

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> max        | I <sub>D</sub> max<br>T <sub>A</sub> = +25°C |
|-------------------|--------------------------------|--|
| -30V              | 13mΩ @ V <sub>GS</sub> = -10V  | -9.8A  |
|                   | 25mΩ @ V <sub>GS</sub> = -4.5V | -7.0A  |

## Description

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

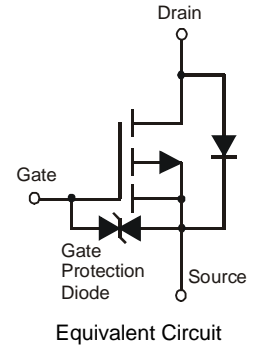
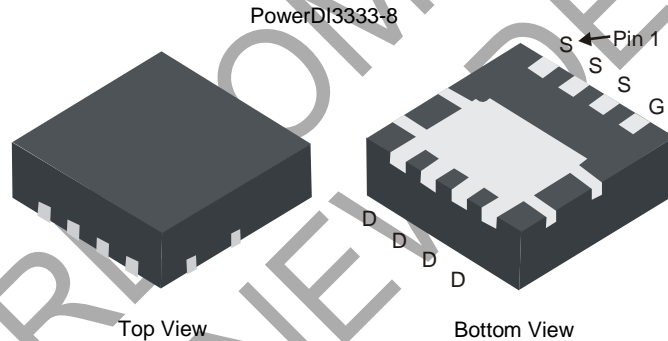
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- Low R<sub>DS(ON)</sub> – 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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMG7401SFGQ](#))**

## 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 Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.0174 grams (Approximate)

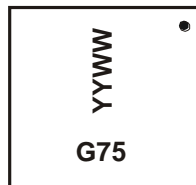


## Ordering Information (Note 4)

| Part Number   | Case          | Packaging        |
|---------------|---------------|------------------|
| DMG7401SFG-7  | PowerDI3333-8 | 2000/Tape & Reel |
| DMG7401SFG-13 | PowerDI3333-8 | 3000/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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



G75 = Product Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 17 for 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> | -30                    | V     |
| Gate-Source Voltage                                      | V <sub>GSS</sub> | ±25                    | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = -10V | I <sub>D</sub>   | T <sub>A</sub> = +25°C | -9.8  |
|  |                  | T <sub>A</sub> = +70°C | -7.7  |
|  | I <sub>D</sub>   | T <sub>A</sub> = +25°C | -13.5 |
|  |                  | T <sub>A</sub> = +70°C | -10.8 |
| Maximum Continuous Body Diode Forward Current (Note 5)   | I <sub>S</sub>   | -3.0                   | A     |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)       | I <sub>DM</sub>  | -80                    | A     |
| Avalanche Current (Notes 7 & 8)                          | I <sub>AR</sub>  | -14                    | A     |
| Repetitive Avalanche Energy (Notes 7 & 8) L = 1mH        | E <sub>AR</sub>  | 104                    | mJ    |

