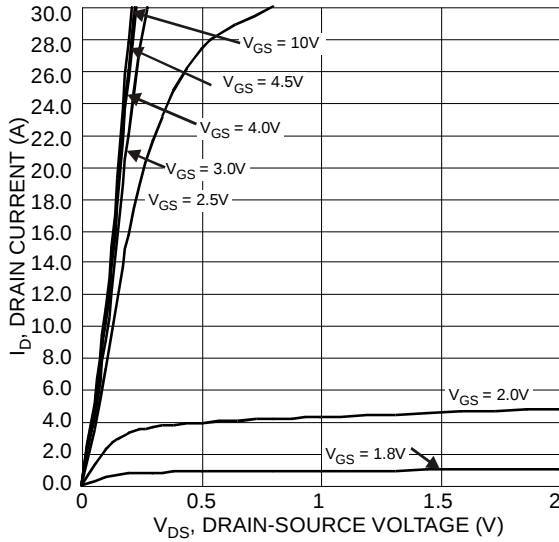


Figure 1 Typical Output Characteristic

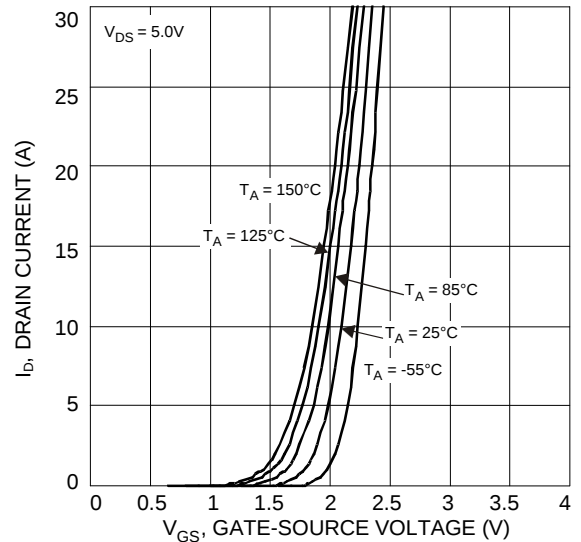


Figure 2 Typical Transfer Characteristics

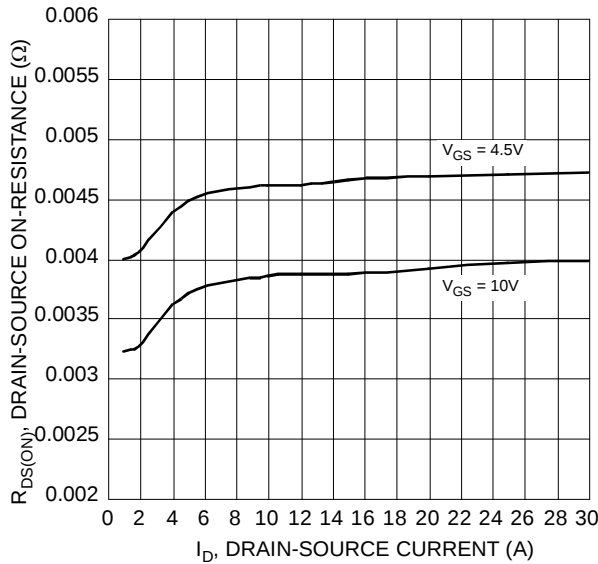


