

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$       | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------|------------------------------------------------|
| -60V          | 25mΩ @ $V_{GS} = -10\text{V}$  | -7.7A                                          |
|               | 33mΩ @ $V_{GS} = -4.5\text{V}$ | -6.8A                                          |

## Description and Applications

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.

- Backlighting
- Power Management Functions
- DC-DC Converters

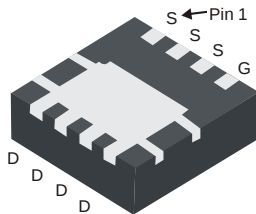
## Features and Benefits

- 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**

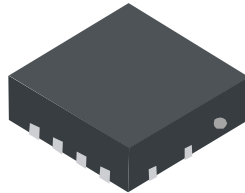
## Mechanical Data

- 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
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (63)
- Weight: 0.072 grams (Approximate)

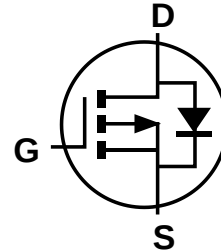
POWERDI3333-8



Bottom View



Top View



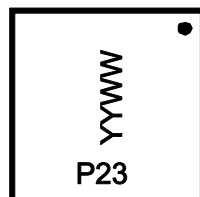
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number   | Case          | Packaging         |
|---------------|---------------|-------------------|
| DMP6023LFG-7  | POWERDI3333-8 | 2,000/Tape & Reel |
| DMP6023LFG-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



P23= Product Type Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 13 = 2013)  
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> | -60           | V     |
| Gate-Source Voltage                                      |              |                                                  | V <sub>GSS</sub> | ±20           | V     |
| 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>   | -7.7<br>-6.2  | A     |
|                                                          | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -10.3<br>-8.2 | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)       |              |                                                  | I <sub>DM</sub>  | -55           | A     |
| Maximum Continuous Body Diode Forward Current (Note 6)   |              |                                                  | I <sub>S</sub>   | -2.2          | A     |
| Avalanche Current, L = 0.1mH                             |              |                                                  | I <sub>AS</sub>  | -35.5         | A     |
| Avalanche Energy, L = 0.1mH                              |              |                                                  | E <sub>AS</sub>  | 62.9          | mJ    |

