

## Product Summary

| BV <sub>DSS</sub> | R <sub>D(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 has been designed to minimize the on-state resistance (R<sub>D(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

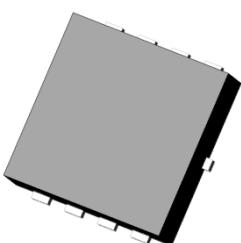
## Features

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

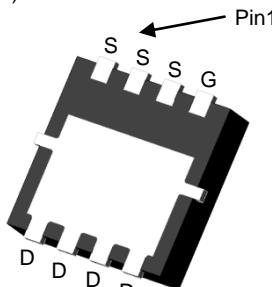
## Mechanical Data

- Case: PowerDI® 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 (e3)
- Weight: 0.072 grams (Approximate)

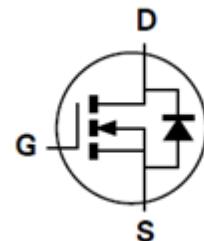
PowerDI3333-8 (Type UX)



Top View



Bottom View



Equivalent Circuit

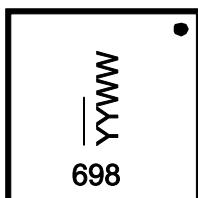
## Ordering Information (Note 4)

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

Notes:

1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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



698 = 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   | Symbol                    | Value       | Units |
|--|---------------------------|-------------|-------|
| Drain-Source Voltage   | $V_{DSS}$                 | 60          | V     |
| Gate-Source Voltage  | $V_{GSS}$                 | $\pm 16$    | V     |
| Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$        | $T_C = +25^\circ\text{C}$ | 45          | A     |
|  | $T_C = +70^\circ\text{C}$ | 37          |       |
| Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%) | $T_A = +25^\circ\text{C}$ | 11          | A     |
|  | $T_A = +70^\circ\text{C}$ | 8.9         |       |
| Maximum Continuous Body Diode Forward Current (Note 5)         | $I_{DM}$                  | 60          | A     |
| Avalanche Current, $L = 0.1\text{mH}$                          | $I_{AS}$                  | 20.3        | A     |
| Avalanche Energy, $L = 0.1\text{mH}$                           | $E_{AS}$                  | 20.6        | mJ    |
| $V_{DS}$ Spike   | $t = 10\mu\text{s}$       | $V_{SPIKE}$ | 72    |

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   | Symbol          | Value       | Units |
|--|-----------------|-------------|-------|
| Total Power Dissipation (Note 5)                 | $P_D$           | 2.2         | W     |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 57          | °C/W  |
| Total Power Dissipation (Note 5)                 | $P_D$           | 42          | W     |
| Thermal Resistance, Junction to Case (Note 5)    | $R_{\theta JC}$ | 3           | °C/W  |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | °C    |

