

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ max                 | $I_D$ max<br>$T_C = +25^\circ C$ |
|------------|----------------------------------|----------------------------------|
| -20V       | 5.5m $\Omega$ @ $V_{GS} = -4.5V$ | -40A                             |
|            | 7.5m $\Omega$ @ $V_{GS} = -2.5V$ | -40A                             |

## Description

This MOSFET is 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

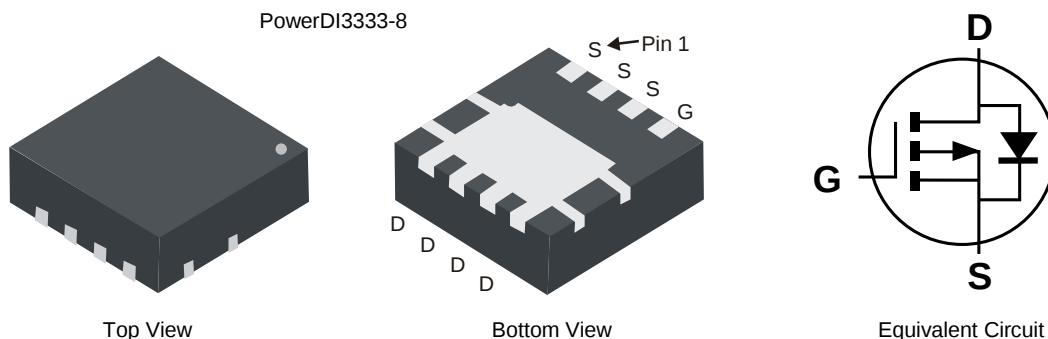
- Load Switch
- Power Management Functions

## Features

- 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: 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 (E3)
- Weight: 0.030 grams (Approximate)



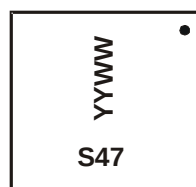
## Ordering Information (Note 4)

| Part Number   | Case          | Packaging         |
|---------------|---------------|-------------------|
| DMP2006UFG-7  | PowerDI3333-8 | 2,000/Tape & Reel |
| DMP2006UFG-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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

PowerDI3333-8



S47 = 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> | -20                   | V    |
| Gate-Source Voltage                                       |              |                                                                            | V <sub>GSS</sub> | ±10                   | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C<br>T <sub>C</sub> = +25°C | I <sub>D</sub>   | -17.5<br>-14.0<br>-40 | A    |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)        |              |                                                                            | I <sub>DM</sub>  | -80                   | A    |
| Maximum Continuous Body Diode Forward Current (Note 5)    |              |                                                                            | I <sub>S</sub>   | -2.2                  | A    |
| Avalanche Current (Note 7) L = 0.1mH                      |              |                                                                            | I <sub>AS</sub>  | -23                   | A    |
| Avalanche Energy (Note 7) L = 0.1mH                       |              |                                                                            | E <sub>AS</sub>  | 28                    | mJ   |

