## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max $T_C$ = +25°C |
|---|---|---|
| -60V | 50mΩ @ $V_{GS}$ = -10V | -18A |
| | 70mΩ @ $V_{GS}$ = -4.5V | -15A |

## Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – ensures on state losses are minimized
- 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)**
- **The DMPH6050SFGQ 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

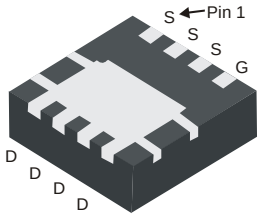
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

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

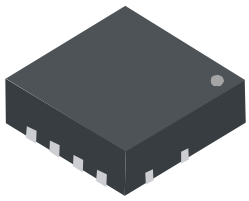
## Mechanical Data

- 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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.034 grams (Approximate)

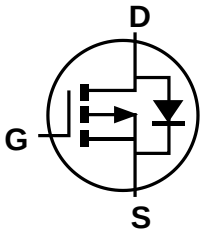
PowerDI3333-8




Bottom View



Top View




Equivalent Circuit

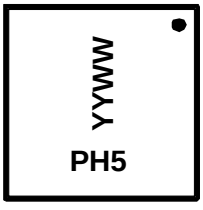
## Ordering Information (Note 4)

| Part Number | Package | Packing | |
|---|---|---|---|
| | | Qty. | Carrier |
| DMPH6050SFGQ-7 | PowerDI3333-8 | 2,000 | Tape & Reel |
| DMPH6050SFGQ-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

PowerDI3333-8




PH5= Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 23 = 2023)
WW = Week Code (01 to 53)


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

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -60 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = -10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +100°C | $I_D$ | -6.1<br>-4.2 | A |
| Continuous Drain Current (Note 7) $V_{GS}$ = -10V | Steady State | $T_C$ = +25°C<br>$T_C$ = +100°C | $I_D$ | -18<br>-12 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | -32 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | $I_S$ | -2 | A |
| Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{SM}$ | -32 | A |
| Avalanche Current (Note 8) L = 0.1mH | | | $I_{AS}$ | -24.8 | A |
| Avalanche Energy (Note 8) L = 0.1mH | | | $E_{AS}$ | 30.8 | 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 | $R_{\theta JA}$ | 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 | $R_{\theta JA}$ | 54 | °C/W |
| | t<10s | | 37 | |
| Thermal Resistance, Junction to Case (Note 7) | | $R_{\theta JC}$ | 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 9)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -60 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | — | — | -1 | µA | $V_{DS}$ = -60V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 9)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -1 | — | -3 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 41 | 50 | mΩ | $V_{GS}$ = -10V, $I_D$ = -7A |
| | | — | 52 | 70 | | $V_{GS}$ = -4.5V, $I_D$ = -7A |
| Diode Forward Voltage | $V_{SD}$ | — | -0.7 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -1A |
| **DYNAMIC CHARACTERISTICS (Note 10)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 1293 | — | pF | $V_{DS}$ = -30V, $V_{GS}$ = 0V, f = 1MHz |
| Output Capacitance | $C_{oss}$ | — | 86.3 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 64.7 | — | pF | |
| Gate Resistance | $R_g$ | — | 12 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge ($V_{GS}$ = -4.5V) | $Q_g$ | — | 11.9 | — | nC | $V_{DS}$ = -30V, $I_D$ = -5A |
| Total Gate Charge ($V_{GS}$ = -10V) | $Q_g$ | — | 24.1 | — | nC | |
| Gate-Source Charge | $Q_{gs}$ | — | 3.6 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 5.7 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.3 | — | ns | $V_{DS}$ = -30V, $V_{GS}$ = -10V, $R_G$ = 3Ω, $I_D$ = -5A |
| Turn-On Rise Time | $t_R$ | — | 6.3 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 46.7 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 25.3 | — | ns | |
| Body Diode Reverse Recovery Time | $t_{RR}$ | — | 13.6 | — | ns | $I_F$ = -5A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | $Q_{RR}$ | — | 7.4 | — | nC | |

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 1inch square copper plate.
7. Thermal resistance from junction to soldering point (on the exposed drain pad).
8. $I_{AS}$ and $E_{AS}$ ratings are based on low frequency and duty cycles to keep $T_J$ = +25°C.
9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.


