

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max       | I <sub>D</sub> Max<br>T <sub>A</sub> = +25°C |
|-------------------|-------------------------------|--|
| 75V               | 22mΩ @ V <sub>GS</sub> = 10V  | 7.8A   |
|                   | 28mΩ @ V <sub>GS</sub> = 4.5V | 6.9A   |

## 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:

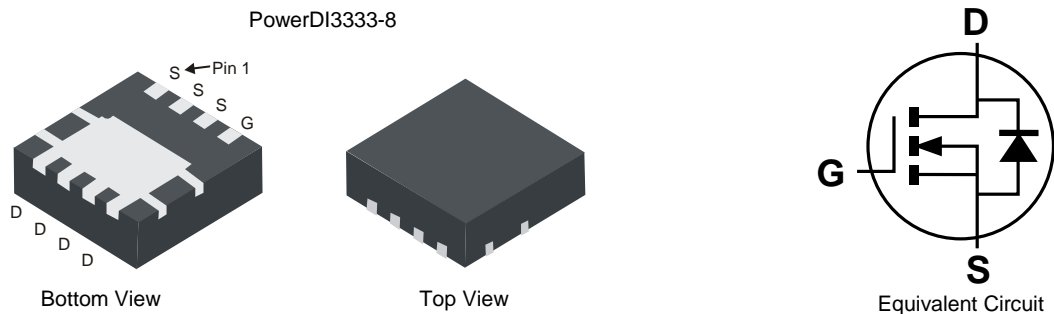
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low R<sub>DS(ON)</sub> – 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**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: PowerDI<sup>®</sup>3333-8
- 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 Ⓔ3
- Weight: 0.072 grams (Approximate)

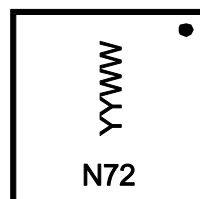


## Ordering Information (Note 5)

| Part Number    | Case          | Packaging         |
|----------------|---------------|-------------------|
| DMN7022LFGQ-7  | PowerDI3333-8 | 2,000/Tape & Reel |
| DMN7022LFGQ-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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



N72= Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 17 = 2017)  
 WW = Week Code (01 to 53)

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

| Characteristic  |              |                        | Symbol           | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage  |              |                        | V <sub>DSS</sub> | 75    | 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 | I <sub>D</sub>   | 7.8   | A    |
|   |              | T <sub>A</sub> = +70°C |                  | 6.2   |      |
| Continuous Drain Current (Note 8) V <sub>GS</sub> = 10V         | Steady State | T <sub>C</sub> = +25°C | I <sub>D</sub>   | 23    | A    |
|   |              | T <sub>C</sub> = +70°C |                  | 18    |      |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)              |              |                        | I <sub>DM</sub>  | 56    | A    |
| Maximum Continuous Body Diode Forward Current (Note 6)          |              |                        | I <sub>S</sub>   | 2.1   | A    |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%) |              |                        | I <sub>SM</sub>  | 50    | A    |
| Avalanche Current, L = 0.1mH (Note 9)                           |              |                        | I <sub>AS</sub>  | 28.8  | A    |
| Avalanche Energy, L = 0.1mH (Note 9)                            |              |                        | E <sub>AS</sub>  | 42.2  | mJ   |