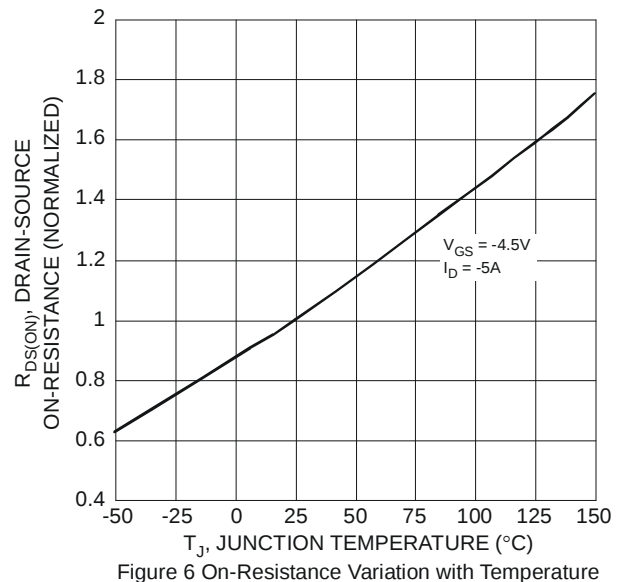
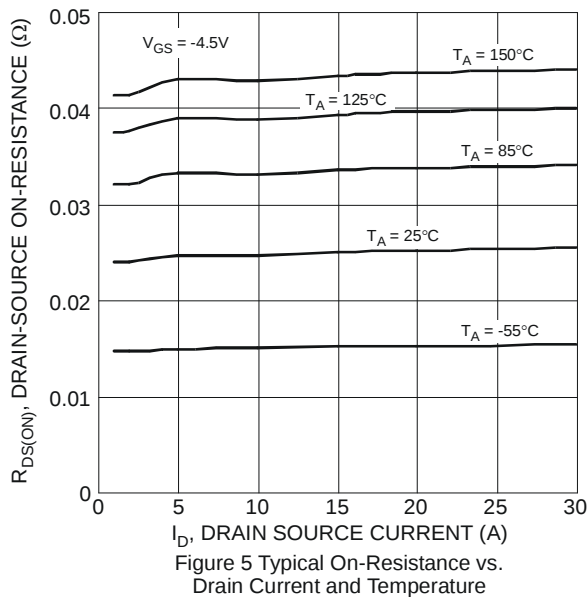
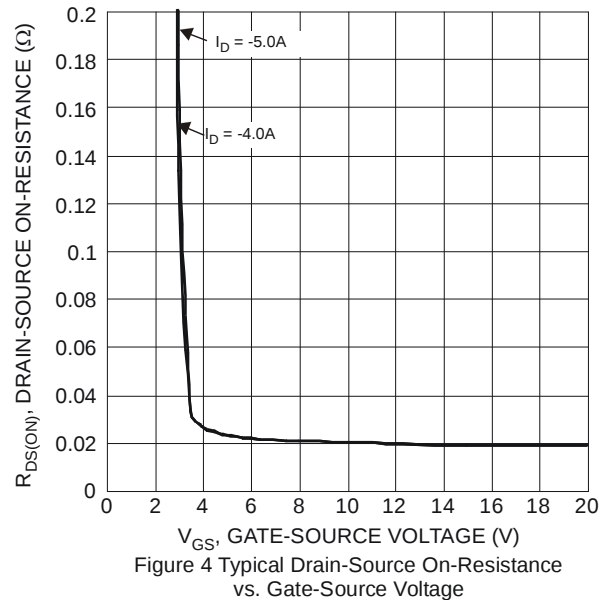
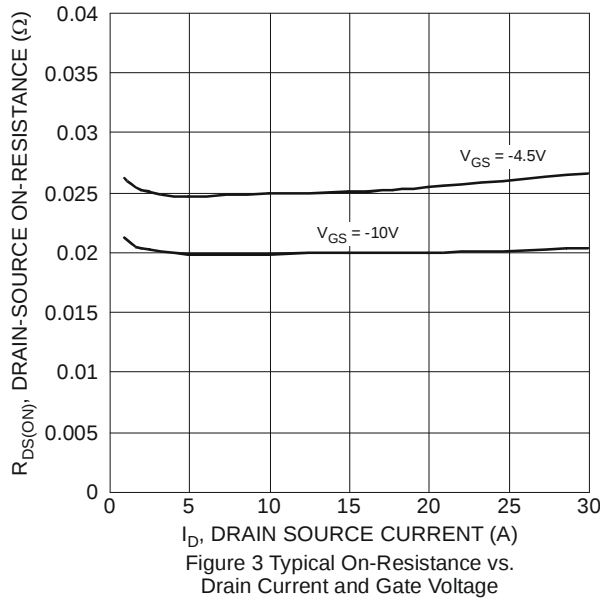
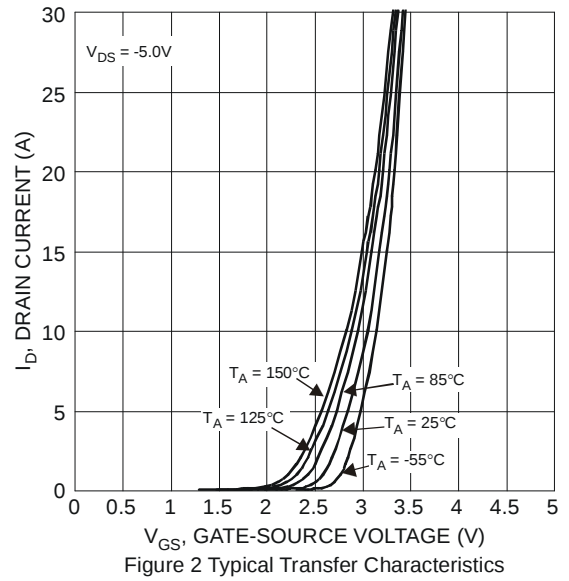
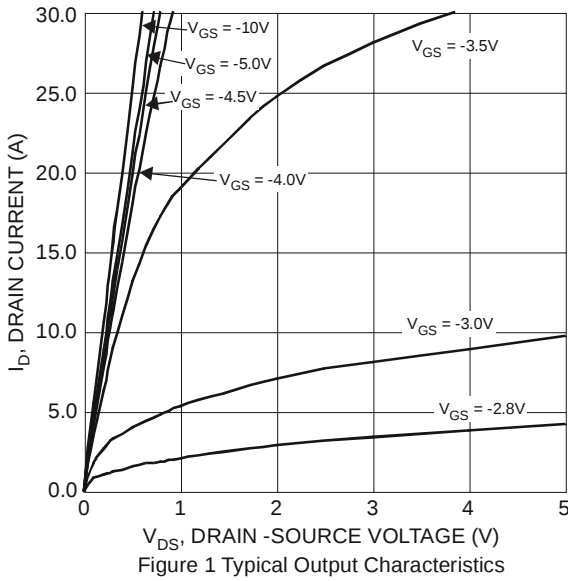
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

