

Product Summary

| BV _{DSS} | R _{DS(on)} Max | I _D Max T _C = +25°C |
|-------------------|-------------------------------|--|
| 30V | 5.5mΩ @ V _{GS} = 10V | 45A |
| | 9mΩ @ V _{GS} = 4.5V | 30A |

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN3009SFGQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

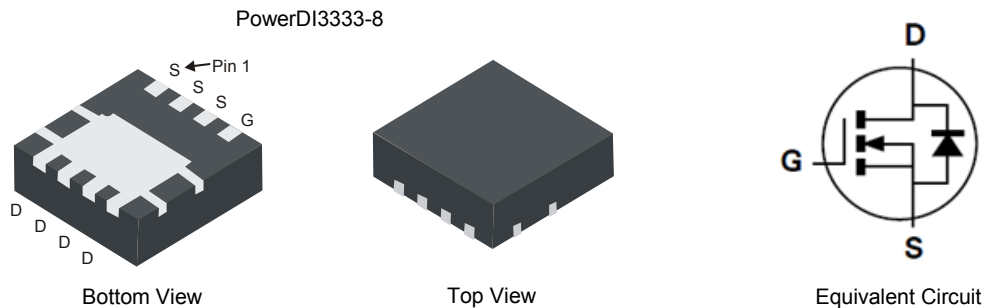
Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Power Management Functions
- DC-DC Converters
- Batteries

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 (E3)
- Weight: 0.072 grams (Approximate)

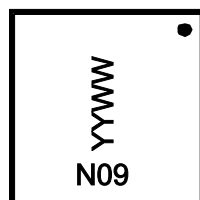


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|----------------|---------------|-------------------|
| DMN3009SFGQ-7 | PowerDI3333-8 | 2,000/Tape & Reel |
| DMN3009SFGQ-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) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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



N09 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 21 = 2021)
 WW = Week Code (01 to 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit | |
|---|-----------|---------------------------|------|---|
| Drain-Source Voltage | V_{DSS} | 30 | V | |
| Gate-Source Voltage | V_{GSS} | ± 20 | V | |
| Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6) | I_D | $T_A = +25^\circ\text{C}$ | 16 | |
| | | $T_A = +70^\circ\text{C}$ | 13 | |
| | I_D | $T_C = +25^\circ\text{C}$ | 45 | A |
| | | $T_C = +70^\circ\text{C}$ | 35 | A |
| Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%) | I_{DM} | 80 | A | |
| Maximum Continuous Body Diode Forward Current (Note 6) | I_S | 20 | A | |
| Avalanche Current, $L = 0.1\text{mH}$ | I_{AS} | 33 | A | |
| Avalanche Energy, $L = 0.1\text{mH}$ | E_{AS} | 55 | mJ | |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------|---------------------------|--------------------|
| Total Power Dissipation (Note 5) | P_D | $T_A = +25^\circ\text{C}$ | 0.9 |
| | | $T_A = +70^\circ\text{C}$ | 0.6 |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 137 | $^\circ\text{C/W}$ |
| Total Power Dissipation (Note 6) | P_D | $T_A = +25^\circ\text{C}$ | 2.1 |
| | | $T_A = +70^\circ\text{C}$ | 1.4 |
| Thermal Resistance, Junction to Ambient (Note 6) Steady State | $R_{\theta JA}$ | 59 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case (Note 6) | $R_{\theta JC}$ | 7.8 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|-------|-----------|---------------|---|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 30 | — | — | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1 | 1.4 | 2.5 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 4.0 | 5.5 | m Ω | $V_{GS} = 10\text{V}, I_D = 20\text{A}$ |
| | | — | 4.9 | 9 | | $V_{GS} = 4.5\text{V}, I_D = 16\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | 0.68 | 1 | V | $V_{GS} = 0\text{V}, I_S = 1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | 2,000 | — | pF | $V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 315 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 248 | — | pF | |
| Gate Resistance | R_g | — | 2.2 | — | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge ($V_{GS} = 4.5\text{V}$) | Q_g | — | 20 | — | nC | $V_{DS} = 15\text{V}, I_D = 15\text{A}$ |
| Total Gate Charge ($V_{GS} = 10\text{V}$) | Q_g | — | 42 | — | nC | |
| Gate-Source Charge | Q_{gs} | — | 4.7 | — | nC | |
| Gate-Drain Charge | Q_{gd} | — | 7.4 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 3.9 | — | ns | $V_{DD} = 15\text{V}, V_{GS} = 10\text{V}, R_G = 3.3\Omega, I_D = 15\text{A}$ |
| Turn-On Rise Time | t_R | — | 4.1 | — | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 31 | — | ns | |
| Turn-Off Fall Time | t_F | — | 14.6 | — | ns | |
| Reverse Recovery Time | t_{RR} | — | 15 | — | ns | $I_F = 15\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge | Q_{RR} | — | 6 | — | nC | |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