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

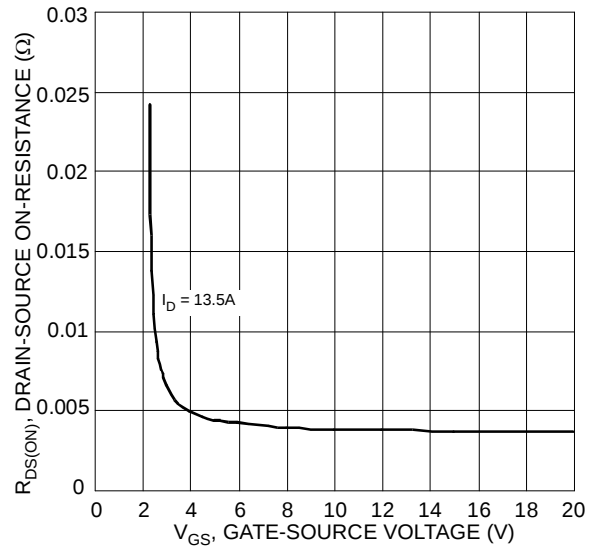


Figure 4 Typical Transfer Characteristic

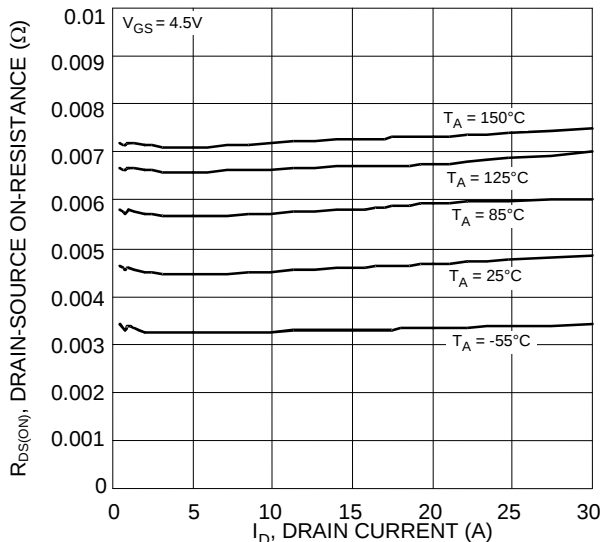


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