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                               | Symbol       | Min | Typ  | Max       | Unit             | Test Condition  |
|--|--------------|-----|------|-----------|------------------|---|
| <b>OFF CHARACTERISTICS (Note 6)</b>          |              |     |      |           |                  |   |
| Drain-Source Breakdown Voltage               | $BV_{DSS}$   | 60  | —    | —         | V                | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$                                    |
| Zero Gate Voltage Drain Current              | $I_{DSS}$    | —   | —    | 1         | $\mu\text{A}$    | $V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$                                     |
| Gate-Source Leakage                          | $I_{GSS}$    | —   | —    | $\pm 100$ | nA               | $V_{GS} = \pm 16\text{V}, V_{DS} = 0\text{V}$                                 |
| <b>ON CHARACTERISTICS (Note 6)</b>           |              |     |      |           |                  |   |
| Gate Threshold Voltage                       | $V_{GS(TH)}$ | 1   | —    | 3         | V                | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                                       |
| Static Drain-Source On-Resistance            | $R_{DS(ON)}$ | —   | 7.5  | 9.5       | $\text{m}\Omega$ | $V_{GS} = 10\text{V}, I_D = 13.5\text{A}$                                     |
|  |              | —   | 9.9  | 13.3      |                  | $V_{GS} = 4.5\text{V}, I_D = 11.5\text{A}$                                    |
| Diode Forward Voltage                        | $V_{SD}$     | —   | —    | 1.2       | V                | $V_{GS} = 0\text{V}, I_S = 13.5\text{A}$                                      |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>      |              |     |      |           |                  |   |
| Input Capacitance                            | $C_{iss}$    | —   | 1925 | —         | pF               | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$                    |
| Output Capacitance                           | $C_{oss}$    | —   | 438  | —         | pF               |   |
| Reverse Transfer Capacitance                 | $C_{rss}$    | —   | 41   | —         | pF               |   |
| Gate Resistance                              | $R_g$        | —   | 1.7  | —         | $\Omega$         | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$                     |
| Total Gate Charge ( $V_{GS} = 10\text{V}$ )  | $Q_g$        | —   | 33.5 | —         | nC               | $V_{DS} = 30\text{V}, I_D = 13.5\text{A}$                                     |
| Total Gate Charge ( $V_{GS} = 4.5\text{V}$ ) | $Q_g$        | —   | 15.6 | —         | nC               |   |
| Gate-Source Charge                           | $Q_{gs}$     | —   | 4.7  | —         | nC               |   |
| Gate-Drain Charge                            | $Q_{gd}$     | —   | 5.3  | —         | nC               |   |
| Turn-On Delay Time                           | $t_{D(ON)}$  | —   | 4.5  | —         | ns               | $V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, R_G = 6\Omega, I_D = 13.5\text{A}$ |
| Turn-On Rise Time                            | $t_R$        | —   | 8.6  | —         | ns               |   |
| Turn-Off Delay Time                          | $t_{D(OFF)}$ | —   | 35.9 | —         | ns               |   |
| Turn-Off Fall Time                           | $t_F$        | —   | 15.7 | —         | ns               |   |
| Body Diode Reverse Recovery Time             | $t_{RR}$     | —   | 18.2 | —         | ns               | $I_F = 13.5\text{A}, di/dt = 400\text{A}/\mu\text{s}$                         |
| Body Diode Reverse Recovery Charge           | $Q_{RR}$     | —   | 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.

