

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$        | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|---------------|---------------------------------|------------------------------------|
| 30V           | 18.6mΩ @ $V_{GS} = 10\text{V}$  | 8.0A                               |
|               | 26.5mΩ @ $V_{GS} = 4.5\text{V}$ | 6.5A                               |

## Description

This new generation 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

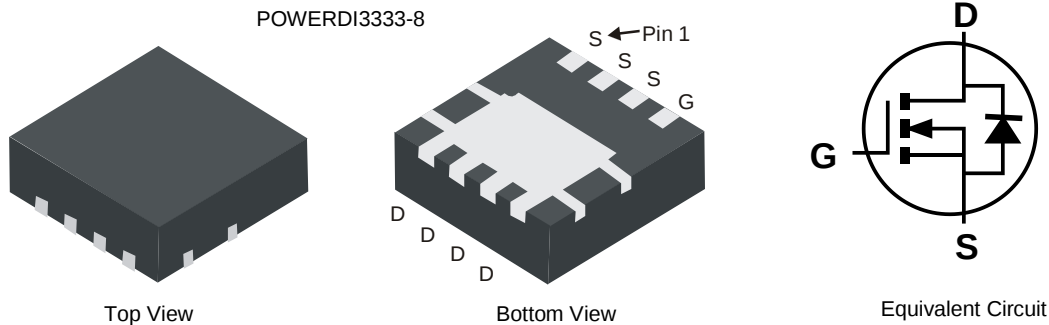
- Backlighting
- DC-DC Converters
- Power Management Functions

## 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
- 100% UIS (Avalanche) rated
- 100% Rg tested
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 **(e3)**
- Weight: 0.072 grams (Approximate)

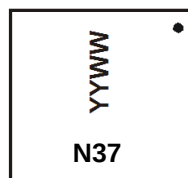


## Ordering Information (Note 4)

| Part Number   | Case          | Packaging           |
|---------------|---------------|---------------------|
| DMN3027LFG-7  | POWERDI3333-8 | 2,000 / Tape & Reel |
| DMN3027LFG-13 | POWERDI3333-8 | 3,000 / 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>.

## Marking Information



N37 = Product Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 15 for 2015)  
WW = Week Code (01 – 53)

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

| Characteristic                                           |              |                                                  | Symbol           | Value      | Unit |
|----------------------------------------------------------|--------------|--------------------------------------------------|------------------|------------|------|
| Drain-Source Voltage                                     |              |                                                  | V <sub>DSS</sub> | 30         | V    |
| Gate-Source Voltage                                      |              |                                                  | V <sub>GSS</sub> | ±25        | V    |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 5.3<br>4.2 | A    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 8.0<br>6.3 | A    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V  | t ≤ 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 9.5<br>7.7 | A    |
| Continuous Drain Current (Note 6) 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>   | 6.5<br>4.9 | A    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | t ≤ 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 7.8<br>6.2 | A    |
| Pulsed Drain Current (Note 7)                            |              |                                                  | I <sub>DM</sub>  | 70         | A    |
| Avalanche Current (Notes 7 & 8)                          |              |                                                  | I <sub>AR</sub>  | 18         | A    |
| Repetitive Avalanche Energy (Notes 7 & 8) L = 0.1mH      |              |                                                  | E <sub>AR</sub>  | 16         | mJ   |

