

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> max         | I <sub>D</sub> max<br>T <sub>C</sub> = +25°C |
|-------------------|---------------------------------|----------------------------------------------|
| 60V               | 9.5mΩ @ V <sub>GS</sub> = 10V   | 45A                                          |
|                   | 13.3mΩ @ V <sub>GS</sub> = 4.5V | 36A                                          |

## Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Power Management Functions
- DC-DC Converters
- Synchronous Rectifier

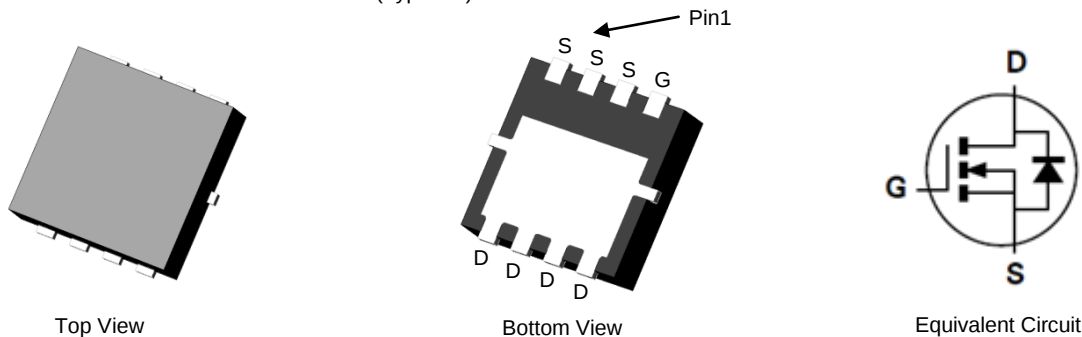
## Features

- 100% Unclamped Inductive Switching – Ensures more reliable and robust end application
- Low On-Resistance
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: PowerDI<sup>®</sup> 3333-8 (Type UX)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.072 grams (Approximate)

PowerDI3333-8 (Type UX)

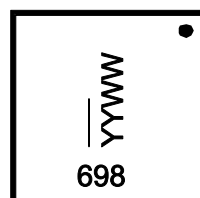


## Ordering Information (Note 4)

| Part Number   | Case                    | Packaging        |
|---------------|-------------------------|------------------|
| DMT69M8LFV-7  | PowerDI3333-8 (Type UX) | 2000/Tape & Reel |
| DMT69M8LFV-13 | PowerDI3333-8 (Type UX) | 3000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



698 = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Two Digits of Year (ex: 18 = 2018)  
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>   | 60    | V    |
| Gate-Source Voltage                                     |                        | V <sub>GSS</sub>   | ±16   | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V | T <sub>C</sub> = +25°C | I <sub>D</sub>     | 45    | A    |
|                                                         | T <sub>C</sub> = +70°C | I <sub>D</sub>     | 37    | A    |
|                                                         | T <sub>A</sub> = +25°C | I <sub>D</sub>     | 11    | A    |
|                                                         | T <sub>A</sub> = +70°C | I <sub>D</sub>     | 8.9   | A    |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)      |                        | I <sub>DM</sub>    | 60    | A    |
| Maximum Continuous Body Diode Forward Current (Note 5)  |                        | I <sub>S</sub>     | 2     | A    |
| Avalanche Current, L = 0.1mH                            |                        | I <sub>AS</sub>    | 20.3  | A    |
| Avalanche Energy, L = 0.1mH                             |                        | E <sub>AS</sub>    | 20.6  | mJ   |
| V <sub>DS</sub> Spike                                   | t = 10μs               | V <sub>SPIKE</sub> | 72    | V    |