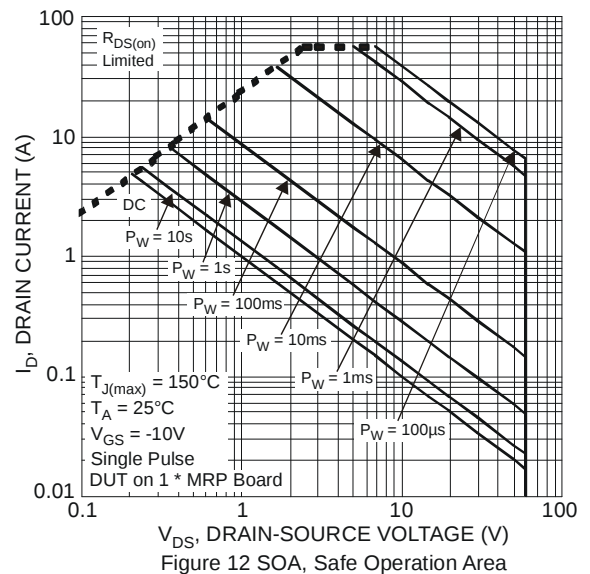
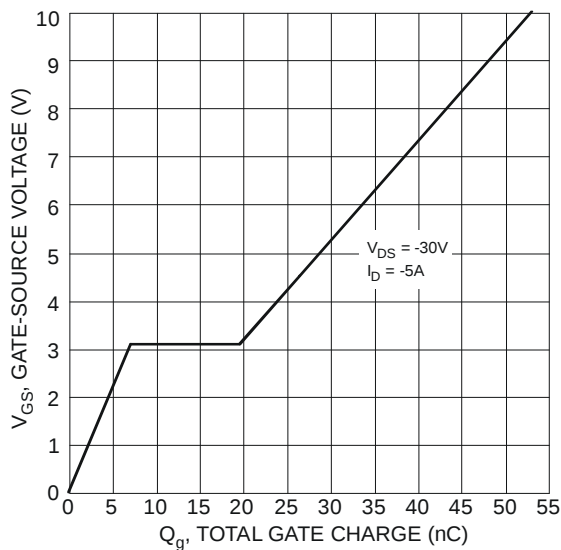
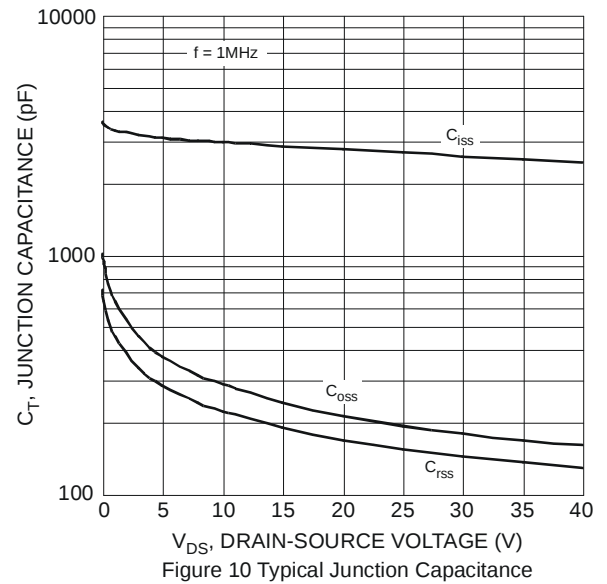
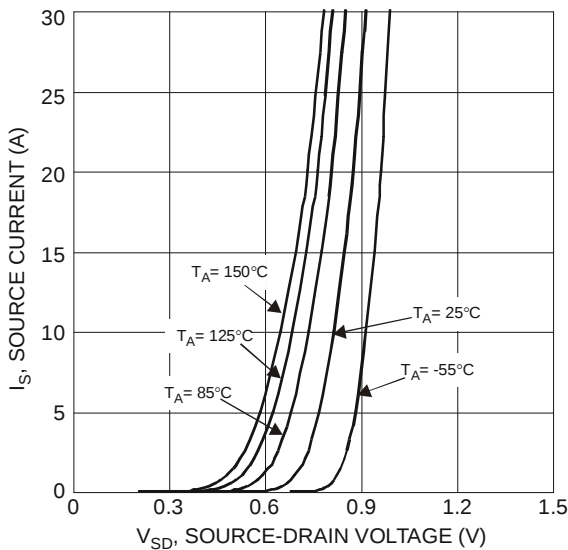
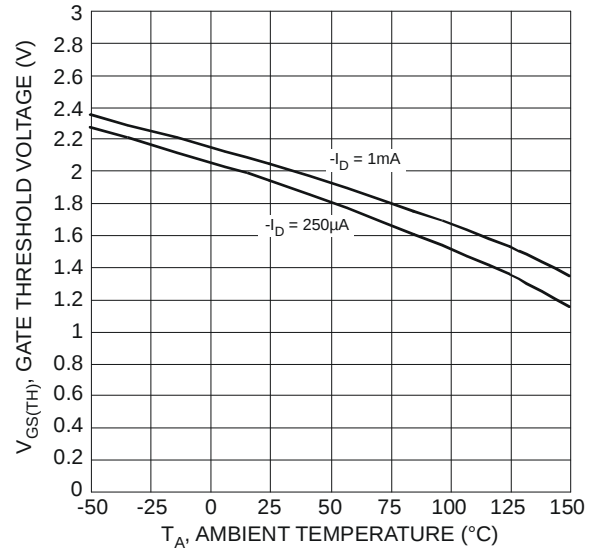
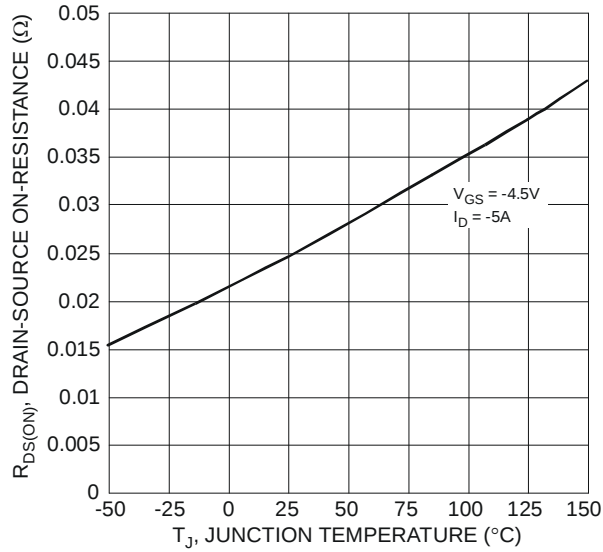
| Characteristic                                   |              | Symbol                            | Value       | Units |
|--------------------------------------------------|--------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 |              | P <sub>D</sub>                    | 1.0         | W     |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R <sub>θJA</sub>                  | 123         | °C/W  |
|                                                  | t < 10s      |                                   | 69          |       |
| Total Power Dissipation (Note 6)                 |              | P <sub>D</sub>                    | 2.1         | W     |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R <sub>θJA</sub>                  | 60          | °C/W  |
|                                                  | t < 10s      |                                   | 34          |       |
| Thermal Resistance, Junction to Case (Note 6)    |              | R <sub>θJC</sub>                  | 6.3         |       |
| Operating and Storage Temperature Range          |              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