**Thermal Characteristics**

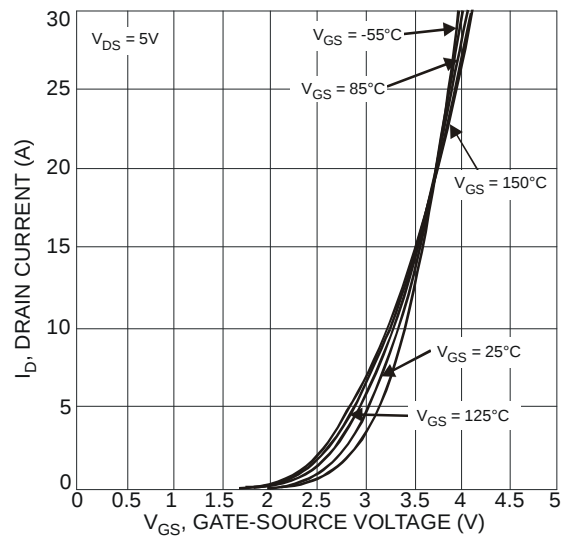
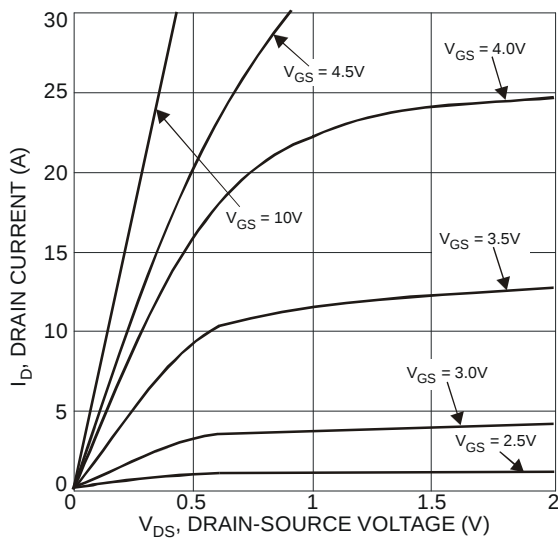
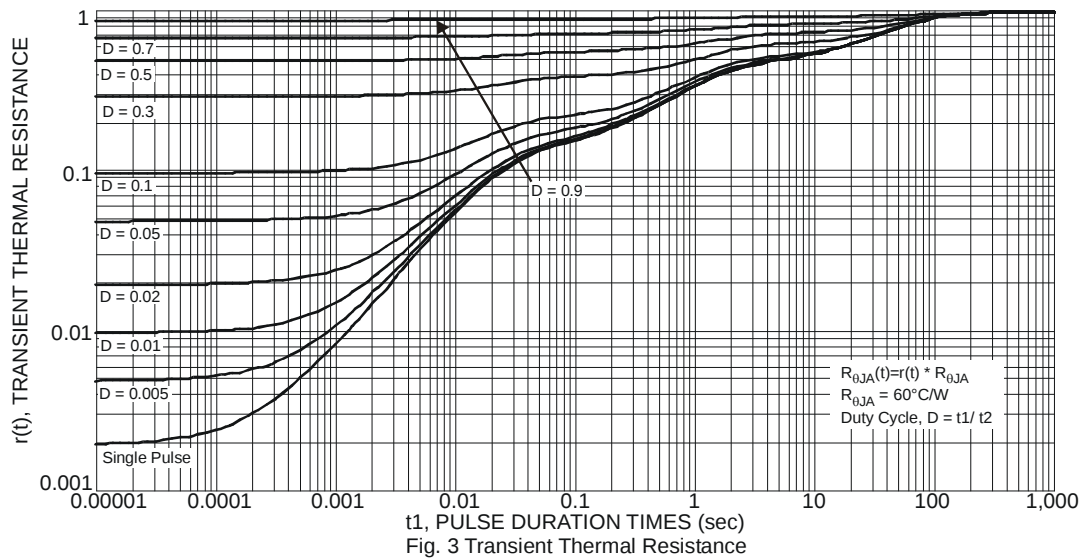
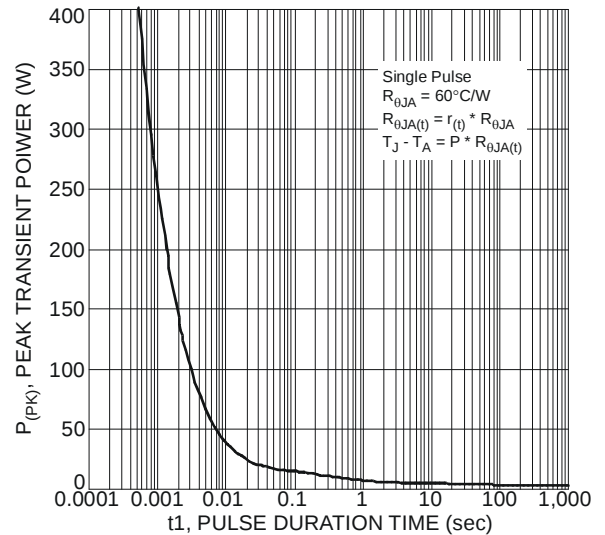
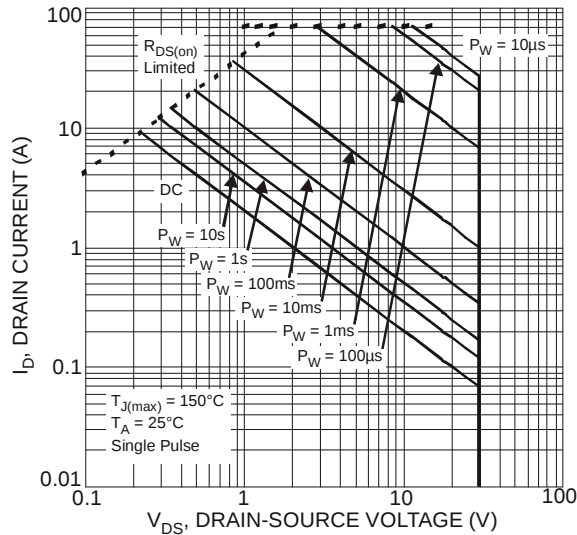
| Characteristic                                                                   | Symbol                            | Max         | Unit |
|----------------------------------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                                                       | P <sub>D</sub>                    | 1.0         | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)         | R <sub>θJA</sub>                  | 130.6       | °C/W |
| Power Dissipation (Note 6)                                                       | P <sub>D</sub>                    | 2.07        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6)         | R <sub>θJA</sub>                  | 62.5        | °C/W |
| Power Dissipation (Note 6) t ≤ 10s                                               | P <sub>D</sub>                    | 3.0         | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6) t ≤ 10s | R <sub>θJA</sub>                  | 43.8        | °C/W |
| Operating and Storage Temperature Range                                          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  6. Device mounted on 2" x 2" FR-4 PCB with high coverage 2 oz. Copper, single sided.
  7. Repetitive rating, pulse width limited by junction temperature.
  8. I<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.