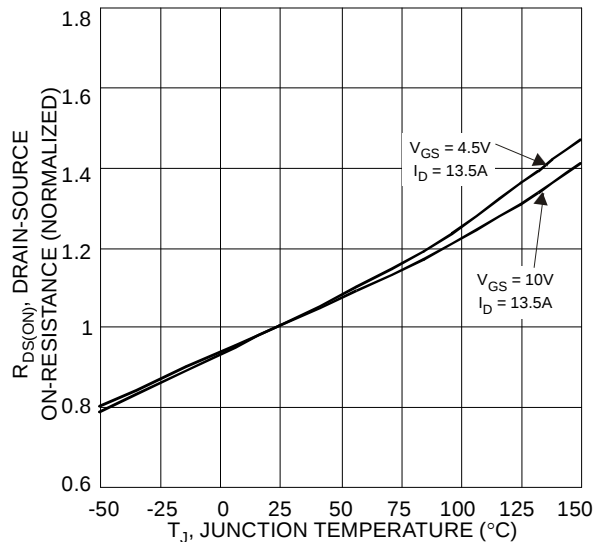
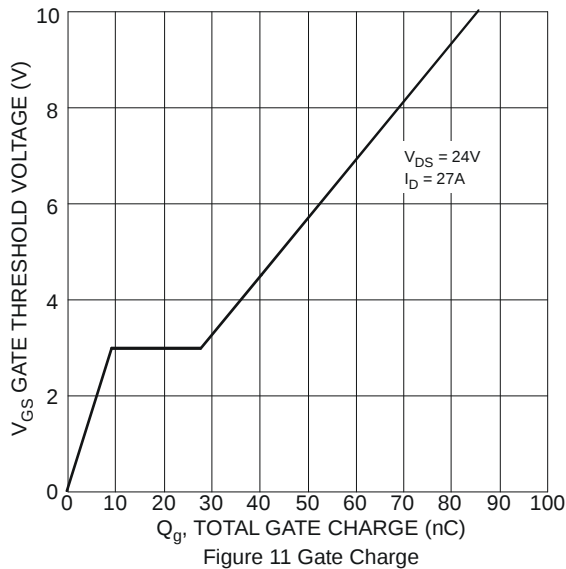
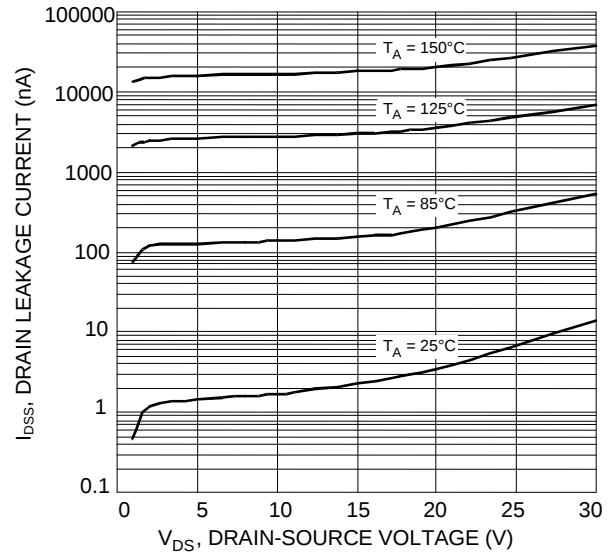
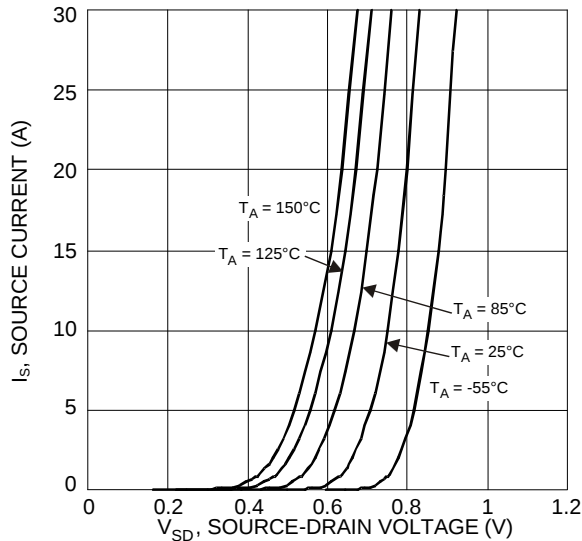
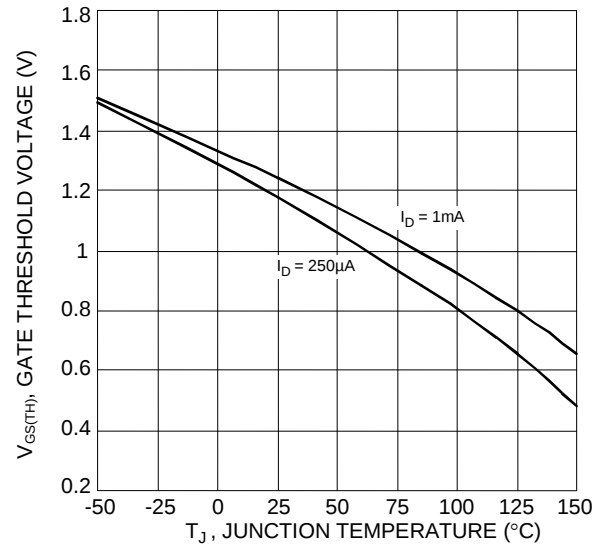
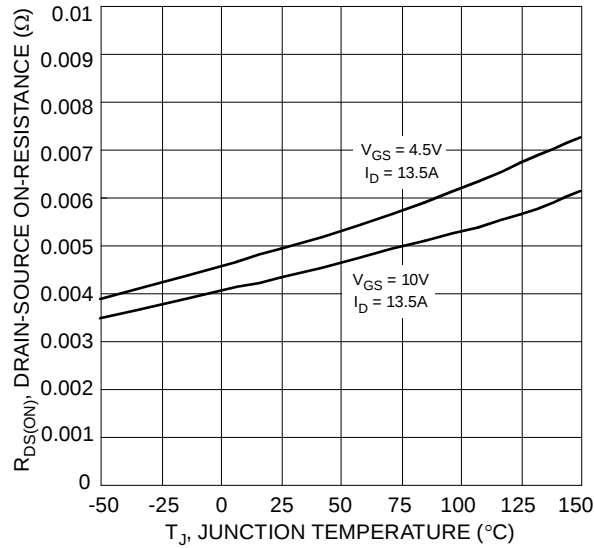