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

| Characteristic                                   |              | Symbol                            | Value       | Unit |
|--|--------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 6)                 |              | P <sub>D</sub>                    | 0.9         | W    |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R <sub>θJA</sub>                  | 125         | °C/W |
|  | t < 10s      |                                   | 67          |      |
| Total Power Dissipation (Note 7)                 |              | P <sub>D</sub>                    | 2           | W    |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State | R <sub>θJA</sub>                  | 62          | °C/W |
|  | t < 10s      |                                   | 34          |      |
| Thermal Resistance, Junction to Case (Note 8)    |              | R <sub>θJC</sub>                  | 6.9         |      |
| 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 10)</b>                     |                     |     |      |      |      |   |
| Drain-Source Breakdown Voltage                           | BV <sub>DSS</sub>   | 75  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA  |
| Zero Gate Voltage Drain Current (T <sub>J</sub> = +25°C) | I <sub>DSS</sub>    | —   | —    | 1    | µA   | V <sub>DS</sub> = 75V, 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 10)</b>                      |                     |     |      |      |      |   |
| Gate Threshold Voltage                                   | V <sub>GS(TH)</sub> | 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> | —   | 14.6 | 22   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.2A  |
|  |                     | —   | 20.5 | 28   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6.4A   |
| Diode Forward Voltage                                    | V <sub>SD</sub>     | —   | 0.72 | —    | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3.2A   |
| <b>DYNAMIC CHARACTERISTICS (Note 11)</b>                 |                     |     |      |      |      |   |
| Input Capacitance  | C <sub>ISS</sub>    | —   | 2737 | —    | pF   | V <sub>DS</sub> = 35V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                    |
| Output Capacitance                                       | C <sub>OSS</sub>    | —   | 126  | —    | pF   |   |
| Reverse Transfer Capacitance                             | C <sub>RSS</sub>    | —   | 96.1 | —    | pF   |   |
| Gate Resistance  | R <sub>g</sub>      | —   | 0.89 | —    | 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>      | —   | 26.4 | —    | nC   | V <sub>DS</sub> = 38V, I <sub>D</sub> = 7.2A  |
| Total Gate Charge (V <sub>GS</sub> = 10V)                | Q <sub>g</sub>      | —   | 56.5 | —    | nC   |   |
| Gate-Source Charge                                       | Q <sub>gs</sub>     | —   | 12   | —    | nC   |   |
| Gate-Drain Charge  | Q <sub>gd</sub>     | —   | 11.8 | —    | nC   |   |
| Turn-On Delay Time                                       | t <sub>D(ON)</sub>  | —   | 6.1  | —    | ns   |   |
| Turn-On Rise Time  | t <sub>R</sub>      | —   | 5.7  | —    | ns   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 38V,<br>R <sub>g</sub> = 1Ω, I <sub>D</sub> = 5.7A |
| Turn-Off Delay Time                                      | t <sub>D(OFF)</sub> | —   | 19.6 | —    | ns   |   |
| Turn-Off Fall Time                                       | t <sub>F</sub>      | —   | 3.9  | —    | ns   |   |
| Body Diode Reverse Recovery Time                         | t <sub>RR</sub>     | —   | 26.2 | —    | ns   | I <sub>F</sub> = 5.7A, di/dt = 100A/µs  |
| Body Diode Reverse Recovery Charge                       | Q <sub>RR</sub>     | —   | 25.2 | —    | nC   |   |

- Notes:
6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
  8. Thermal resistance from junction to soldering point (on the exposed drain pad).
  9. I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  10. Short duration pulse test used to minimize self-heating effect.
  11. Guaranteed by design. Not subject to product testing.