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

| Characteristic                                         | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                          |
|--------------------------------------------------------|---------------------|-----|------|------|------|-----------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 9)</b>                    |                     |     |      |      |      |                                                                                         |
| 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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | -   | -    | 0.1  | μA   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V                                             |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | -   | -    | ±100 | nA   | V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V                                            |
| <b>ON CHARACTERISTICS (Note 9)</b>                     |                     |     |      |      |      |                                                                                         |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | 0.9 | 1.2  | 1.8  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                              |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | -   | 13.5 | 18.6 | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A                                             |
|                                                        |                     | -   | 22   | 26.5 |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7.5A                                           |
| 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 (Note 10)</b>               |                     |     |      |      |      |                                                                                         |
| Input Capacitance                                      | C <sub>iss</sub>    | -   | 580  | -    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz                                 |
| Output Capacitance                                     | C <sub>oss</sub>    | -   | 110  | -    |      |                                                                                         |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | -   | 70   | -    |      |                                                                                         |
| Gate Resistance                                        | R <sub>g</sub>      | -   | 2.0  | 3.0  | 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>      | -   | 5.3  | -    | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 10A                     |
| Total Gate Charge V <sub>GS</sub> = 10V                | Q <sub>g</sub>      | -   | 11.3 | -    |      |                                                                                         |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | -   | 1.9  | -    |      |                                                                                         |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | -   | 1.9  | -    |      |                                                                                         |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | -   | 4.4  | -    | ns   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>L</sub> = 15Ω, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                                      | t <sub>r</sub>      | -   | 4.6  | -    | ns   |                                                                                         |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | -   | 19.5 | -    | ns   |                                                                                         |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | -   | 5.8  | -    | ns   |                                                                                         |

