

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D Max (Note 10) T _C = +25°C |
|-------------------|-------------------------------|--------------------------------------------------------|
| 40V | 3.0mΩ @ V _{GS} = 10V | 100A |
| | 5.0mΩ @ V _{GS} = 5V | 93A |

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} – Ensures On-State Losses are Minimized
- Excellent Q_{GD} × R_{DS(ON)} Product (FOM)
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

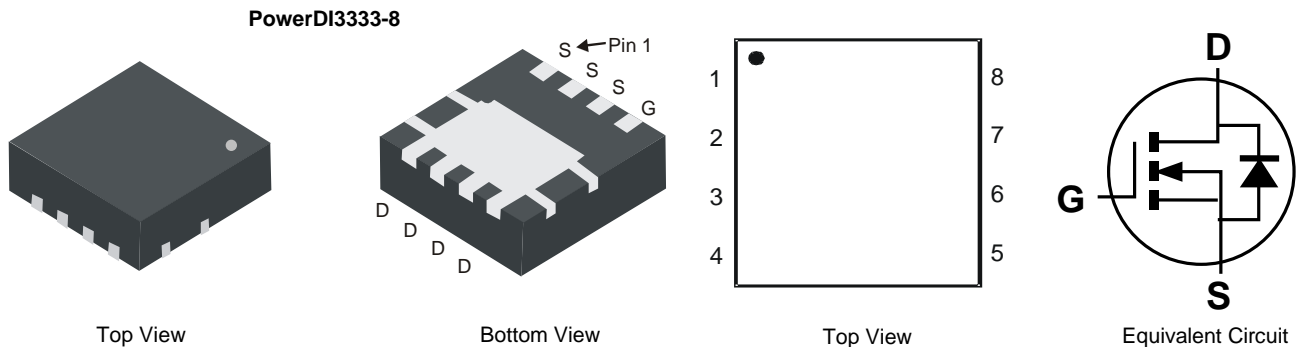
Description and Applications

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:

- Motor Control
- DC-DC Converters
- Power Management

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 Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 [Ⓔ]
- Weight: 0.008 grams (Approximate)

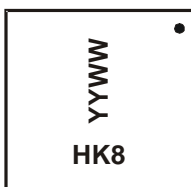


Ordering Information (Note 5)

| Part Number | Case | Packaging |
|-----------------|---------------|-------------------|
| DMTH43M8LFGQ-7 | PowerDI3333-8 | 2,000/Tape & Reel |
| DMTH43M8LFGQ-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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



- HK8 = 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_C = +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 7) (Note 10) V _{GS} = 10V | I _D | T _C = +25°C 100 T _C = +100°C 85 | A |
| Continuous Drain Current (Note 6) V _{GS} = 10V | I _D | T _A = +25°C 24.0 T _A = +100°C 16.9 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | I _{DM} | 400 | A |
| Maximum Continuous Body Diode Forward Current (Note 7) (Note 10) | I _S | 100 | A |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%) | I _{SM} | 400 | A |
| Avalanche Current, L = 1mH | I _{AS} | 18.2 | A |
| Avalanche Energy, L = 1mH | E _{AS} | 165 | mJ |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--------------------------------------------------|-----------------------------------|--------------------------------|------|
| Total Power Dissipation (Note 6) | P _D | T _A = +25°C 2.62 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 57.8 | °C/W |
| Total Power Dissipation (Note 7) | P _D | T _C = +25°C 65.2 | W |
| Thermal Resistance, Junction to Case (Note 7) | R _{θJC} | 2.3 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_J = +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 = 1mA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | µA | V _{DS} = 32V, 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 | 1.5 | 2.5 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 2.3 | 3.0 | mΩ | V _{GS} = 10V, I _D = 20A |
| | | — | 3.4 | 5.0 | | V _{GS} = 5V, I _D = 15A |
| Static Drain-Source On-Resistance (T _J = +175°C) (Note 9) | R _{DS(ON)} | — | — | 6.0 | mΩ | V _{GS} = 10V, I _D = 20A |
| | | — | — | 9.0 | | V _{GS} = 5V, I _D = 15A |
| Diode Forward Voltage | V _{SD} | — | 0.8 | 1.0 | V | V _{GS} = 0V, I _S = 20A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iSS} | — | 2798 | — | pF | V _{DS} = 20V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 904 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 88 | — | | |
| Gate Resistance | R _G | — | 2.44 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = 10V) | Q _G | — | 40.1 | — | nC | V _{DS} = 20V, I _D = 20A, V _{GS} = 10V |
| Gate-Source Charge | Q _{GS} | — | 5.2 | — | | |
| Gate-Drain Charge | Q _{GD} | — | 8.8 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.16 | — | ns | V _{DD} = 20V, V _{GS} = 10V, R _G = 1.6Ω, I _D = 20A |
| Turn-On Rise Time | t _R | — | 10.7 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 24.6 | — | | |
| Turn-Off Fall Time | t _F | — | 12.4 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 32.6 | — | ns | I _F = 15A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 26.6 | — | nC | |

