

Product Summary

| BV_{DSS} | $R_{DS(ON)}$ Max | I_D Max $T_A = +25^\circ\text{C}$ |
|------------|--|--|
| -40V | 29m Ω @ $V_{GS} = -10\text{V}$ | -8.0A |
| | 45m Ω @ $V_{GS} = -4.5\text{V}$ | -6.0A |

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.

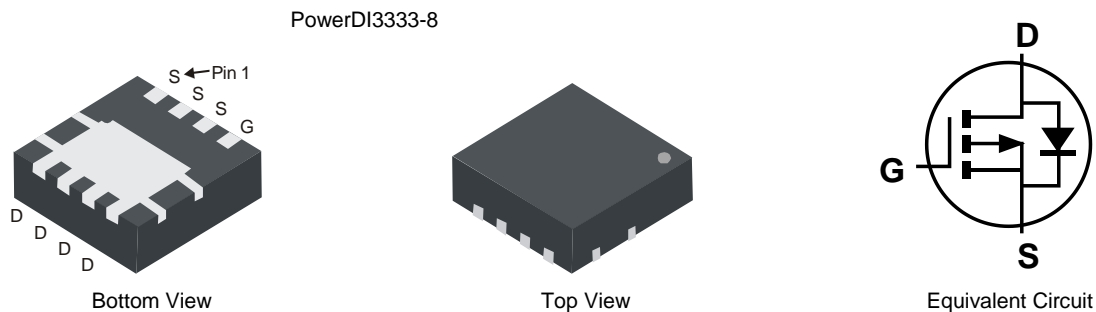
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Rated to $+175^\circ\text{C}$ – Ideal for High Ambient Temperature Environments
- 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
- **Lead-Free Finish; 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 ([DMPH4029LFGQ](#))**

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)

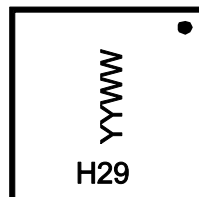


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|----------------|---------------|------------------|
| DMPH4029LFG-7 | PowerDI3333-8 | 2000/Tape & Reel |
| DMPH4029LFG-13 | PowerDI3333-8 | 3000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 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



H29= Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of year (ex: 19 = 2019)
 WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|--|------------------|--------------|------|
| Drain-Source Voltage | | | V _{DSS} | -40 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) V _{GS} = -10V | Steady State | T _A = +25°C T _A = +70°C | I _D | -8.0 -6.7 | A |
| | Steady State | T _C = +25°C T _C = +70°C | I _D | -22 -18 | A |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%) | | | I _{DM} | -88 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I _S | -2.0 | A |
| Pulsed Source Current (380µs Pulse, Duty Cycle = 1%) | | | I _{SM} | -88 | A |
| Avalanche Current (Note 7) L = 0.1mH | | | I _{AS} | -25 | A |
| Avalanche Energy (Note 7) L = 0.1mH | | | E _{AS} | 32 | mJ |

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

| Characteristic | | Symbol | Value | Unit |
|--|--------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | | P _D | 1.2 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | R _{θJA} | 125 | °C/W |
| | t < 10s | | 85 | |
| Total Power Dissipation (Note 6) | | P _D | 2.8 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | R _{θJA} | 54 | °C/W |
| | t < 10s | | 36 | |
| Thermal Resistance, Junction to Case (Note 6) | | R _{θJC} | 6 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +175 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|------|------|------|--|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -40 | — | — | V | V _{GS} = 0V, I _D = -250µA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -1 | µA | V _{DS} = -40V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1.0 | — | -3.0 | V | V _{DS} = V _{GS} , I _D = -250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 18 | 29 | mΩ | V _{GS} = -10V, I _D = -3A |
| | | — | 23 | 45 | | V _{GS} = -4.5V, I _D = -3A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1626 | — | pF | V _{DS} = -20V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 135 | — | pF | |
| Reverse Transfer Capacitance | C _{RSS} | — | 107 | — | pF | |
| Gate Resistance | R _g | — | 11 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 17 | — | nC | V _{DS} = -20V, I _D = -3A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 34 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 3.7 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 6.0 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.9 | — | ns | V _{GS} = -10V, V _{DS} = -20V, R _G = 3Ω, I _D = -3A |
| Turn-On Rise Time | t _R | — | 2.8 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 83 | — | ns | |
| Turn-Off Fall Time | t _F | — | 30 | — | ns | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 17.3 | — | ns | I _F = -3A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 7.2 | — | nC | I _F = -3A, di/dt = 100A/µs |

- Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1 inch square copper plate.
 7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

