

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ Max | I_D Max $T_C = +25^\circ\text{C}$ |
|---------------|---------------------------------------|--|
| 30V | 5.5m Ω @ $V_{GS} = 10\text{V}$ | 45A |
| | 9m Ω @ $V_{GS} = 4.5\text{V}$ | 30A |

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

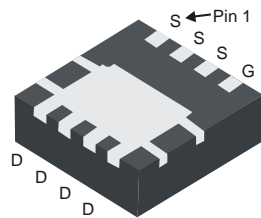
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Power Management Functions
- DC-DC Converters
- Battery

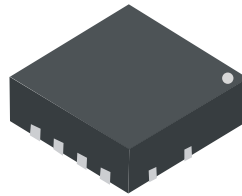
Mechanical Data

- 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)

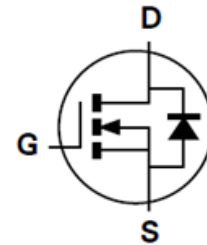
PowerDI3333-8



Bottom View



Top View



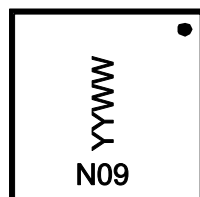
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|-------------------|
| DMN3009SFG-7 | PowerDI3333-8 | 2,000/Tape & Reel |
| DMN3009SFG-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 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



N09= Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 15 = 2015)
 WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°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} = 10V (Note 6) | I _D | T _A = +25°C | 16 |
| | | T _A = +70°C | 13 |
| | I _D | T _C = +25°C | 45 |
| | | T _C = +70°C | 35 |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%) | I _{DM} | 80 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | I _S | 20 | A |
| Avalanche Current, L = 0.1mH | I _{AS} | 33 | A |
| Avalanche Energy, L = 0.1mH | E _{AS} | 55 | mJ |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------------------------|------------------------|------|
| Total Power Dissipation (Note 5) | P _D | T _A = +25°C | 0.9 |
| | | T _A = +70°C | 0.6 |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 137 | °C/W |
| Total Power Dissipation (Note 6) | P _D | T _A = +25°C | 2.1 |
| | | T _A = +70°C | 1.4 |
| Thermal Resistance, Junction to Ambient (Note 6) Steady State | R _{θJA} | 59 | °C/W |
| Thermal Resistance, Junction to Case (Note 6) | R _{θJC} | 7.8 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|-------|------|------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 30 | — | — | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | µA | V _{DS} = 24V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1 | — | 2.5 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | — | 5.5 | mΩ | V _{GS} = 10V, I _D = 20A |
| | | — | — | 9 | | V _{GS} = 4.5V, I _D = 16A |
| Diode Forward Voltage | V _{SD} | — | — | 1 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iss} | — | 2,000 | — | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 315 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 248 | — | pF | |
| Gate Resistance | R _g | — | 2.2 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 20 | — | nC | V _{DS} = 15V, I _D = 15A |
| Total Gate Charge (V _{GS} = 10V) | 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} = 15V, V _{GS} = 10V, R _G = 3.3Ω, I _D = 15A |
| 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 = 15A, di/dt = 100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 6 | — | nC | |

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.

