

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$                          | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|---------------|---------------------------------------|------------------------------------|
| 30V           | 20m $\Omega$ @ $V_{GS} = 10\text{V}$  | 8.0 A                              |
|               | 27m $\Omega$ @ $V_{GS} = 4.5\text{V}$ | 6.5 A                              |

## 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

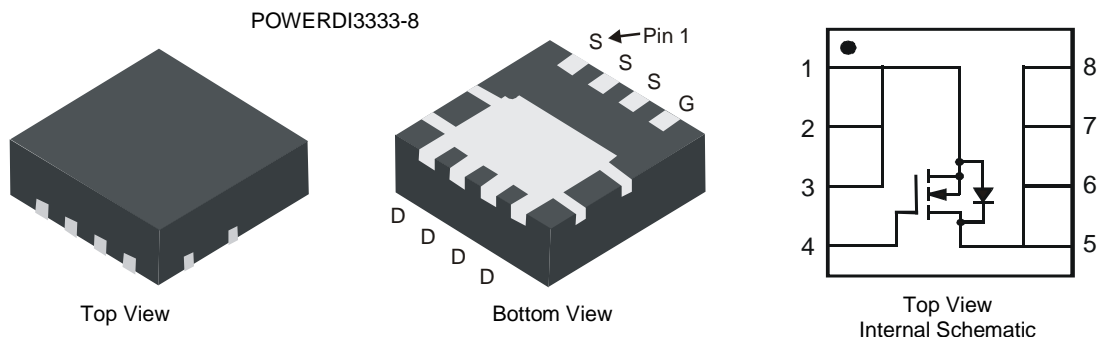
- Backlighting
- DC-DC Converters
- Power Management Functions

## 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: 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: See Diagram Below
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.072 grams (Approximate)

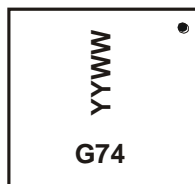


## Ordering Information (Note 4)

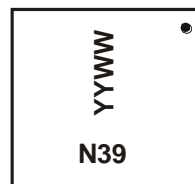
| Part Number   | Case          | Packaging         |
|---------------|---------------|-------------------|
| DMG7410SFG-7  | POWERDI3333-8 | 2,000/Tape & Reel |
| DMG7410SFG-13 | POWERDI3333-8 | 3,000/Tape & Reel |

- 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/products/packages.html>.

## Marking Information



G74 = Product Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 10 for 2010)  
WW = Week Code (01 – 53)



N39 = Product Marking Code  
YYWW = Date Code Marking  
YY = Last Digit of Year (ex: 10 for 2010)  
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 | I <sub>D</sub>   | 5.3   | A    |
|  |              | T <sub>A</sub> = +70°C |                  | 4.2   |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V  | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 8.0   | A    |
|  |              | T <sub>A</sub> = +70°C |                  | 6.3   |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V  | t ≤ 10s      | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 9.5   | A    |
|  |              | T <sub>A</sub> = +70°C |                  | 7.7   |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 6.5   | A    |
|  |              | T <sub>A</sub> = +70°C |                  | 4.9   |      |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | t ≤ 10s      | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 7.8   | A    |
|  |              | T <sub>A</sub> = +70°C |                  | 6.2   |      |
| 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**