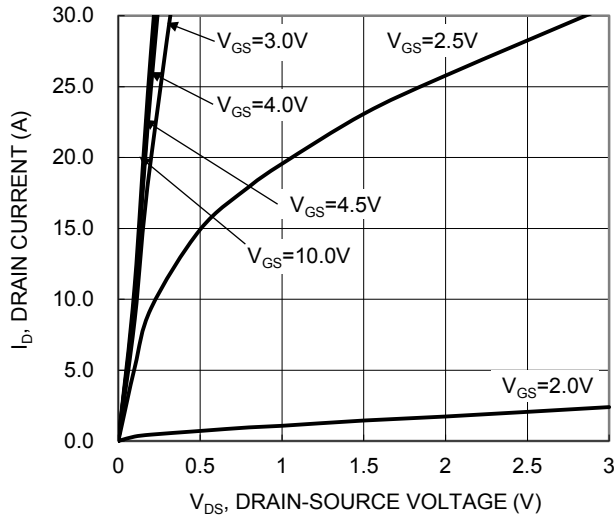


Figure 1. Typical Output Characteristic

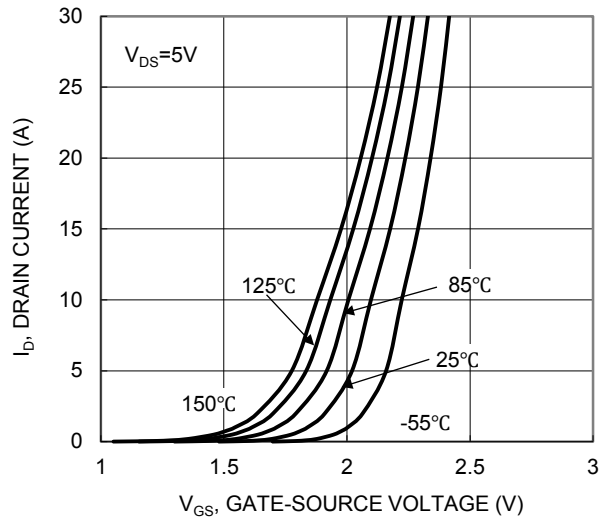


Figure 2. Typical Transfer Characteristic

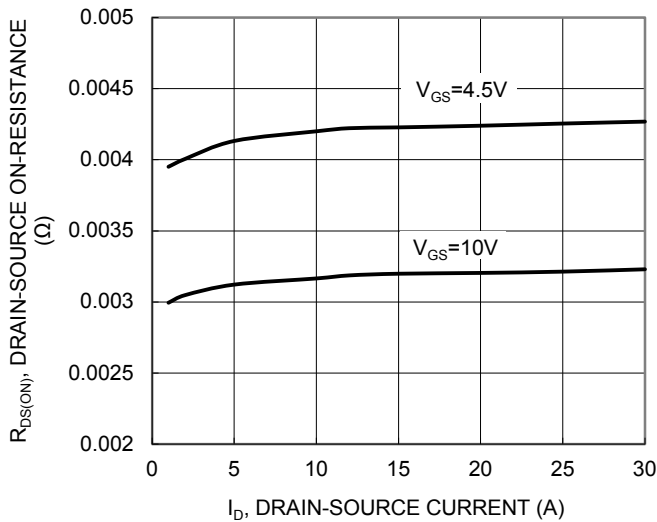


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