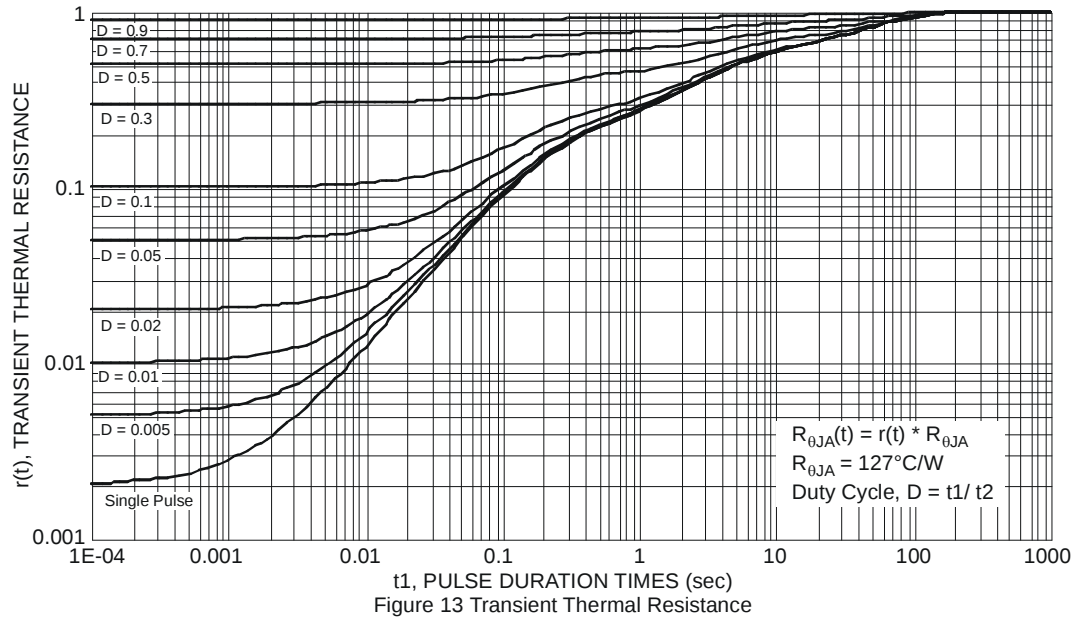
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                         | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                               |
|--------------------------------------------------------|---------------------|-----|------|------|------|----------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —   | —    | -1   | µA   | V <sub>DS</sub> = -60V, 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 (Note 7)</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> | —   | —    | 25   | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A                                                 |
|                                                        |                     | —   | —    | 33   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A                                                |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | —   | -0.7 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A                                                   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>                |                     |     |      |      |      |                                                                                              |
| Input Capacitance                                      | C <sub>iss</sub>    | —   | 2569 | —    | pF   | V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                    |
| Output Capacitance                                     | C <sub>oss</sub>    | —   | 179  | —    | pF   |                                                                                              |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —   | 143  | —    | pF   |                                                                                              |
| Gate Resistance                                        | R <sub>g</sub>      | —   | 8    | —    | 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>      | —   | 26.5 | —    | nC   | V <sub>DS</sub> = -30V, I <sub>D</sub> = -5A                                                 |
| Total Gate Charge (V <sub>GS</sub> = -10V,)            | Q <sub>g</sub>      | —   | 53.1 | —    | nC   |                                                                                              |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —   | 7.1  | —    | nC   |                                                                                              |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —   | 12.6 | —    | nC   |                                                                                              |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | —   | 6    | —    | ns   | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -30V,<br>R <sub>G</sub> = 3Ω, I <sub>D</sub> = -5A |
| Turn-On Rise Time                                      | t <sub>r</sub>      | —   | 7.1  | —    | ns   |                                                                                              |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | —   | 110  | —    | ns   |                                                                                              |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | —   | 62   | —    | ns   |                                                                                              |
| Body Diode Reverse Recovery Time                       | t <sub>rr</sub>     | —   | 20   | —    | ns   | I <sub>F</sub> = -5A, di/dt = 100A/µs                                                        |
| Body Diode Reverse Recovery Charge                     | Q <sub>rr</sub>     | —   | 14   | —    | nC   |                                                                                              |