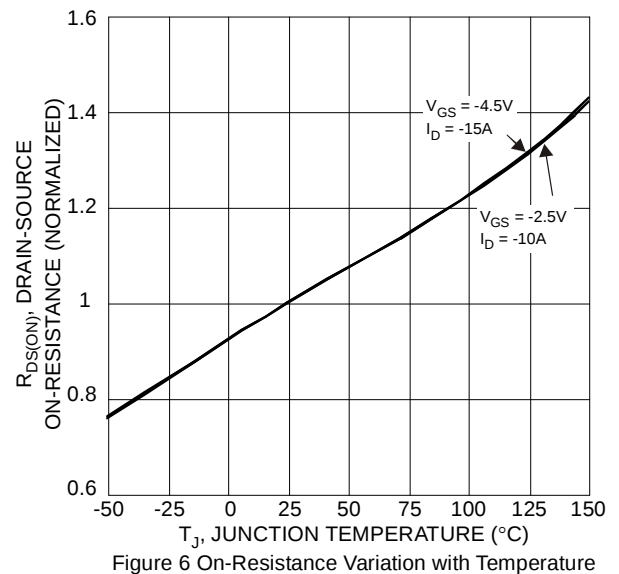
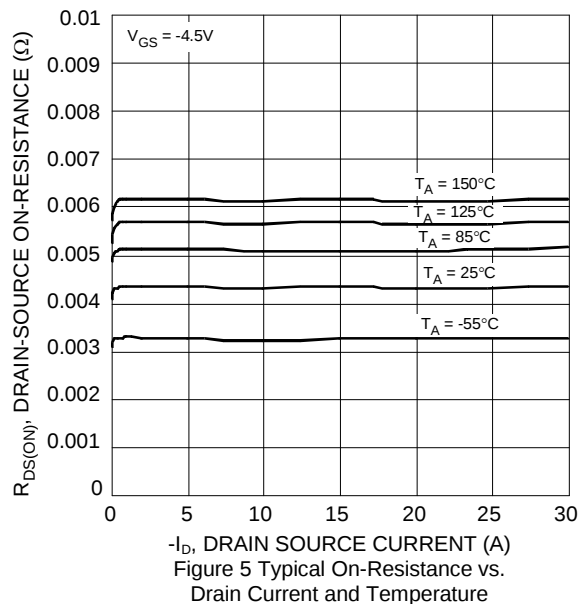
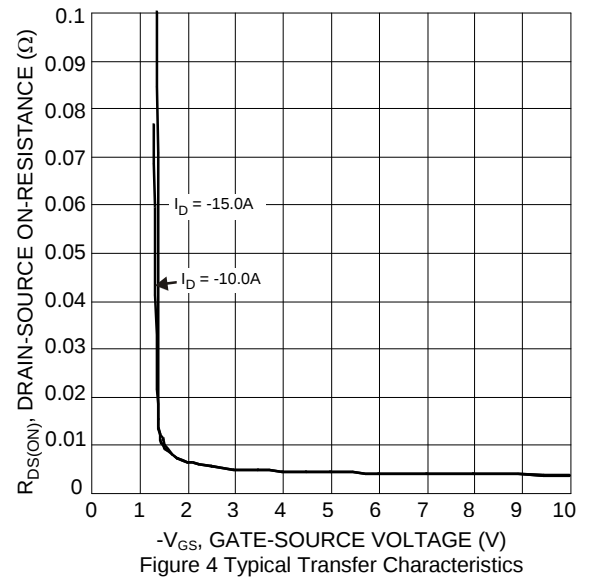
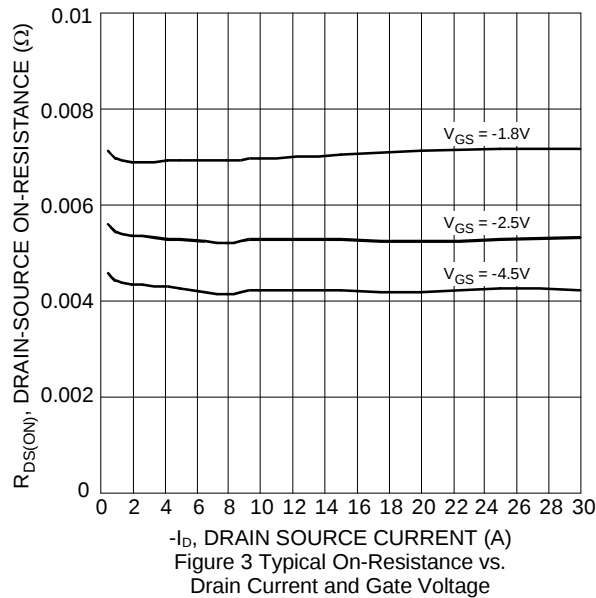
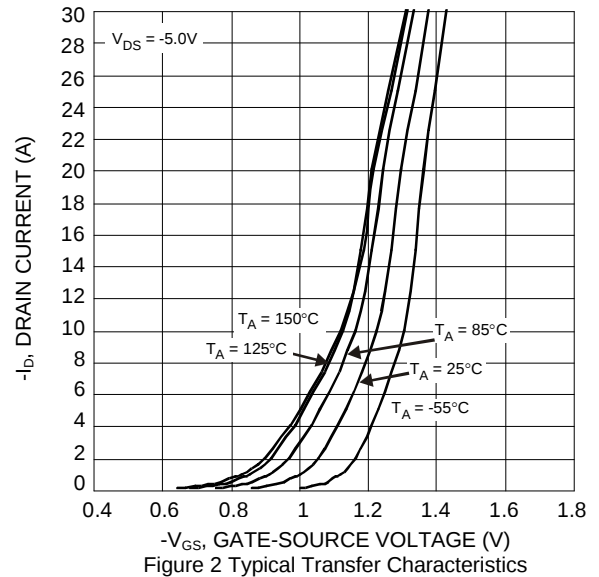
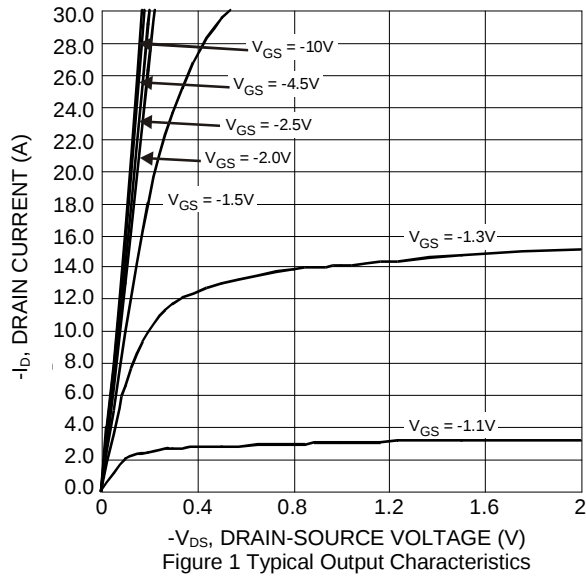
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

