

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max                       | $I_D$ Max<br>$T_A = 25^\circ\text{C}$ |
|------------|----------------------------------------|---------------------------------------|
| -30V       | 17m $\Omega$ @ $V_{GS} = -10\text{V}$  | -8.6A                                 |
|            | 25m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -7.1A                                 |

## Features and Benefits

- 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**
- **PPAP Capable (Note 4)**

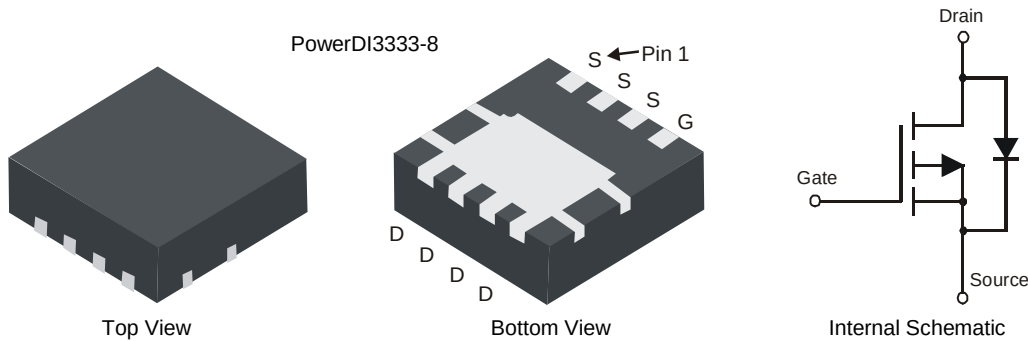
## Description and Applications

This MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

## Mechanical Data

- Case: PowerDI® 3333-8
- 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: 0.008 grams (Approximate)

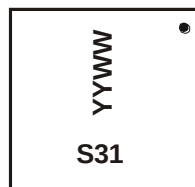


## Ordering Information (Note 5)

| Part Number    | Case          | Packaging         |
|----------------|---------------|-------------------|
| DMP3008SFGQ-7  | PowerDI3333-8 | 2,000/Tape & Reel |
| DMP3008SFGQ-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> 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. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



S31 = Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last digit of year (ex: 11 = 2011)  
WW = Week code (01 ~ 53)