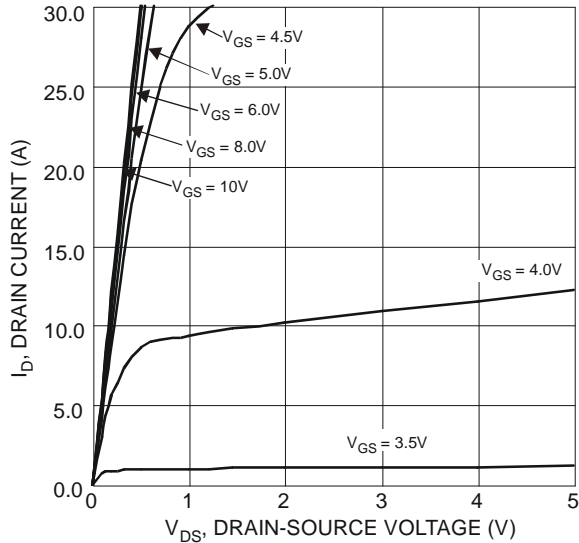


Figure 1 Typical Output Characteristics

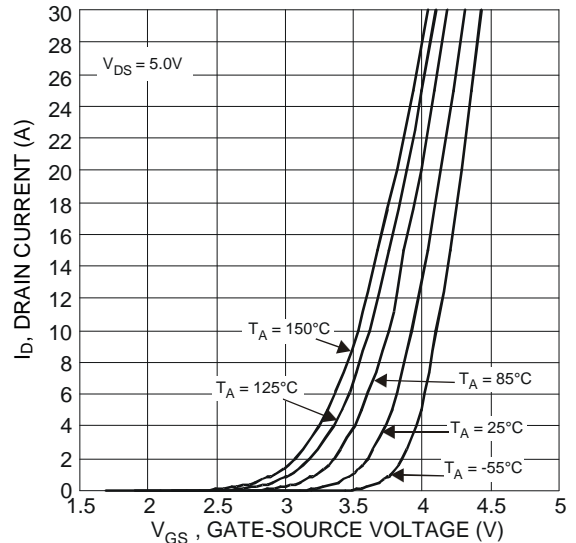


Figure 2 Typical Transfer Characteristics

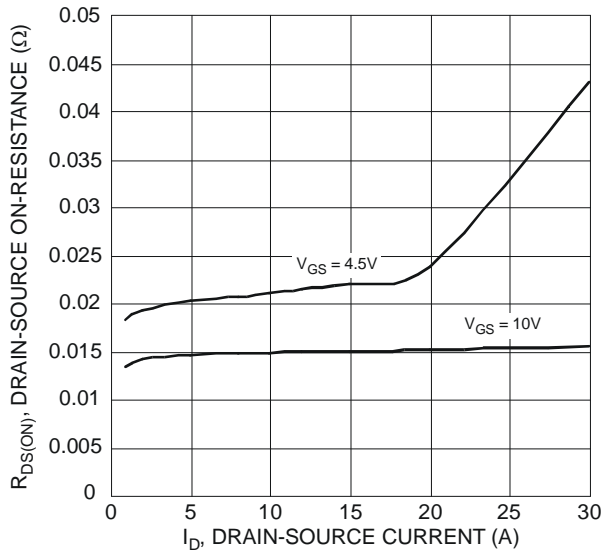


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

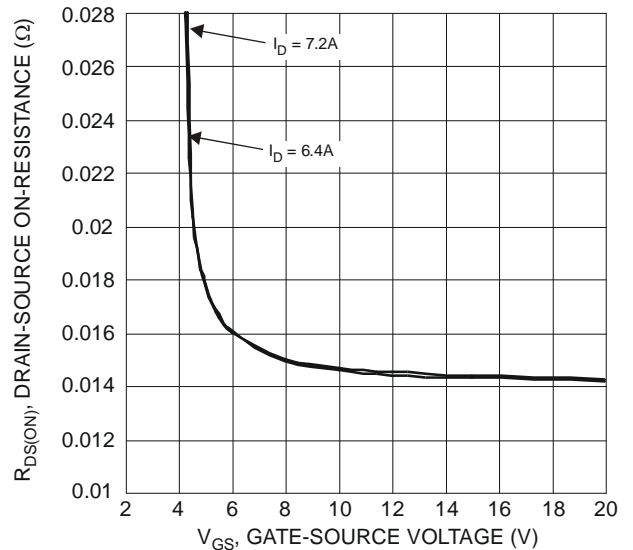


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

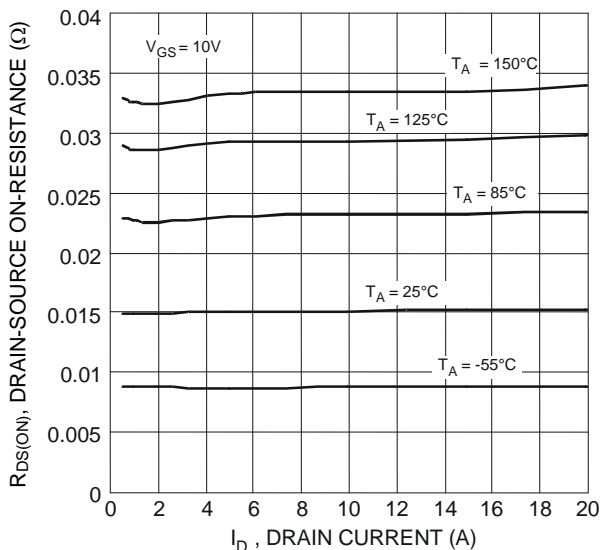


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