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



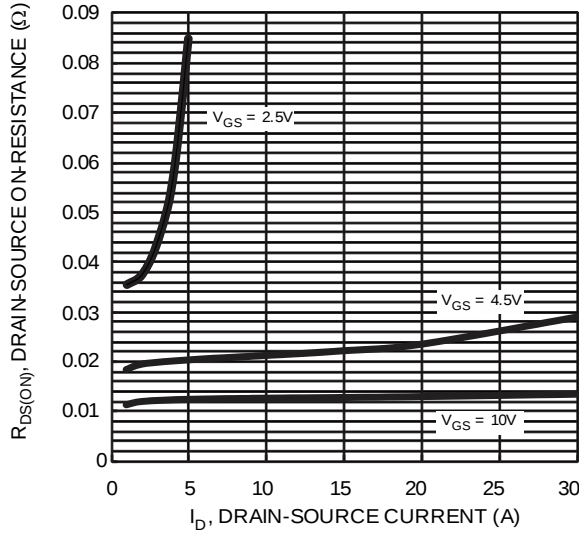


Figure 6 Typical On-Resistance vs. Drain Current and Gate Voltage

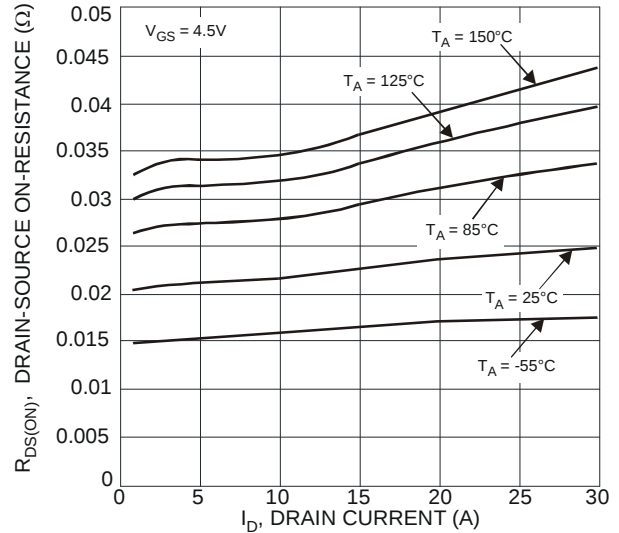


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

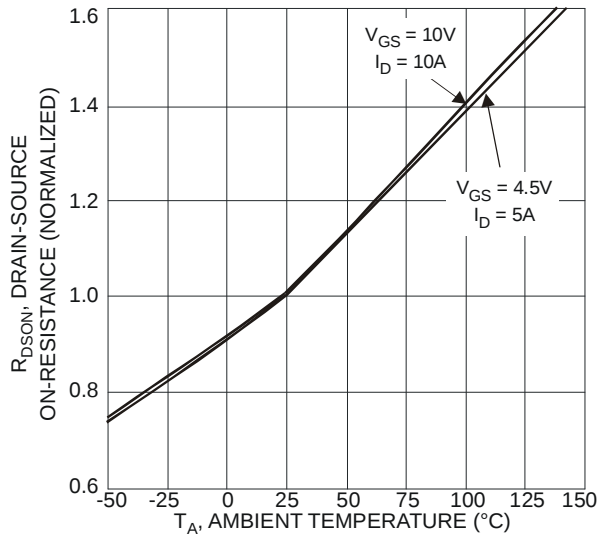


Fig. 8 On-Resistance Variation with Temperature