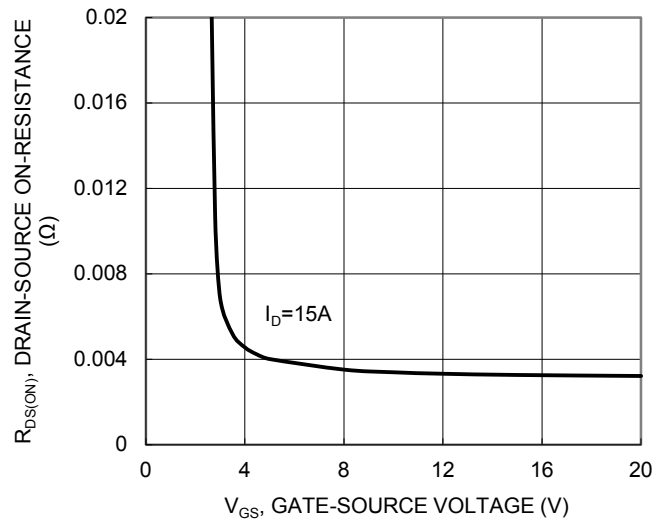


Figure 4. Typical Transfer Characteristic

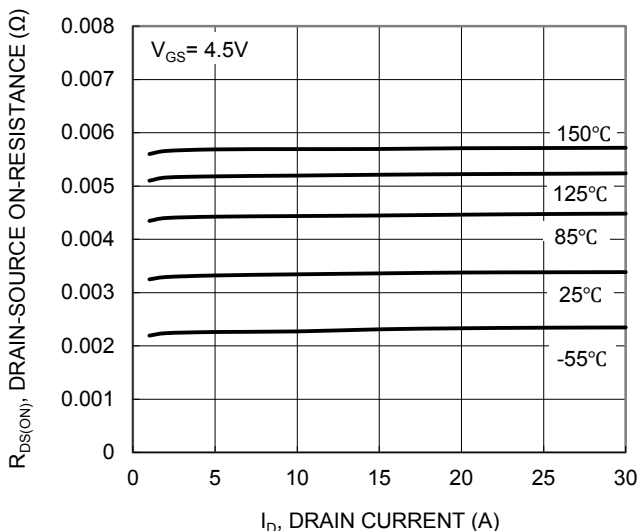


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

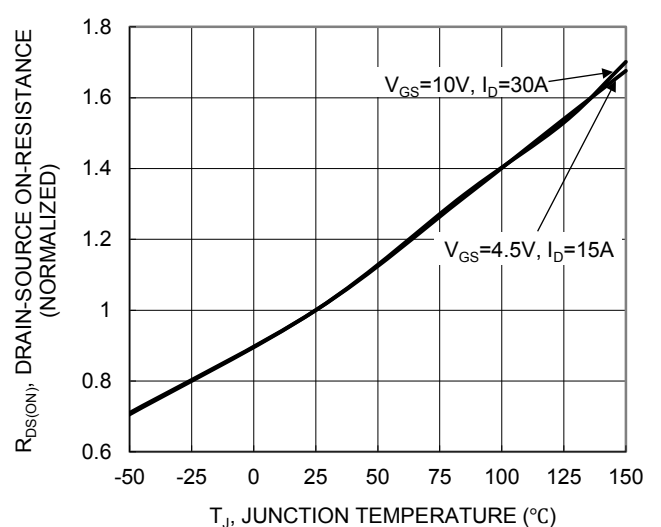


Figure 6. On-Resistance Variation with Temperature

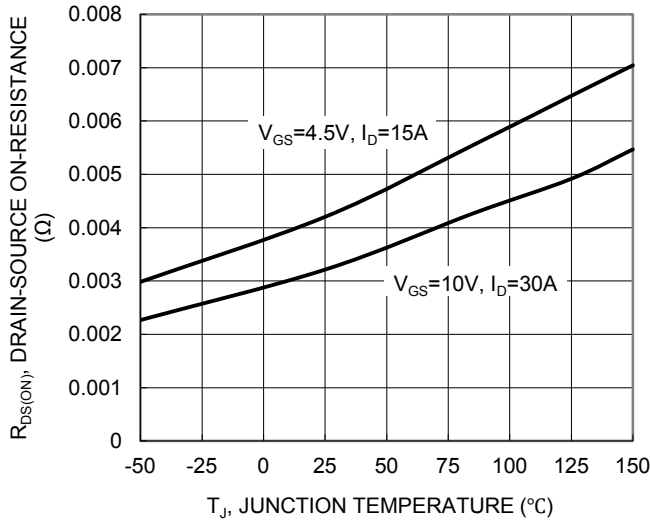