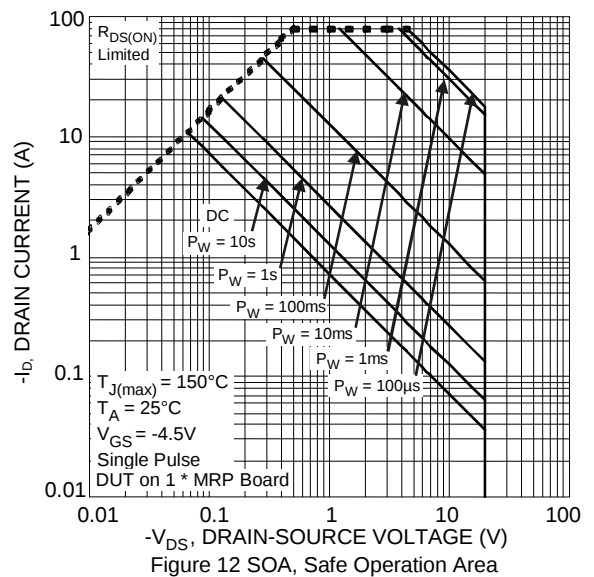
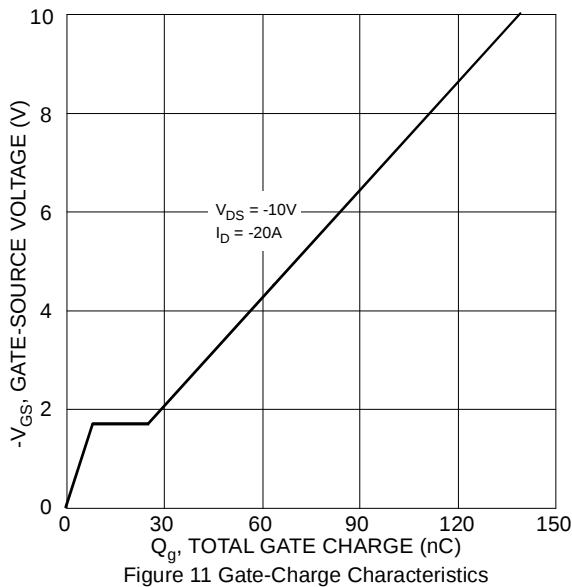
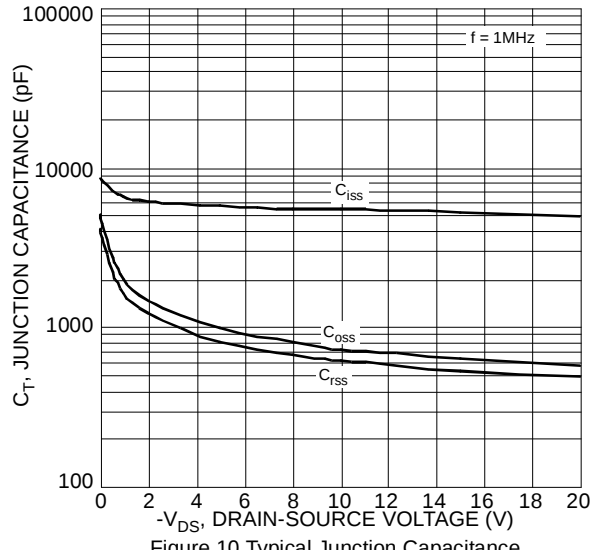
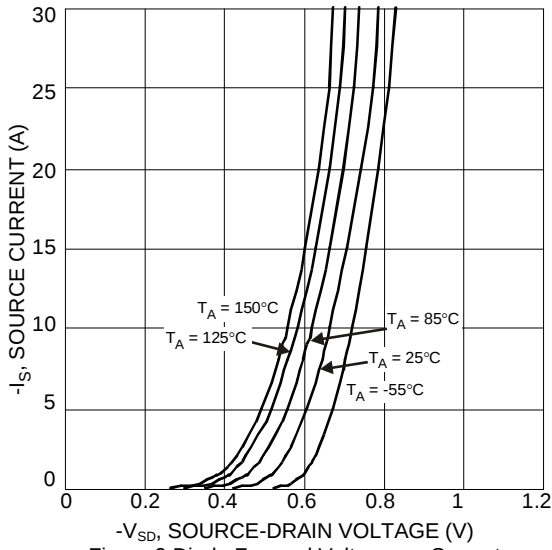
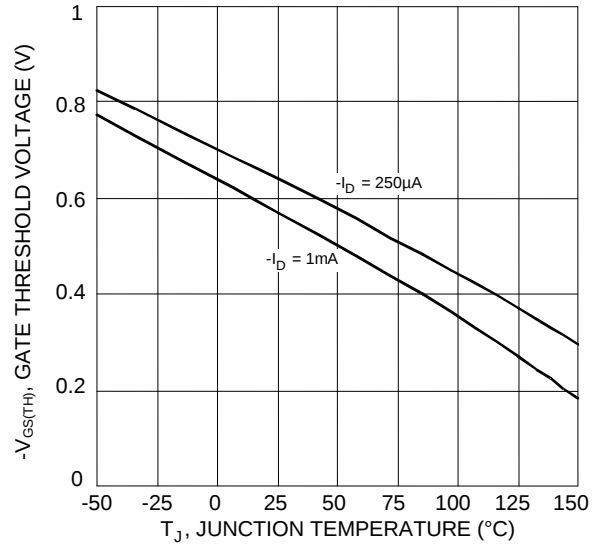
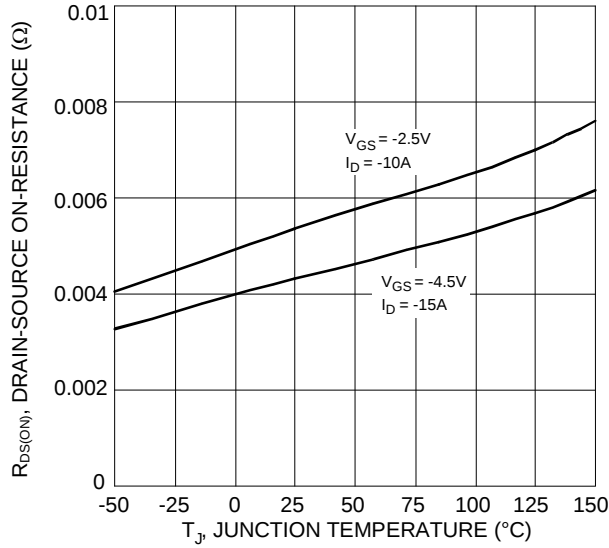
| Characteristic                                |                        | Symbol                            | Value       | Unit |
|-----------------------------------------------|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)              | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.3         | W    |
|                                               | T <sub>C</sub> = +25°C |                                   | 41          |      |
| Thermal Resistance, Junction to Ambient       | (Note 5)               | R <sub>θJA</sub>                  | 54          | °C/W |
|                                               | (Note 6)               |                                   | 136         |      |
| Thermal Resistance, Junction to Case (Note 5) |                        | R <sub>θJC</sub>                  | 3.0         |      |
| Operating and Storage Temperature Range       |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