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

| Characteristic                                   | Symbol                            | Value                  | Unit |
|--|-----------------------------------|------------------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | T <sub>A</sub> = +25°C | 0.94 |
|  |                                   | T <sub>A</sub> = +70°C | 0.6  |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | Steady State           | 137  |
|  |                                   | t < 10s                | 82   |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | T <sub>A</sub> = +25°C | 2.2  |
|  |                                   | T <sub>A</sub> = +70°C | 1.3  |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | Steady State           | 60   |
|  |                                   | t < 10s                | 36   |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 3.0                    | °C/W |
| 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>   | -30  | —    | —    | 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> = -30V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —    | —    | ±10  | µA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 8)</b>          |                     |      |      |      |      |  |
| Gate Threshold Voltage                      | V <sub>GS(TH)</sub> | -1.7 | —    | -3.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA                                    |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —    | 9    | 11   | mΩ   | V <sub>GS</sub> = -20V, I <sub>D</sub> = -12A  |
|   |                     | —    | 10   | 13   |      | V <sub>GS</sub> = -10V, I <sub>D</sub> = -9A   |
|   |                     | —    | 17   | 25   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A  |
|   |                     | —    | —    | —    |      | V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A   |
| Forward Transfer Admittance                 | Y <sub>fs</sub>     | —    | 21   | —    | S    | V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>     |                     |      |      |      |      |  |
| Input Capacitance                           | C <sub>iss</sub>    | —    | 2246 | 2987 | pF   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                    |
| Output Capacitance                          | C <sub>oss</sub>    | —    | 352  | 468  | pF   |  |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —    | 294  | 391  | pF   |  |
| Gate Resistance                             | R <sub>g</sub>      | —    | 5.1  | 10   | 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>      | —    | 20.5 | 30   | nC   | V <sub>DS</sub> = -15V, I <sub>D</sub> = -12A  |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —    | 41   | 58   | nC   |  |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —    | 7.6  | —    | nC   |  |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —    | 8.0  | —    | nC   |  |
| Turn-On Delay Time                          | t <sub>D(ON)</sub>  | —    | 11.3 | 23   | ns   |  |
| Turn-On Rise Time                           | t <sub>R</sub>      | —    | 15.4 | 31   | ns   | V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V,<br>R <sub>L</sub> = 1.25Ω, R <sub>G</sub> = 3Ω |
| Turn-Off Delay Time                         | t <sub>D(OFF)</sub> | —    | 38.0 | 61   | ns   |  |
| Turn-Off Fall Time                          | t <sub>F</sub>      | —    | 22.0 | 38   | ns   |  |
| <b>BODY DIODE CHARACTERISTICS</b>           |                     |      |      |      |      |  |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —    | -0.7 | -1.0 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A   |
| Reverse Recovery Time (Note 9)              | t <sub>RR</sub>     | —    | 20   | 31   | ns   | I <sub>S</sub> = -9.5A, dI/dt = 100A/µs  |
| Reverse Recovery Charge (Note 9)            | Q <sub>RR</sub>     | —    | 9.5  | 18   | nC   |  |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - I<sub>AR</sub> and E<sub>AR</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