Figure 7. On-Resistance Variation with Temperature

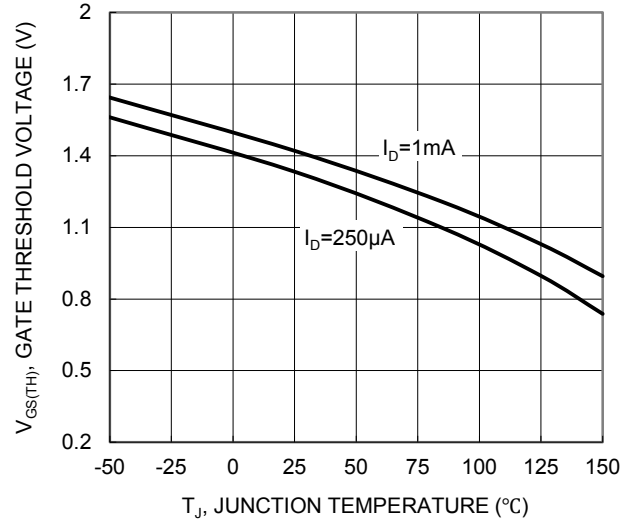


Figure 8. Gate Threshold Variation vs. Junction Temperature

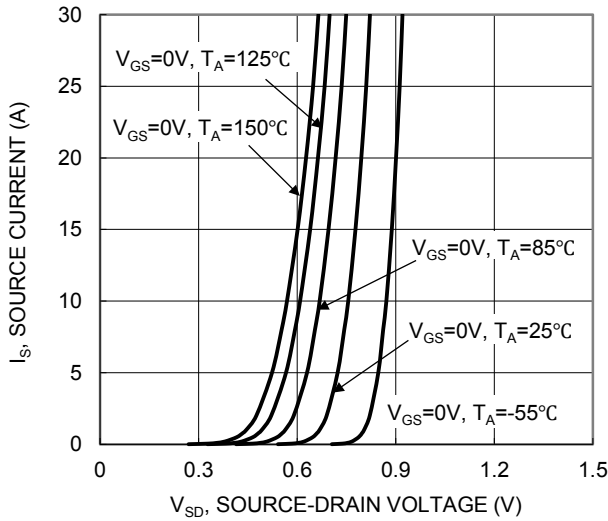


Figure 9. Diode Forward Voltage vs. Current

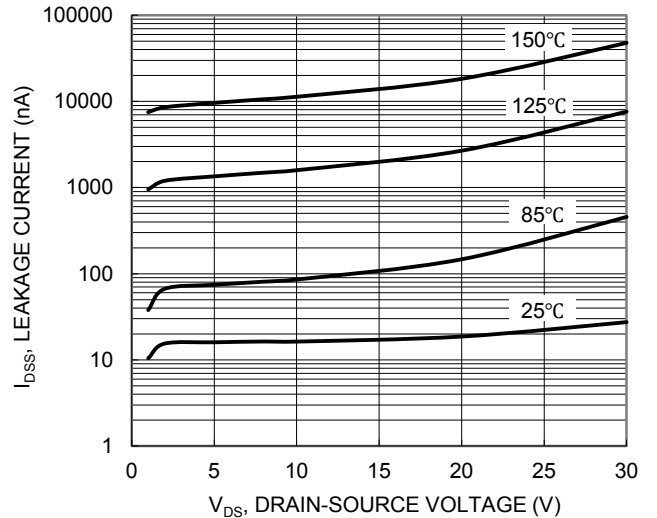


