

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | I_D max $T_A = +25^\circ\text{C}$ |
|---------------|--|--|
| -60V | 25m Ω @ $V_{GS} = -10\text{V}$ | -7.7A |
| | 33m Ω @ $V_{GS} = -4.5\text{V}$ | -6.8A |

Features and Benefits

- 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
- **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**

Description and Applications

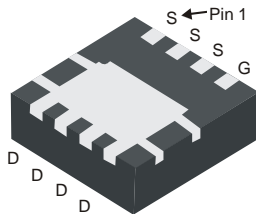
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

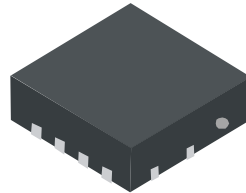
Mechanical Data

- 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(3)
- Weight: 0.072 grams (Approximate)

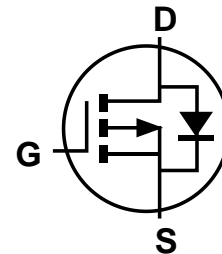
POWERDI3333-8



Bottom View



Top View



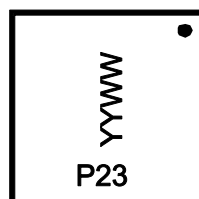
Equivalent Circuit

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|---------------|-------------------|
| DMP6023LFG-7 | POWERDI3333-8 | 2,000/Tape & Reel |
| DMP6023LFG-13 | POWERDI3333-8 | 3,000/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



P23= Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 13 = 2013)
 WW = Week Code (01 ~ 53)

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

| Characteristic | | | Symbol | Value | Units |
|--|--------------|--|------------------|---------------|-------|
| 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 T _A = +70°C | I _D | -7.7 -6.2 | A |
| | t < 10s | T _A = +25°C T _A = +70°C | I _D | -10.3 -8.2 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | I _{DM} | -55 | A |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I _S | -2.2 | A |
| Avalanche Current, L = 0.1mH | | | I _{AS} | -35.5 | A |
| Avalanche Energy, L = 0.1mH | | | E _{AS} | 62.9 | mJ |

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

| Characteristic | | | Symbol | Value | Units |
|--|--------------|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | | | P _D | 1.0 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | | R _{θJA} | 123 | °C/W |
| | t < 10s | | | 69 | |
| Total Power Dissipation (Note 6) | | | P _D | 2.1 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | | R _{θJA} | 60 | °C/W |
| | t < 10s | | | 34 | |
| Thermal Resistance, Junction to Case (Note 6) | | | R _{θJC} | 6.3 | |
| Operating and Storage Temperature Range | | | T _J , T _{STG} | -55 to +150 | °C |

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} | -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 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)} | — | — | 25 | mΩ | V _{GS} = -10V, I _D = -5A |
| | | — | — | 33 | | V _{GS} = -4.5V, I _D = -4A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iSS} | — | 2569 | — | pF | V _{DS} = -30V, V _{GS} = 0V, f = 1MHz |
| Output Capacitance | C _{oss} | — | 179 | — | pF | |
| Reverse Transfer Capacitance | C _{rSS} | — | 143 | — | pF | |
| Gate Resistance | R _g | — | 8 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V,) | Q _g | — | 26.5 | — | nC | |
| Total Gate Charge (V _{GS} = -10V), | Q _g | — | 53.1 | — | nC | V _{DS} = -30V, I _D = -5A |
| Gate-Source Charge | Q _{gs} | — | 7.1 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 12.6 | — | nC | |
| Turn-On Delay Time | t _{D(on)} | — | 6 | — | ns | V _{GS} = -10V, V _{DS} = -30V, R _G = 3Ω, I _D = -5A |
| Turn-On Rise Time | t _r | — | 7.1 | — | ns | |
| Turn-Off Delay Time | t _{D(off)} | — | 110 | — | ns | |
| Turn-Off Fall Time | t _f | — | 62 | — | ns | |
| Body Diode Reverse Recovery Time | t _{rr} | — | 20 | — | ns | I _F = -5A, di/dt = 100A/µs |
| Body Diode Reverse Recovery Charge | Q _{rr} | — | 14 | — | 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
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

