

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max                        | $I_D$ max<br>$T_C = +25^\circ\text{C}$ |
|---------------|---|--|
| 60V           | 7.5m $\Omega$ @ $V_{GS} = 10\text{V}$   | 60A                                    |
|               | 11.5m $\Omega$ @ $V_{GS} = 4.5\text{V}$ | 49A                                    |

## Description

This MOSFET has been 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.

## Applications

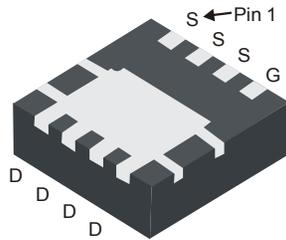
- Synchronous Rectifier
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

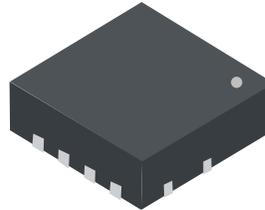
- Low  $R_{DS(ON)}$  – Ensures on State Losses Are Minimized
- Excellent  $Q_{gd} \times R_{DS(ON)}$  Product (FOM)
- Advanced Technology for DC/DC Converts
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- Occupies Just 33% of the Board Area Occupied by SO-8 Enabling Smaller End Product
- 100% UIS (Avalanche) rated
- 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**

## Mechanical Data

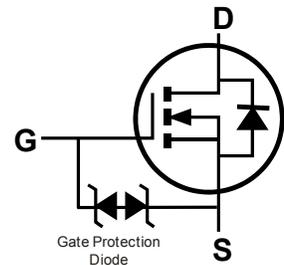
- Case: POWERDI<sup>®</sup>3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 <sup>(e)</sup>3
- Weight: 0.008 grams (approximate)



Bottom View



Top View  
Internal Schematic

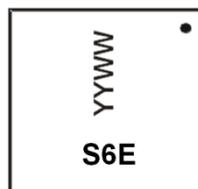


## Ordering Information (Note 4)

| Part Number   | Case          | Packaging         |
|---------------|---------------|-------------------|
| DMT6008LFG-7  | POWERDI3333-8 | 2,000/Tape & Reel |
| DMT6008LFG-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](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



S6E = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last digit of year (ex: 13 = 2013)  
 WW = Week code (01 ~ 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  | Symbol                 | Value | Units |
|---|------------------------|-------|-------|
| Drain-Source Voltage                                    | V <sub>DSS</sub>       | 60    | V     |
| Gate-Source Voltage                                     | V <sub>GSS</sub>       | ±12   | V     |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V | T <sub>A</sub> = +25°C | 13    | A     |
|   | T <sub>A</sub> = +70°C | 11    | A     |
|   | T <sub>C</sub> = +25°C | 60    | A     |
|   | T <sub>C</sub> = +70°C | 48    | A     |
| Maximum Continuous Body Diode Forward Current (Note 5)  | I <sub>S</sub>         | 3     | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)      | I <sub>DM</sub>        | 80    | A     |
| Avalanche Current (Note 6)                              | I <sub>AS</sub>        | 13    | A     |
| Avalanche Energy (Note 6)                               | E <sub>AS</sub>        | 25    | mJ    |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   | Symbol                            | Value                  | Units |
|--|-----------------------------------|------------------------|-------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | T <sub>A</sub> = +25°C | 2.2   |
|  |                                   | T <sub>C</sub> = +25°C | 41    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | Steady State           | 58    |
|  |                                   | t < 10s                | 35    |
| Thermal Resistance, Junction to Case (Note 5)    | R <sub>θJC</sub>                  | 3                      | °C/W  |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150            | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ  | Max  | Unit | Test Condition   |
|--|---------------------|-----|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>        |                     |     |      |      |      |  |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA   |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —    | 1    | µA   | V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±10  | µA   | V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 7)</b>         |                     |     |      |      |      |  |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 0.7 | —    | 2.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                               |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | —   | 5.0  | 7.5  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A  |
|  |                     | —   | 6.5  | 11.5 |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A   |
|  |                     | —   | 19   | —    |      | V <sub>GS</sub> = 3V, I <sub>D</sub> = 3A  |
|  |                     | —   | —    | —    |      | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A   |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.9  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>    |                     |     |      |      |      |  |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 2713 | —    | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1.0MHz                                  |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 822  | —    |      |  |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 57   | —    |      |  |
| Gate Resistance                            | R <sub>g</sub>      | —   | 0.54 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                   |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 22.4 | —    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 20A  |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 50.4 | —    |      |  |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 9.6  | —    |      |  |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 7.8  | —    |      |  |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 7.0  | —    | nS   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>G</sub> = 3Ω, |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 4.4  | —    |      |  |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 24.4 | —    |      |  |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 7.0  | —    |      |  |