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

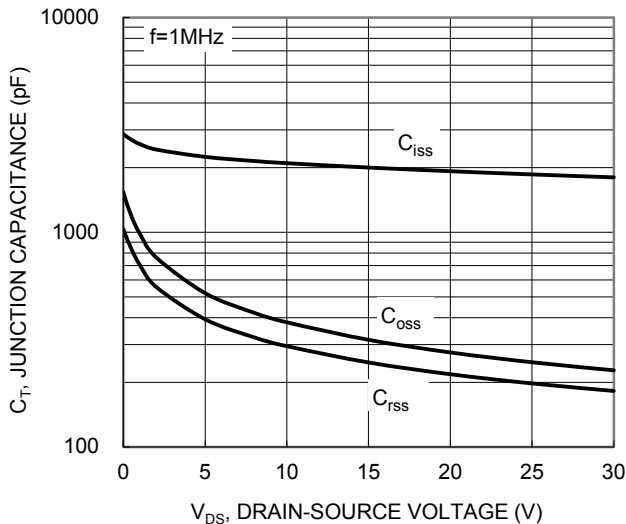


Figure 11. Typical Junction Capacitance

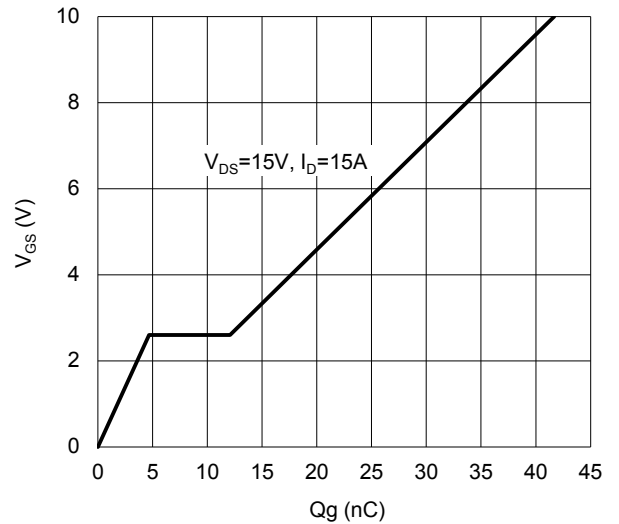
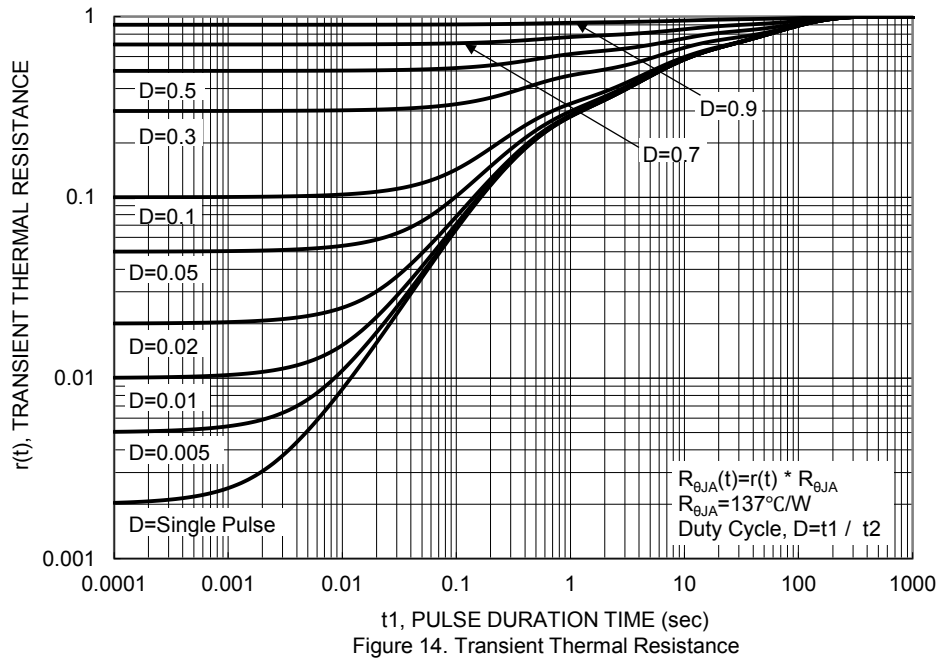
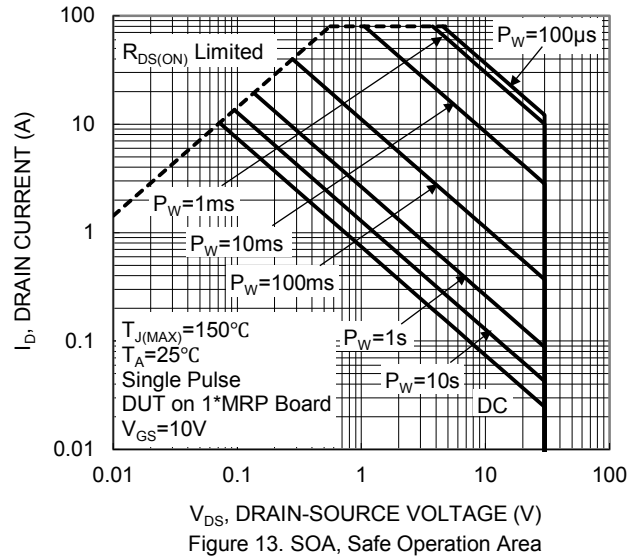


