# THE DATASHEET OF

# DMT3003LFGQ-13

# 30V N-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max<br>$T_C$ = +25°C |
|---|---|---|
| 30V | 3.2mΩ @ $V_{GS}$ = 10V | 100A |
| | 5.5mΩ @ $V_{GS}$ = 4.5V | 85A |

## 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:

- Backlighting
- Power-management functions
- DC-DC converters

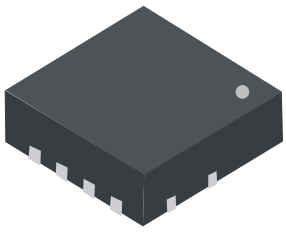
## Features and Benefits

- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- Excellent $Q_{GD}$ × $R_{DS(ON)}$ Product (FOM)
- Advanced Technology for DC-DC Converters
- 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% Unclamped Inductive Switching, Test in Production – Ensures More Reliable And Robust End Application
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMT3003LFGQ 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/**

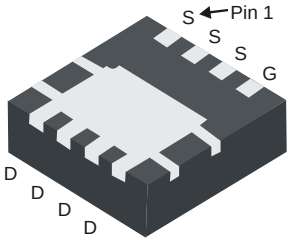
## Mechanical Data

- Package: PowerDI®3333-8
- Package 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
- Terminal Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

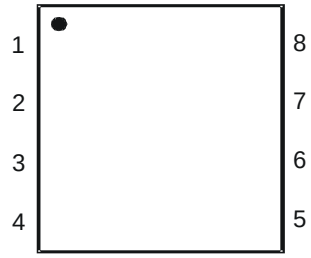
PowerDI3333-8



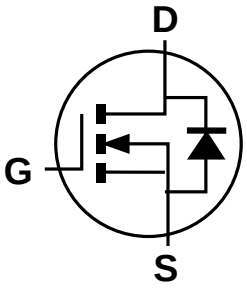
Top View




Bottom View




Top View
Internal Schematic




Equivalent Circuit

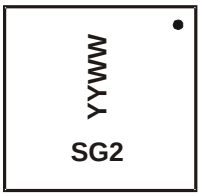
## Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| DMT3003LFGQ-7 | PowerDI3333-8 | 2,000 | Tape & Reel |
| DMT3003LFGQ-13 | PowerDI3333-8 | 3,000 | 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

Site 1




SG2 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 23 = 2023)
WW = Week Code (01 to 53)

Site 2


SG2 = Product Type Marking Code
YWX = Date Code Marking
Y = Year (ex: 3 = 2023)
W = Week (ex: a = week 27; z represents week 52 and 53)
X = Internal code (ex: U = Monday)

Date Code Key

| Year | 2018 | - | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 8 | - | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 |

| Week | 1-26 | 27-52 | 53 |
|---|---|---|---|
| Code | A-Z | a-z | z |

| Internal Code | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|---|
| Code | T | U | V | W | X | Y | Z |

## 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 (Note 6) $V_{GS}$ = 10V | $T_C$ = +25°C<br>$T_C$ = +70°C | $I_D$ | 100<br>90 | A |
| Continuous Drain Current (Note 5) $V_{GS}$ = 10V | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 22<br>18 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | $I_S$ | 3 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | $I_{DM}$ | 100 | A |
| Avalanche Current, L=1mH | | $I_{AS}$ | 16 | A |
| Avalanche Energy, L=1mH | | $E_{AS}$ | 250 | mJ |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_A$ = +25°C | $P_D$ | 2.4 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | $R_{\theta JA}$ | 52 | °C/W |
| Total Power Dissipation (Note 6) | $T_C$ = +25°C | $P_D$ | 62 | W |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 2 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
6. Thermal resistance from junction to soldering point (on the exposed drain pad).