- Notes:
- R<sub>θJA</sub> is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R<sub>θJC</sub> is guaranteed by design while R<sub>θJA</sub> is determined by the user's board design.
  - UIS in production with L = 0.3mH, T<sub>J</sub> = +25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

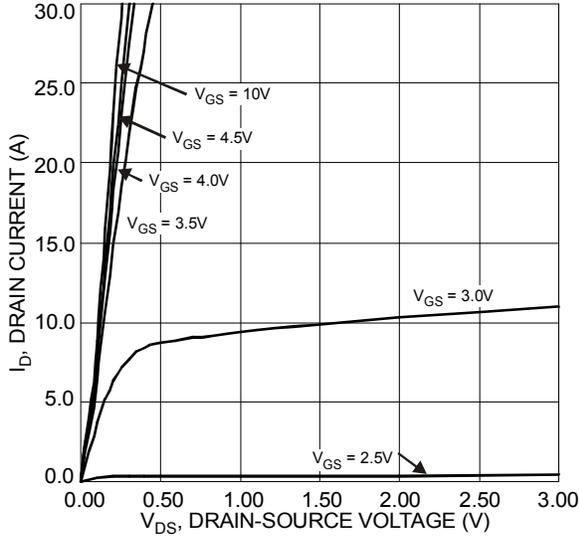


Figure 1 Typical Output Characteristics

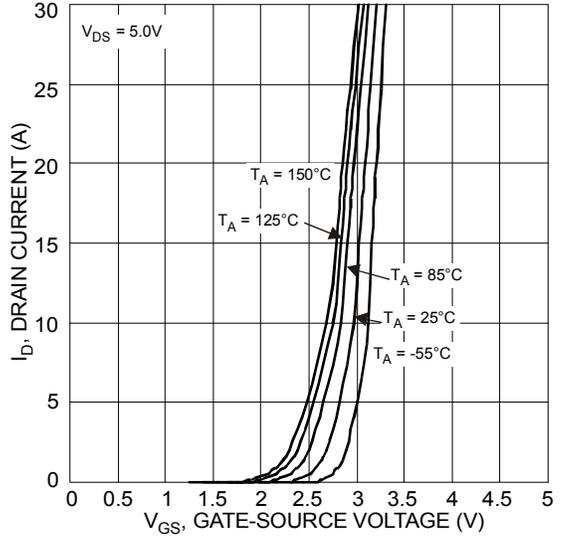


Figure 2 Typical Transfer Characteristics