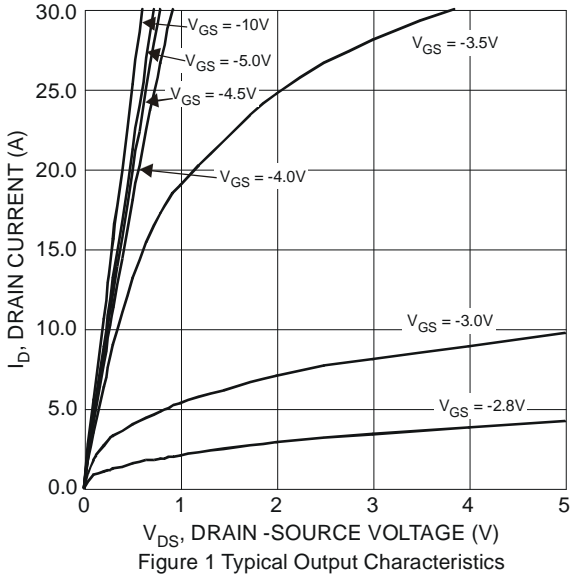


Figure 1 Typical Output Characteristics

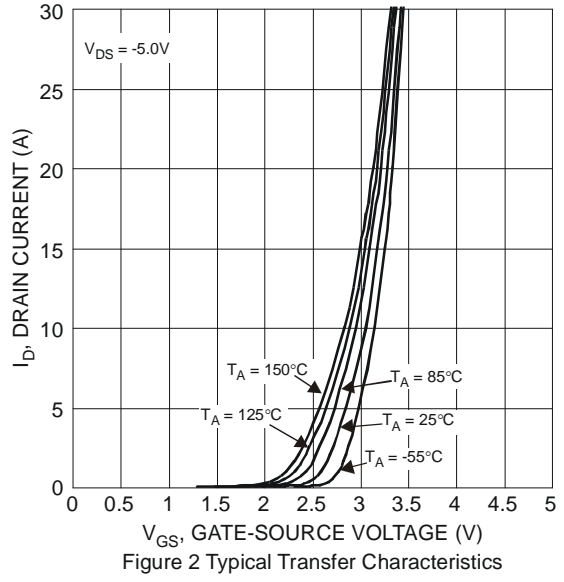


Figure 2 Typical Transfer Characteristics

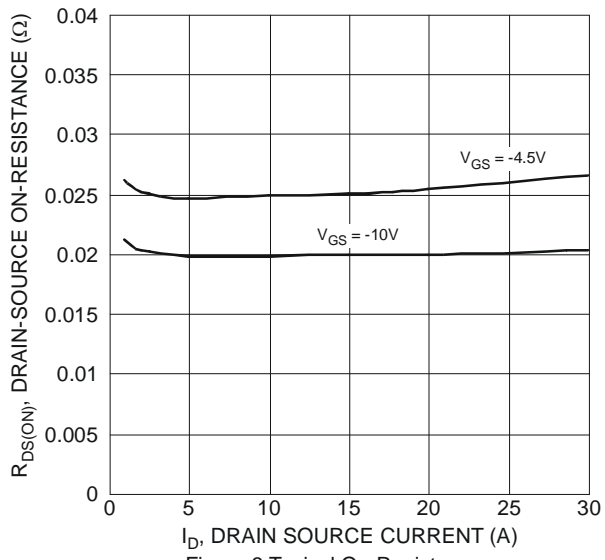


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

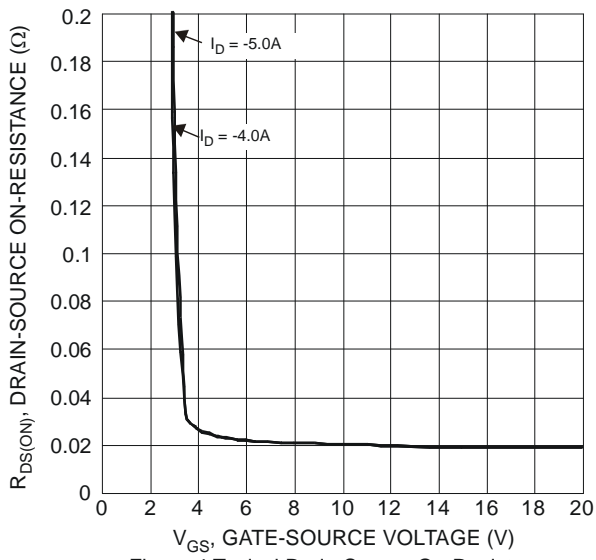


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

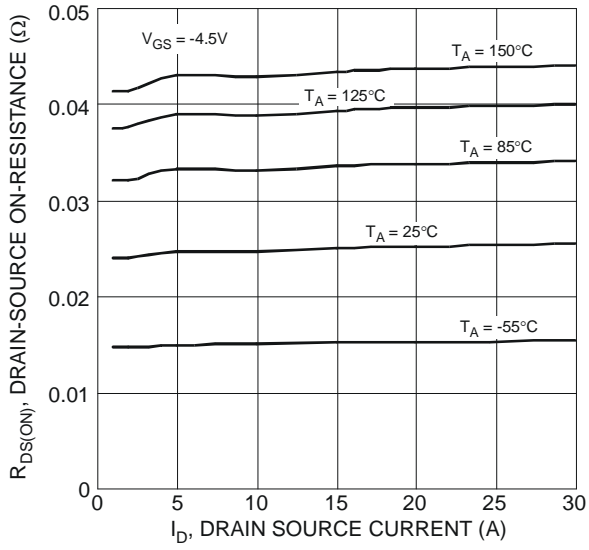


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