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

| Characteristic                                   |                        | Symbol                            | Value       | Unit |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.2         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) |                        | R <sub>θJA</sub>                  | 57          | °C/W |
| Total Power Dissipation (Note 5)                 | T <sub>C</sub> = +25°C | P <sub>D</sub>                    | 42          | W    |
| Thermal Resistance, Junction to Case (Note 5)    |                        | R <sub>θJC</sub>                  | 3           | °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 6)</b>        |                     |     |      |      |      |                                                                                              |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —    | —    | 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> = 48V, V <sub>GS</sub> = 0V                                                  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V                                                 |
| <b>ON CHARACTERISTICS (Note 6)</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> | —   | 7.5  | 9.5  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 13.5A                                                |
|                                            |                     | —   | 9.9  | 13.3 |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11.5A                                               |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | —    | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 13.5A                                                 |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>    |                     |     |      |      |      |                                                                                              |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 1925 | —    | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                     |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 438  | —    | pF   |                                                                                              |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 41   | —    | pF   |                                                                                              |
| Gate Resistance                            | R <sub>g</sub>      | —   | 1.7  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                         |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 33.5 | —    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 13.5A                                                |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 15.6 | —    | nC   |                                                                                              |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 4.7  | —    | nC   |                                                                                              |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 5.3  | —    | nC   |                                                                                              |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 4.5  | —    | ns   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = 13.5A |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 8.6  | —    | ns   |                                                                                              |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 35.9 | —    | ns   |                                                                                              |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 15.7 | —    | ns   |                                                                                              |
| Body Diode Reverse Recovery Time           | t <sub>RR</sub>     | —   | 18.2 | —    | ns   | I <sub>F</sub> = 13.5A, di/dt = 400A/μs                                                      |
| Body Diode Reverse Recovery Charge         | Q <sub>RR</sub>     | —   | 33.1 | —    | nC   |                                                                                              |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.  
6. Short duration pulse test used to minimize self-heating effect.  
7. Guaranteed by design. Not subject to product testing.