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

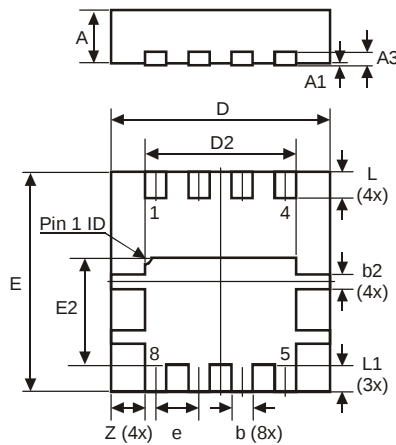






## Package Outline Dimensions

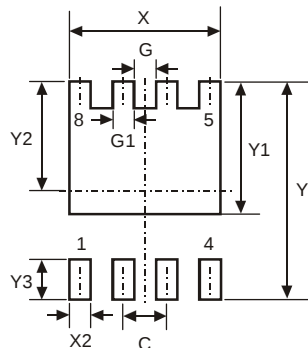
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| POWERDI® 3333-8      |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| D                    | 3.25 | 3.35 | 3.30  |
| E                    | 3.25 | 3.35 | 3.30  |
| D2                   | 2.22 | 2.32 | 2.27  |
| E2                   | 1.56 | 1.66 | 1.61  |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0    | 0.05 | 0.02  |
| A3                   | —    | —    | 0.203 |
| b                    | 0.27 | 0.37 | 0.32  |
| b2                   | —    | —    | 0.20  |
| L                    | 0.35 | 0.45 | 0.40  |
| L1                   | —    | —    | 0.39  |
| e                    | —    | —    | 0.65  |
| 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.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 0.230         |
| G1         | 0.420         |
| Y          | 3.700         |
| Y1         | 2.250         |
| Y2         | 1.850         |
| Y3         | 0.700         |
| X          | 2.370         |
| X2         | 0.420         |

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