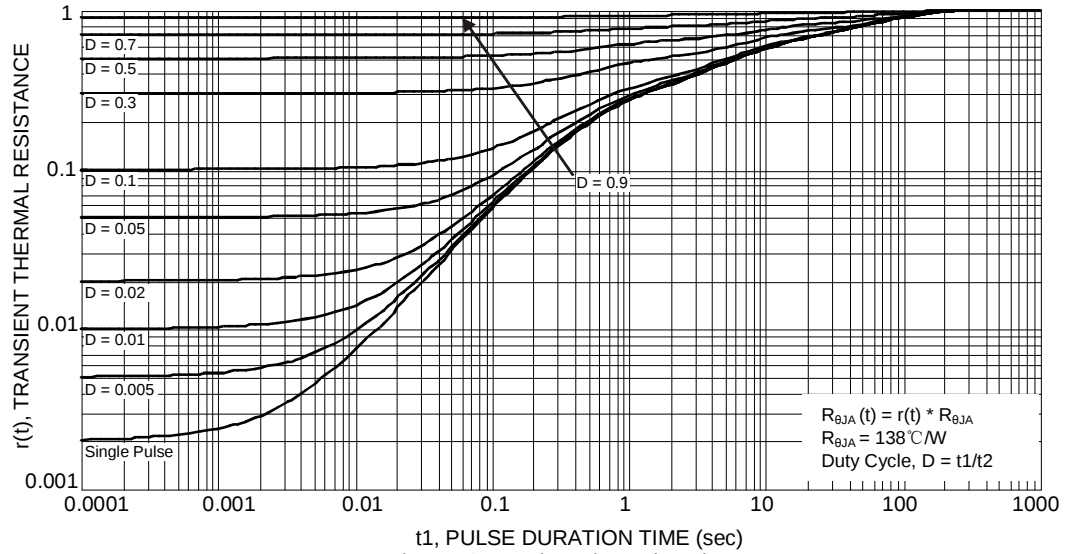
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol              | Min  | Typ  | Max  | Unit | Test Condition                                                                                                      |
|---------------------------------------------|---------------------|------|------|------|------|---------------------------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 8)</b>         |                     |      |      |      |      |                                                                                                                     |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -20  | —    | —    | 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> = -16V, V <sub>GS</sub> = 0V                                                                        |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —    | —    | ±100 | nA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V                                                                         |
| <b>ON CHARACTERISTICS (Note 8)</b>          |                     |      |      |      |      |                                                                                                                     |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -0.4 | —    | -1.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                                         |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 4.2  | 5.5  | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A                                                                      |
|                                             |                     | —    | 5.4  | 7.5  |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -10A                                                                      |
|                                             |                     | —    | 8    | 12   |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A                                                                       |
|                                             |                     | —    | 12   | 17   |      | V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -1A                                                                       |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.7 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -10A                                                                         |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>     |                     |      |      |      |      |                                                                                                                     |
| Input Capacitance                           | C <sub>ISS</sub>    | —    | 5404 | 7500 | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                                          |
| Output Capacitance                          | C <sub>OSS</sub>    | —    | 728  | 1000 |      |                                                                                                                     |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 612  | 900  |      |                                                                                                                     |
| Gate Resistance                             | R <sub>G</sub>      | —    | 3.8  | 8    | 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>      | —    | 64   | 100  | nC   | V <sub>DD</sub> = -10V, I <sub>D</sub> = -20A                                                                       |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 140  | 200  |      |                                                                                                                     |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 8.5  | 15   |      |                                                                                                                     |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 17   | 30   |      |                                                                                                                     |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 9.1  | 20   | ns   | V <sub>GS</sub> = -4.5V, V <sub>DD</sub> = -10V,<br>R <sub>G</sub> = 1Ω, R <sub>G</sub> = 1Ω, I <sub>D</sub> = -10A |
| Turn-On Rise Time                           | t <sub>r</sub>      | —    | 19   | 35   |      |                                                                                                                     |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 146  | 220  |      |                                                                                                                     |
| Turn-Off Fall Time                          | t <sub>f</sub>      | —    | 104  | 150  |      |                                                                                                                     |
| Reverse Recovery Time (Note 9)              | t <sub>RR</sub>     | —    | 61   | 100  | ns   | I <sub>F</sub> = -10A, di/dt = 100A/μs                                                                              |
| Reverse Recovery Charge (Note 9)            | Q <sub>RR</sub>     | —    | 44   | 70   | nC   | I <sub>F</sub> = -10A, di/dt = 100A/μs                                                                              |