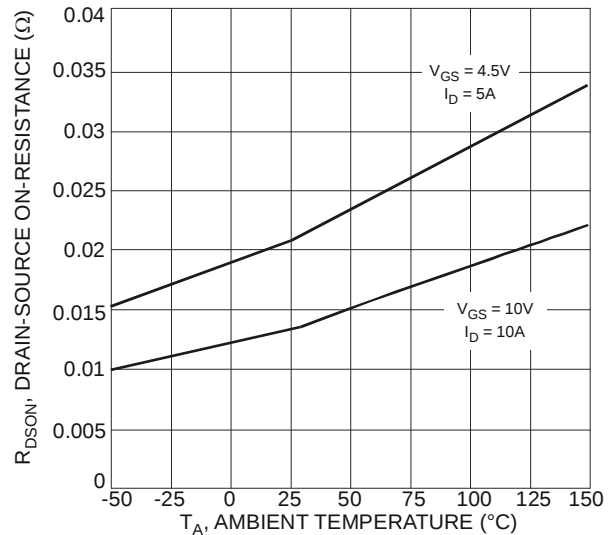


Fig. 9 On-Resistance Variation with Temperature

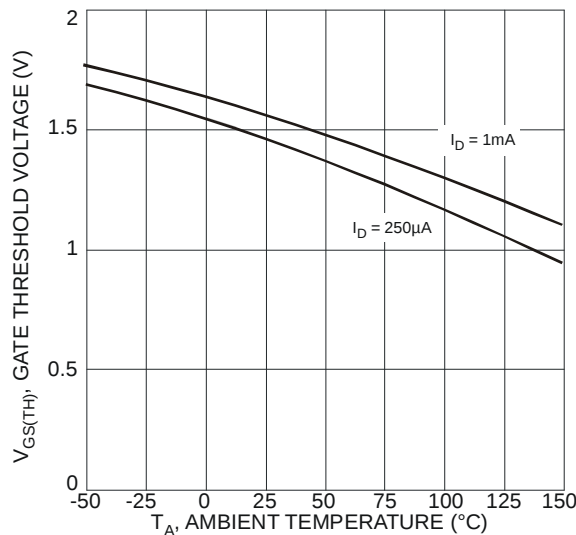


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

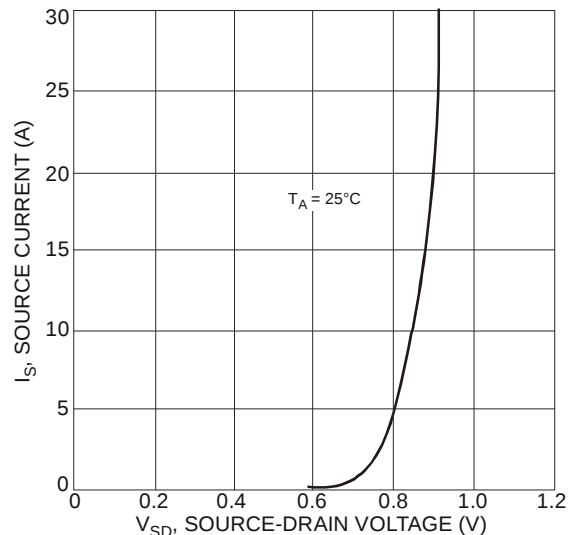
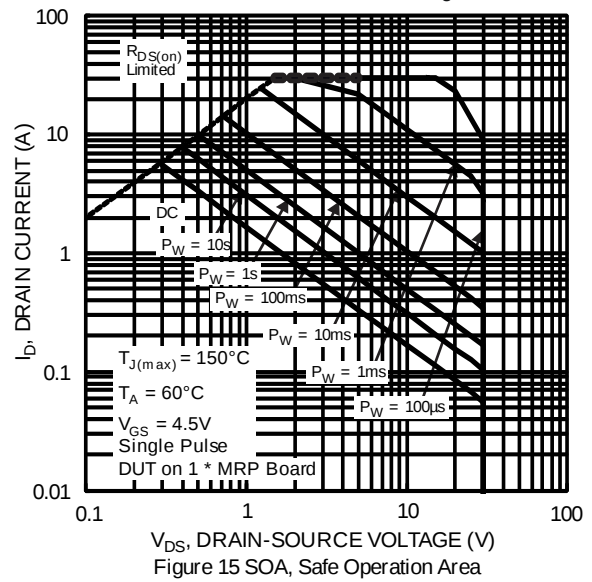
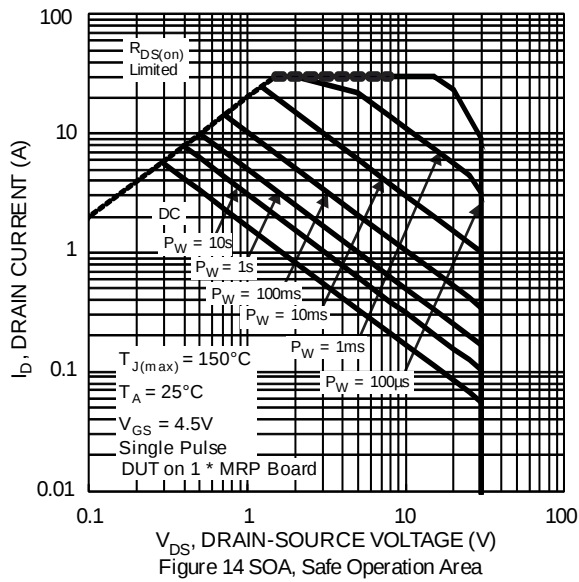
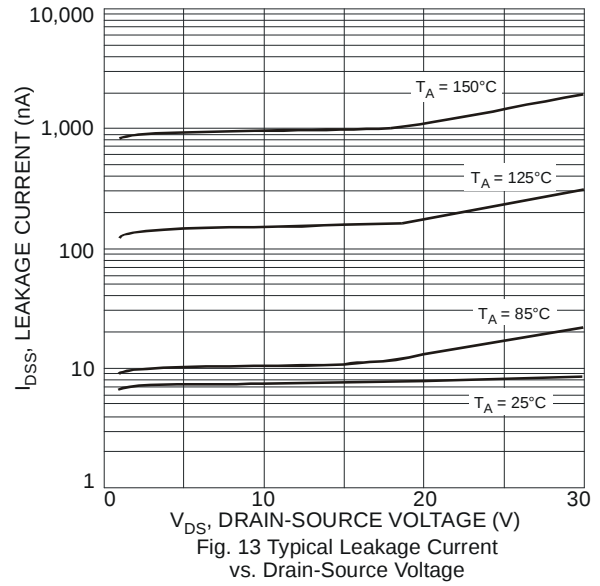
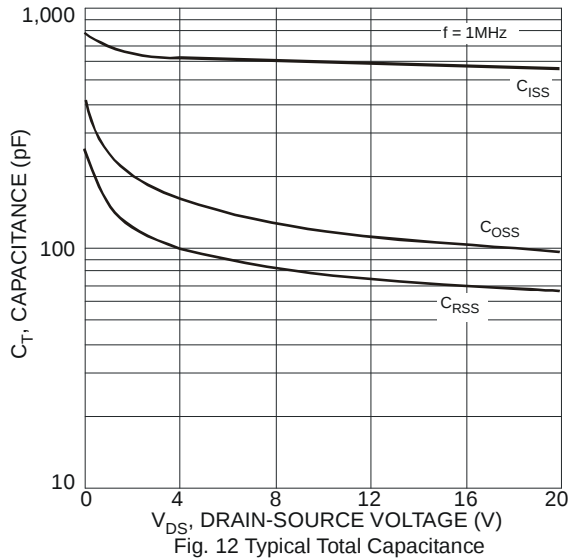