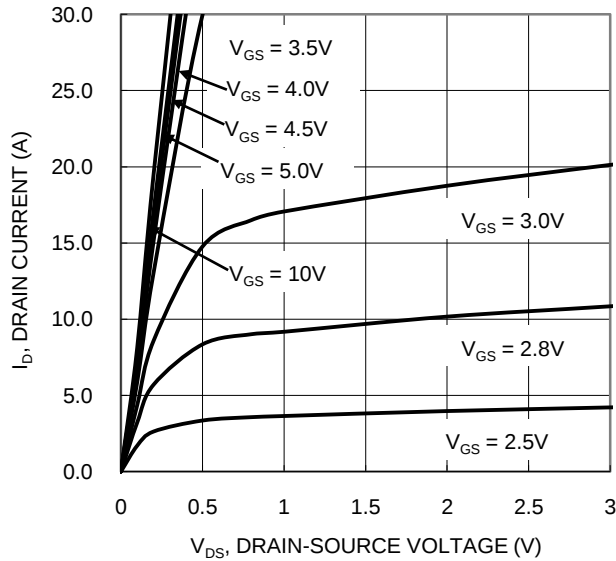


Figure 1. Typical Output Characteristic

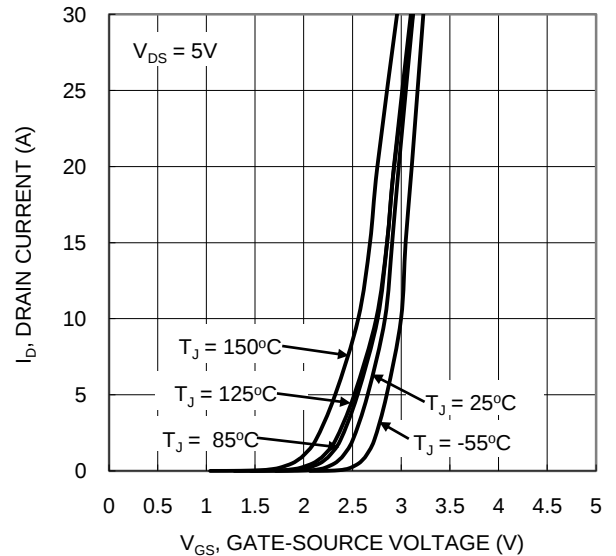


Figure 2. Typical Transfer Characteristic

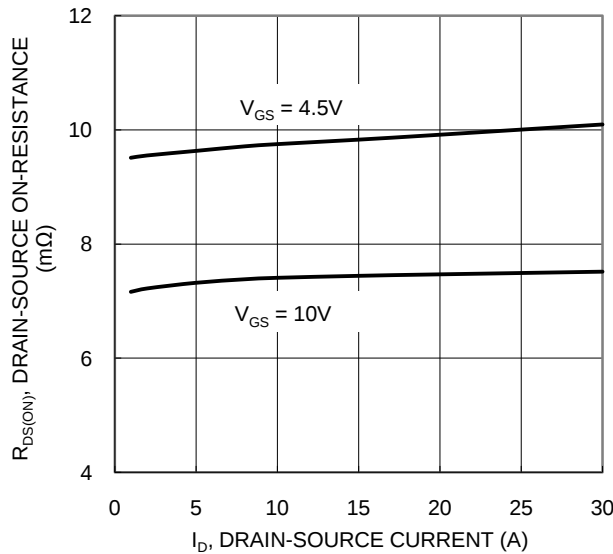


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

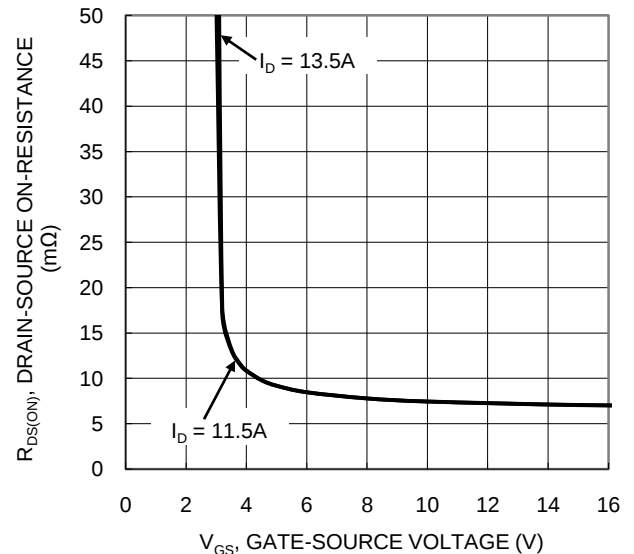


Figure 4. Typical Transfer Characteristic

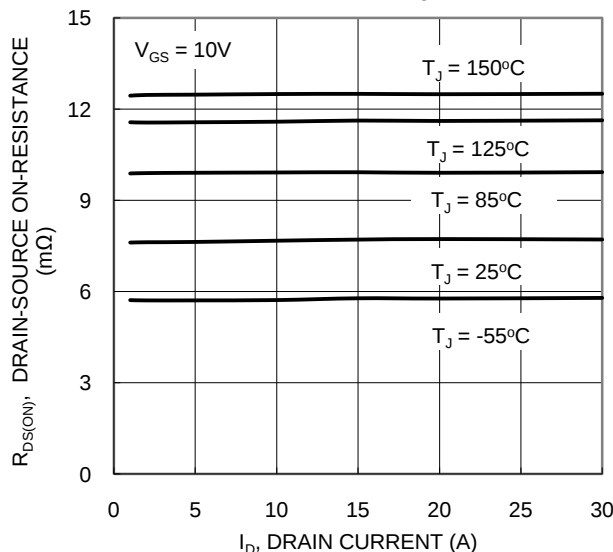


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

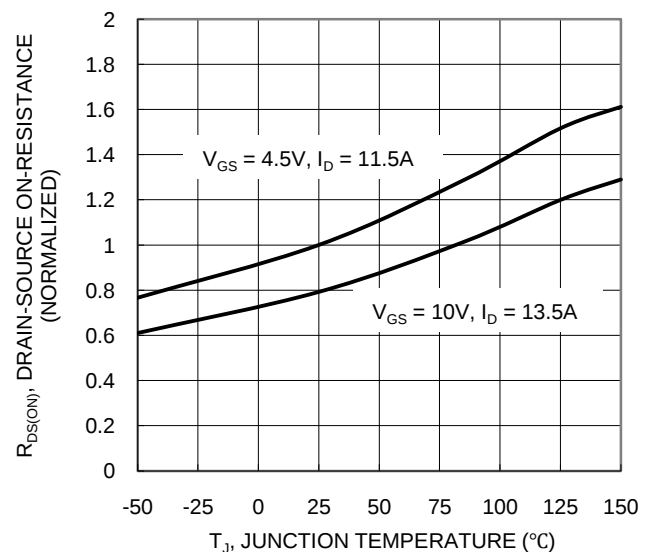


Figure 6. On-Resistance Variation with Junction Temperature

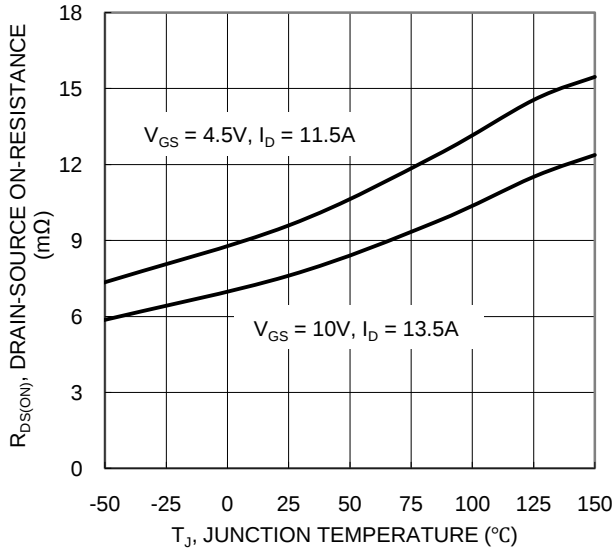


Figure 7. On-Resistance Variation with Junction Temperature