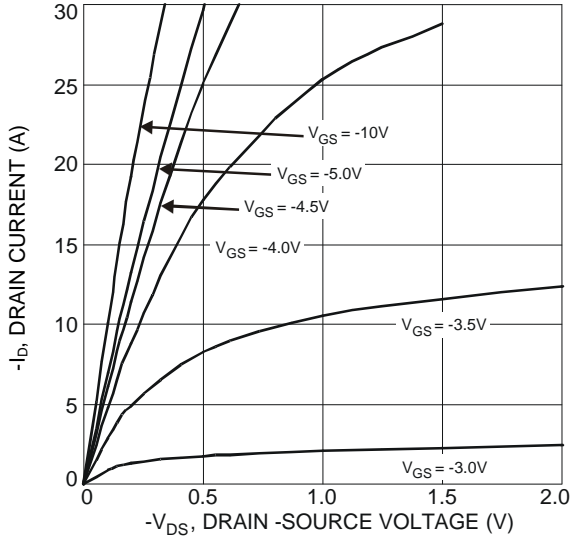


Fig. 1 Typical Output Characteristics

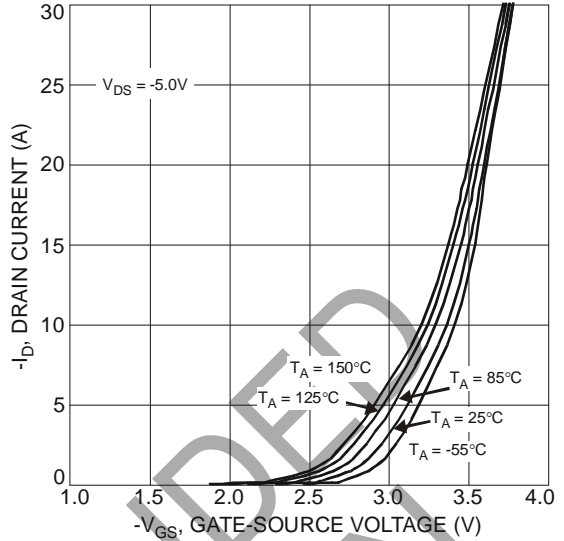


Fig. 2 Typical Transfer Characteristics

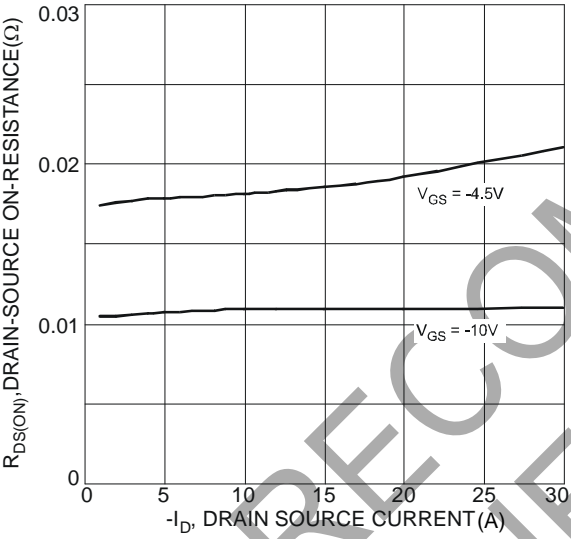


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

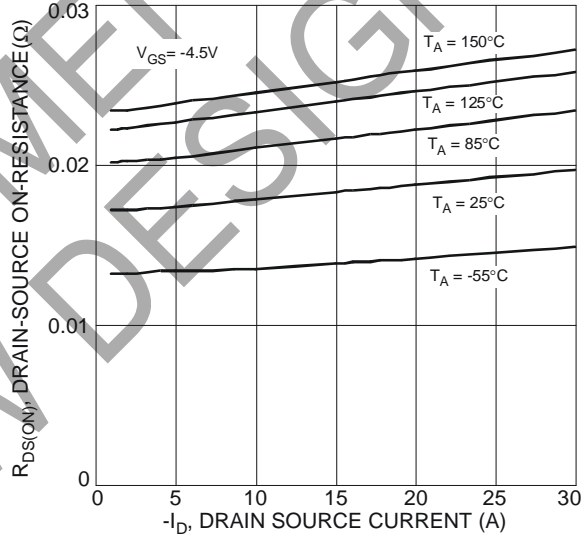


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