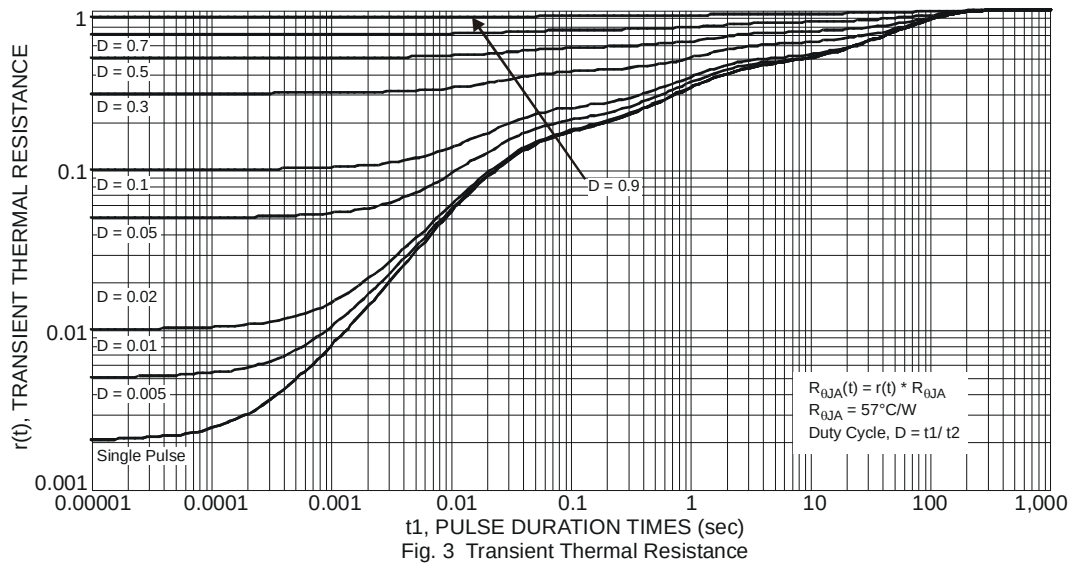
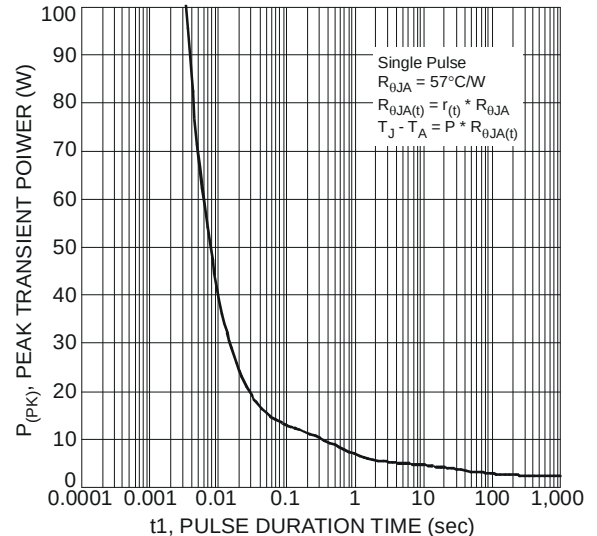
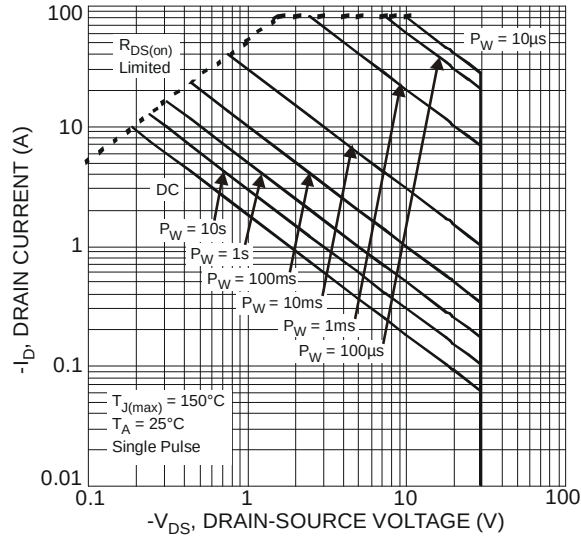
**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| 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>   | -8.6<br>-7.0  | A     |
|                                                           | t<10s        | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -11.7<br>-9.3 | A     |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -7.1<br>-5.6  | A     |
|                                                           | t<10s        | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -9.6<br>-7.6  | A     |
| 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>   | -3.0          | A     |

**Thermal Characteristics**

| Characteristic                                   |              | Symbol                            | Value       | Units |
|--------------------------------------------------|--------------|-----------------------------------|-------------|-------|
| 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>                  | 140         | °C/W  |
|                                                  | t<10s        |                                   | 72          | °C/W  |
| Total Power Dissipation (Note 7)                 |              | P <sub>D</sub>                    | 2.2         | W     |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State | R <sub>θJA</sub>                  | 57          | °C/W  |
|                                                  | t<10s        |                                   | 30          | °C/W  |
| Thermal Resistance, Junction to Case (Note 7)    |              | R <sub>θJC</sub>                  | 7.1         | °C/W  |
| Operating and Storage Temperature Range          |              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

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.