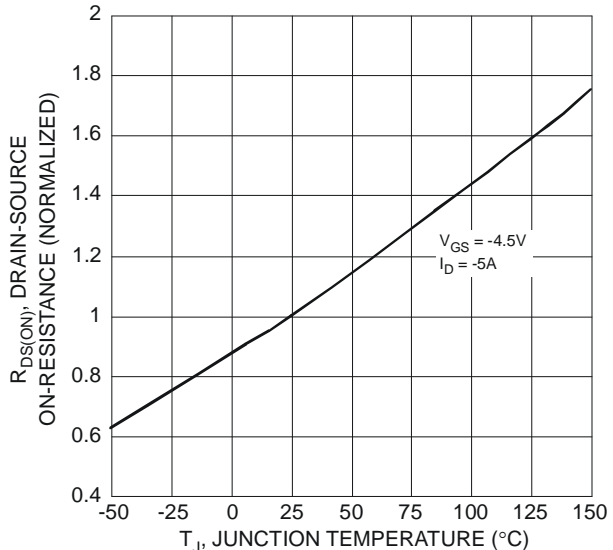


Figure 6 On-Resistance Variation with Temperature

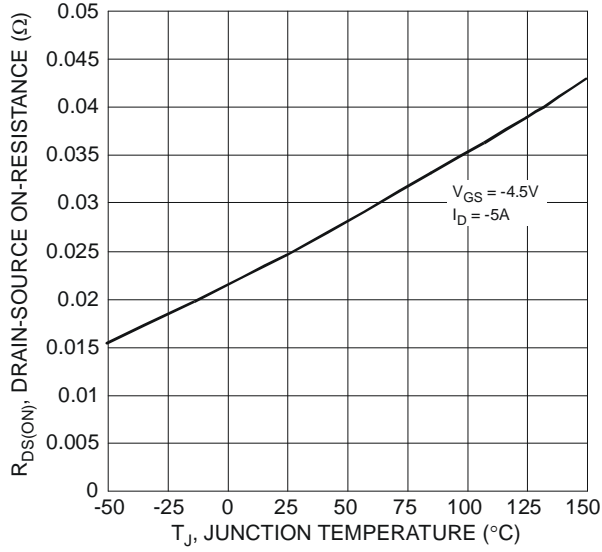


Figure 7 On-Resistance Variation with Temperature

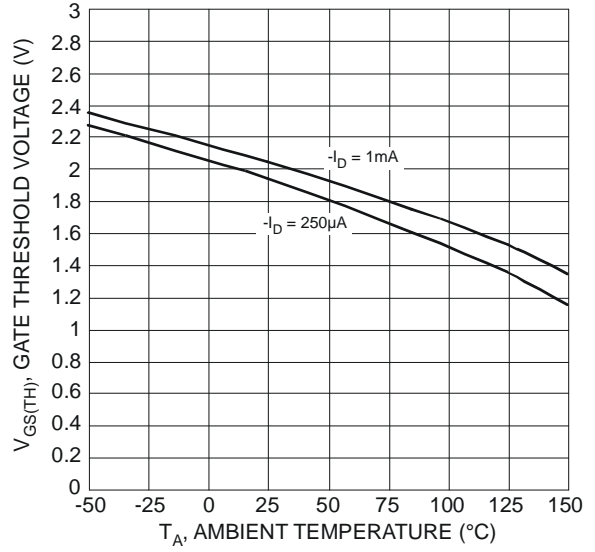


Figure 8 Gate Threshold Variation vs. Ambient Temperature

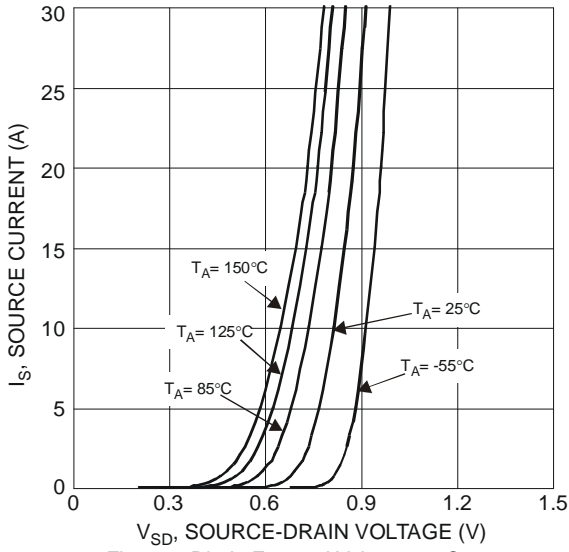


Figure 9 Diode Forward Voltage vs. Current

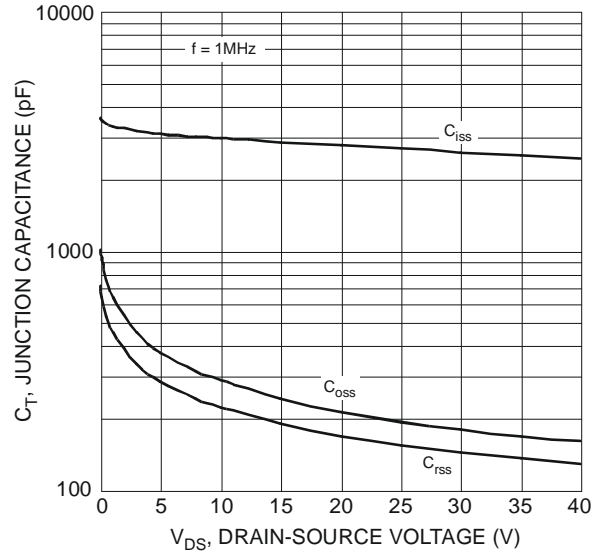


Figure 10 Typical Junction Capacitance