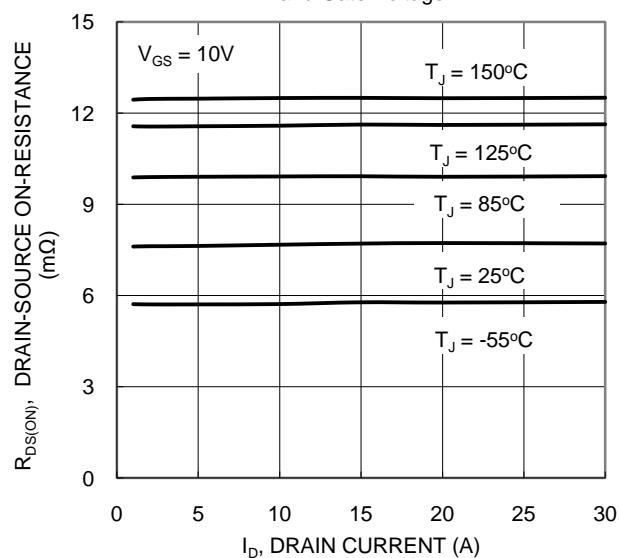
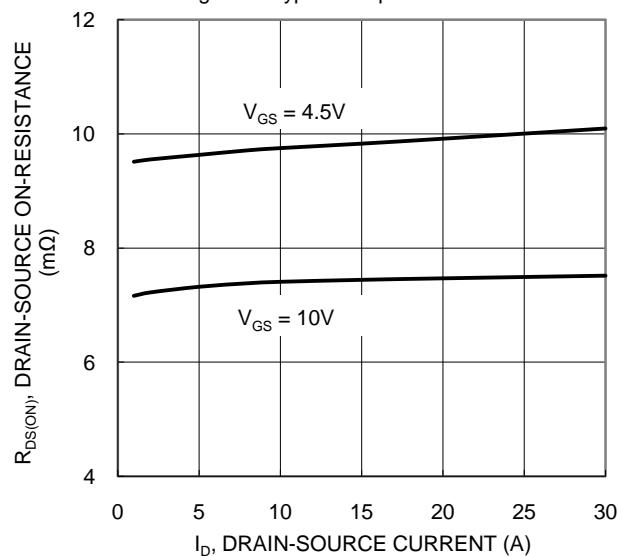
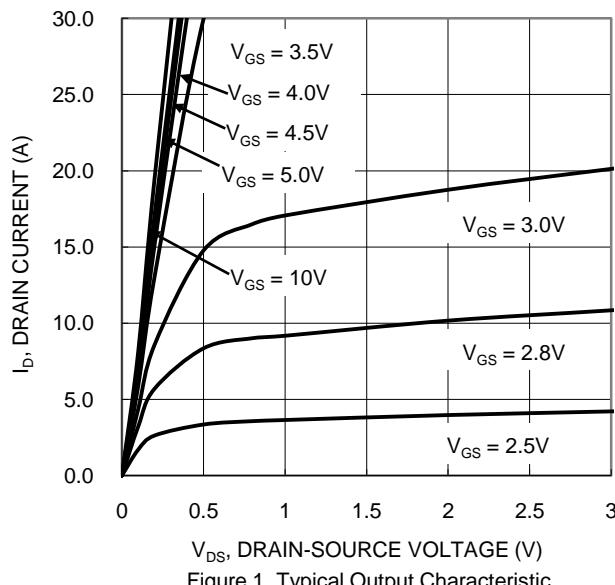
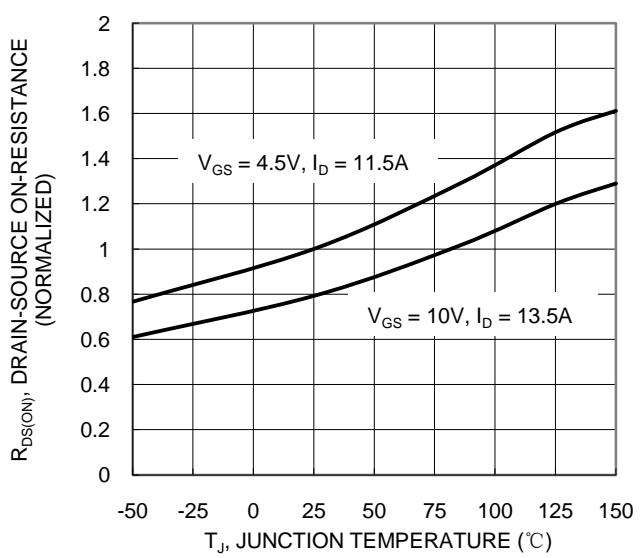
