

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ Max | I_D Max $T_c = +25^\circ\text{C}$ |
|---------------|---------------------------------------|--|
| 30V | 21m Ω @ $V_{GS} = 10\text{V}$ | 30A |
| | 35m Ω @ $V_{GS} = 4.5\text{V}$ | 24A |

Description

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.

Applications

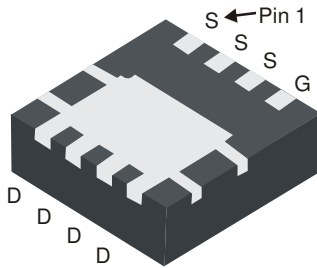
- Backlighting
- Power Management Functions
- DC-DC Converters

Features and Benefits

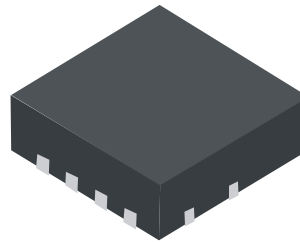
- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- Small form factor thermally efficient package enables higher density end products (PowerDI[®])
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (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 ([DMN3018SFGQ](#))**

Mechanical Data

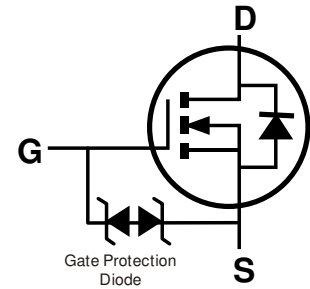
- Case: PowerDI3333-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (Approximate)



Bottom View



Top View



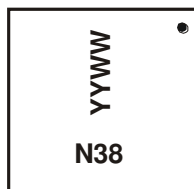
Top View
Internal Schematic

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|------------------|
| DMN3018SFG-7 | PowerDI3333-8 | 2000/Tape & Reel |
| DMN3018SFG-13 | PowerDI3333-8 | 3000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 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



N38 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 16 = 2016)
 WW = Week Code (01 – 53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Units |
|--|--|--|--|------------|-------------|
| Drain-Source Voltage | | | V_{DSS} | 30 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 25 | V |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$ | Steady State | $T_C = +25^\circ\text{C}$ $T_C = +70^\circ\text{C}$ | I_D | 30 25 | A |
| | Steady State | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | I_D | 8.5 6.8 | A |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$ | | $t < 10\text{s}$ | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | I_D | 11.3 9.1 |
| | Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$ | Steady State | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | I_D | 6.6 5.3 |
| $t < 10\text{s}$ | | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | I_D | 8.7 7.0 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | I_S | 2.5 | A |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | | | I_{DM} | 60 | A |
| Avalanche Current (Note 7) $L = 0.1\text{mH}$ | | | I_{AS} | 18 | A |
| Avalanche Energy (Note 7) $L = 0.1\text{mH}$ | | | E_{AS} | 16 | mJ |

Thermal Characteristics

| Characteristic | | | Symbol | Value | Units |
|--|------------------|--|-----------------|------------|--------------------|
| Total Power Dissipation (Note 5) | | | P_D | 1.0 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | | $R_{\theta JA}$ | 126 | $^\circ\text{C/W}$ |
| | $t < 10\text{s}$ | | | 71 | |
| Total Power Dissipation (Note 6) | | | P_D | 2.2 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | | $R_{\theta JA}$ | 56 | $^\circ\text{C/W}$ |
| | $t < 10\text{s}$ | | | 31 | |
| Thermal Resistance, Junction to Case (Note 6) | | | $R_{\theta JC}$ | 7.0 | |
| Operating and Storage Temperature Range | | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|------|----------|---------------|---|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 30 | — | — | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 10 | μA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 1 | 1.7 | 2.1 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 16 | 21 | m Ω | $V_{GS} = 10\text{V}, I_D = 10\text{A}$ |
| | | — | 21 | 35 | | $V_{GS} = 4.5\text{V}, I_D = 8.5\text{A}$ |
| Diode Forward Voltage | V_{SD} | 0.5 | — | 1.2 | V | $V_{GS} = 0\text{V}, I_S = 1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{ISS} | — | 697 | — | pF | $V_{DS} = 15\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$ |
| Output Capacitance | C_{OSS} | — | 97 | — | pF | |
| Reverse Transfer Capacitance | C_{RSS} | — | 67 | — | pF | |
| Gate resistance | R_G | — | 1.47 | — | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Total Gate Charge ($V_{GS} = 4.5\text{V}$) | Q_G | — | 6.0 | — | nC | $V_{GS} = 10\text{V}, V_{DS} = 15\text{V},$ $I_D = 9\text{A}$ |
| Total Gate Charge ($V_{GS} = 10\text{V}$) | Q_G | — | 13.2 | — | nC | |
| Gate-Source Charge | Q_{GS} | — | 2.2 | — | nC | |
| Gate-Drain Charge | Q_{GD} | — | 1.8 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.3 | — | ns | $V_{DD} = 15\text{V}, V_{GS} = 10\text{V},$ $R_L = 15\Omega, I_D = 1\text{A}, R_G = 6\Omega$ |
| Turn-On Rise Time | t_R | — | 4.4 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 20.1 | — | ns | |
| Turn-Off Fall Time | t_F | — | 4.1 | — | ns | |
| Reverse Recovery Time | T_{RR} | — | 7.3 | — | ns | $I_F = 9\text{A}, di/dt = 500\text{A}/\mu\text{s}$ |
| Reverse Recovery Charge | Q_{RR} | — | 7.9 | — | nC | |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
 - I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.
 - Short duration pulse test used to minimize self-heating effect.