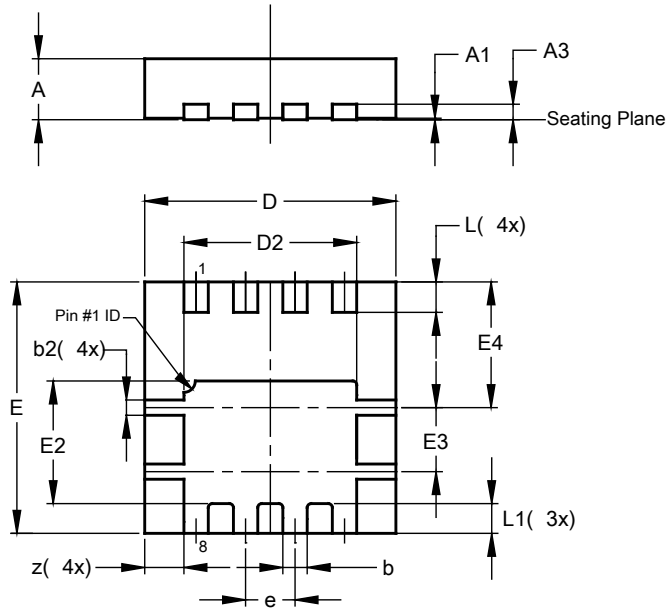
Figure 12. Gate Charge



Package Outline Dimensions

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

PowerDI3333-8

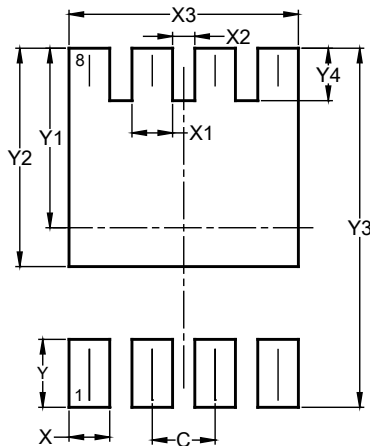


| PowerDI3333-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | 0.15 | 0.25 | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E | 3.25 | 3.35 | 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 |
| All Dimensions in mm | | | |

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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