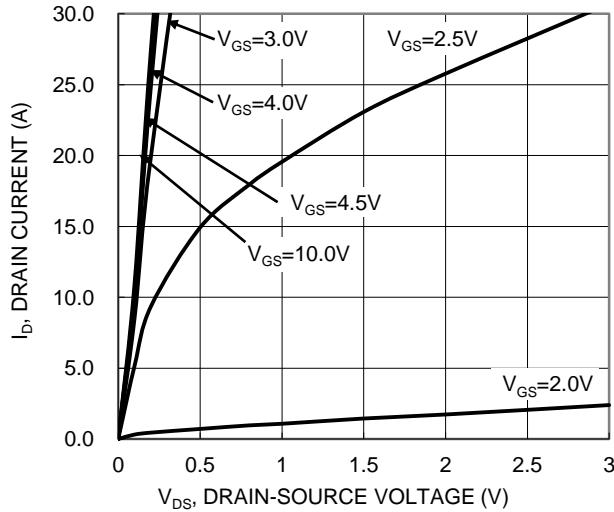


Figure 1. Typical Output Characteristic

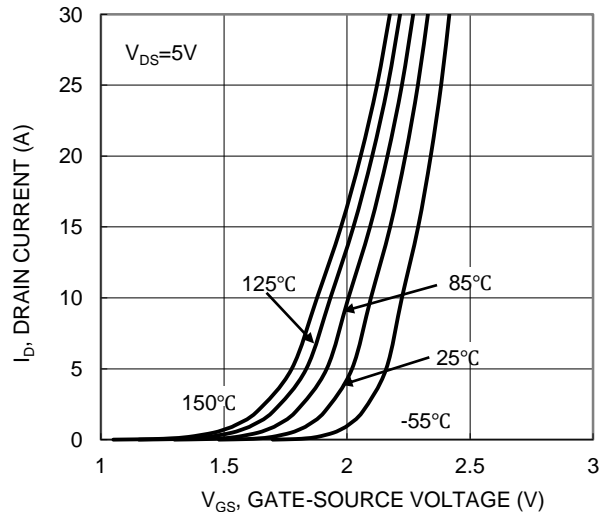


Figure 2. Typical Transfer Characteristic

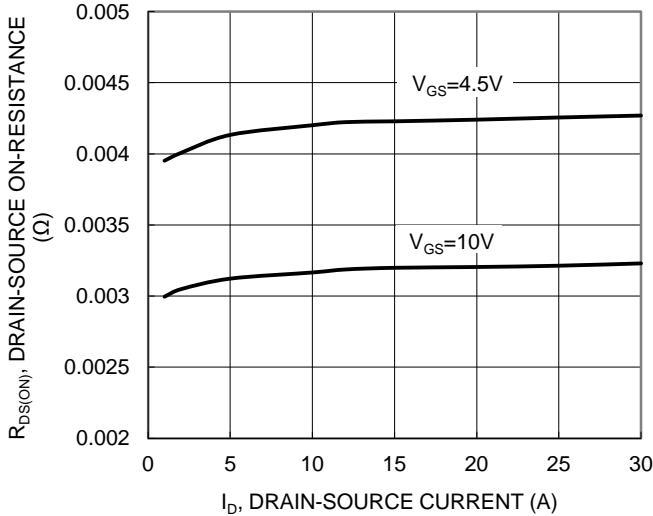


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

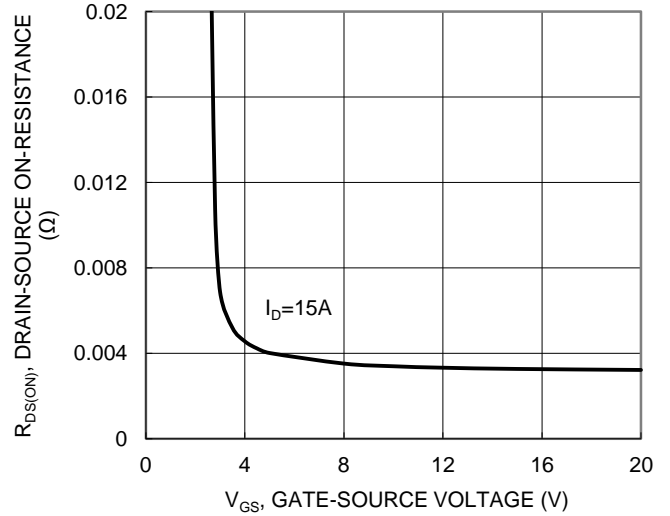


Figure 4. Typical Transfer Characteristic

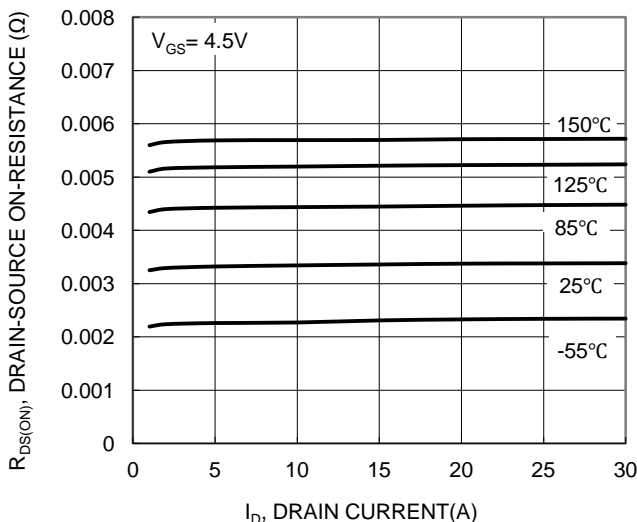