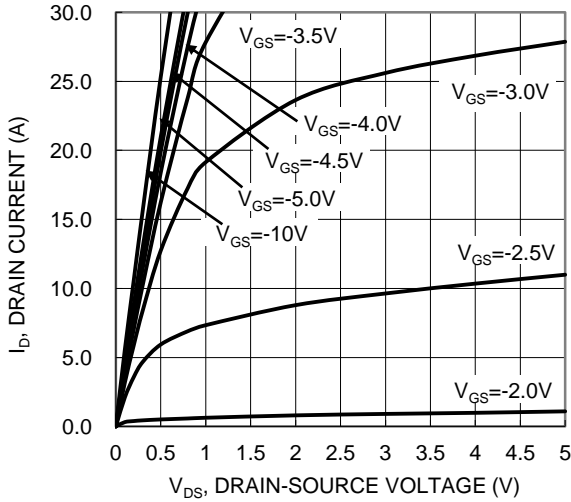


Figure 1. Typical Output Characteristic

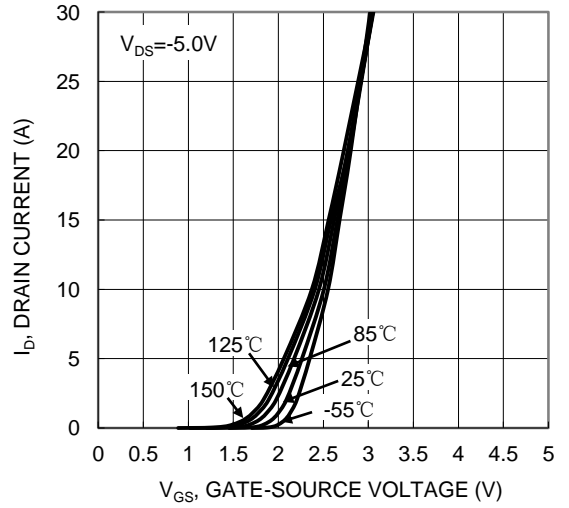


Figure 2. Typical Transfer Characteristic

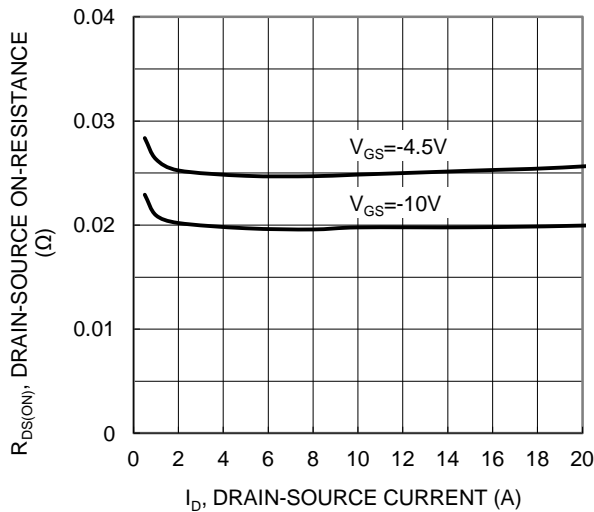


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

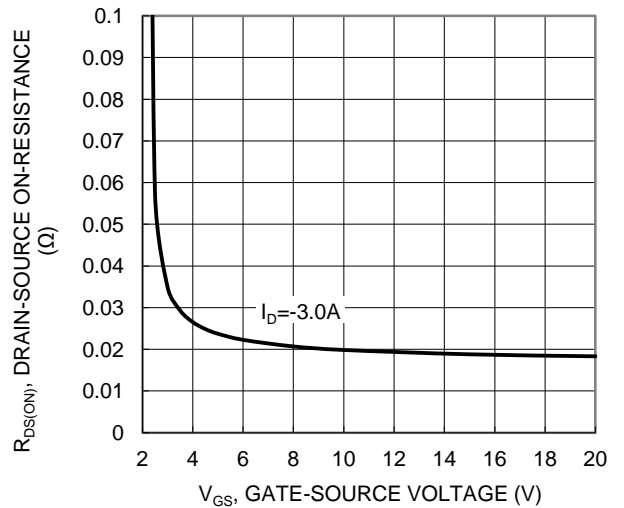


Figure 4. Typical Transfer Characteristic

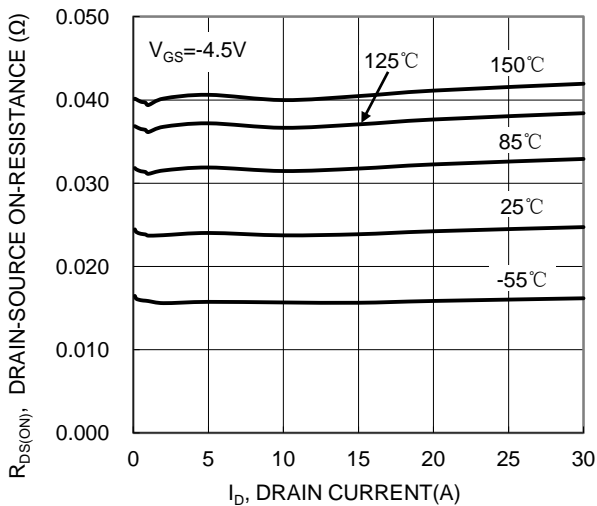