# 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>    | —    | —     | -1.0 | 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> | -1.1 | -1.6  | -2.1 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA         |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 12.5  | 17   | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A                       |
|                                             |                     | —    | 18.5  | 25   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A                      |
| Forward Transfer Admittance                 | Y <sub>fs</sub>     | —    | 13    | —    | S    | V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A                       |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.7  | -1.0 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A                          |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 9)     |                     |      |       |      |      |                                                                     |
| Input Capacitance                           | C <sub>iss</sub>    | —    | 2,230 | —    | pF   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz          |
| Output Capacitance                          | C <sub>oss</sub>    | —    | 328   | —    |      |                                                                     |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 294   | —    |      |                                                                     |
| Gate Resistance                             | R <sub>G</sub>      | —    | 6.4   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz              |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 47    | —    | nC   | V <sub>DS</sub> = -15V, I <sub>D</sub> = -10A                       |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —    | 23    | —    |      |                                                                     |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 9.4   | —    |      |                                                                     |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 5.6   | —    |      |                                                                     |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 10.5  | —    | nS   | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                           | t <sub>R</sub>      | —    | 8.5   | —    |      |                                                                     |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 90    | —    |      |                                                                     |
| Turn-Off Fall Time                          | t <sub>F</sub>      | —    | 40    | —    |      |                                                                     |