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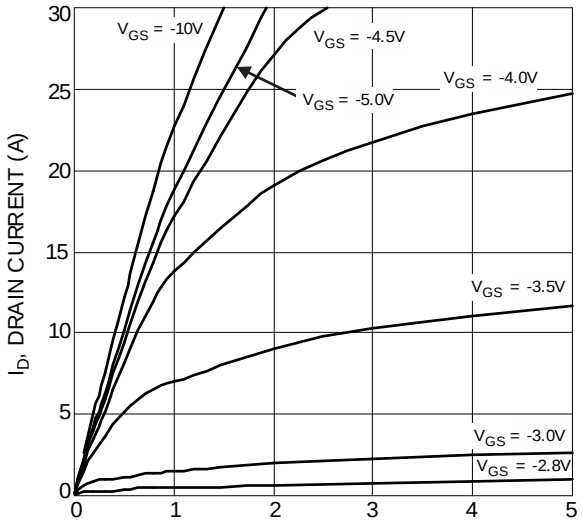


Figure 1 Typical Output Characteristics

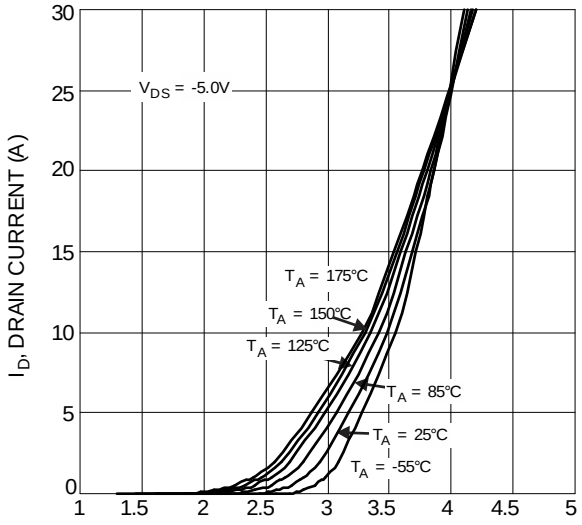


Figure 2 Typical Transfer Characteristics

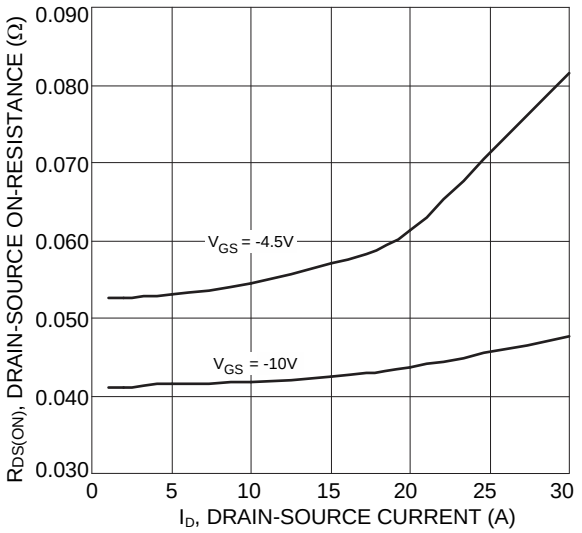


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

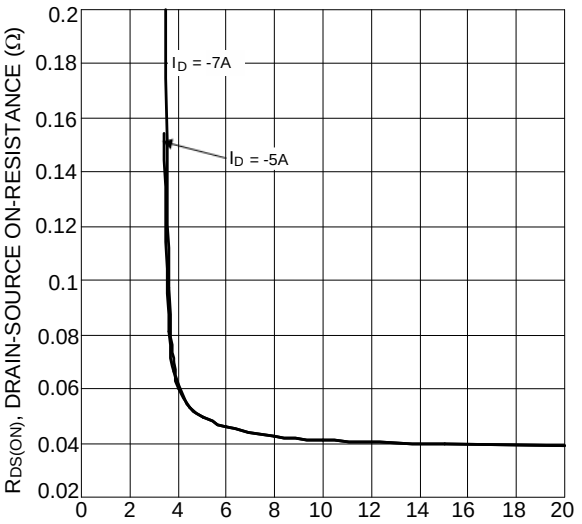