Figure 6 On-Resistance Variation with Temperature



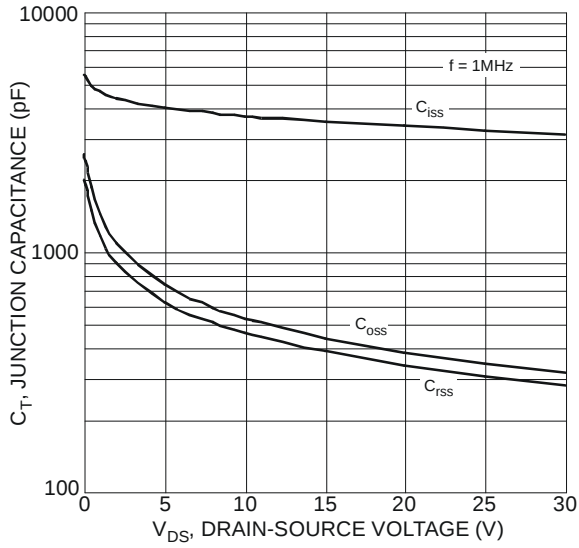


Figure 12 Typical Junction Capacitance

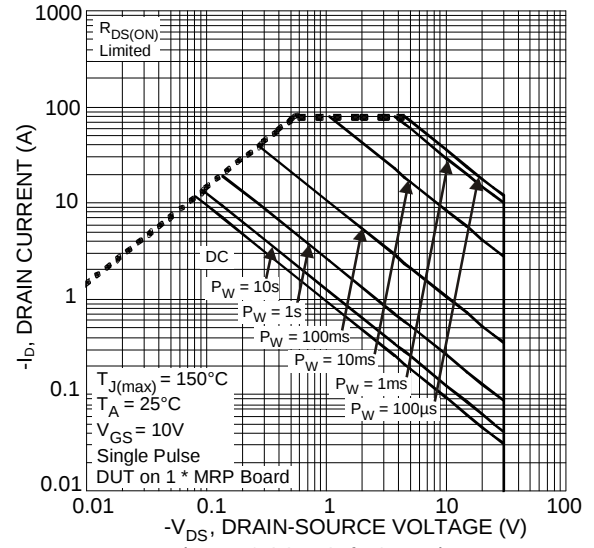


Figure 13 SOA, Safe Operation Area

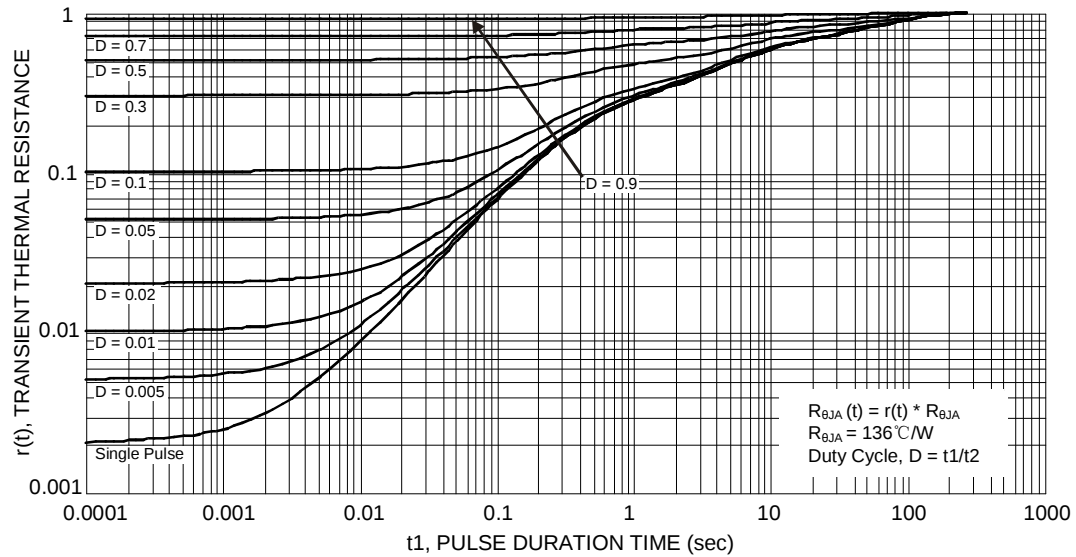
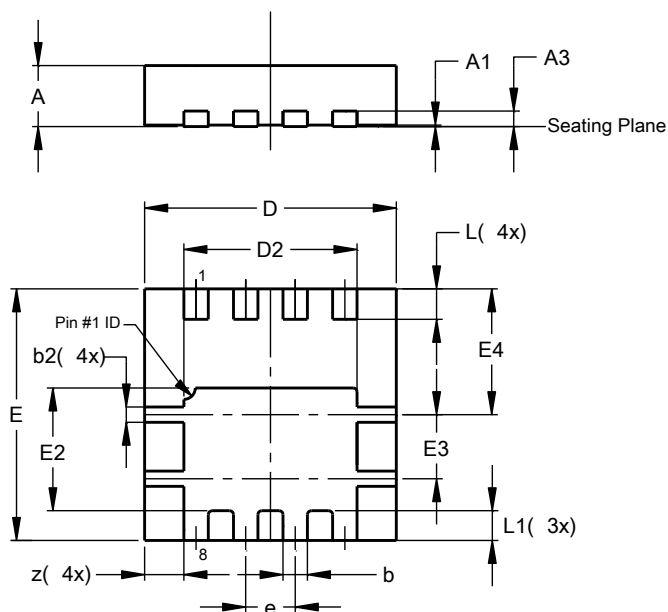


Figure 14 Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**PowerDI3333-8**

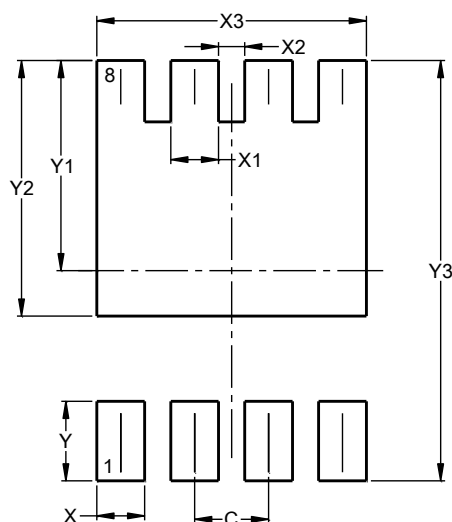


| PowerDI3333-8        |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0.00 | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 0.27 | 0.37 | 0.32  |
| b2                   | 0.15 | 0.25 | 0.20  |
| D                    | 3.25 | 3.35 | 3.30  |
| D2                   | 2.22 | 2.32 | 2.27  |
| E                    | 3.25 | 3.35 | 3.30  |
| E2                   | 1.56 | 1.66 | 1.61  |
| E3                   | 0.79 | 0.89 | 0.84  |
| E4                   | 1.60 | 1.70 | 1.65  |
| e                    | —    | —    | 0.65  |
| L                    | 0.35 | 0.45 | 0.40  |
| L1                   | —    | —    | 0.39  |
| z                    | —    | —    | 0.515 |
| All Dimensions in mm |      |      |       |

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**PowerDI3333-8**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| X          | 0.420         |
| X1         | 0.420         |
| X2         | 0.230         |
| X3         | 2.370         |
| Y          | 0.700         |
| Y1         | 1.850         |
| Y2         | 2.250         |
| Y3         | 3.700         |

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