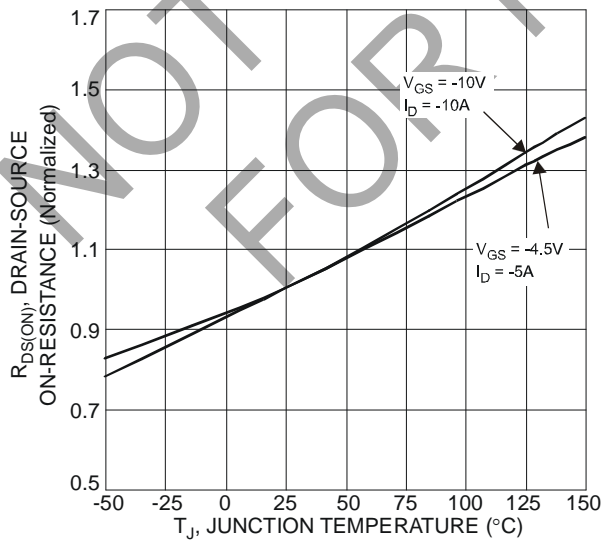


Fig. 5 On-Resistance Variation with Temperature

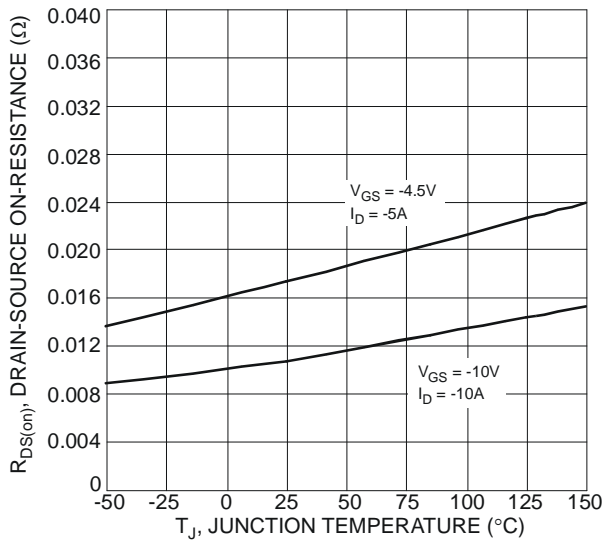


Fig. 6 On-Resistance Variation with Temperature

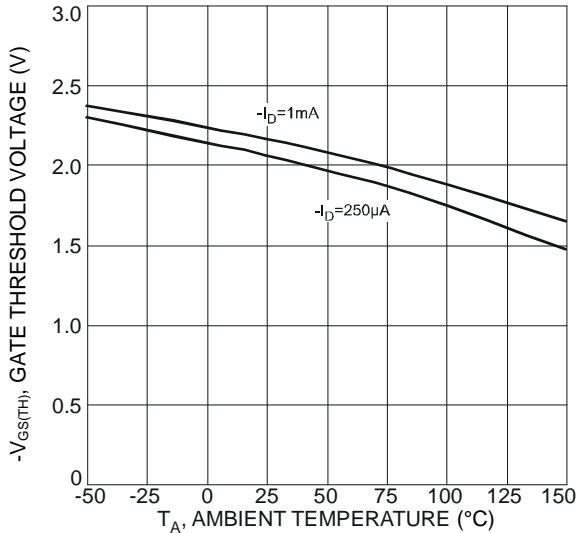


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

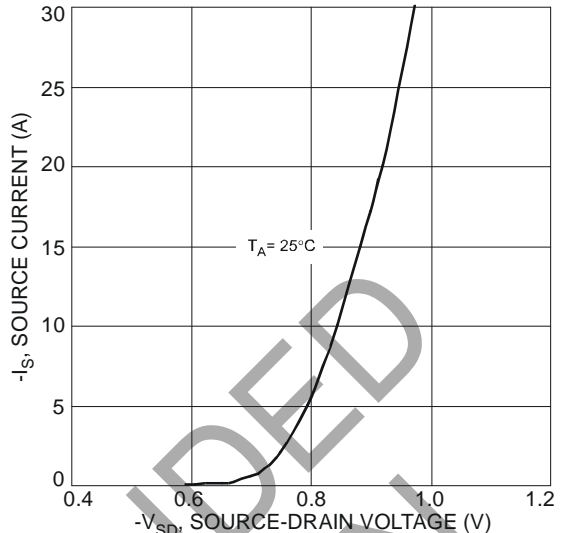


Fig. 8 Diode Forward Voltage vs. Current