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

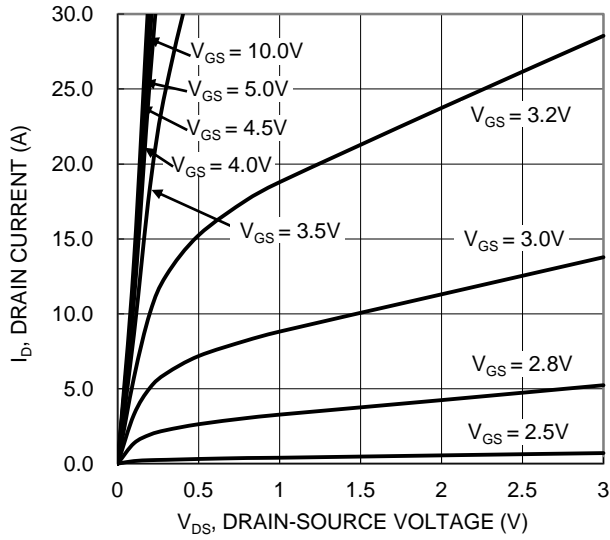


Figure 1. Typical Output Characteristic

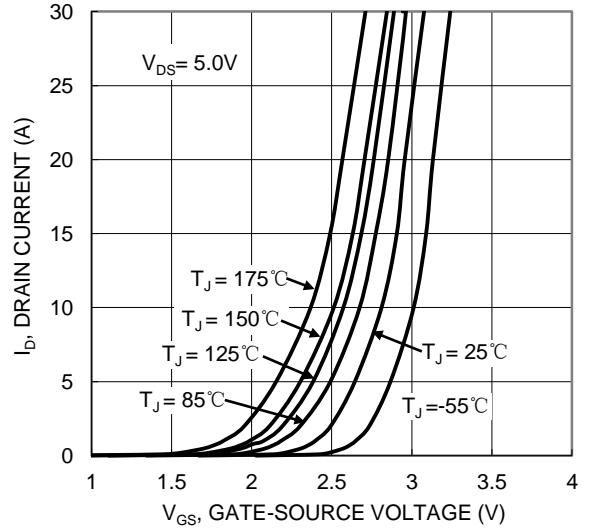


Figure 2. Typical Transfer Characteristic

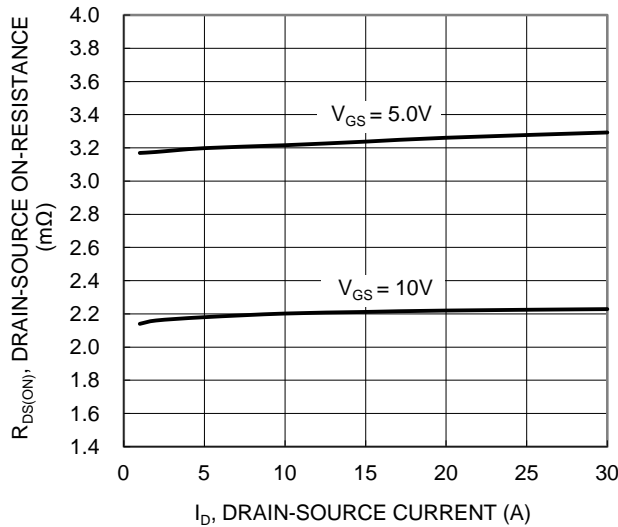