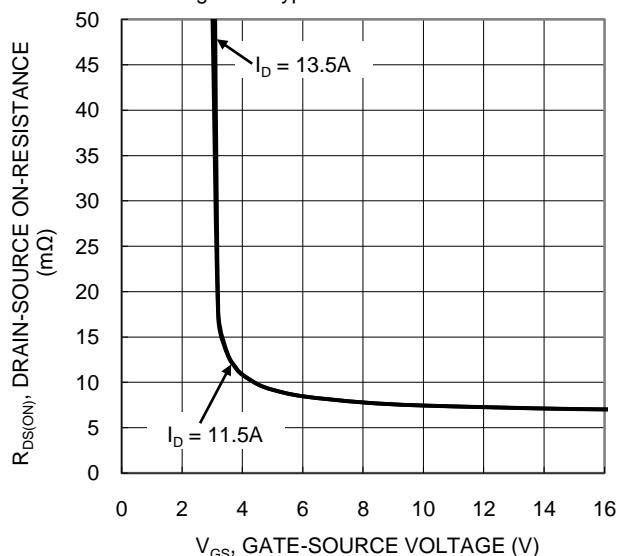
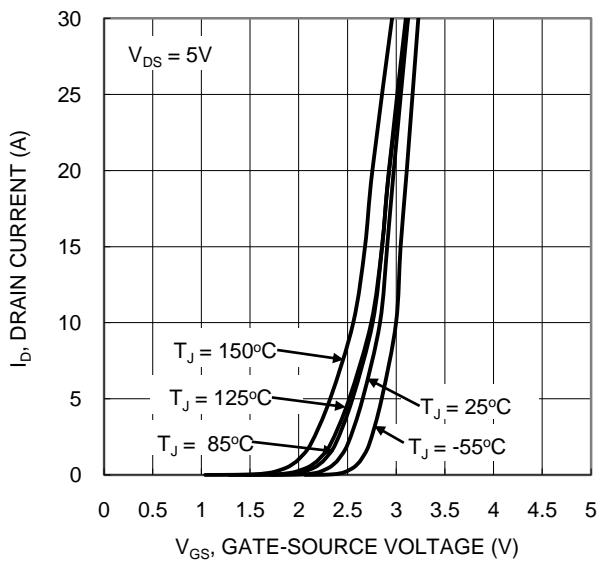
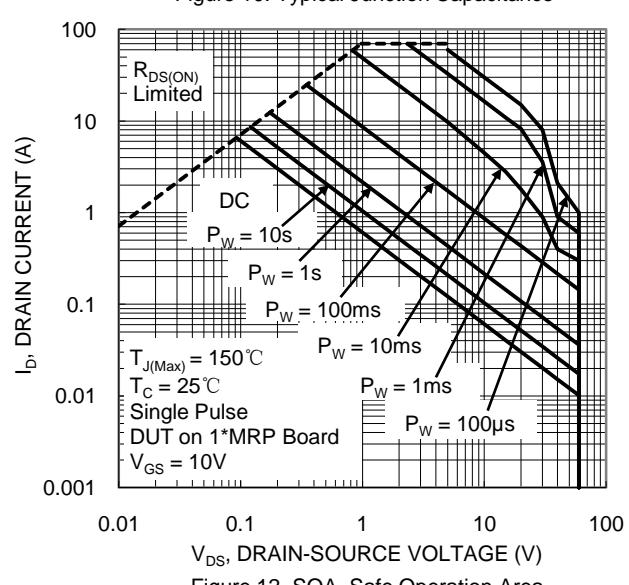
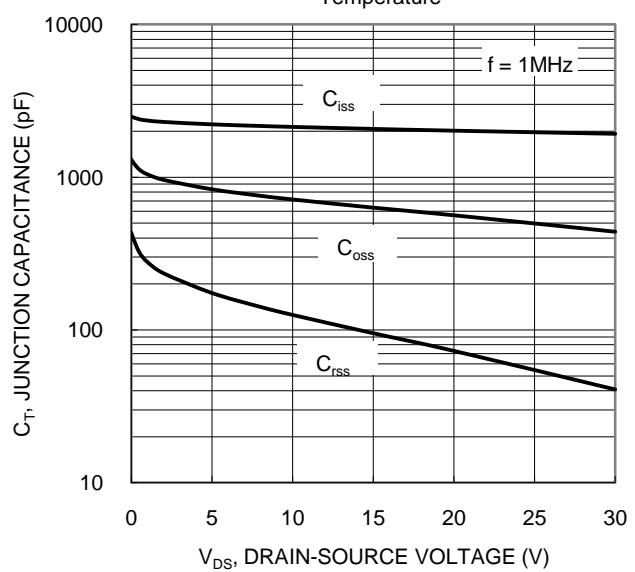