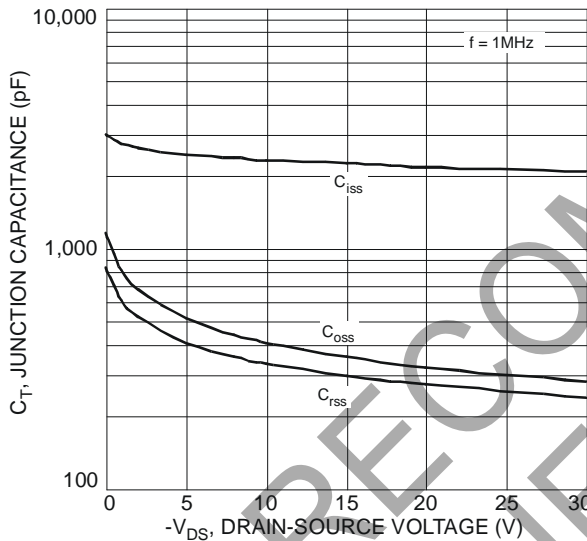


Fig. 9 Typical Junction Capacitance

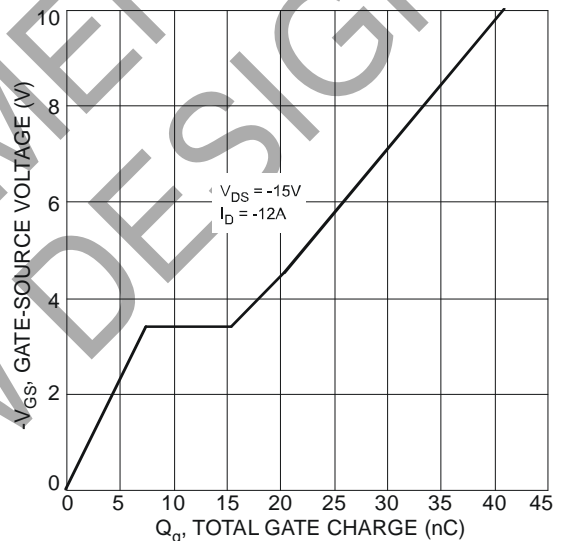


Fig. 10 Gate-Charge Characteristics

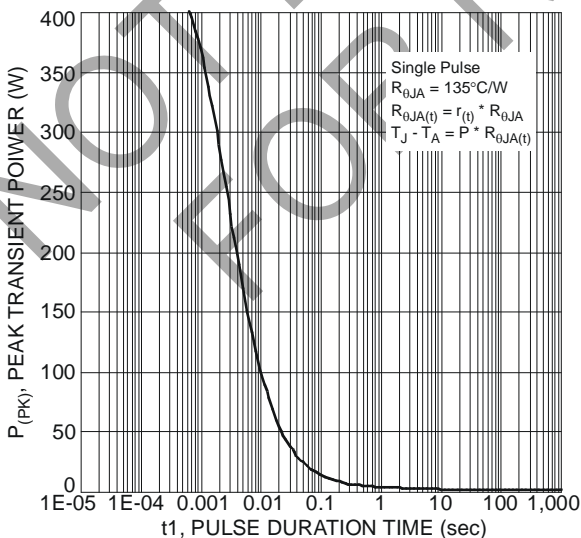


Fig. 11 Single Pulse Maximum Power Dissipation

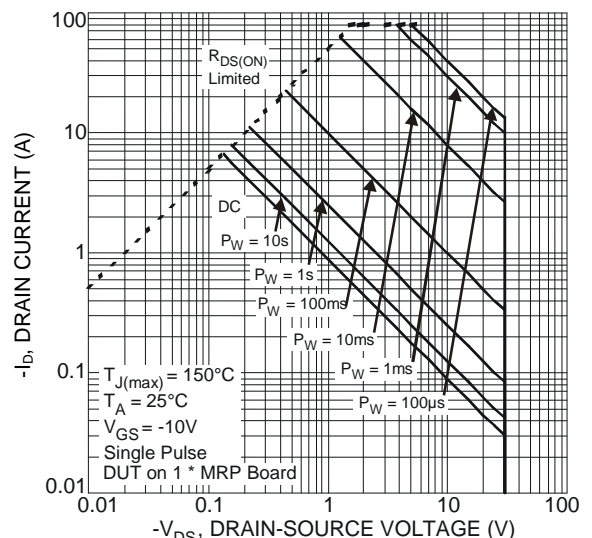
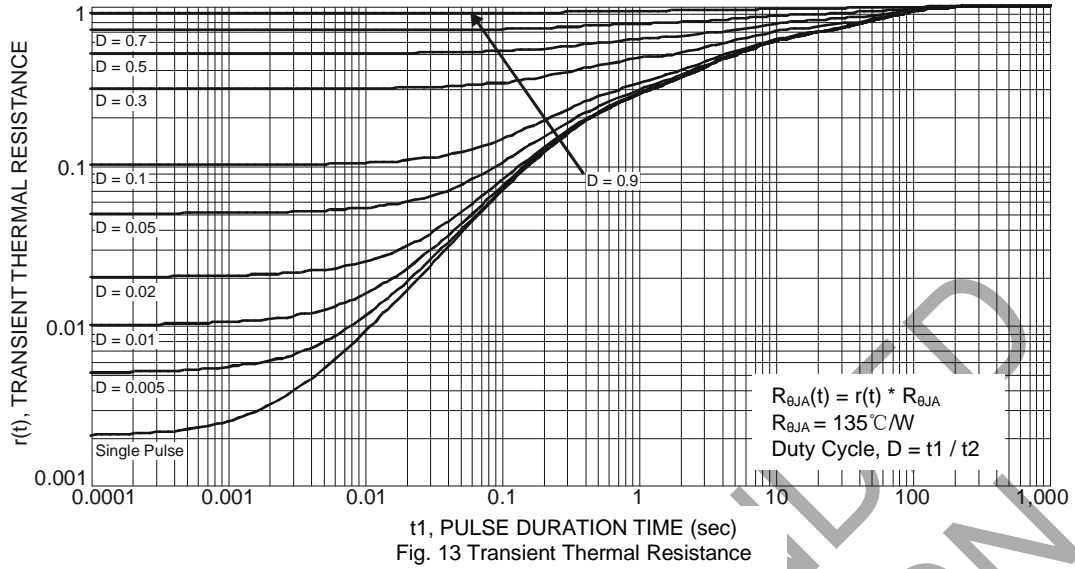