Figure 4 Typical Transfer Characteristic

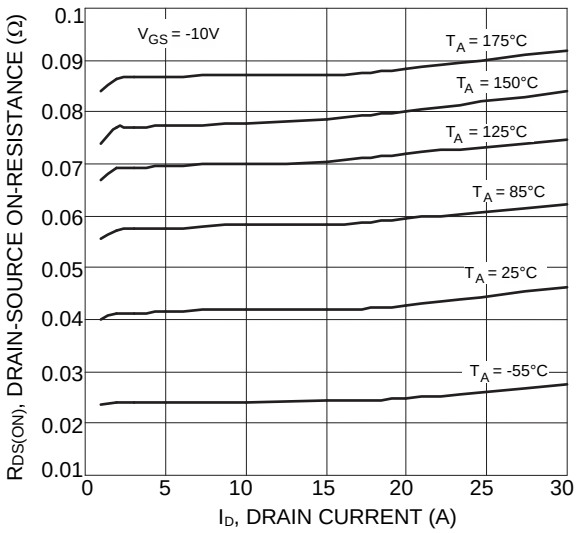


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

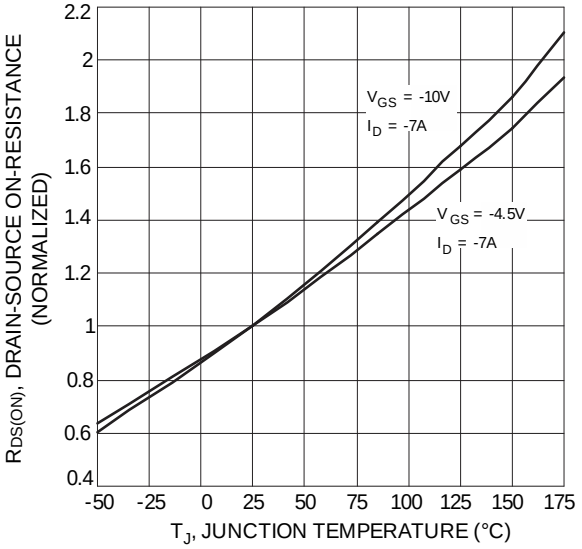


Figure 6 On-Resistance Variation with Temperature


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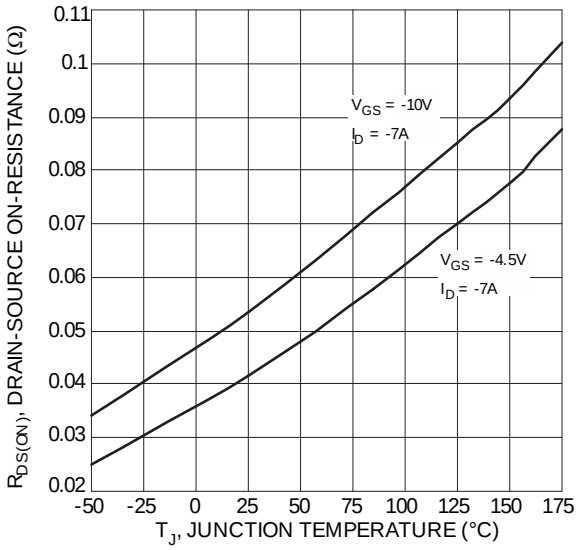