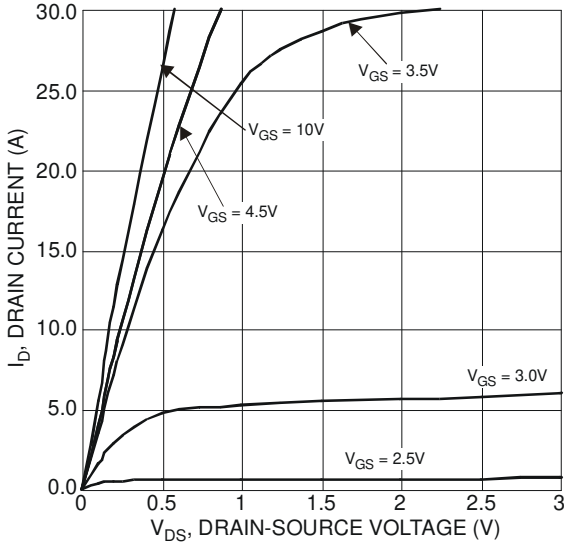


Figure 1 Typical Output Characteristics

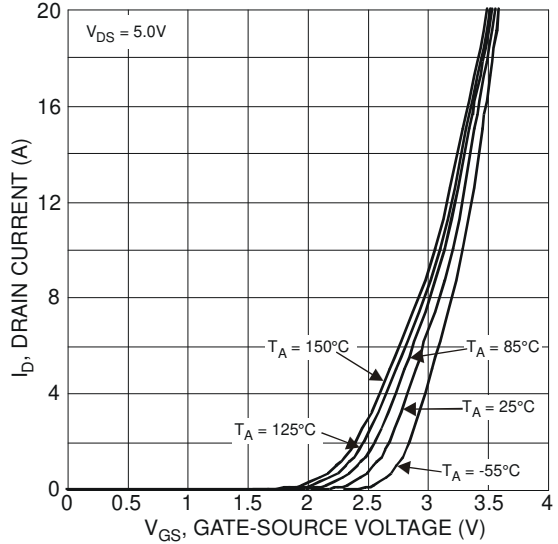


Figure 2 Typical Transfer Characteristics

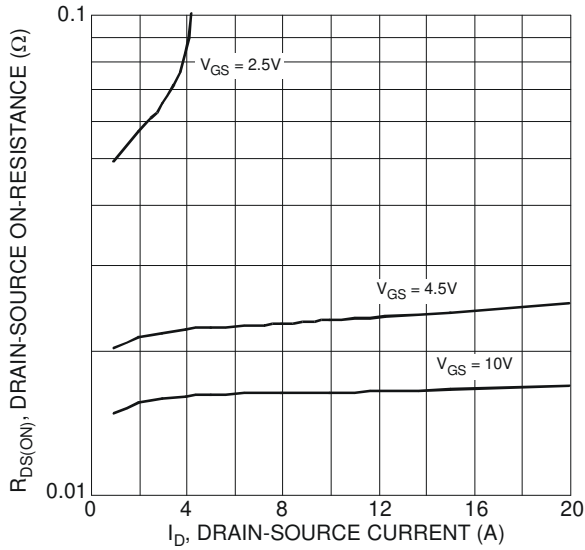


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

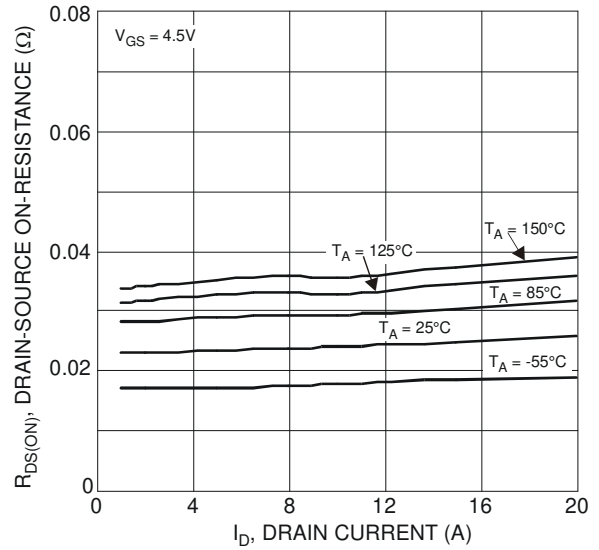


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

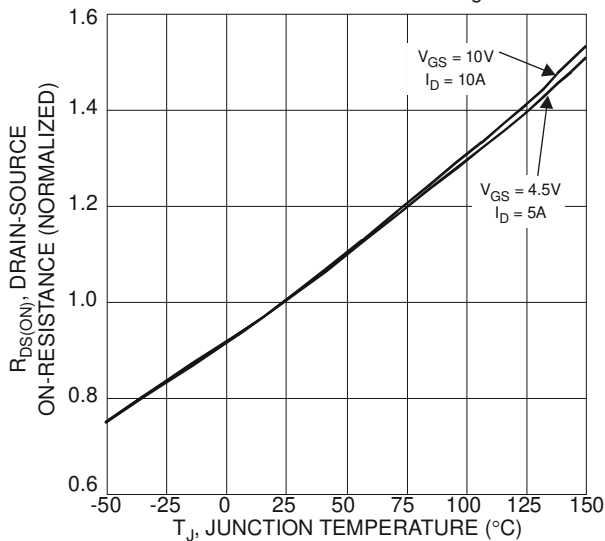