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 1mA |
| 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<br>$V_{GS}$ = -16V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1 | — | 3 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 2.4 | 3.2 | mΩ | $V_{GS}$ = 10V, $I_D$ = 20A |
| | | — | 4 | 5.5 | | $V_{GS}$ = 4.5V, $I_D$ = 15A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.75 | 1 | V | $V_{GS}$ = 0V, $I_S$ = 10A |
| **DYNAMIC CHARACTERISTICS** (Note 8) | | | | | | |
| Input Capacitance | $C_{ISS}$ | — | 2,370 | — | pF | $V_{DS}$ = 15V, $V_{GS}$ = 0V, f = 1MHz |
| Output Capacitance | $C_{OSS}$ | — | 1,360 | — | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | — | 240 | — | | |
| Gate Resistance | $R_G$ | — | 0.6 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_G$ | — | 20 | — | nC | $V_{DS}$ = 15V, $I_D$ = 20A |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_G$ | — | 44 | — | | |
| Gate-Source Charge | $Q_{GS}$ | — | 7 | — | | |
| Gate-Drain Charge | $Q_{GD}$ | — | 8 | — | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 6.2 | — | ns | $V_{DD}$ = 15V, $V_{GS}$ = 10V, $R_L$ = 0.75Ω, $R_G$ = 3Ω, $I_D$ = 20A |
| Turn-On Rise Time | $t_R$ | — | 4.3 | — | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 21 | — | | |
| Turn-Off Fall Time | $t_F$ | — | 8 | — | | |
| Body Diode Reverse Recovery Time | $t_{RR}$ | — | 25 | — | ns | $I_F$ = 15A, di/dt = 500A/μs |
| Body Diode Reverse Recovery Charge | $Q_{RR}$ | — | 37 | — | nC | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