Figure 7 On-Resistance Variation with Temperature

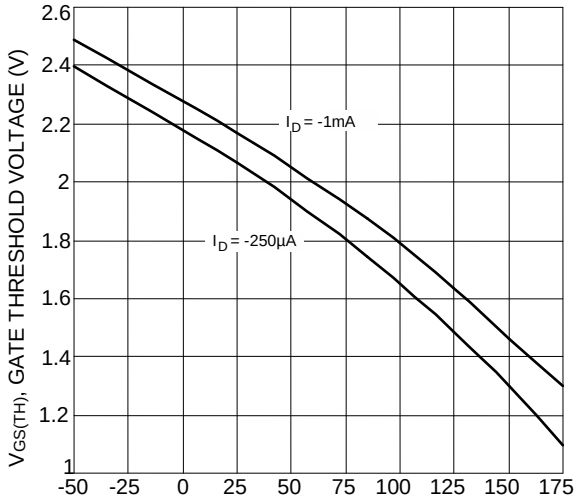



Figure 8 Gate Threshold Variation vs. Junction Temperature

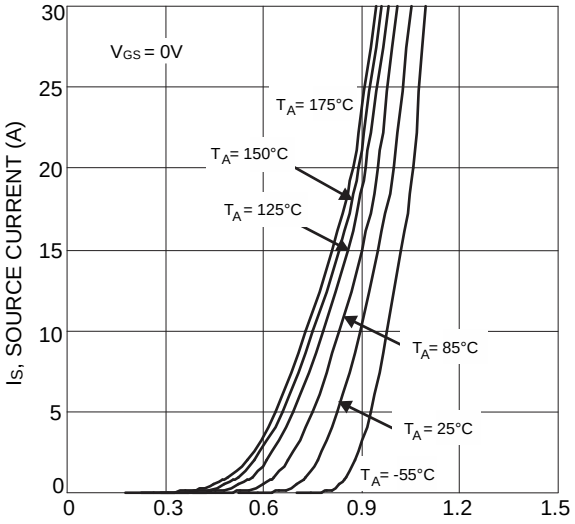



Figure 9 Diode Forward Voltage vs. Current

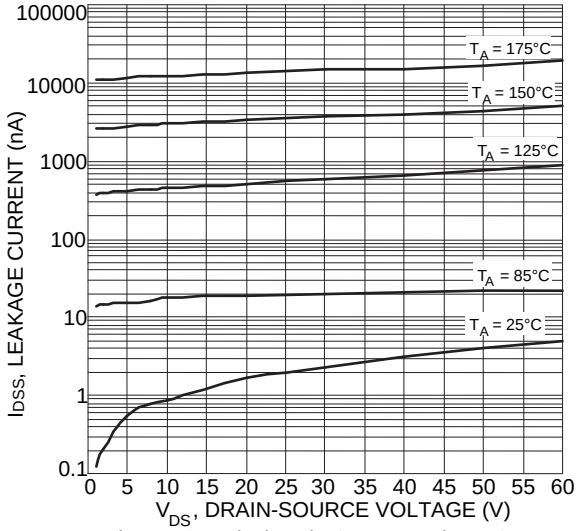



Figure 10 Typical Drain-Source Leakage Current vs. Voltage

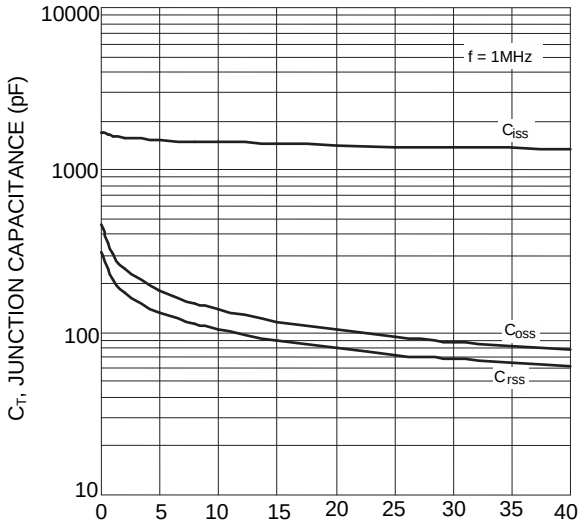



Figure 11 Typical Junction Capacitance

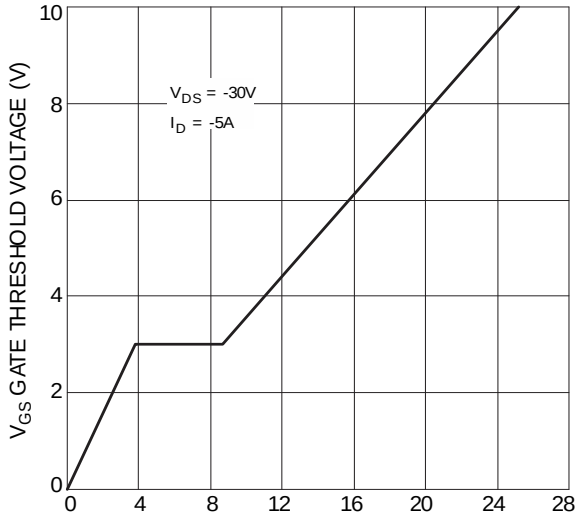



Figure 12 Gate Charge


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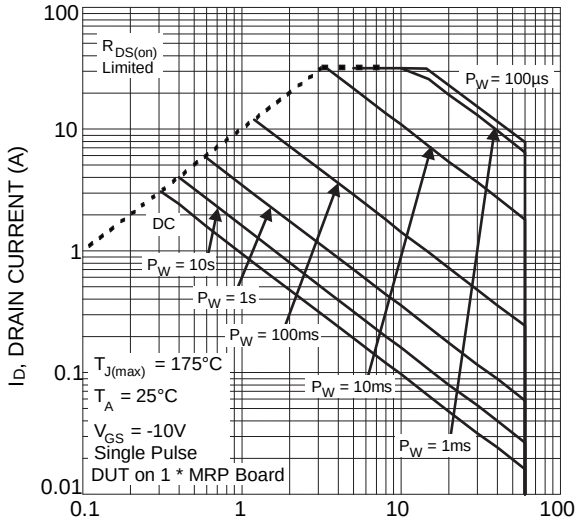