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

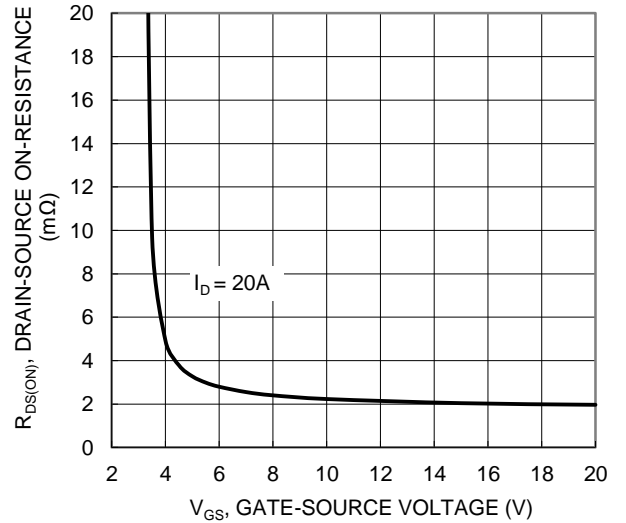


Figure 4. Typical Transfer Characteristic

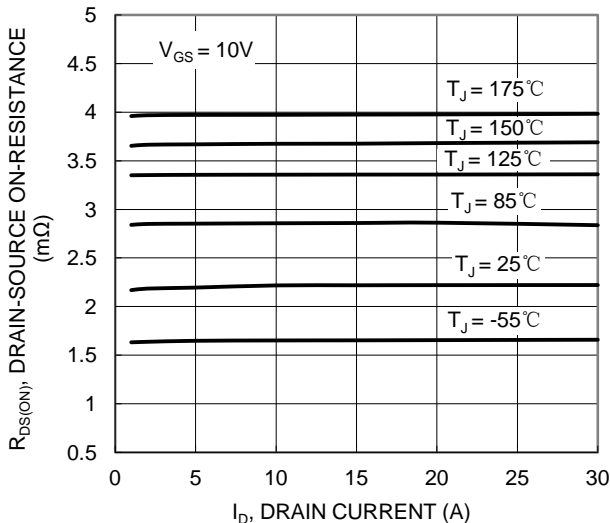


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

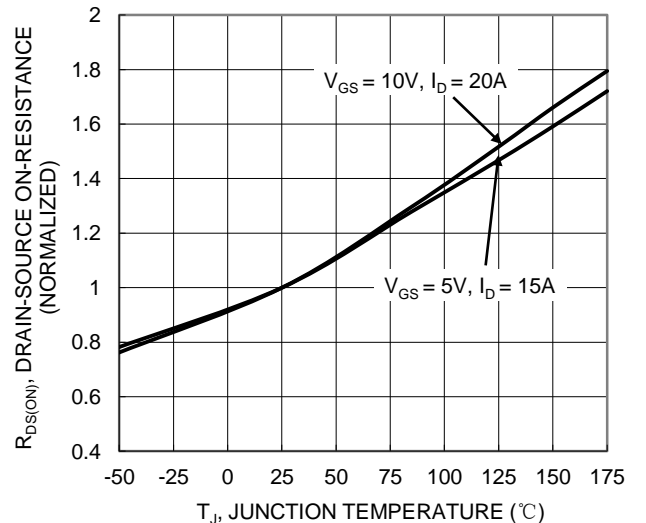