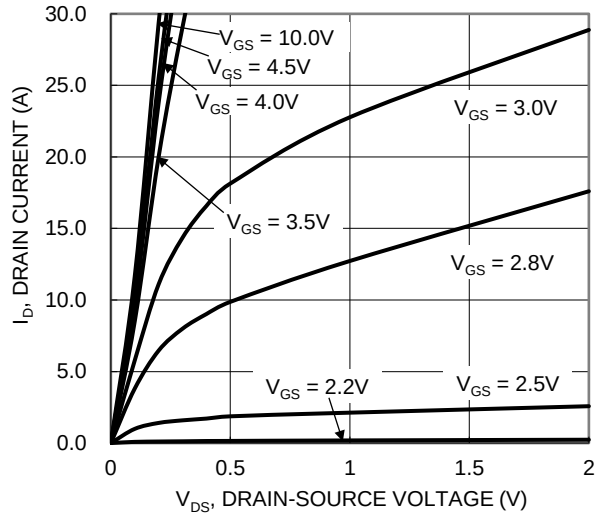



Figure 1. Typical Output Characteristic

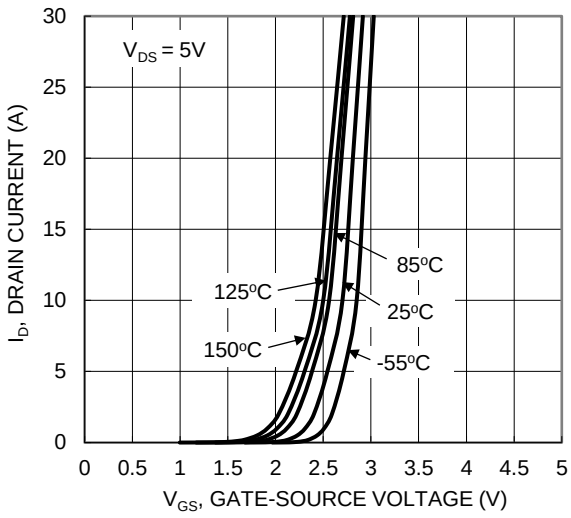



Figure 2. Typical Transfer Characteristic

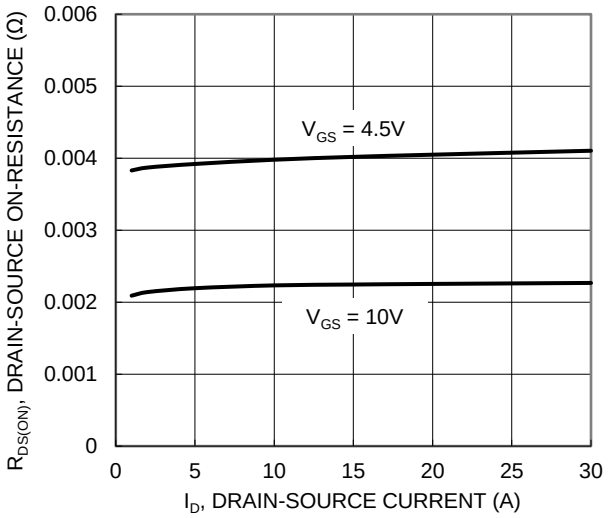



Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

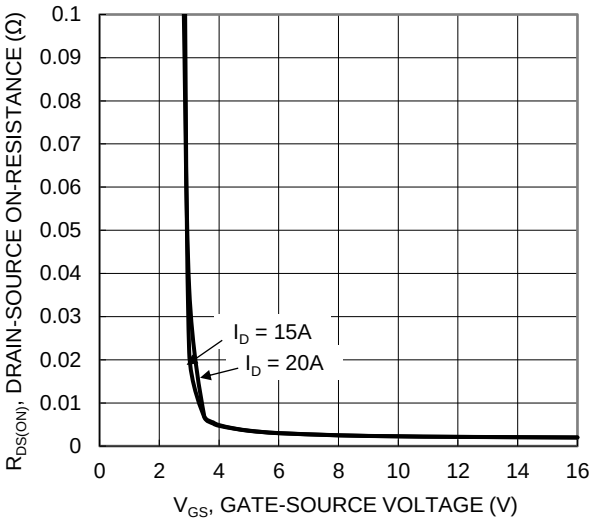



Figure 4. Typical Transfer Characteristic

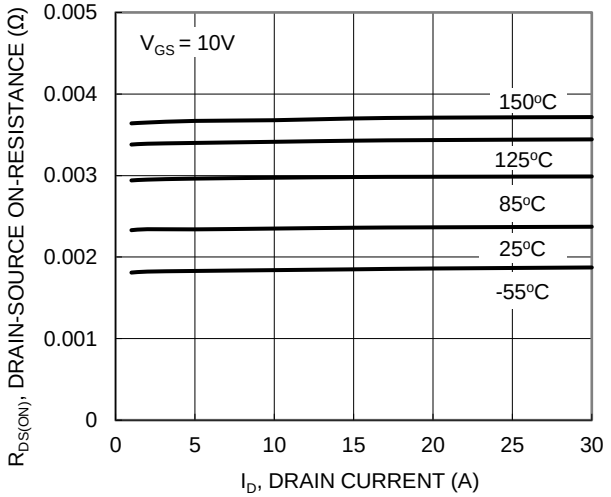



Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

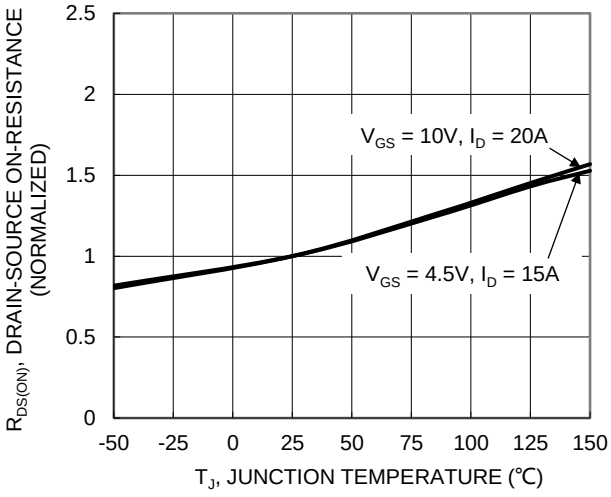