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

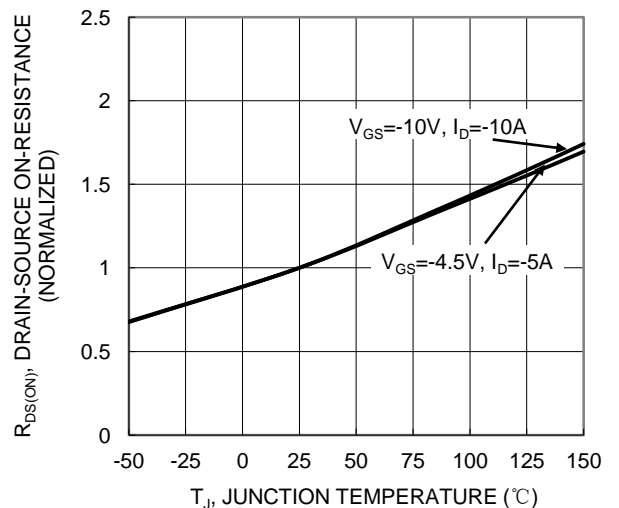


Figure 6. On-Resistance Variation with Temperature

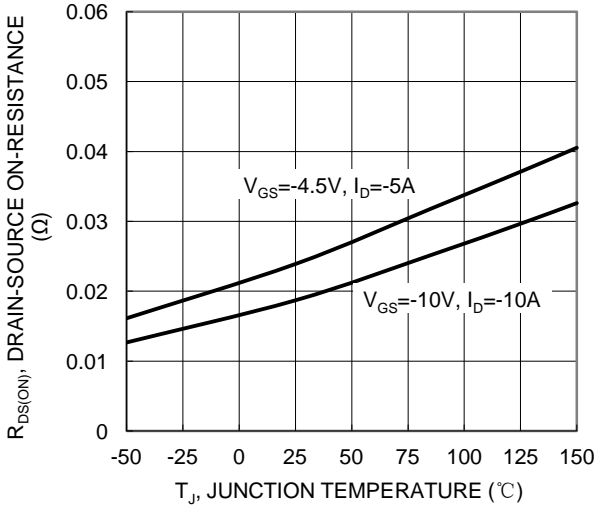


Figure 7. On-Resistance Variation with Temperature

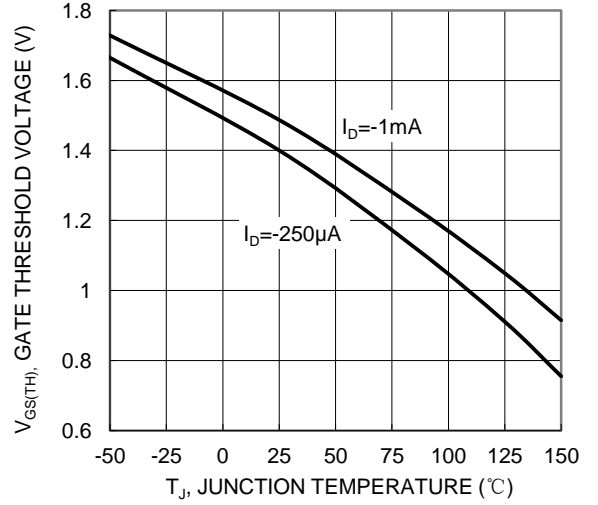


Figure 8. Gate Threshold Variation vs. Junction Temperature

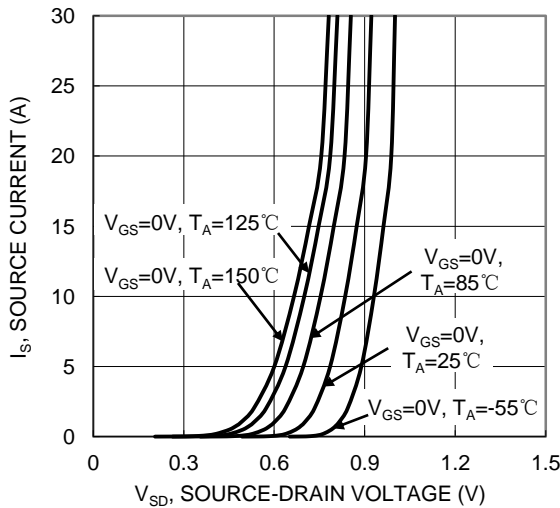