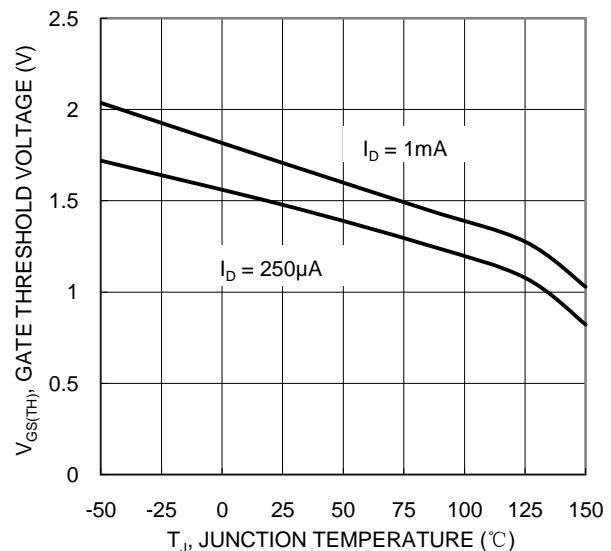
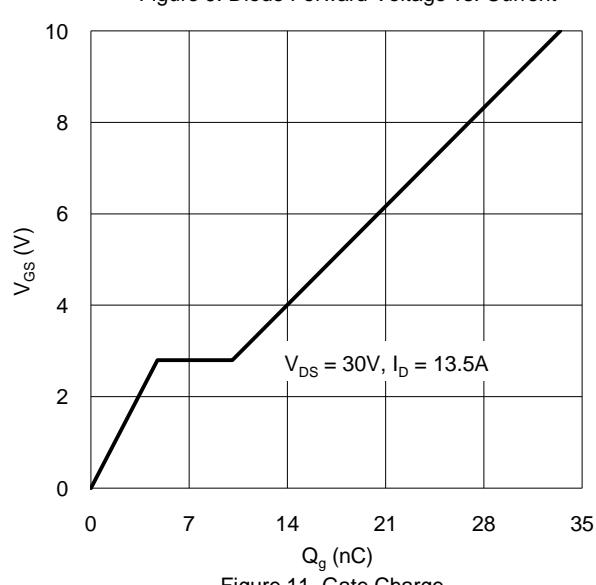
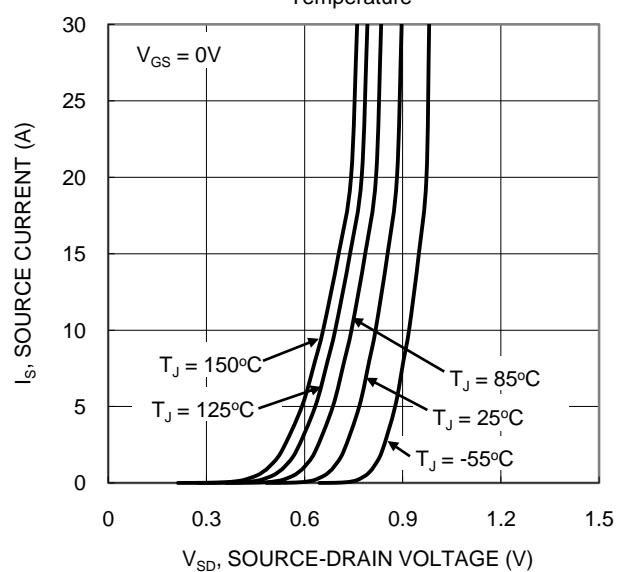
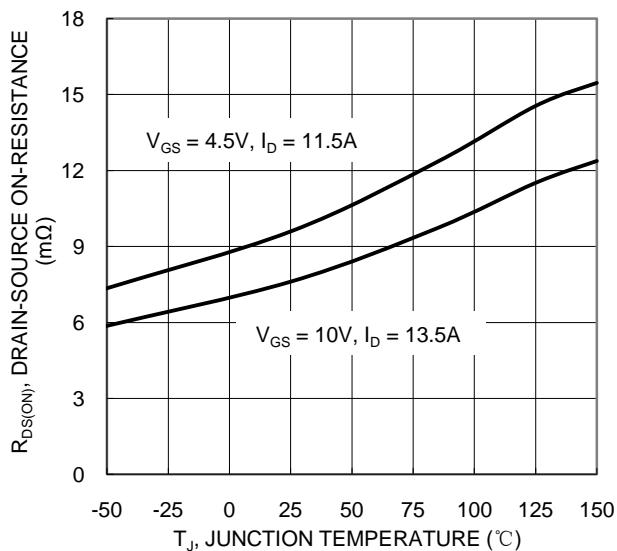