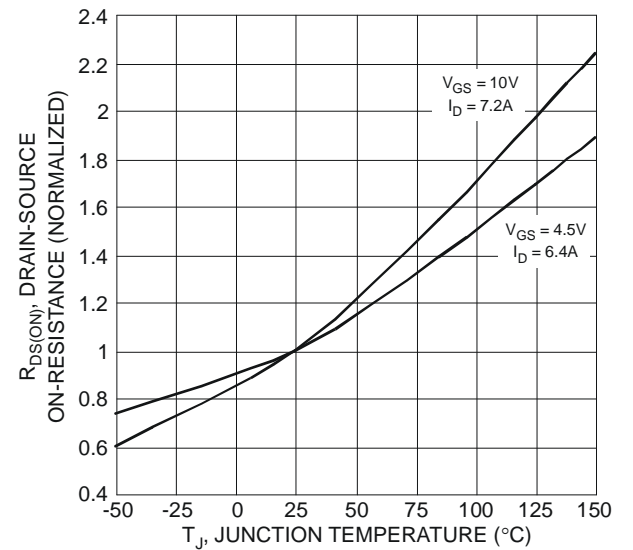


Figure 6 On-Resistance Variation with Temperature

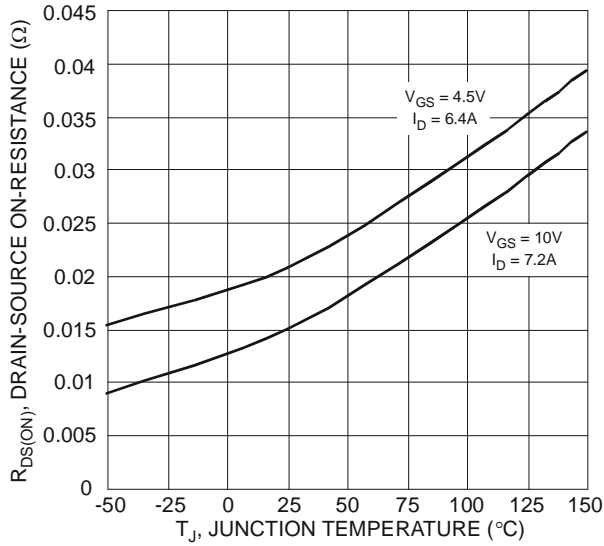


Figure 7 On-Resistance Variation with Temperature

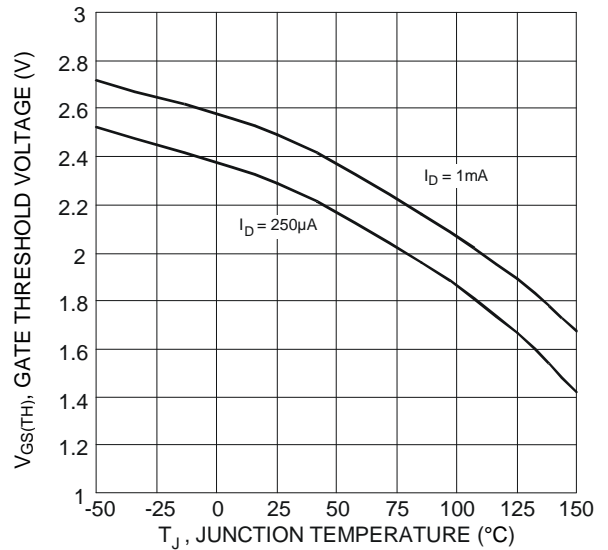


Figure 8 Gate Threshold Variation vs Junction Temperature

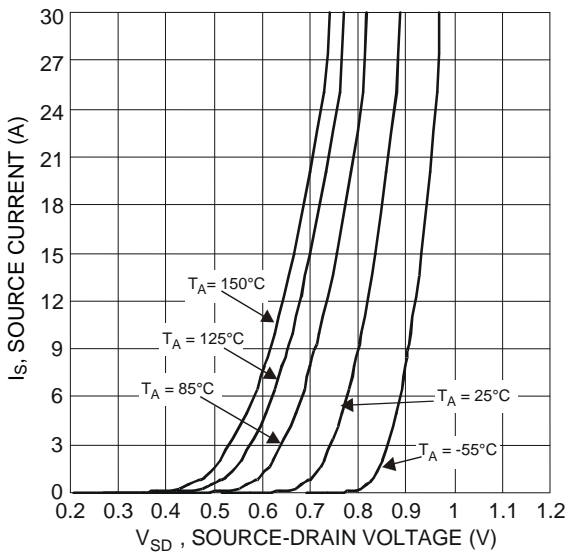


Figure 9 Diode Forward Voltage vs. Current

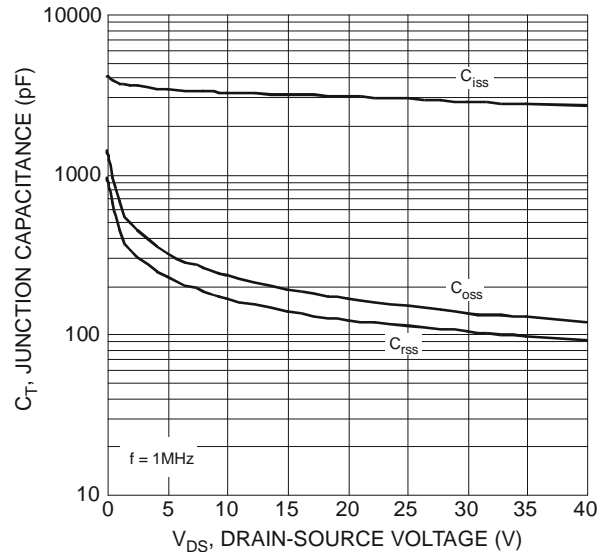