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

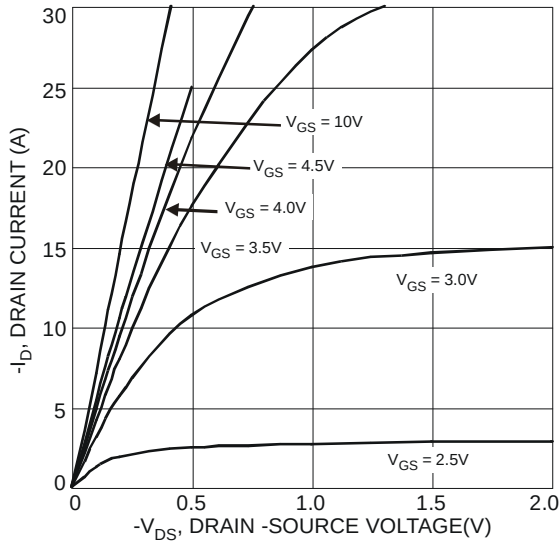


Fig. 4 Typical Output Characteristics

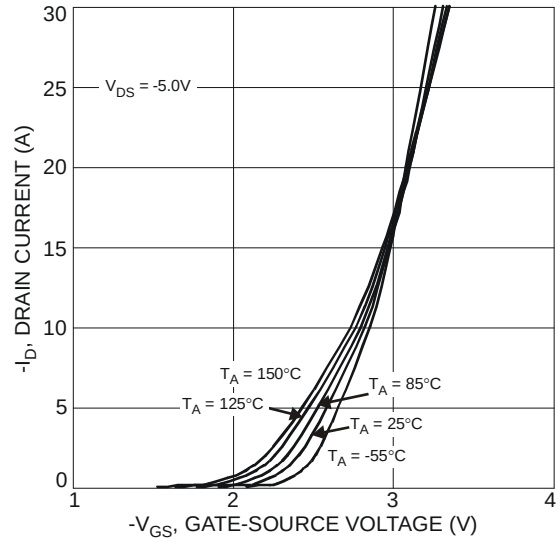


Fig. 5 Typical Transfer Characteristics

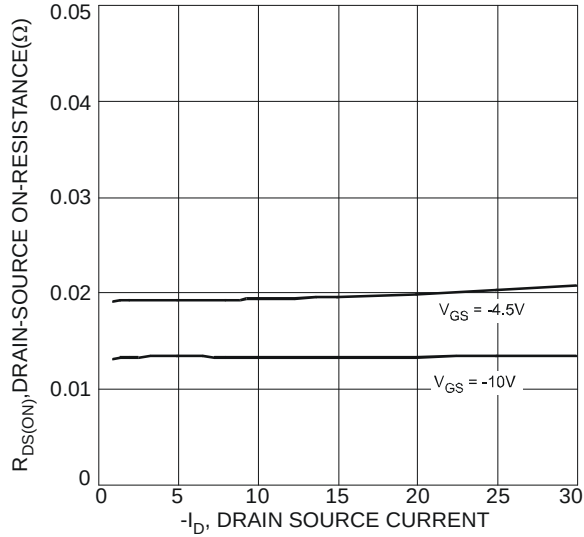


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

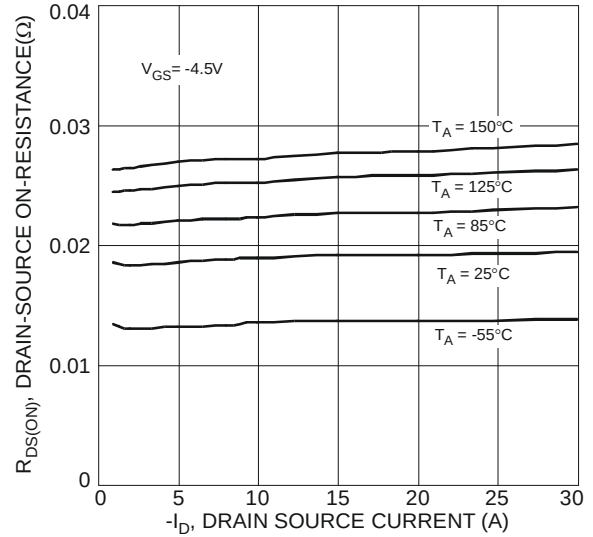


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

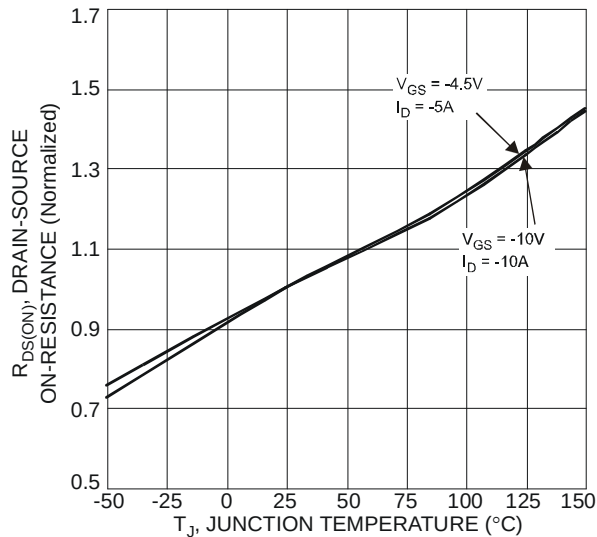


Fig. 8 On-Resistance Variation with Temperature

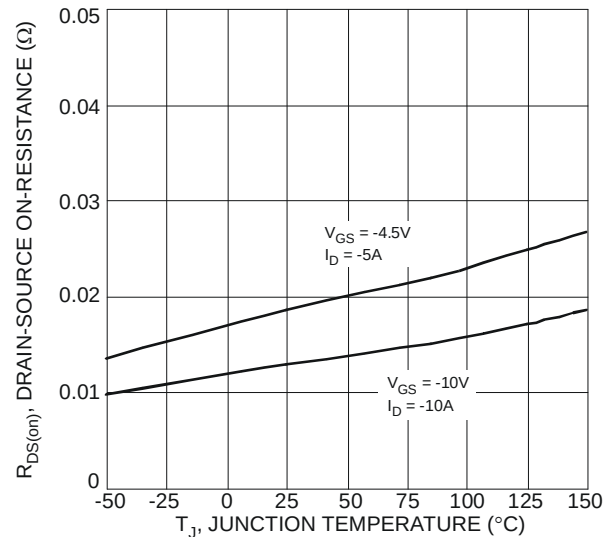


Fig. 9 On-Resistance Variation with Temperature

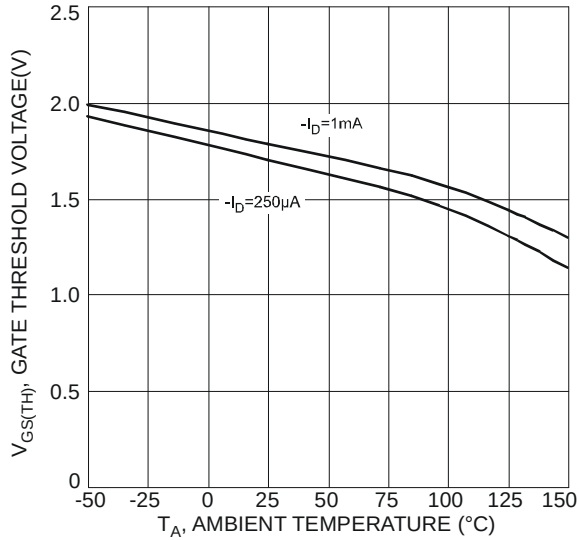