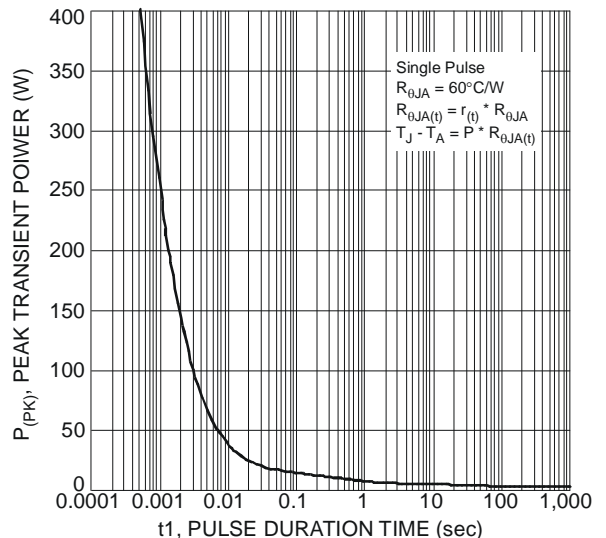
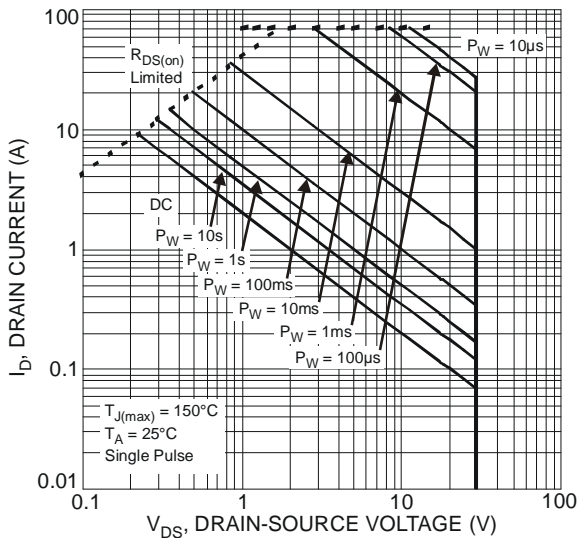
| Characteristic   | Symbol                            | Max         | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)   | P <sub>D</sub>                    | 1.0         | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 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> | 0.8 | 1.2  | 2.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                              |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | -   | 13.5 | 20   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A   |
|  |                     | -   | 22   | 27   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7.5A   |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | -   | 13.0 | -    | S    | V <sub>DS</sub> = 5V, 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 (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   |   |
| Body Diode Reverse Recovery Time                       | t <sub>rr</sub>     | -   | 12.6 | -    | ns   | IF=8A, di/dt=500A/μs  |
| Body Diode Reverse Recovery Charge                     | Q <sub>rr</sub>     | -   | 10.5 | -    | nC   |   |