Figure 10 Typical Junction Capacitance

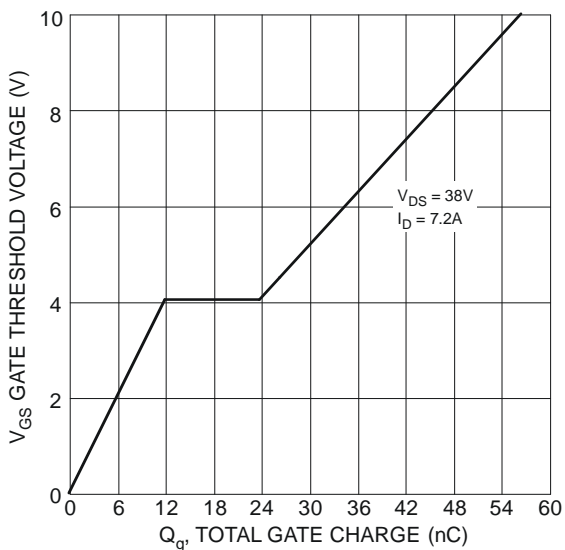


Figure 11 Gate Charge

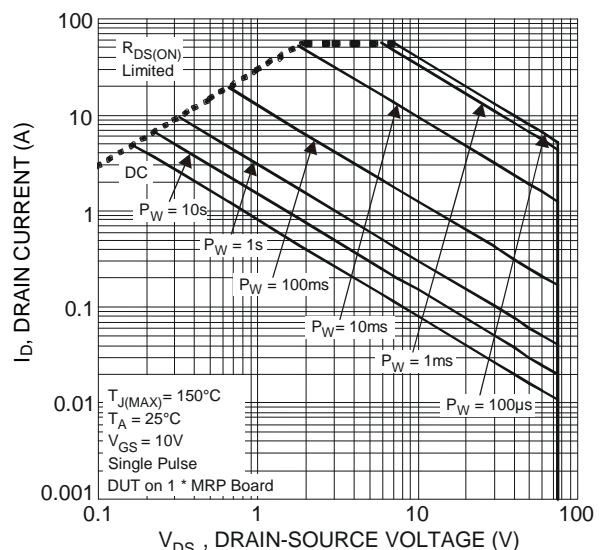
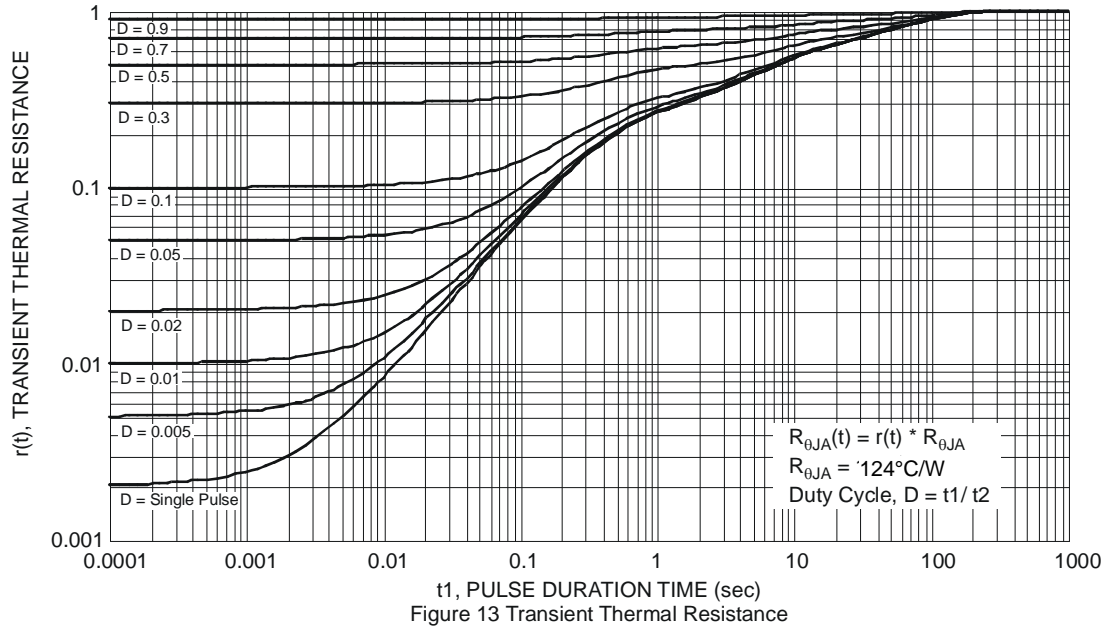


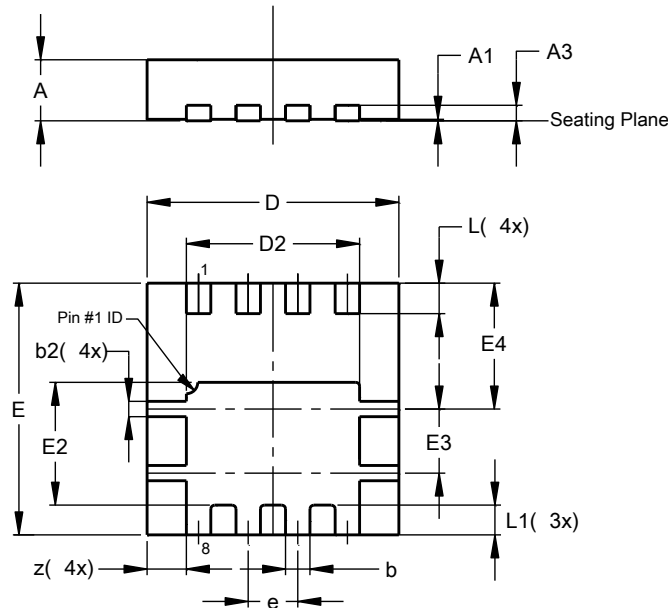
Figure 12 SOA, Safe Operation Area



### Package Outline Dimensions

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

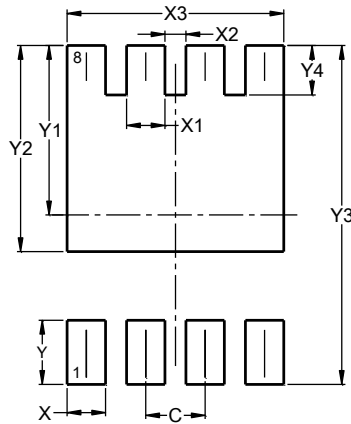
**PowerDI3333-8**



| 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) |
|------------|---------------|
| <b>C</b>   | 0.650         |
| <b>X</b>   | 0.420         |
| <b>X1</b>  | 0.420         |
| <b>X2</b>  | 0.230         |
| <b>X3</b>  | 2.370         |
| <b>Y</b>   | 0.700         |
| <b>Y1</b>  | 1.850         |
| <b>Y2</b>  | 2.250         |
| <b>Y3</b>  | 3.700         |
| <b>Y4</b>  | 0.540         |

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