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

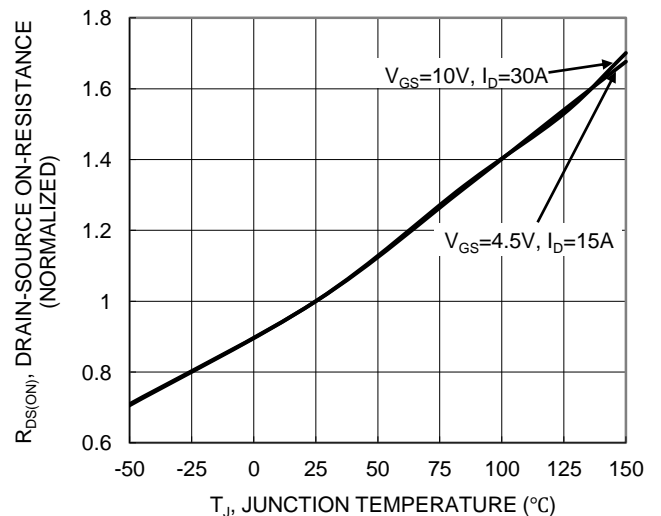


Figure 6. On-Resistance Variation with Temperature

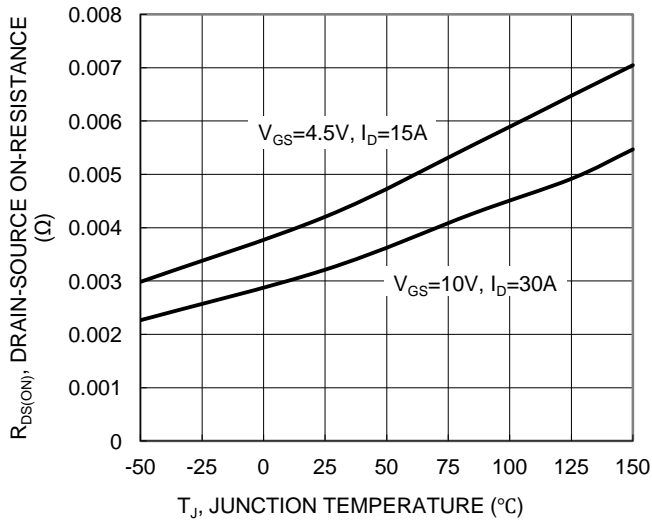


Figure 7. On-Resistance Variation with Temperature

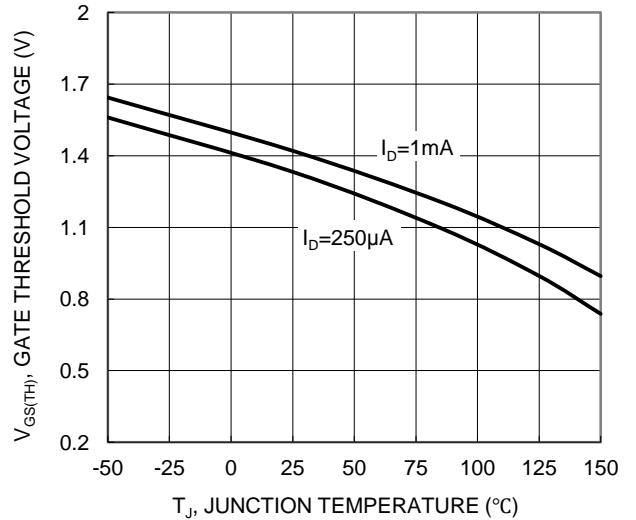


Figure 8. Gate Threshold Variation vs. Junction Temperature