Figure 6. On-Resistance Variation with Junction Temperature

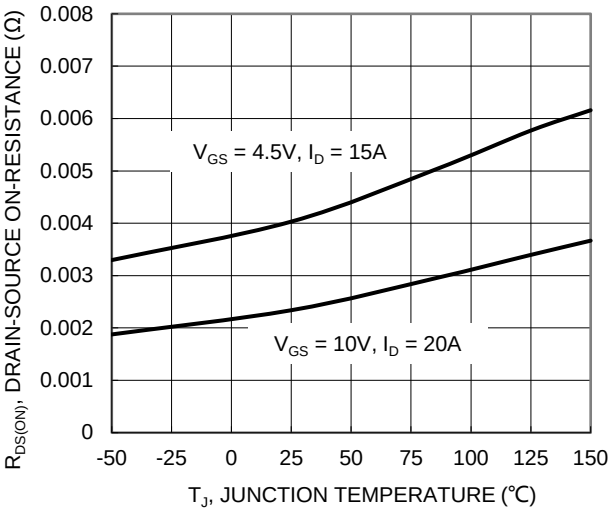



Figure 7. On-Resistance Variation with Junction Temperature

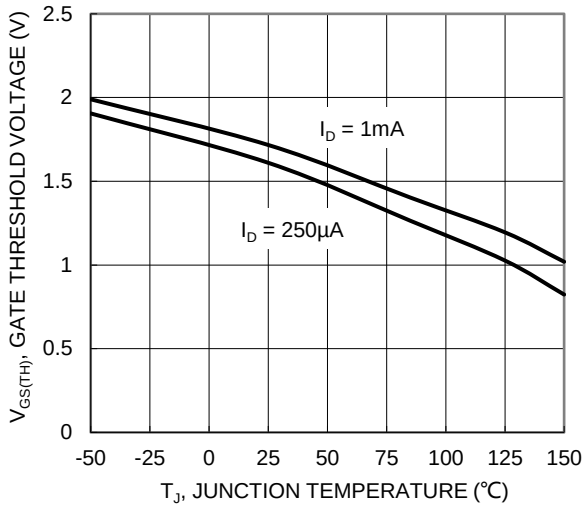



Figure 8. Gate Threshold Variation vs. Junction Temperature

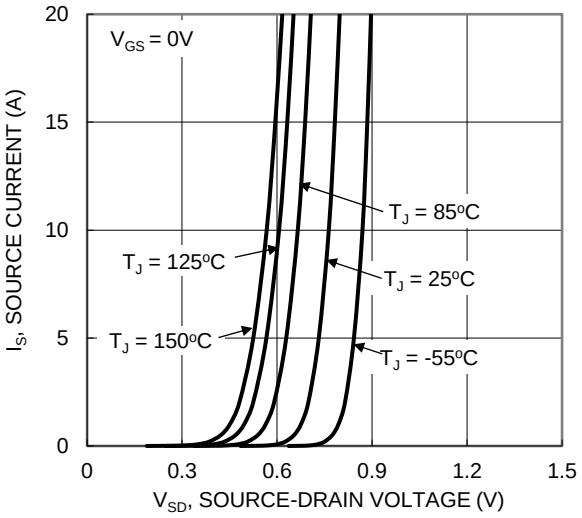



Figure 9. Diode Forward Voltage vs. Current

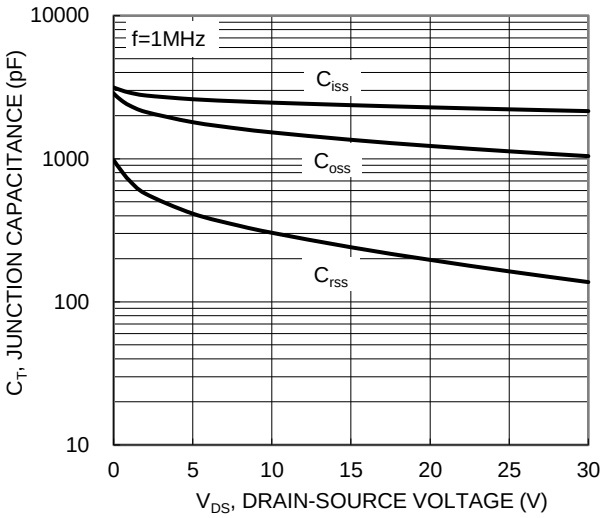



Figure 10. Typical Junction Capacitance

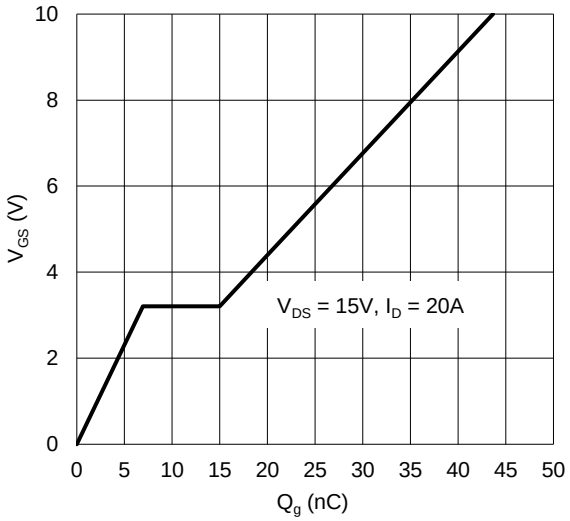