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

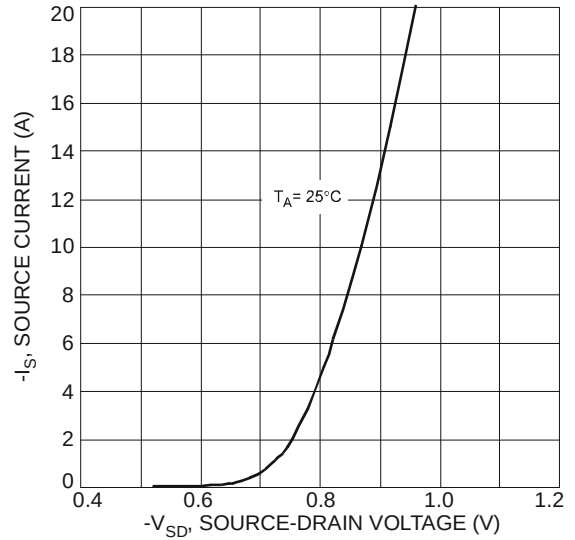


Fig. 11 Diode Forward Voltage vs. Current

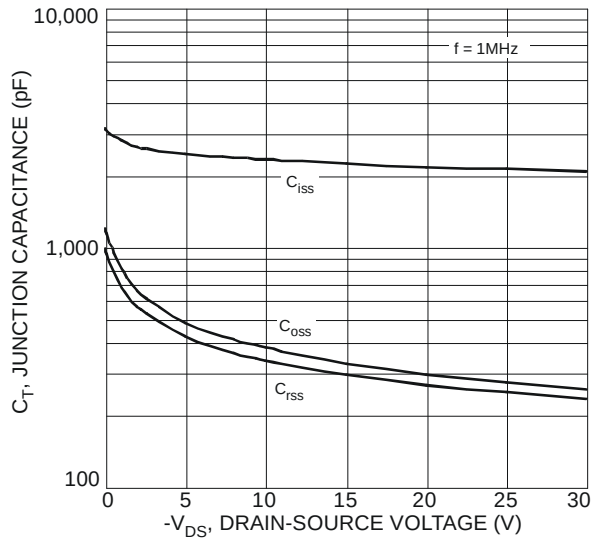


Fig. 12 Typical Junction Capacitance

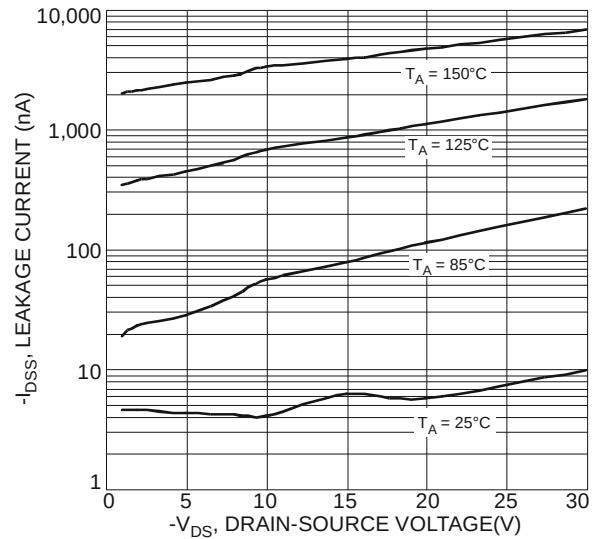


Fig. 13 Typical Drain-Source Leakage Current vs. Voltage

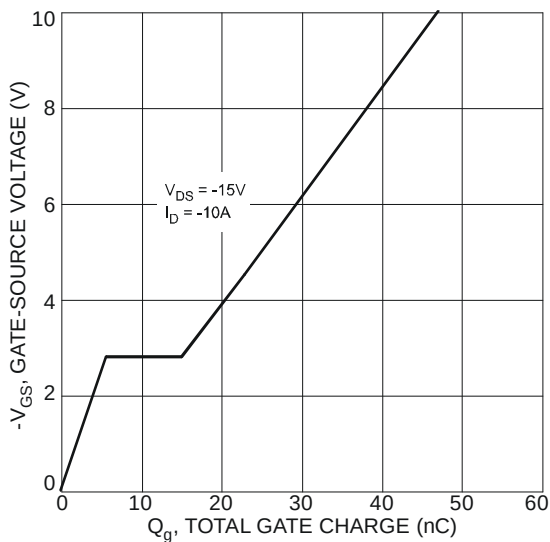
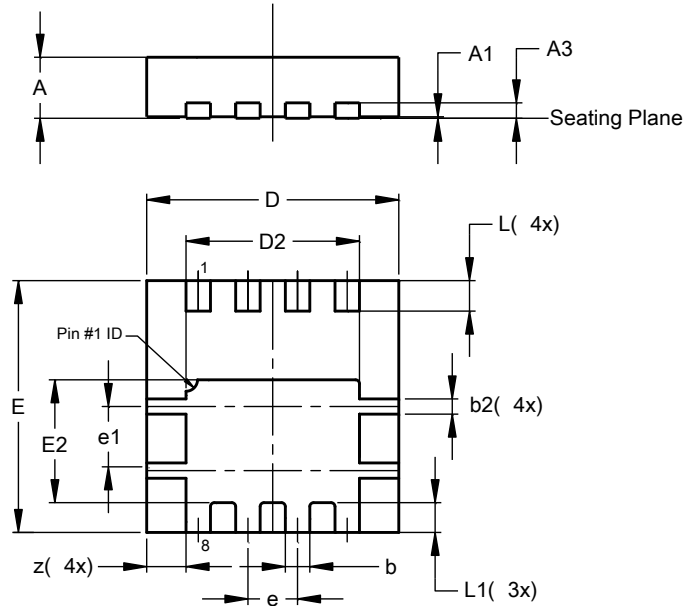


Fig. 14 Gate-Charge Characteristics

## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

**PowerDI3333-8**

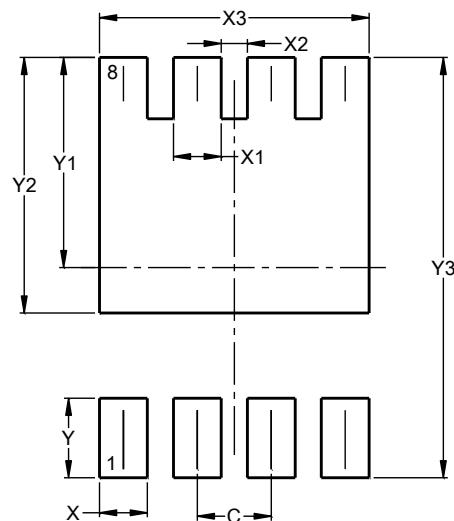


| PowerDI3333-8        |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0.00 | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 0.27 | 0.37 | 0.32  |
| b2                   | —    | —    | 0.20  |
| 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  |
| e                    | —    | —    | 0.65  |
| e1                   | 0.79 | 0.89 | 0.84  |
| L                    | 0.35 | 0.45 | 0.40  |
| L1                   | —    | —    | 0.39  |
| z                    | —    | —    | 0.515 |
| All Dimensions in mm |      |      |       |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> 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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