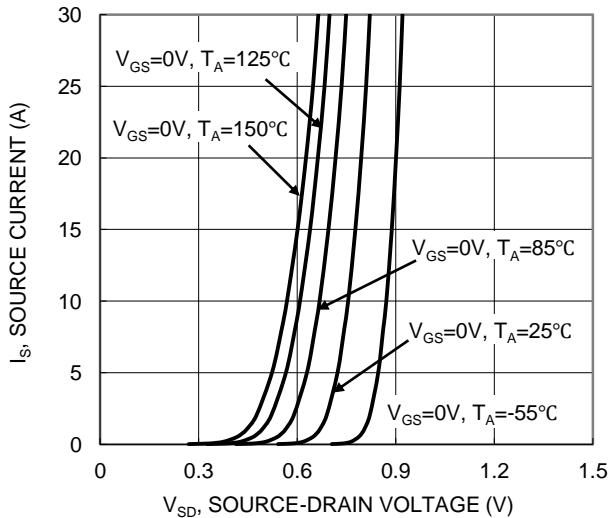


Figure 9. Diode Forward Voltage vs. Current

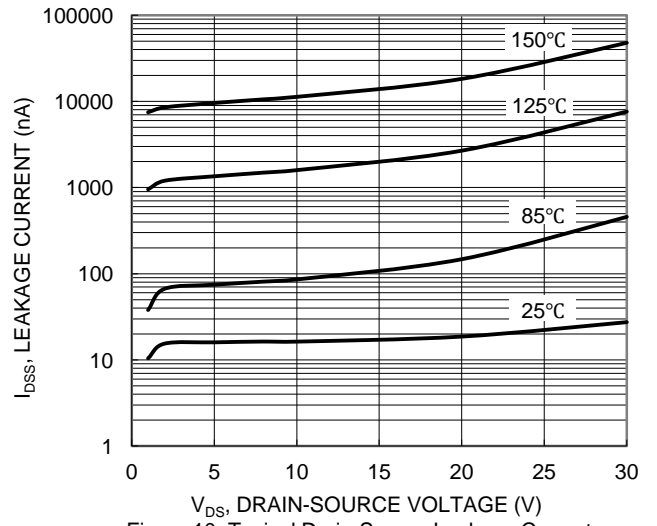


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

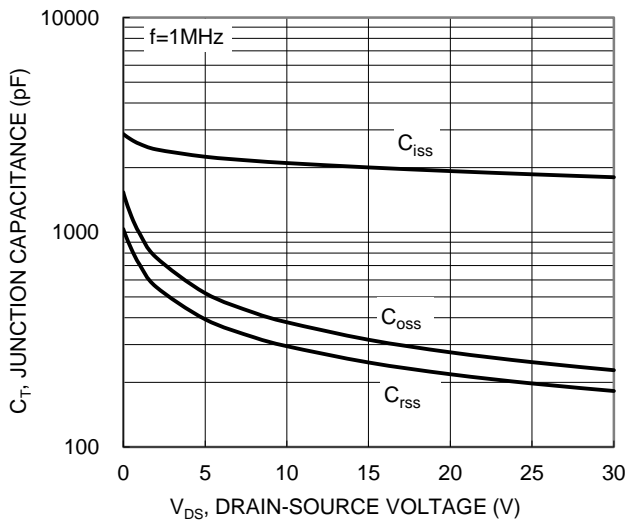


Figure 11. Typical Junction Capacitance

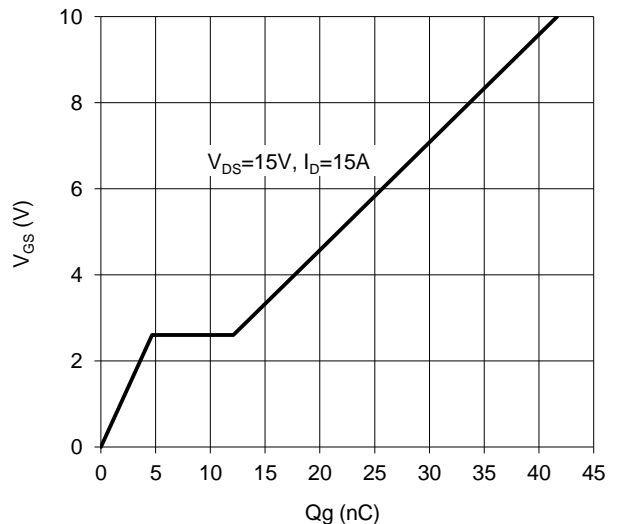
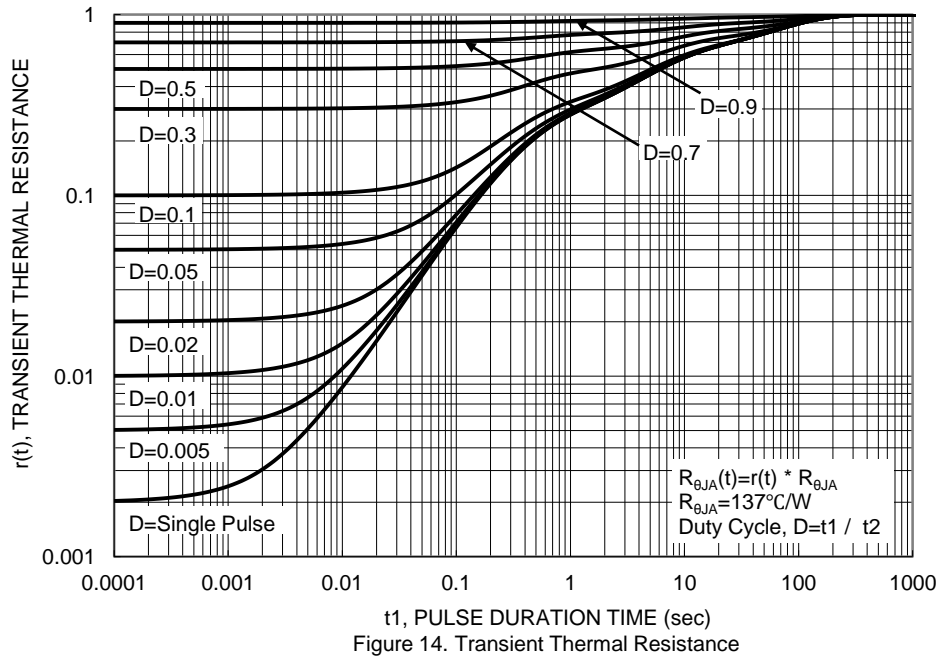
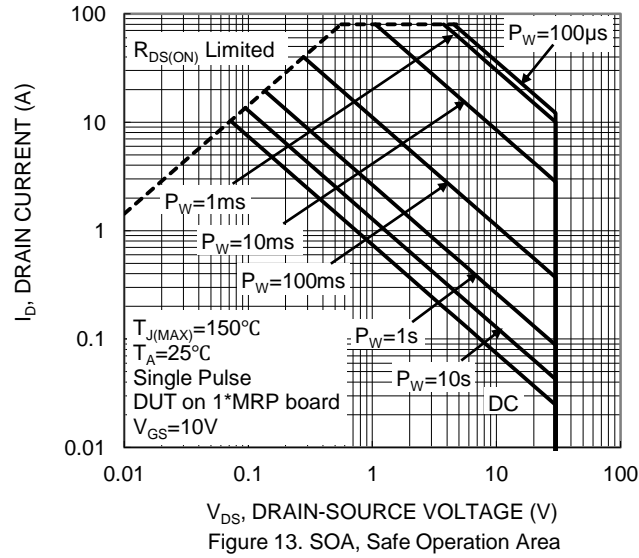