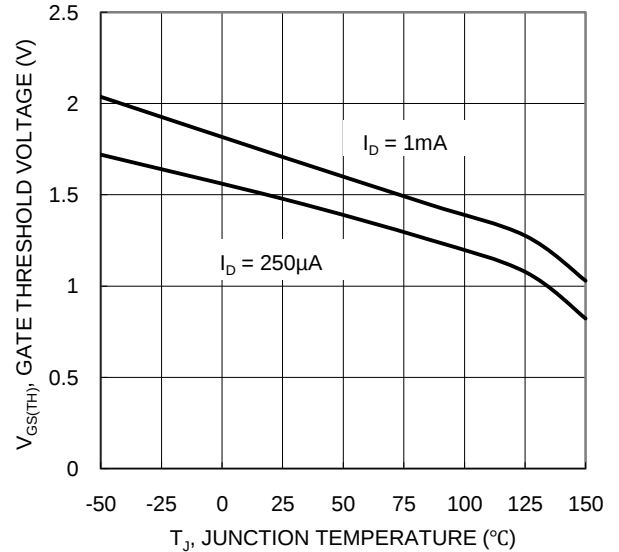


Figure 8. Gate Threshold Variation vs. Junction Temperature

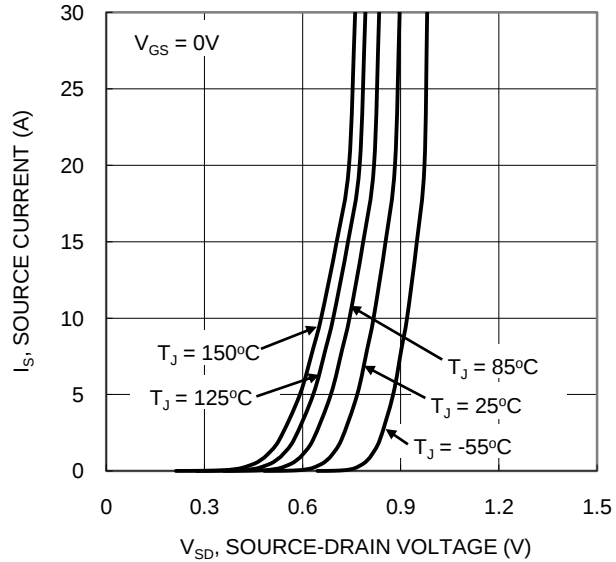


Figure 9. Diode Forward Voltage vs. Current

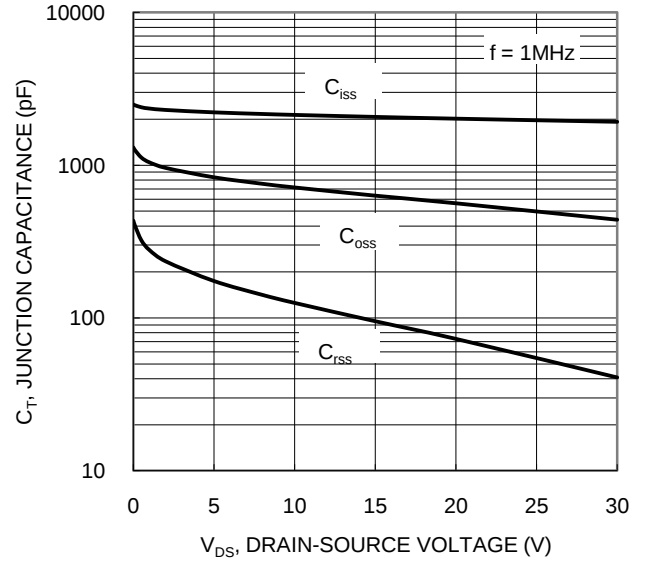


Figure 10. Typical Junction Capacitance

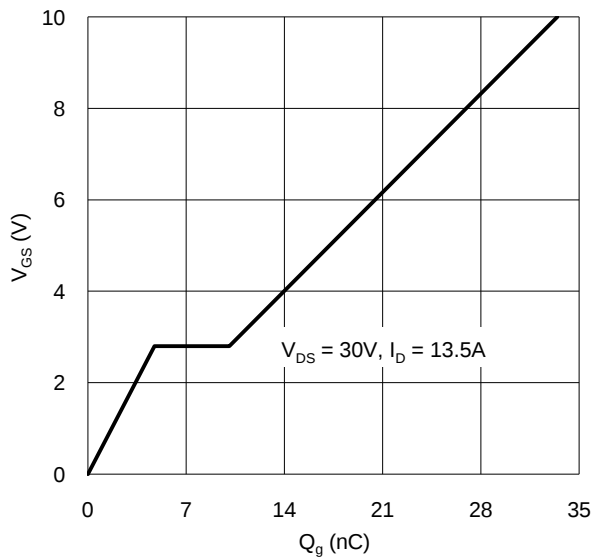


Figure 11. Gate Charge

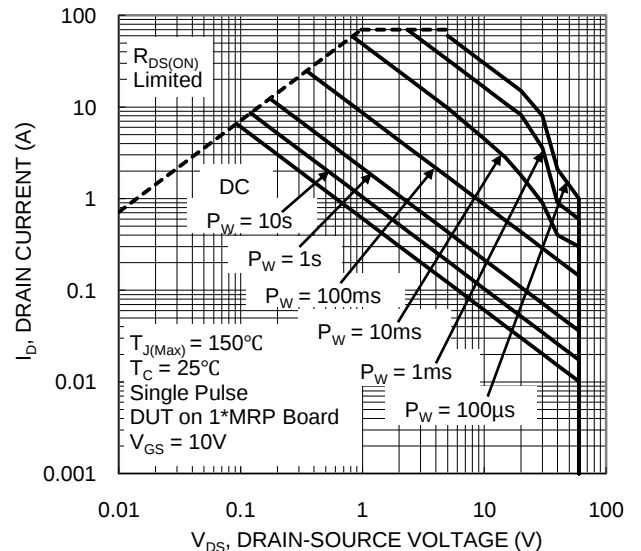


Figure 12. SOA, Safe Operation Area

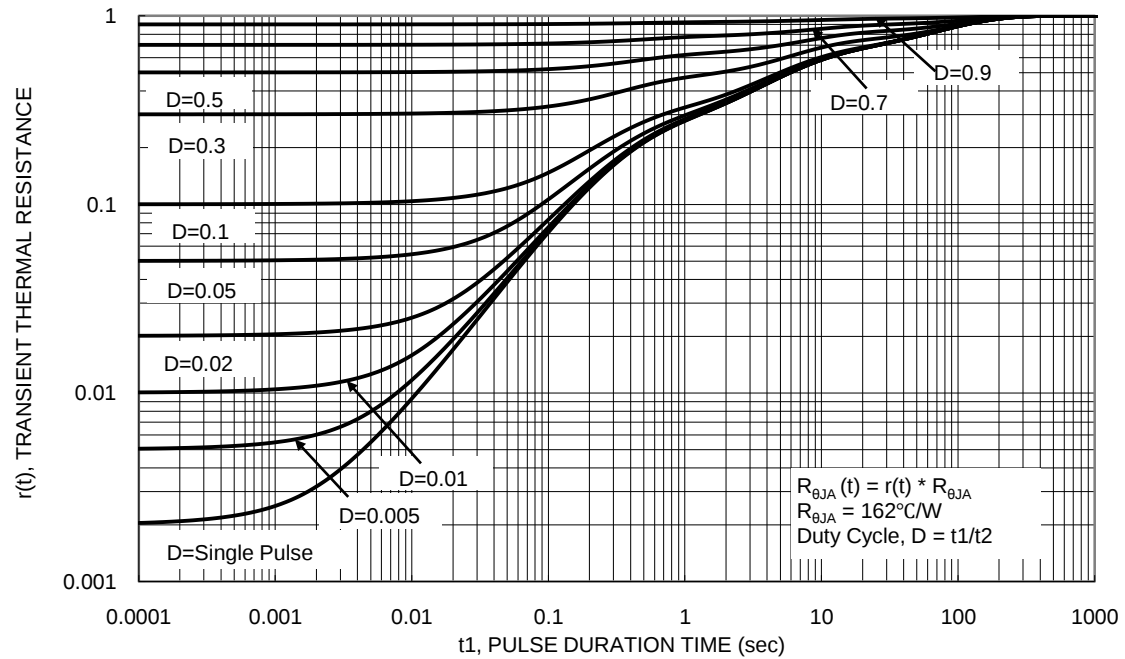
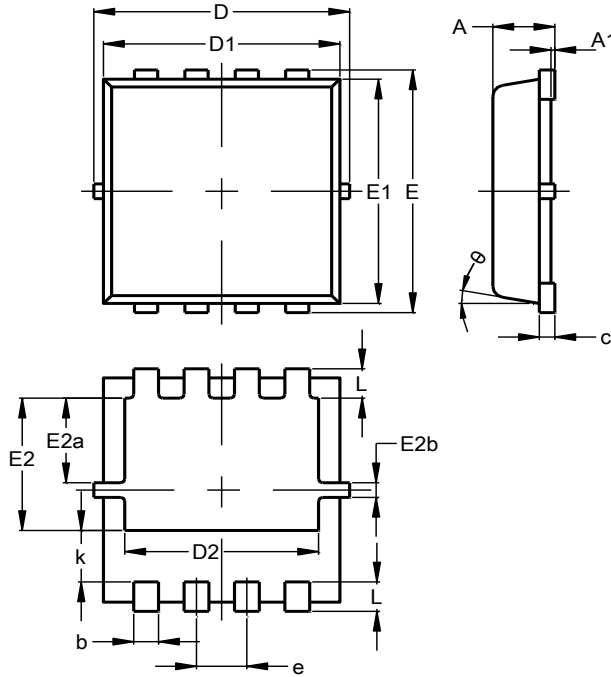


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

### PowerDI3333-8 (Type UX)

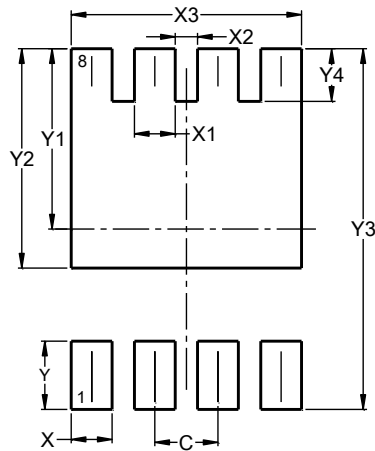


| PowerDI3333-8<br>(Type UX) |          |      |      |
|----------------------------|----------|------|------|
| Dim                        | Min      | Max  | Typ  |
| A                          | 0.75     | 0.85 | 0.80 |
| A1                         | 0.00     | 0.05 | --   |
| b                          | 0.25     | 0.40 | 0.32 |
| c                          | 0.10     | 0.25 | 0.15 |
| D                          | 3.20     | 3.40 | 3.30 |
| D1                         | 2.95     | 3.15 | 3.05 |
| D2                         | 2.30     | 2.70 | 2.50 |
| E                          | 3.20     | 3.40 | 3.30 |
| E1                         | 2.95     | 3.15 | 3.05 |
| E2                         | 1.60     | 2.00 | 1.80 |
| E2a                        | 0.95     | 1.35 | 1.15 |
| E2b                        | 0.10     | 0.30 | 0.20 |
| e                          | 0.65 BSC |      |      |
| k                          | 0.50     | 0.90 | 0.70 |
| L                          | 0.30     | 0.50 | 0.40 |
| θ                          | 0°       | 12°  | 10°  |
| All Dimensions in mm       |          |      |      |

## Suggested Pad Layout

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

### PowerDI3333-8 (Type UX)



| 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         |
| Y4         | 0.540         |

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