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature





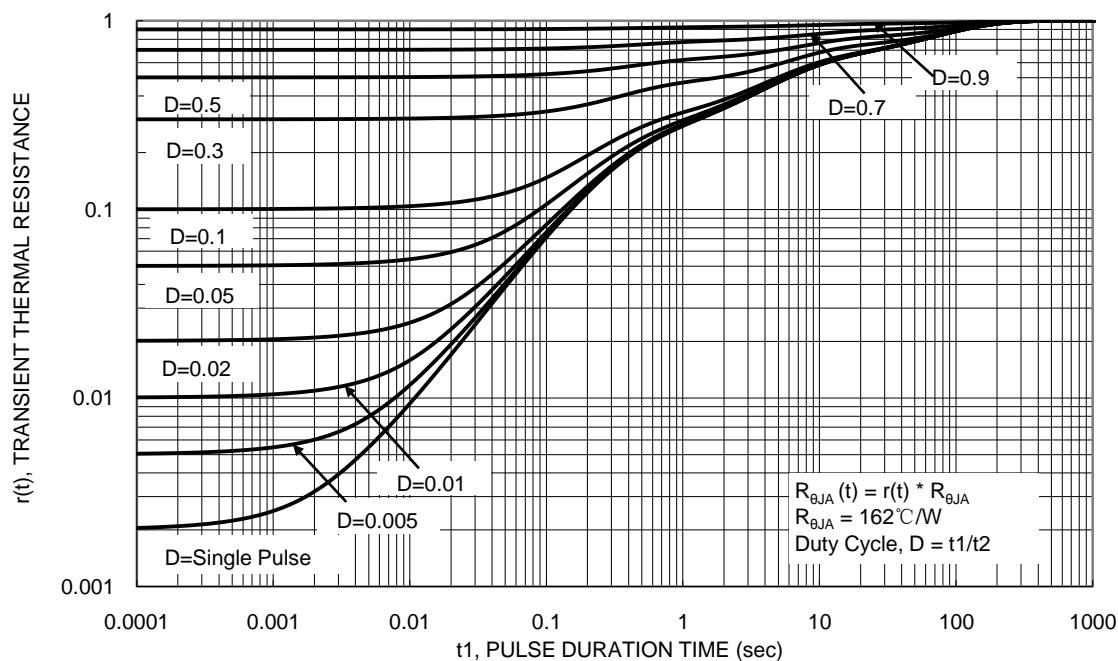
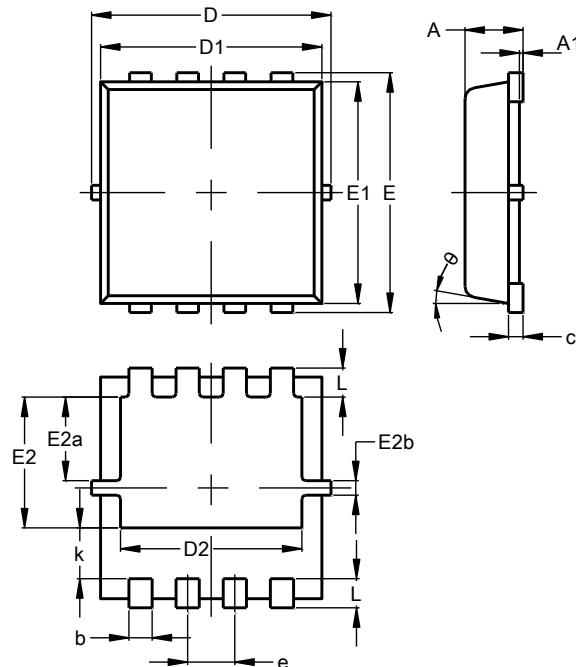


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

PowerDI3333-8 (Type UX)



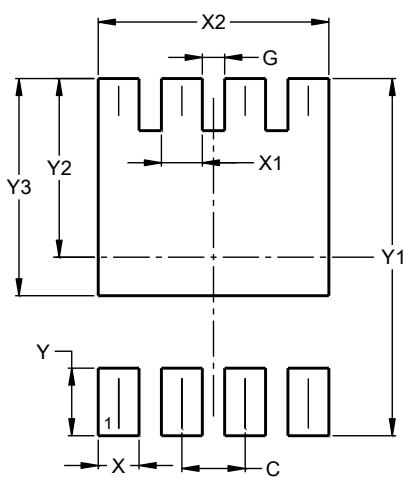
| PowerDI3333-8<br>(Type UX) |          |      |      |
|----------------------------|----------|------|------|
| Dim                        | Min      | Max  | Typ  |
| A                          | 0.75     | 0.85 | 0.80 |
| A1                         | 0.00     | 0.05 | --   |
| b                          | 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 |
| $\theta$                   | 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<br>(in mm) |
|------------|------------------|
| C          | 0.650            |
| G          | 0.230            |
| X          | 0.420            |
| X1         | 0.420            |
| X2         | 2.370            |
| Y          | 0.700            |
| Y1         | 3.700            |
| Y2         | 1.850            |
| Y3         | 2.250            |

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