Figure 11. Gate Charge

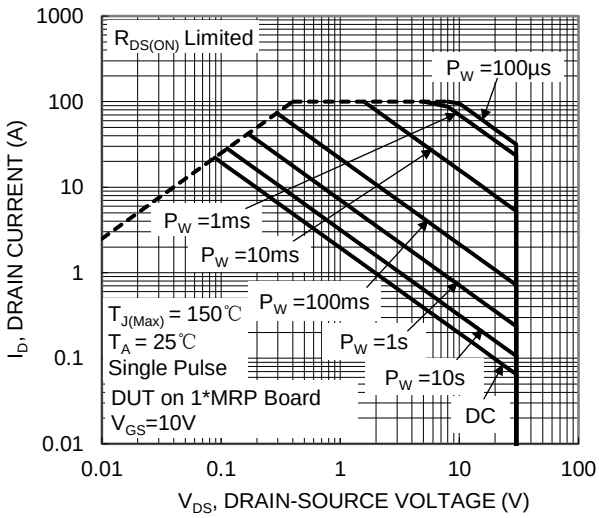



Figure 12. SOA, Safe Operation Area

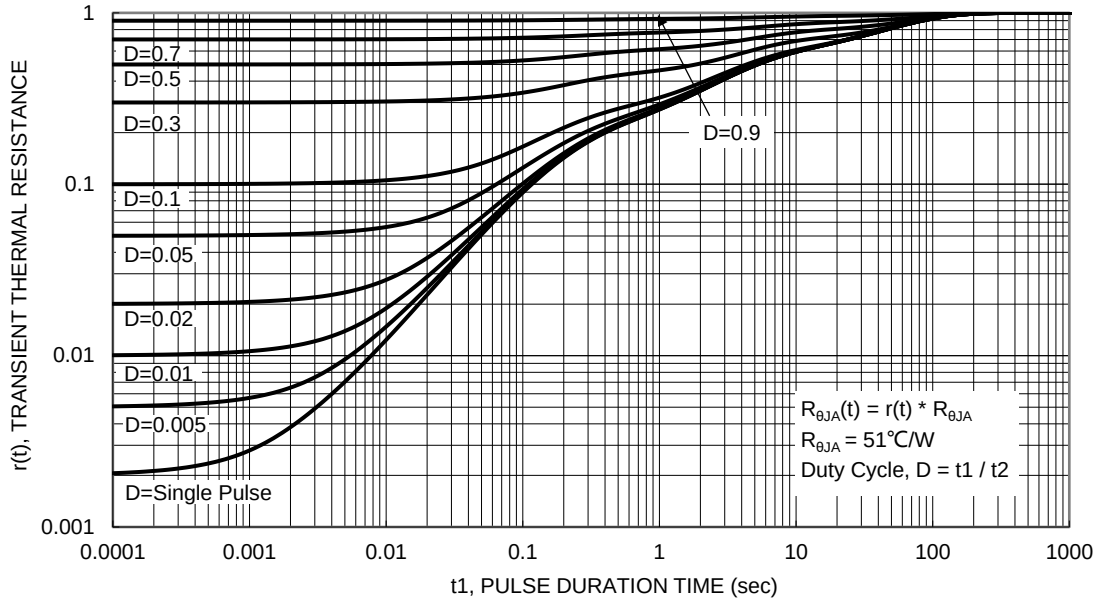
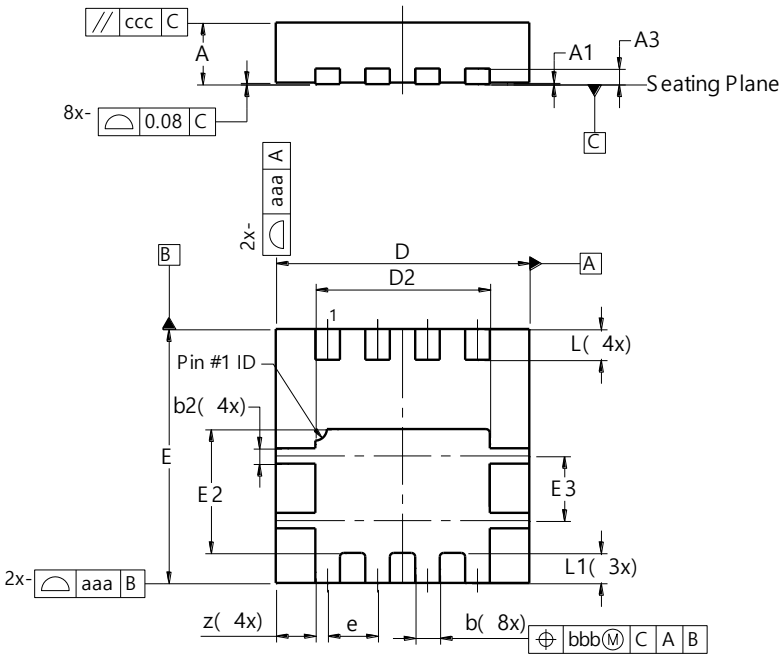



Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

**PowerDI3333-8**

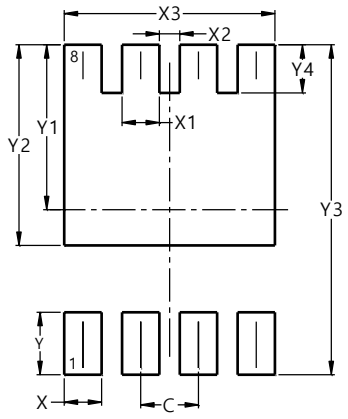



| PowerDI3333-8 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.75 | 0.85 | 0.80 |
| **A1** | 0.00 | 0.05 | 0.02 |
| **A3** | – | – | 0.203 |
| **b** | 0.27 | 0.37 | 0.32 |
| **b2** | – | – | 0.20 |
| **D** | 3.25 | 3.35 | 3.30 |
| **D2** | 2.22 | 2.32 | 2.27 |
| **E** | 3.25 | 3.35 | 3.30 |
| **E2** | 1.56 | 1.66 | 1.61 |
| **E3** | 0.79 | 0.89 | 0.84 |
| **e** | – | – | 0.65 |
| **L** | 0.35 | 0.45 | 0.40 |
| **L1** | – | – | 0.39 |
| **z** | – | – | 0.515 |
| **aaa** | 0.25 | | |
| **bbb** | 0.10 | | |
| **ccc** | 0.10 | | |
| **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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