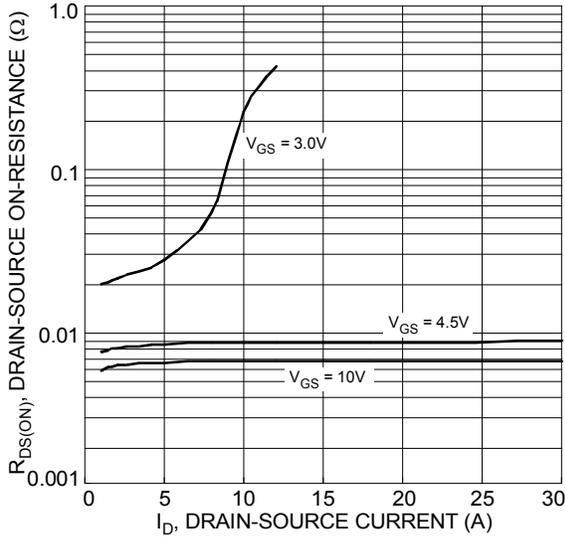


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

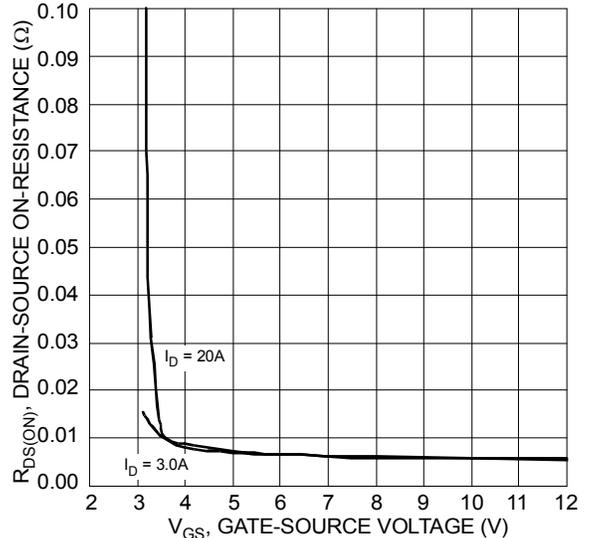


Figure 4 Typical Transfer Characteristics

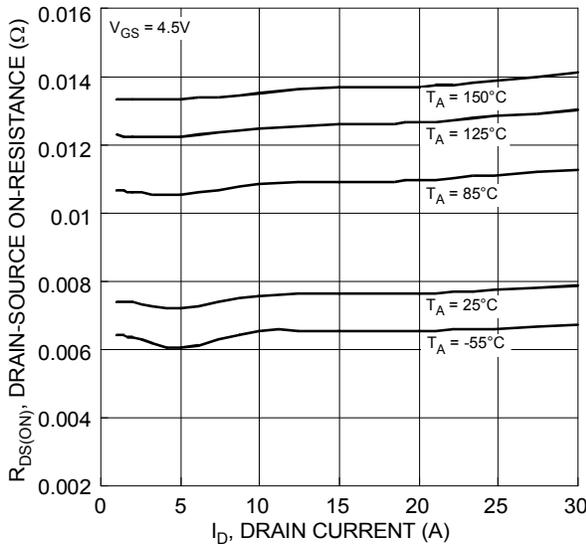


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

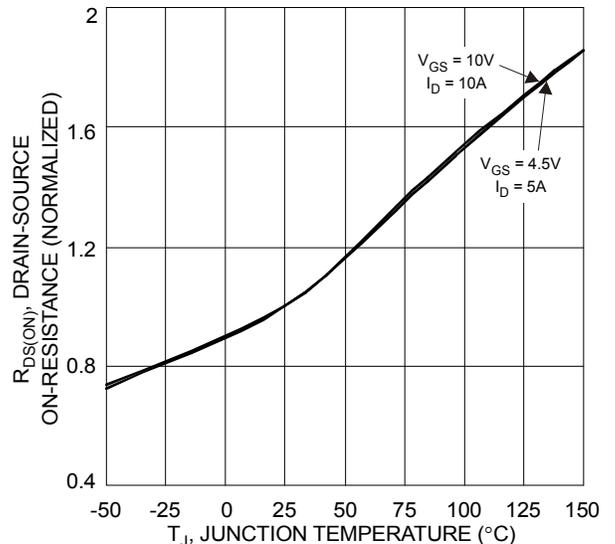


Figure 6 On-Resistance Variation with Temperature

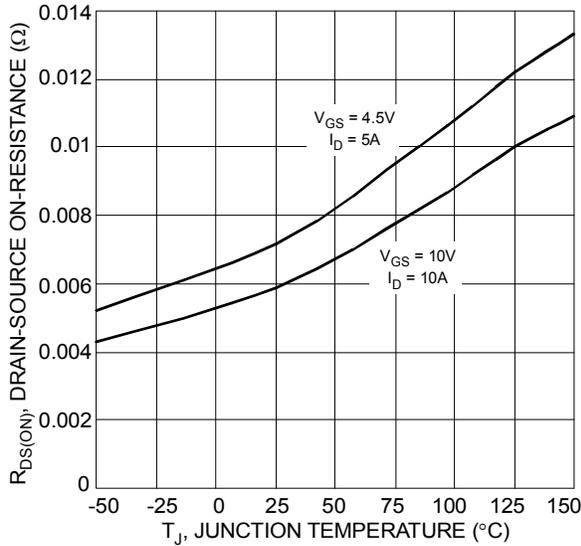


Figure 7 On-Resistance Variation with Temperature