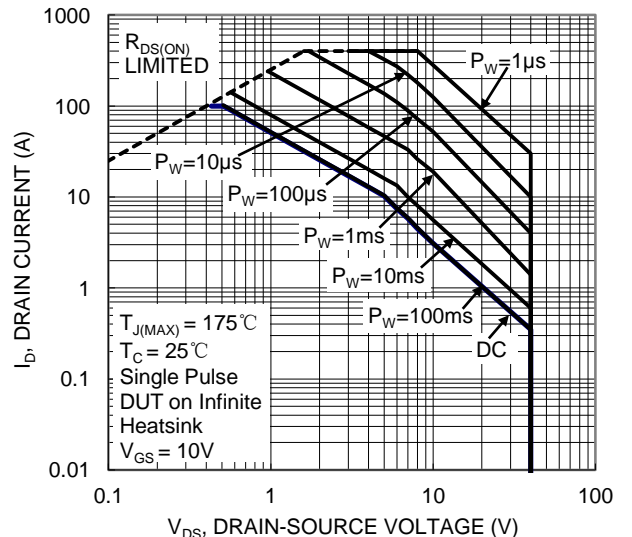
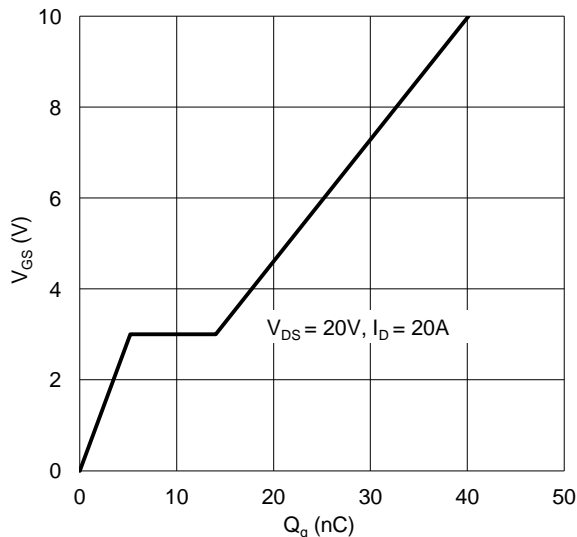
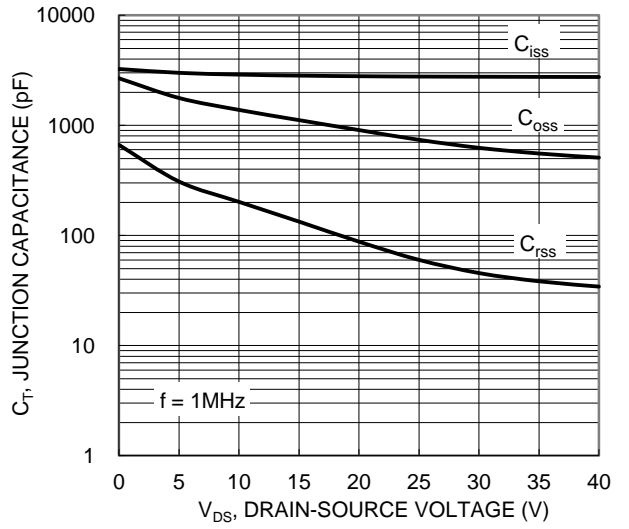
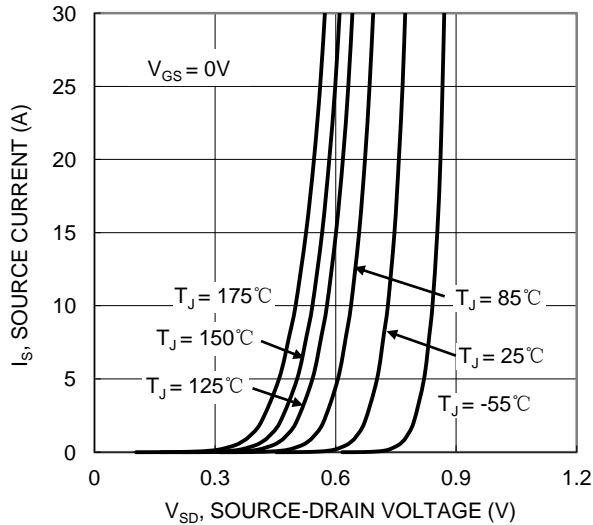
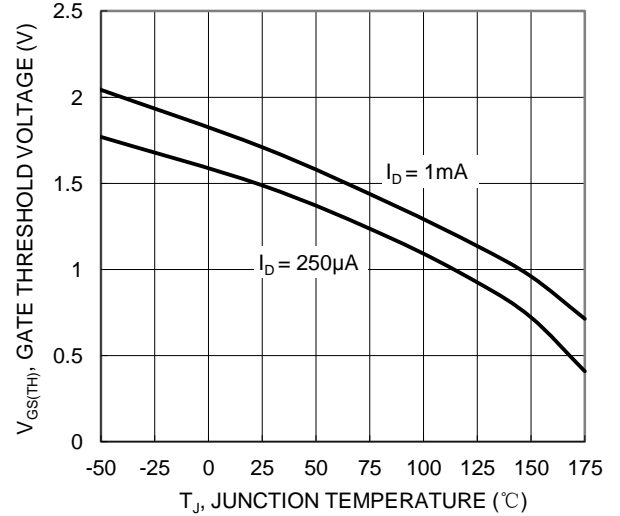
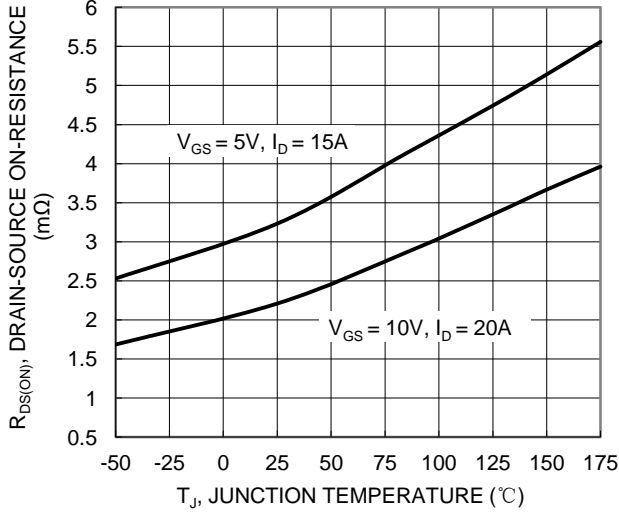