Fig. 12 SOA, Safe Operation Area

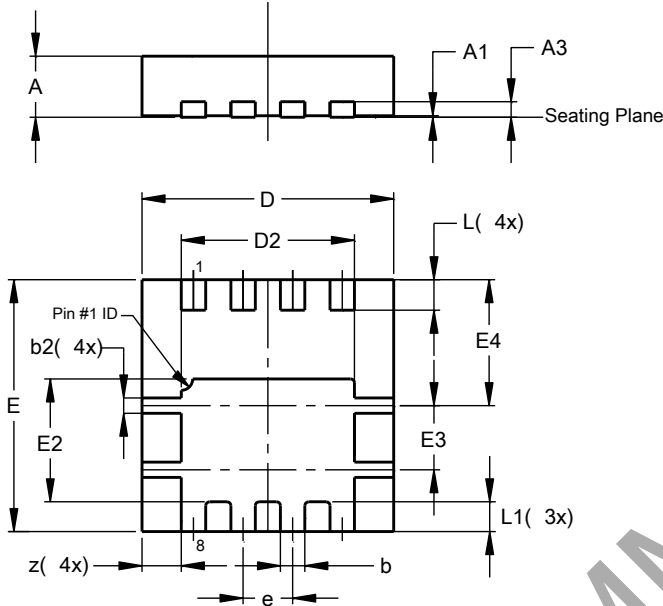


NOT RECOMMENDED FOR NEW DESIGN

## Package Outline Dimensions

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

### PowerDI3333-8

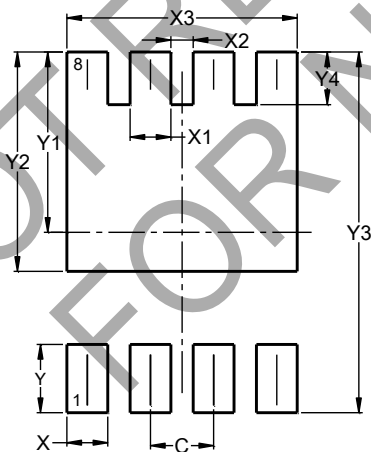


| PowerDI3333-8               |      |      |       |
|-----------------------------|------|------|-------|
| Dim                         | Min  | Max  | Typ   |
| A                           | 0.75 | 0.85 | 0.80  |
| A1                          | 0.00 | 0.05 | 0.02  |
| A3                          | -    | -    | 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 |
| <b>All Dimensions in mm</b> |      |      |       |

## 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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