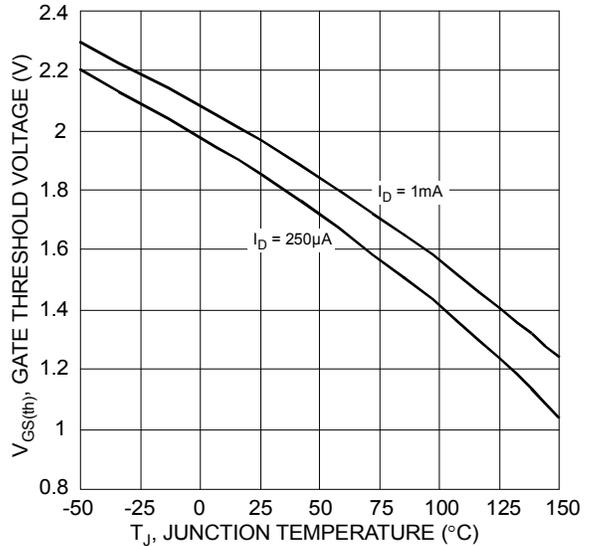


Figure 8 Gate Threshold Variation vs. Ambient Temperature

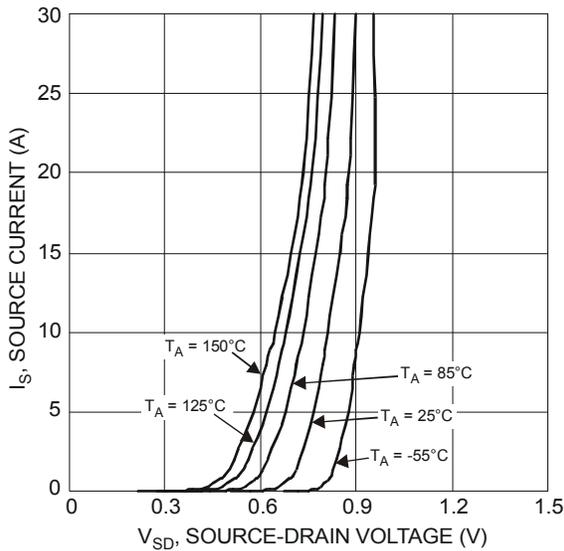


Figure 9 Diode Forward Voltage vs. Current

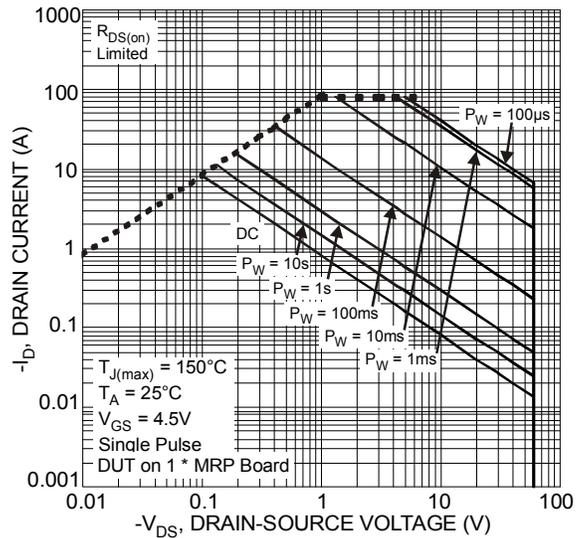


Figure 10 SOA, Safe Operation Area

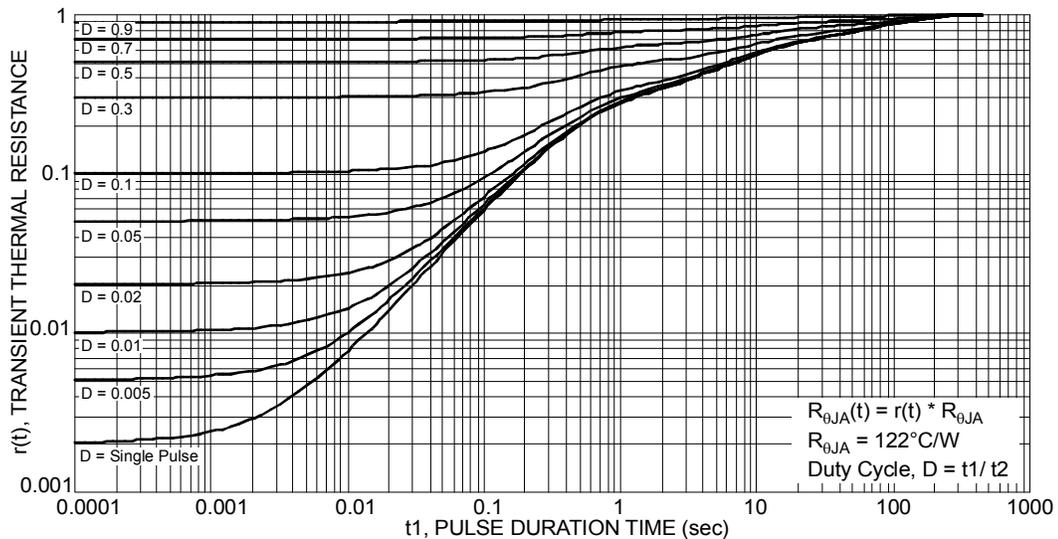
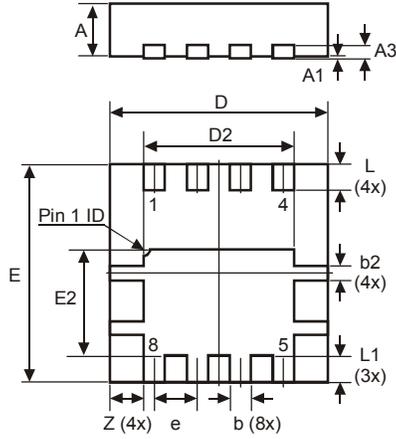


Figure 11 Transient Thermal Resistance

**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

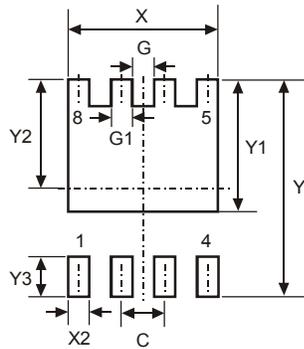


| POWERDI® 3333-8      |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| D                    | 3.25 | 3.35 | 3.30  |
| E                    | 3.25 | 3.35 | 3.30  |
| D2                   | 2.22 | 2.32 | 2.27  |
| E2                   | 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 |      |      |       |

NEW PRODUCT

**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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