Figure 5 On-Resistance Variation with Temperature

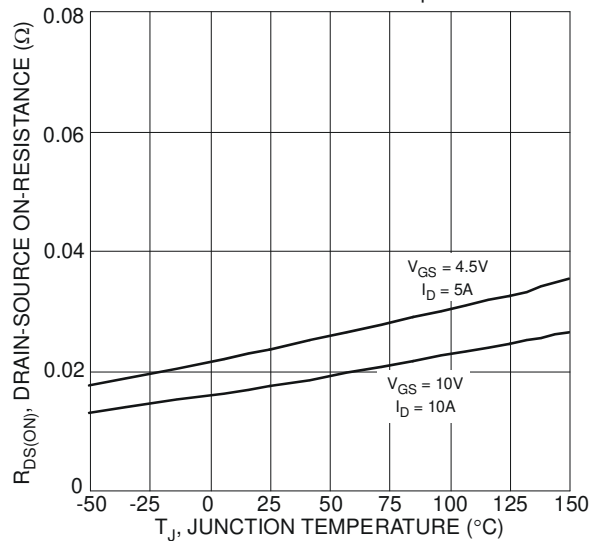


Figure 6 On-Resistance Variation with Temperature

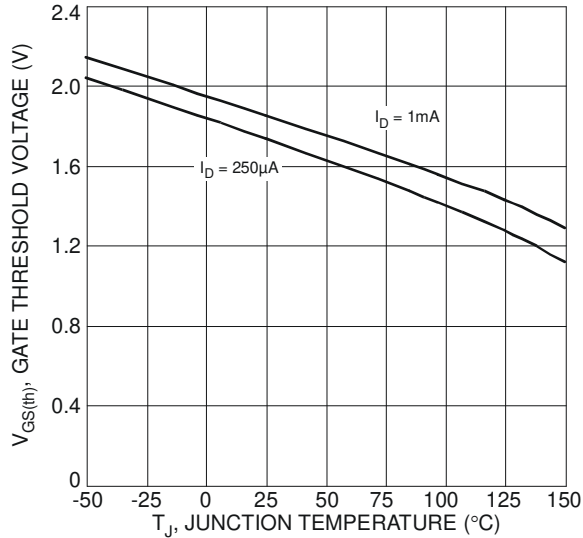


Figure 7 Gate Threshold Variation vs. Ambient Temperature

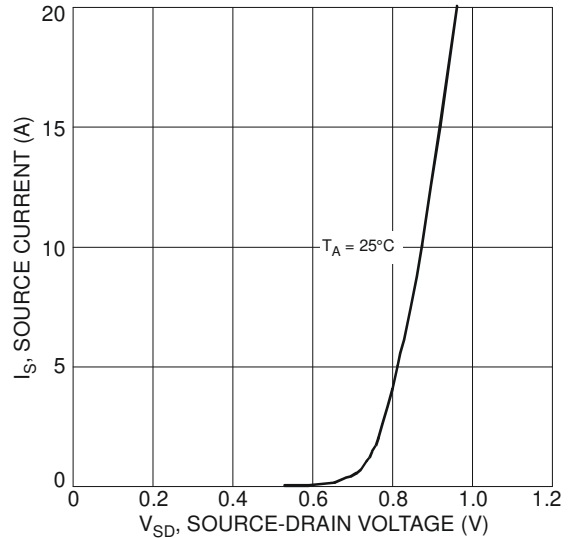


Figure 8 Diode Forward Voltage vs. Current

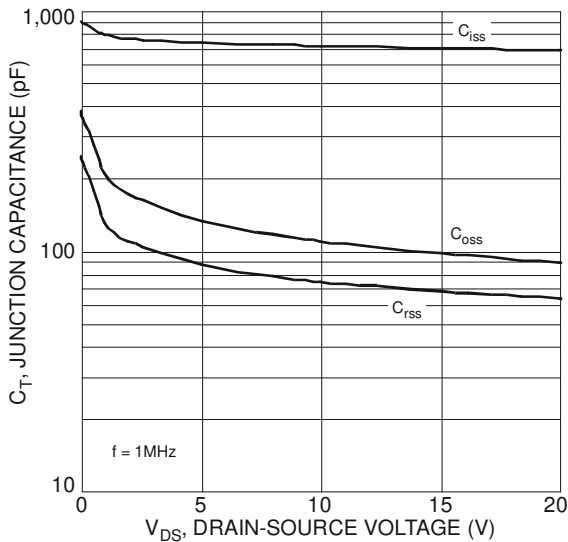