- Notes:
5. R<sub>θJA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R<sub>θJC</sub> is guaranteed by design while R<sub>θJA</sub> is determined by the user's board design.
  6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. UIS in production with L = 0.1mH, T<sub>J</sub> = +25°C.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to product testing.



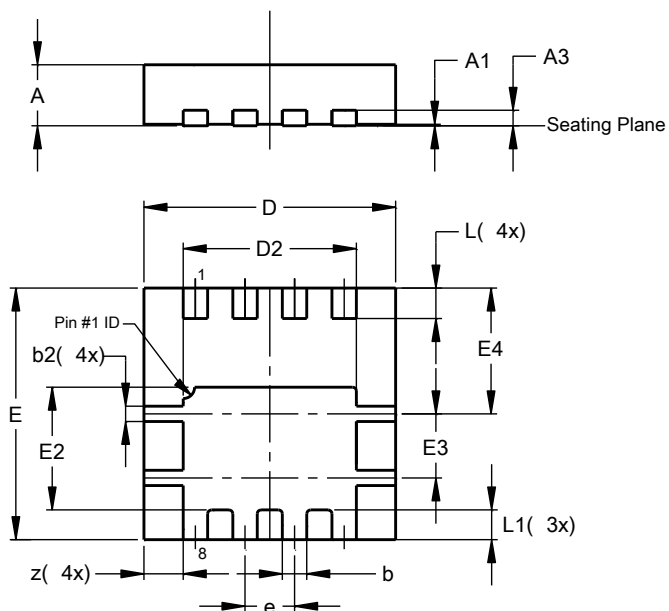




## Package Outline Dimensions

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

**PowerDI3333-8**

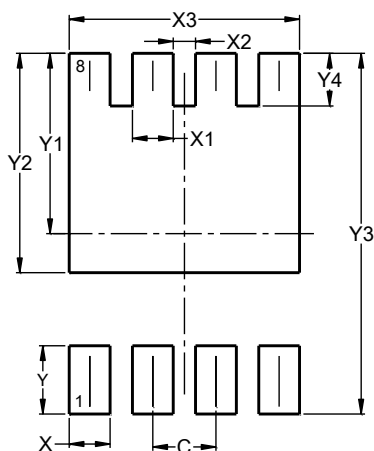


| PowerDI3333-8        |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0.00 | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 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         |
| Y4         | 0.540         |

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