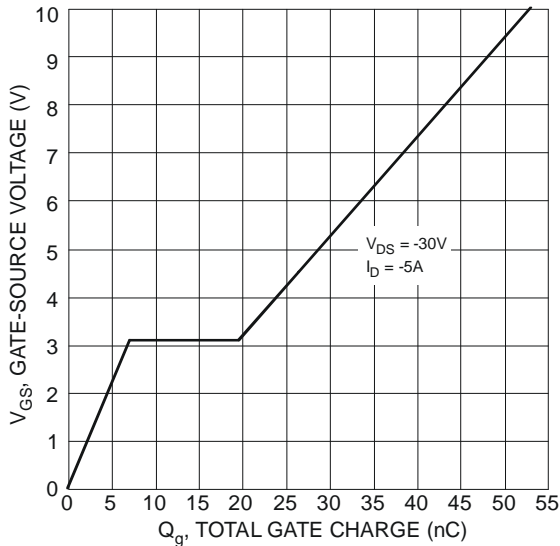


Figure 11 Gate-Charge Characteristics

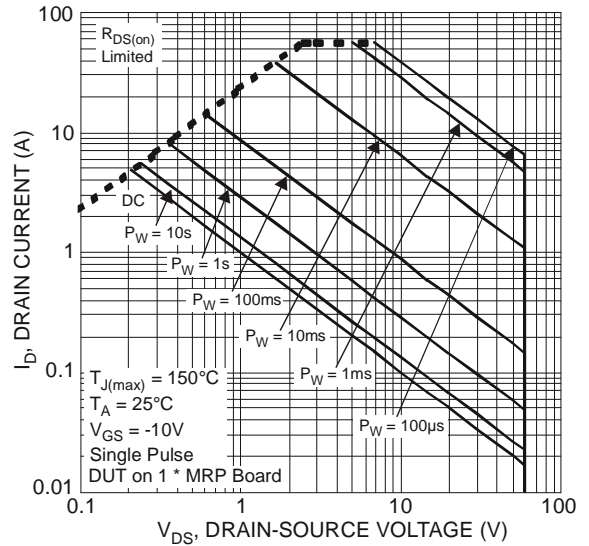
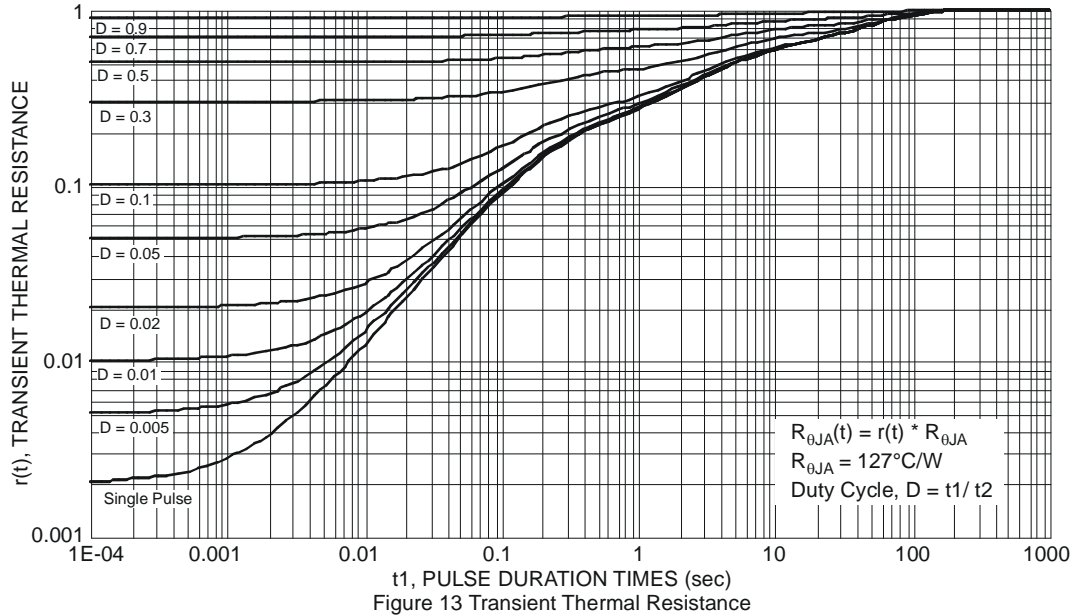
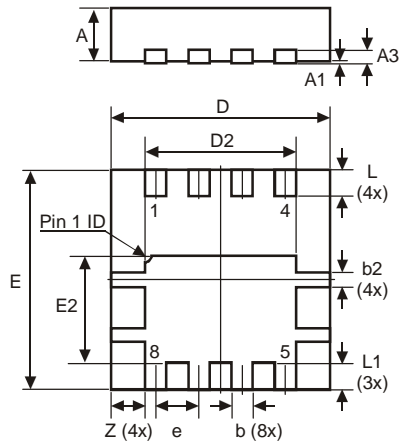


Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

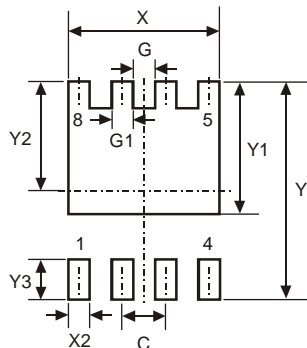


| POWERDI [®] 3333-8 | | | |
|-----------------------------|------|------|-------|
| Dim | Min | Max | Typ |
| D | 3.25 | 3.35 | 3.30 |
| E | 3.25 | 3.35 | 3.30 |
| D2 | 2.22 | 2.32 | 2.27 |
| E2 | 1.56 | 1.66 | 1.61 |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.27 | 0.37 | 0.32 |
| b2 | - | - | 0.20 |
| L | 0.35 | 0.45 | 0.40 |
| L1 | - | - | 0.39 |
| e | - | - | 0.65 |
| Z | - | - | 0.515 |

All Dimensions in mm

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 0.230 |
| G1 | 0.420 |
| Y | 3.700 |
| Y1 | 2.250 |
| Y2 | 1.850 |
| Y3 | 0.700 |
| X | 2.370 |
| X2 | 0.420 |

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