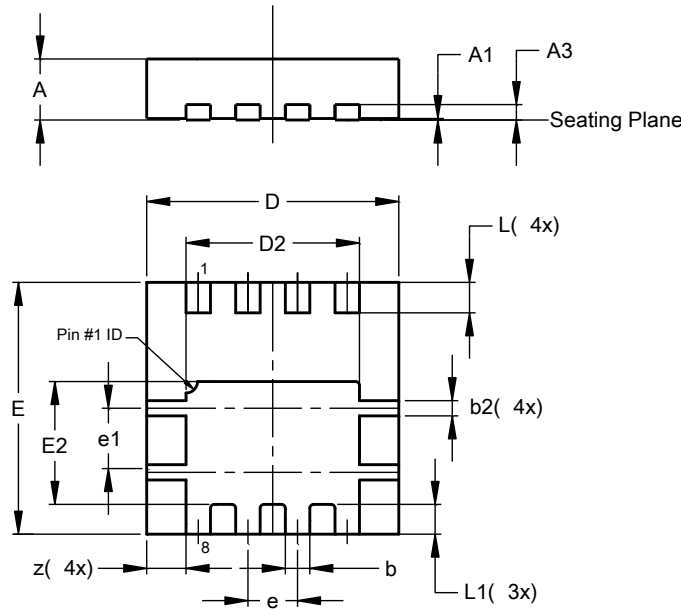
Fig. 11 Diode Forward Voltage vs. Current



## Package Outline Dimensions

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

### POWERDI® 3333-8

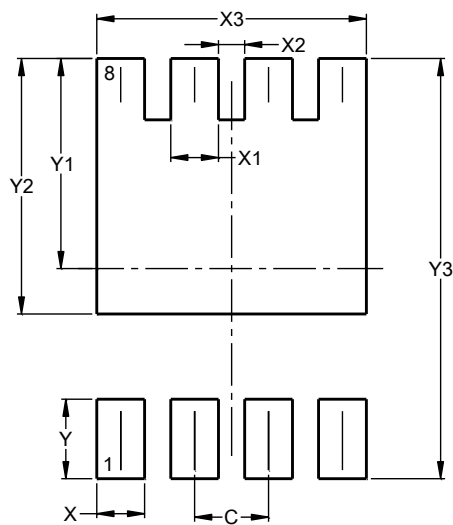


| POWERDI® 3333-8      |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0.00 | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 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.

### POWERDI® 3333-8



| 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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