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



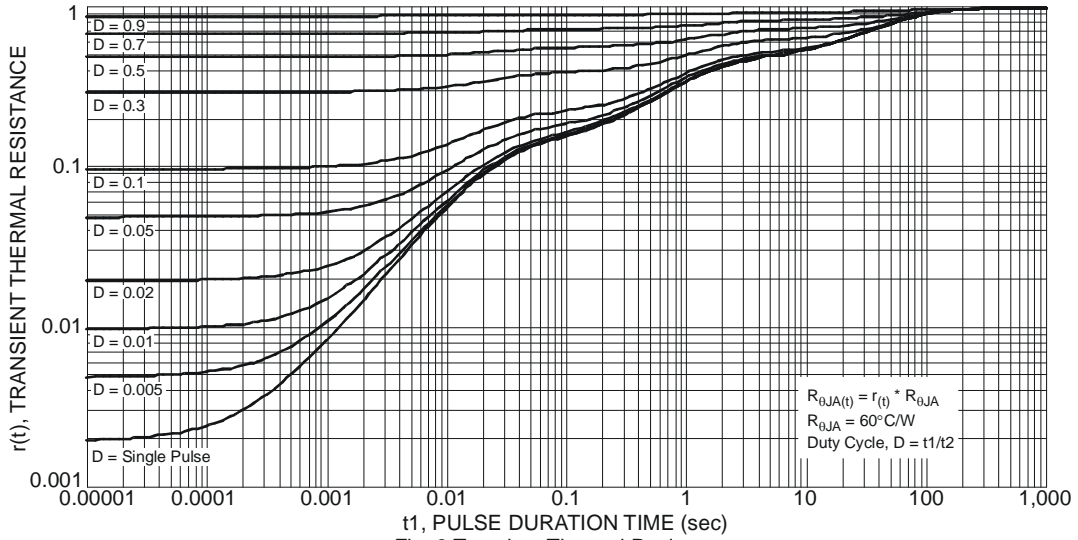


Fig. 3 Transient Thermal Resistance

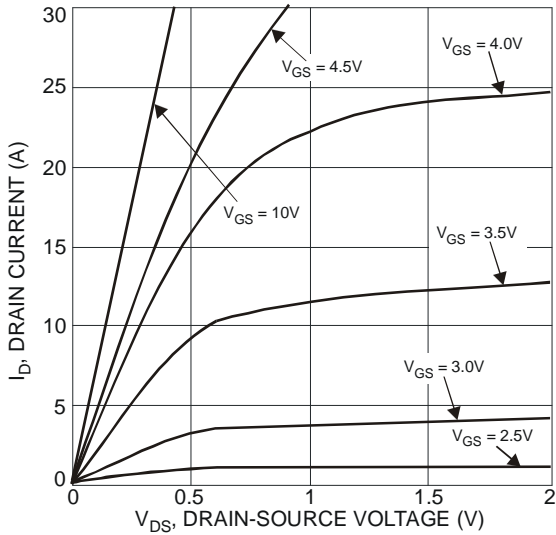


Fig. 4 Typical Output Characteristic

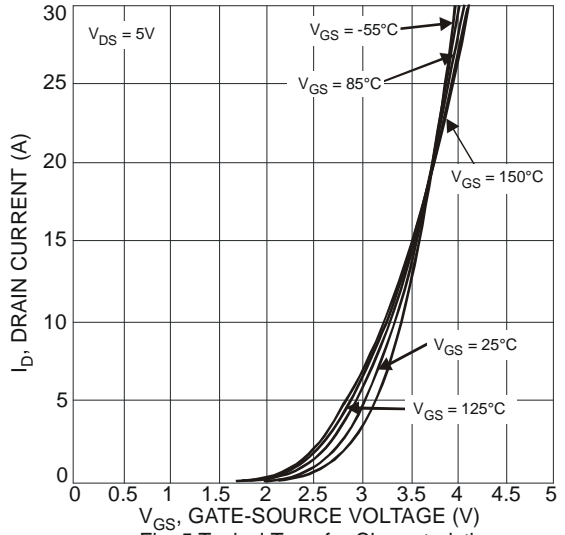


Fig. 5 Typical Transfer Characteristic

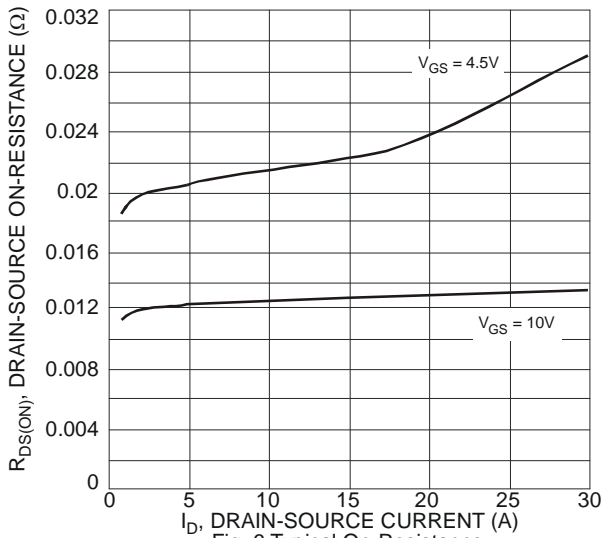


Fig. 6 Typical On-Resistance vs. Drain Current and Gate Voltage

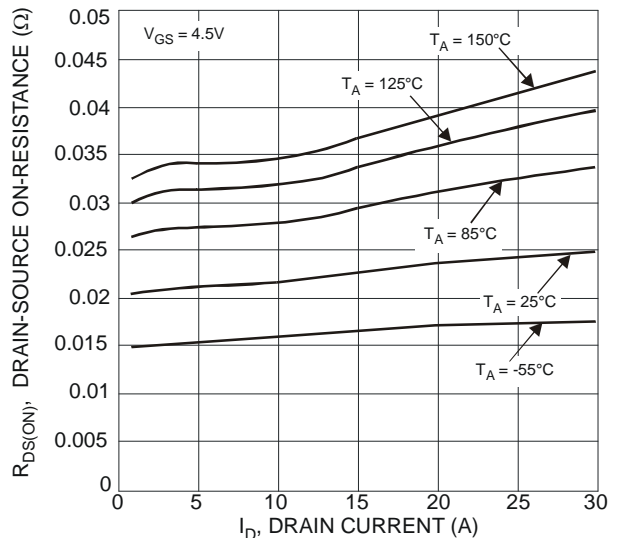


Fig. 7 Typical On-Resistance vs. Drain Current and Temperature

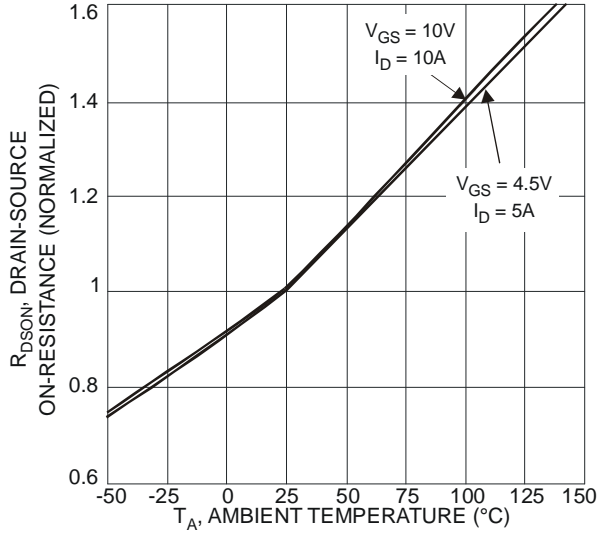


Fig. 8 On-Resistance Variation with Temperature