Figure 9. Diode Forward Voltage vs. Current

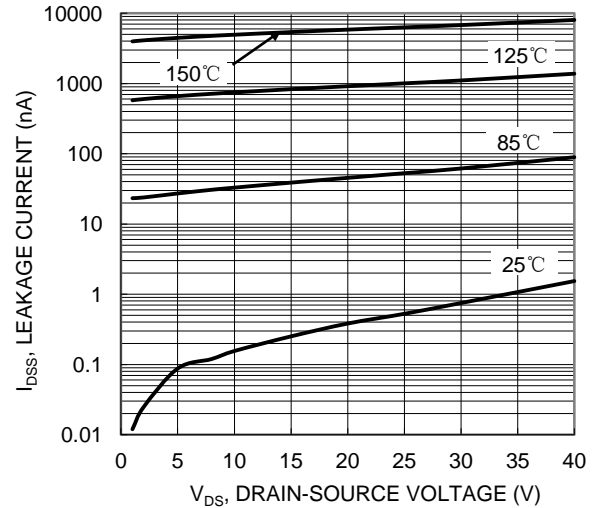


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

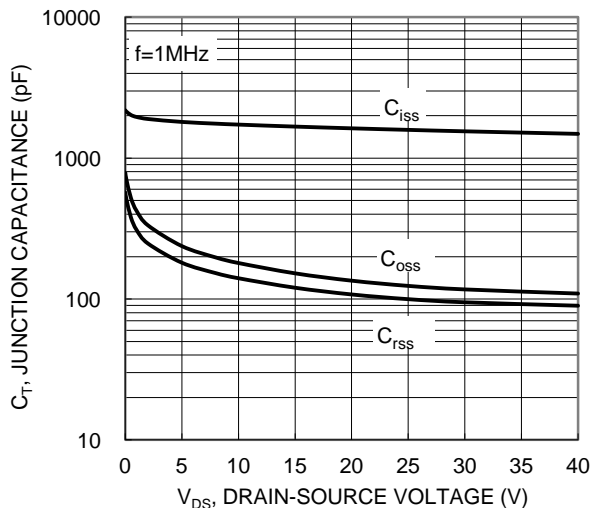


Figure 11. Typical Junction Capacitance

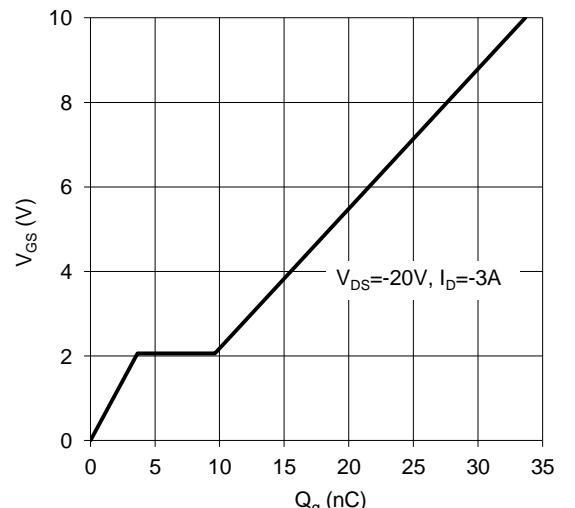
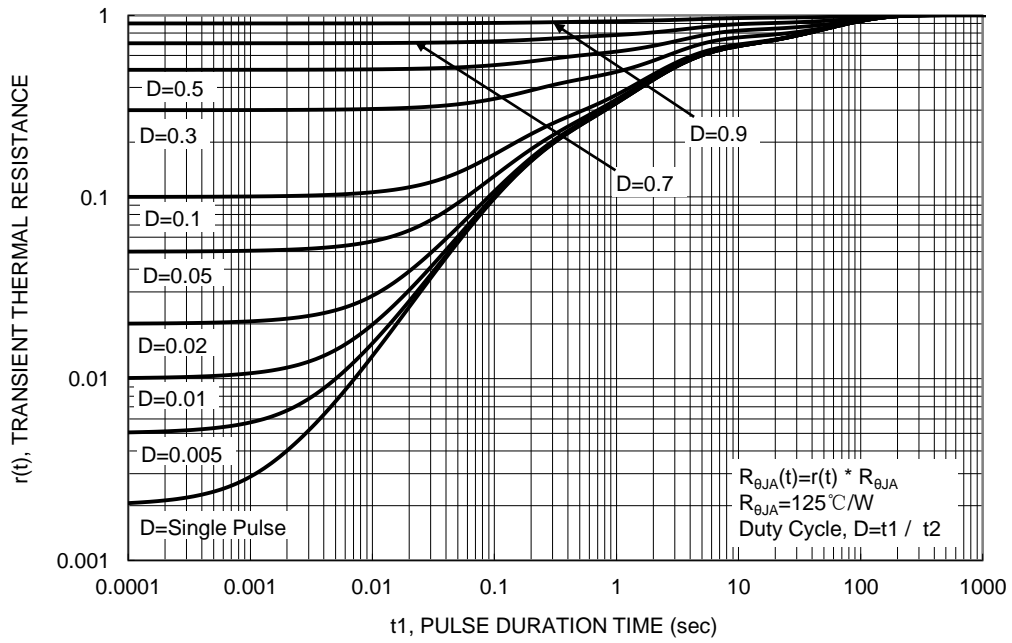
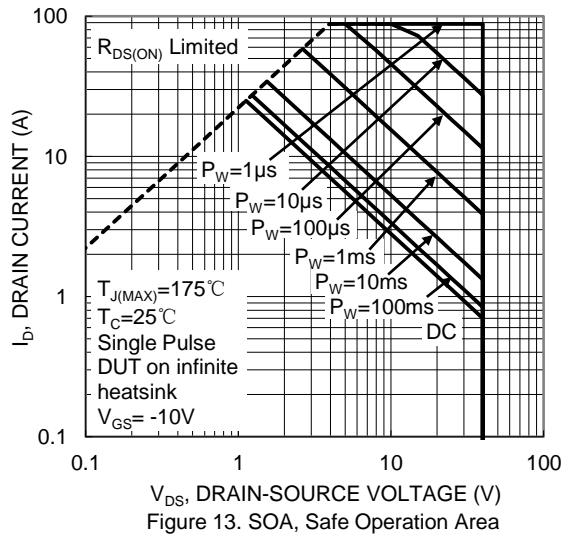


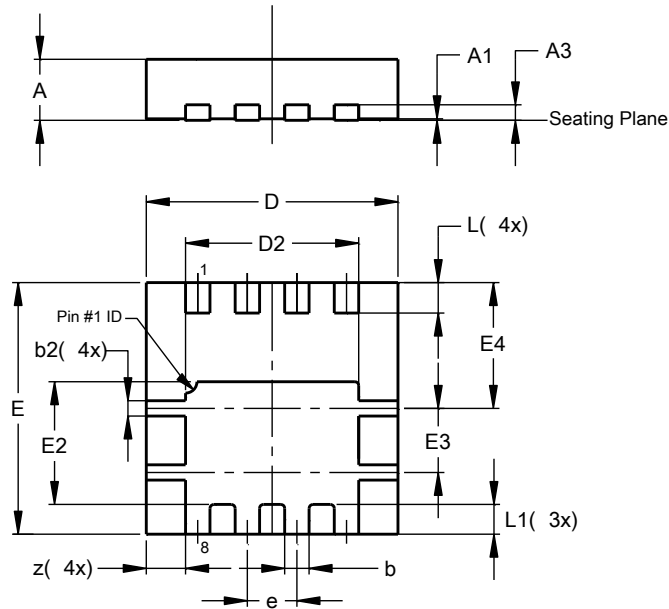
Figure 12. Gate Charge



Package Outline Dimensions

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

PowerDI3333-8

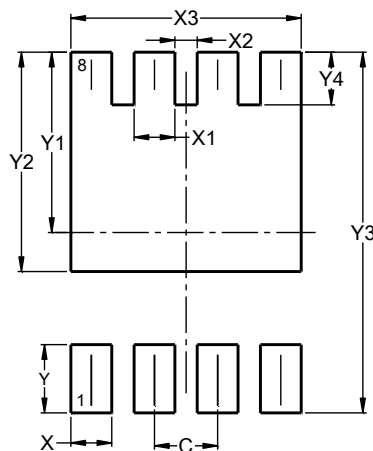


| PowerDI3333-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | 0.15 | 0.25 | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E | 3.25 | 3.35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