Figure 13 SOA, Safe Operation Area

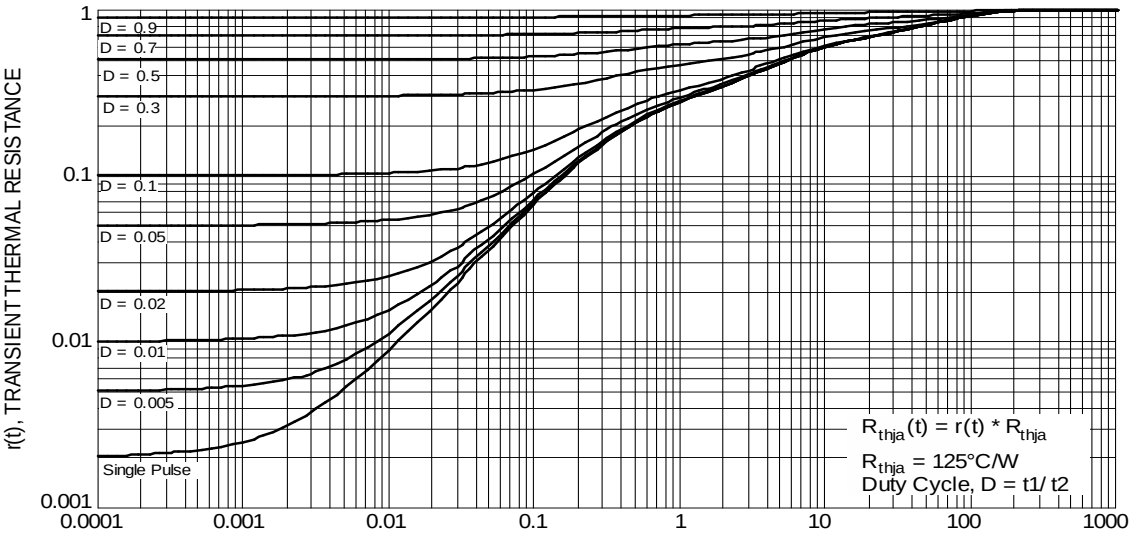


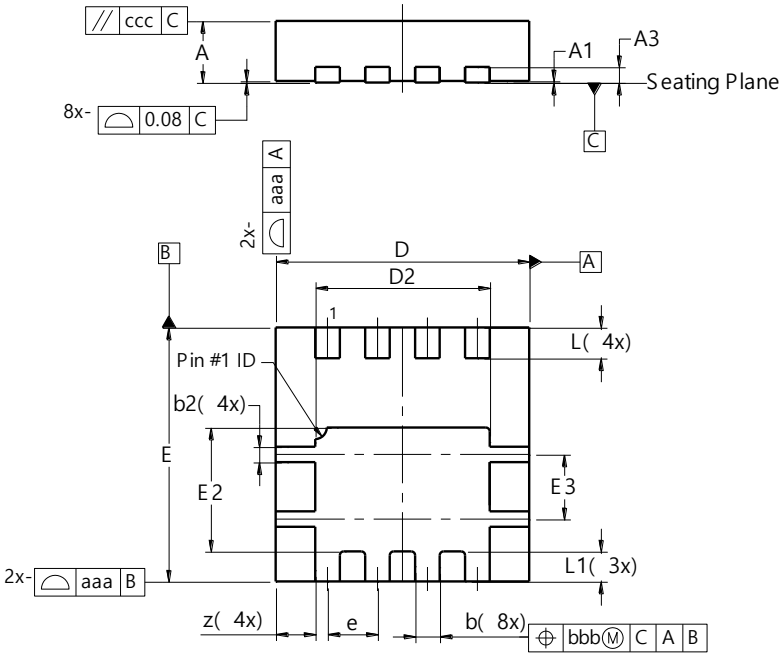

Figure 14 Transient Thermal Resistance


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## Package Outline Dimensions

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

**PowerDI3333-8**

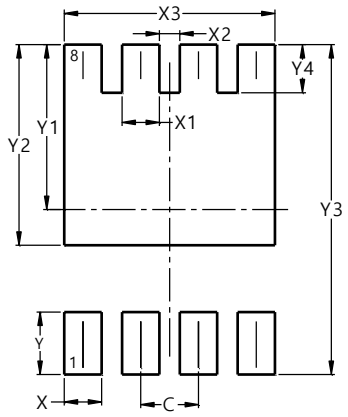



| PowerDI3333-8 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.75 | 0.85 | 0.80 |
| **A1** | 0.00 | 0.05 | 0.02 |
| **A3** | – | – | 0.203 |
| **b** | 0.27 | 0.37 | 0.32 |
| **b2** | – | – | 0.20 |
| **D** | 3.25 | 3.35 | 3.30 |
| **D2** | 2.22 | 2.32 | 2.27 |
| **E**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

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

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