Figure 6. On-Resistance Variation with Temperature



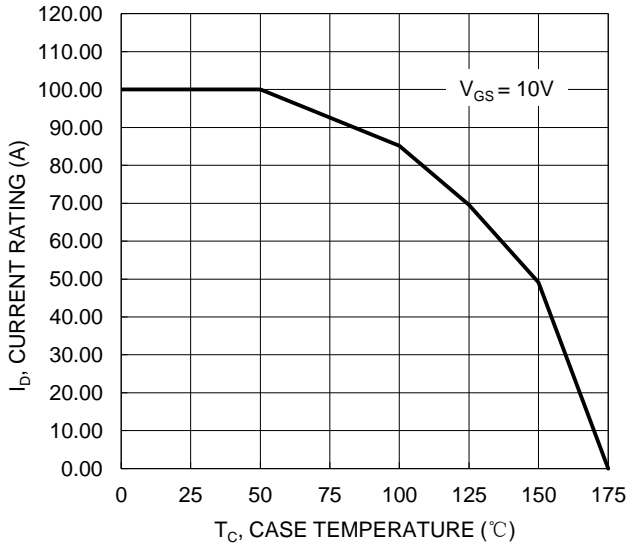


Figure 13. Current Function of T_c

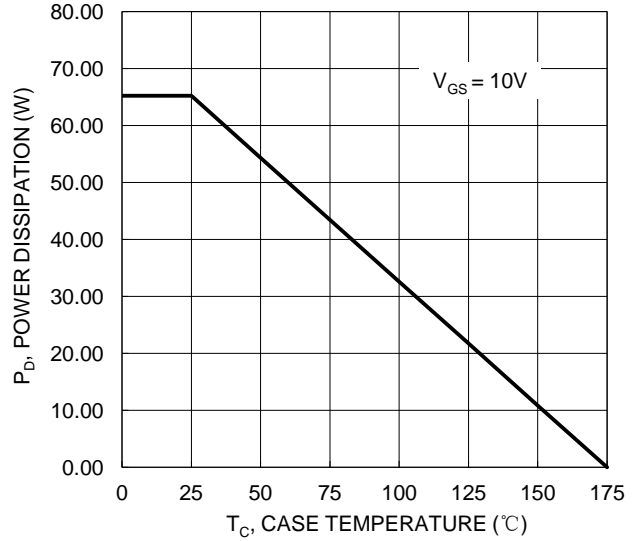


Figure 14. Power Dissipation Function of T_c

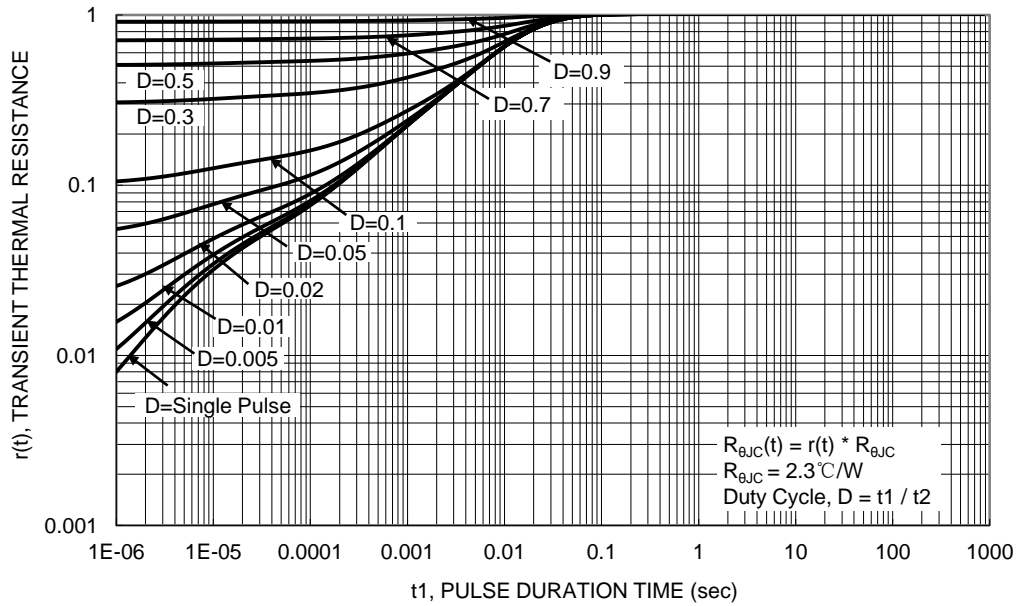
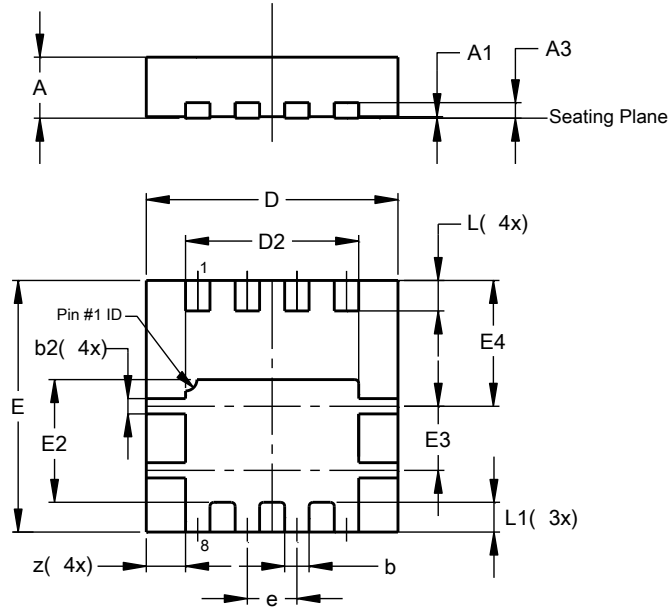


Figure 15. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI3333-8

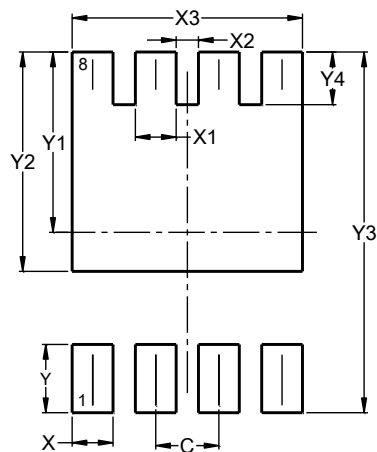


| PowerDI3333-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | 0.15 | 0.25 | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E | 3.25 | 3.35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