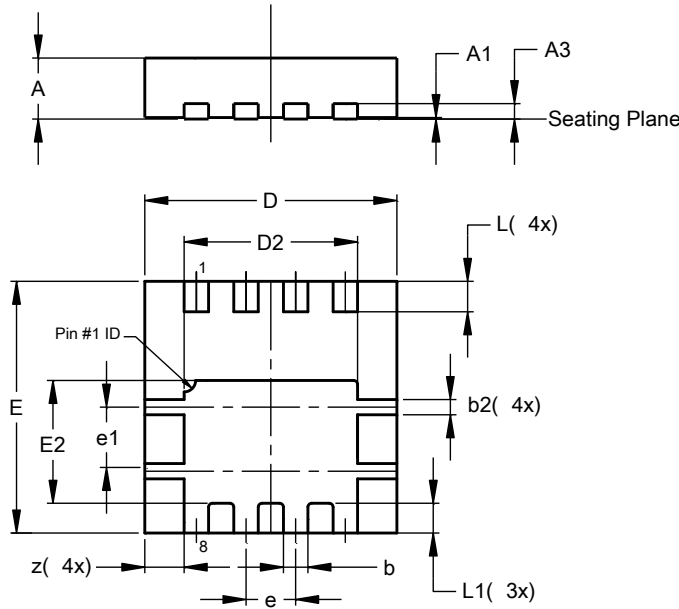
Figure 12. Gate Charge



Package Outline Dimensions

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

PowerDI3333-8

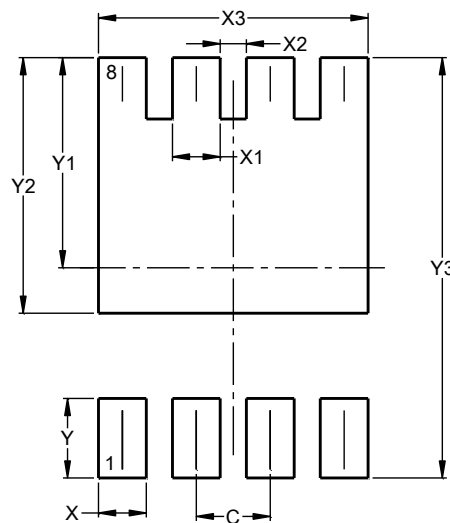


| PowerDI3333-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | - | - | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E | 3.25 | 3.35 | 3.30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

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 |

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