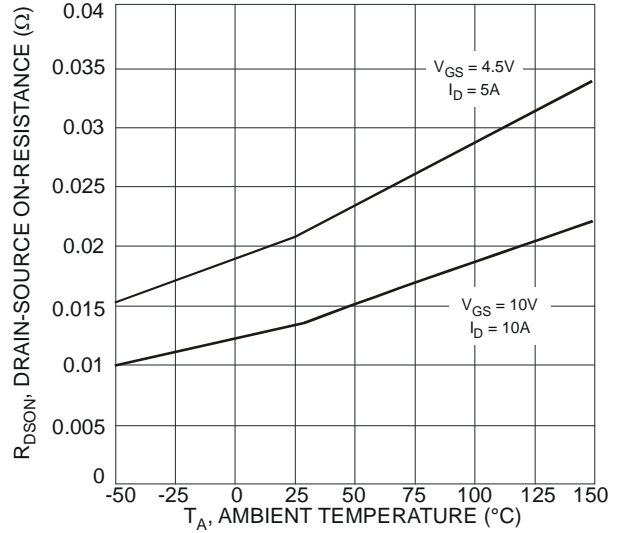


Fig. 9 On-Resistance Variation with Temperature

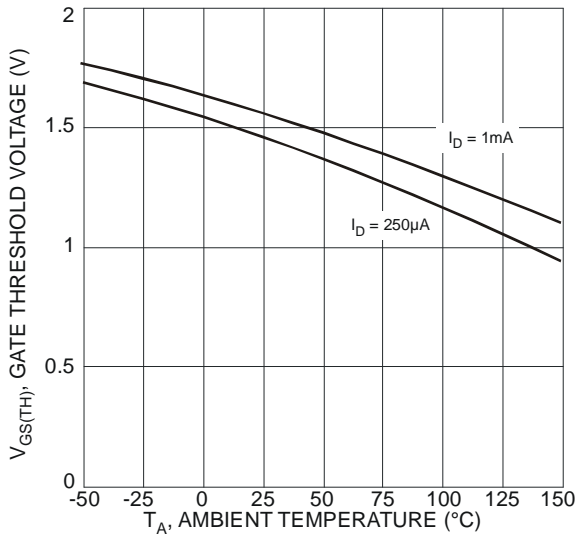


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

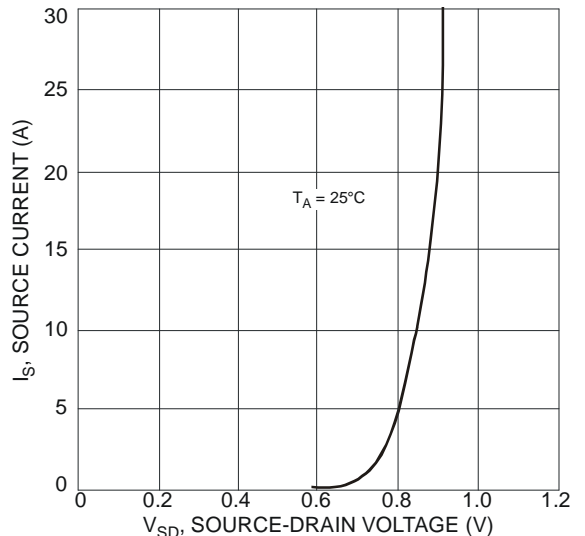


Fig. 11 Diode Forward Voltage vs. Current

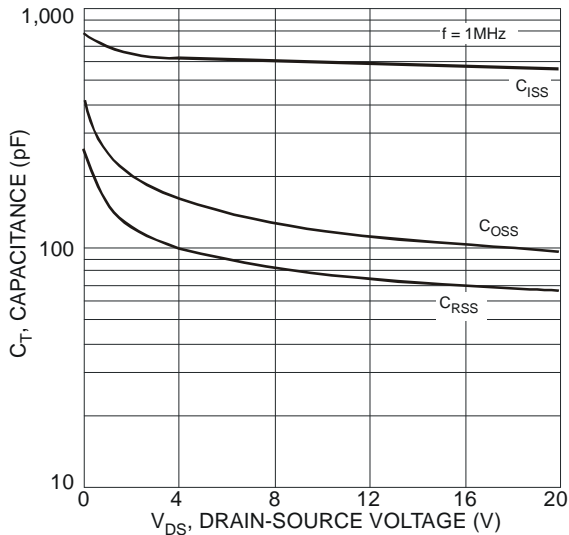


Fig. 12 Typical Total Capacitance

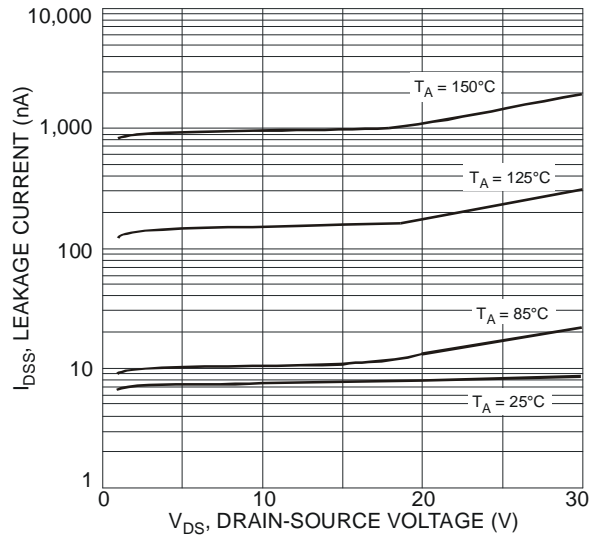
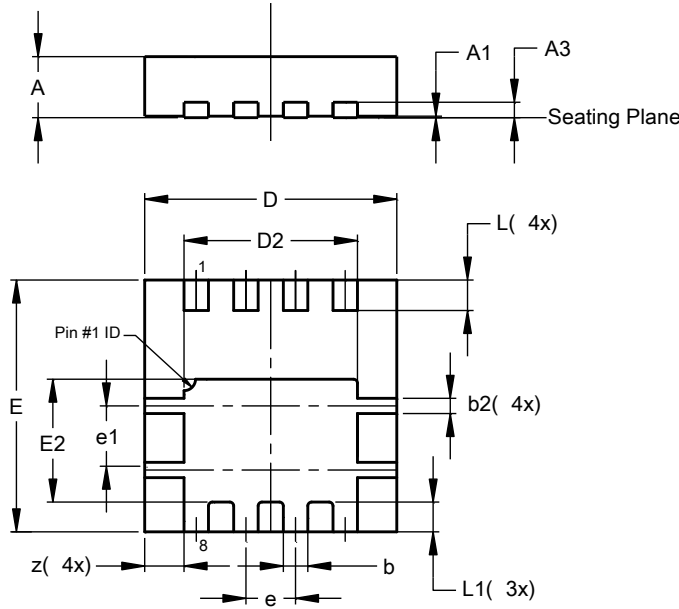


Fig. 13 Typical Leakage Current vs. Drain-Source Voltage

**Package Outline Dimensions**

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

**POWERDI<sup>®</sup> 3333-8**

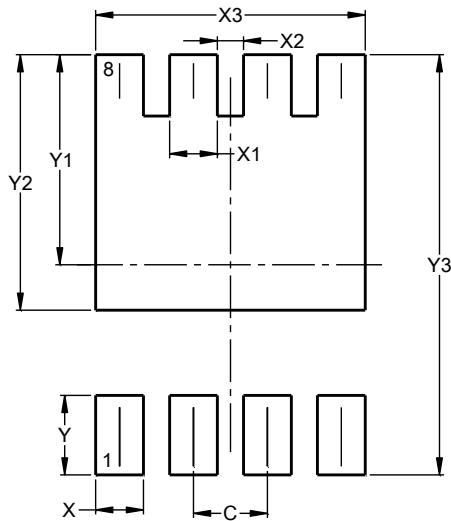


| POWERDI <sup>®</sup> 3333-8 |      |      |       |
|-----------------------------|------|------|-------|
| Dim                         | Min  | Max  | Typ   |
| A                           | 0.75 | 0.85 | 0.80  |
| A1                          | 0.00 | 0.05 | 0.02  |
| A3                          | -    | -    | 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<sup>®</sup> 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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