Figure 9 Typical Junction Capacitance

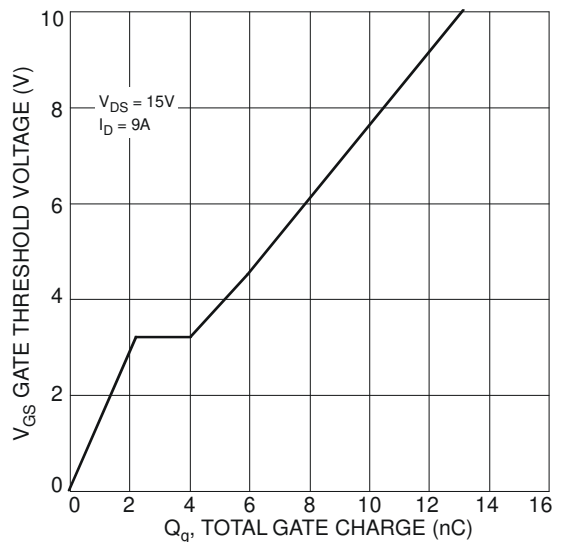


Figure 10 Gate Charge

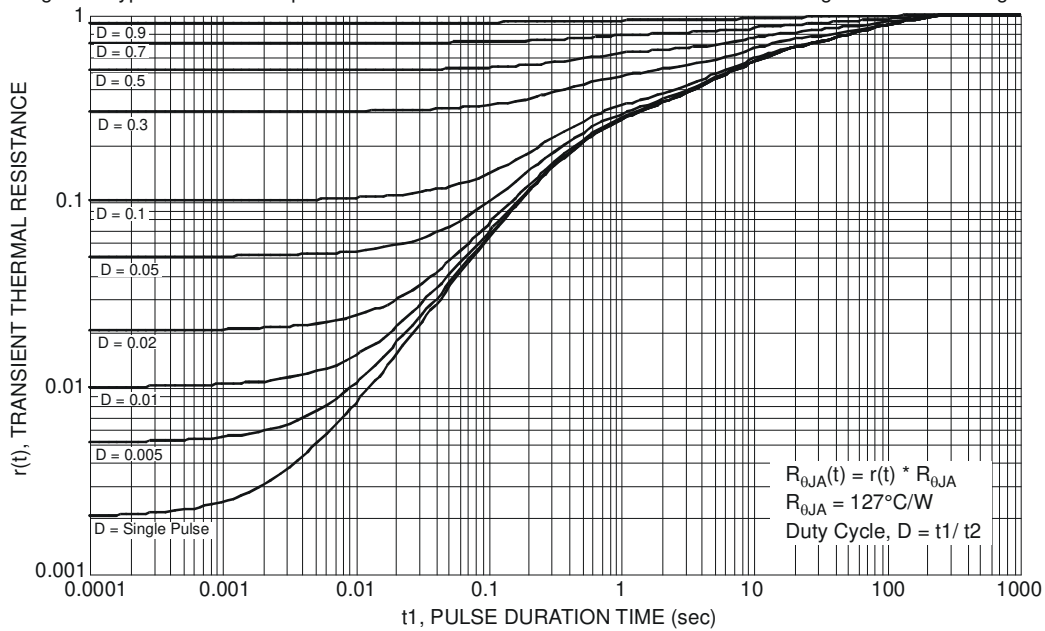


Figure 11 Transient Thermal Resistance

$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

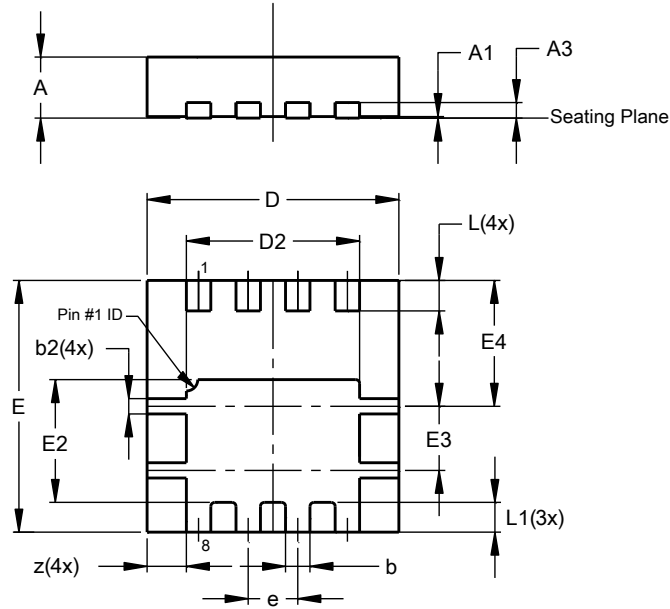
$$R_{\theta JA} = 127^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1 / t_2$$

Package Outline Dimensions

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

PowerDI3333-8

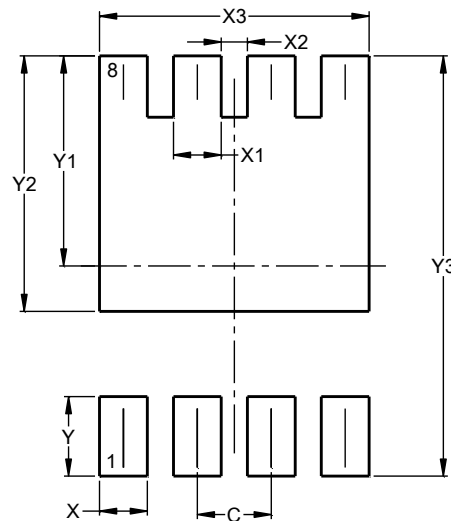


| PowerDI3333-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | 0.15 | 0.25 | 0.20 |
| D | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E | 3.25 | 3.35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

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