

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ max                       | $I_D$ max<br>$T_A = +25^\circ\text{C}$ |
|------------|--|--|
| 20V        | 90m $\Omega$ @ $V_{GS} = 4.5\text{V}$  | 4.2A                                   |
|            | 120m $\Omega$ @ $V_{GS} = 2.5\text{V}$ | 2.7A                                   |

## 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.

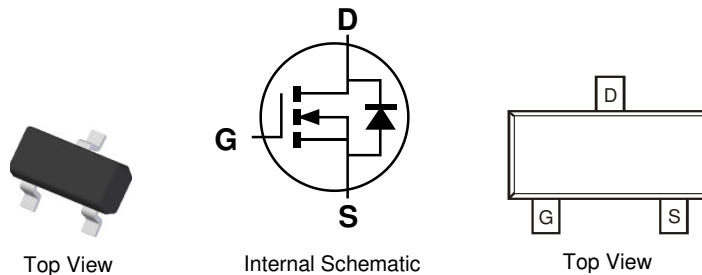
- General Purpose Interfacing Switch
- Power Management Functions
- Boost Application
- Analog Switch

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **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**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (Approximate)

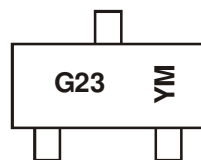


## Ordering Information (Note 5)

| Part Number  | Case   | Packaging          |
|--------------|--------|--------------------|
| DMG2302UQ-7  | SOT-23 | 3,000/Tape & Reel  |
| DMG2302UQ-13 | SOT-23 | 10,000/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



G23 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year  | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |     |
|-------|------|------|------|------|------|------|------|------|------|------|------|-----|
| Code  | W    | X    | Y    | Z    | A    | B    | C    | D    | E    | F    | G    |     |
| Month | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec |
| Code  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | O    | N    | D   |

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

| Characteristic                    |              |                        | Symbol           | Value | Units |
|-----------------------------------|--------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage              |              |                        | V <sub>DSS</sub> | 20    | V     |
| Gate-Source Voltage               |              |                        | V <sub>GSS</sub> | ±8    | V     |
| Continuous Drain Current (Note 6) | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 4.2   | A     |
|                                   |              | T <sub>A</sub> = +70°C |                  | 3.4   |       |
| Pulsed Drain Current (Note 7)     |              |                        | I <sub>DM</sub>  | 27    | A     |

**Thermal Characteristics**

| Characteristic  |                        |  | Symbol                            | Value       | Unit |
|---|------------------------|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                                      | T <sub>A</sub> = +25°C |  | P <sub>D</sub>                    | 0.8         | W    |
|   | T <sub>A</sub> = +70°C |  |                                   | 0.5         |      |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C |                        |  | R <sub>θJA</sub>                  | 156         | °C/W |
| Operating and Storage Temperature Range                         |                        |  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.  
7. Repetitive rating, pulse width limited by junction temperature.

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

| Characteristic   | Symbol              | Min | Typ   | Max  | Unit | Test Condition  |
|--|---------------------|-----|-------|------|------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>                    |                     |     |       |      |      |   |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | 20  | –     | –    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA   |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | –   | –     | 1.0  | μA   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | –   | –     | ±100 | nA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |     |       |      |      |   |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | 0.4 | –     | 1.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 50μA                                       |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | –   | –     | 90   | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.6A   |
|  |                     |     |       | 120  |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.1A   |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | –   | 13    | –    | S    | V <sub>DS</sub> = 5V, I <sub>D</sub> = 3.6A   |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | –   | 0.75  | 1.0  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |     |       |      |      |   |
| Input Capacitance                                      | C <sub>iss</sub>    | –   | 594.3 | –    | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                      |
| Output Capacitance                                     | C <sub>oss</sub>    | –   | 64.5  | –    | pF   |   |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | –   | 57.7  | –    | pF   |   |
| Gate Resistance  | R <sub>g</sub>      | –   | 1.5   | –    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz  |
| Total Gate Charge                                      | Q <sub>g</sub>      | –   | 7.0   | –    | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 3.6A                         |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | –   | 0.9   | –    | nC   |   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | –   | 1.4   | –    | nC   |   |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | –   | 7.4   | –    | ns   | V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V,<br>R <sub>L</sub> = 2.78Ω, R <sub>G</sub> = 1.0Ω |
| Turn-On Rise Time                                      | t <sub>r</sub>      | –   | 9.8   | –    | ns   |   |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | –   | 28.1  | –    | ns   |   |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | –   | 6.7   | –    | ns   |   |

Notes: 8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to production testing.

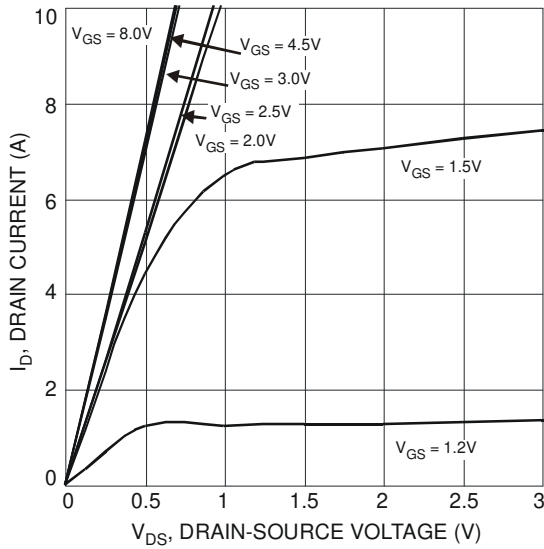


Fig. 1 Typical Output Characteristics

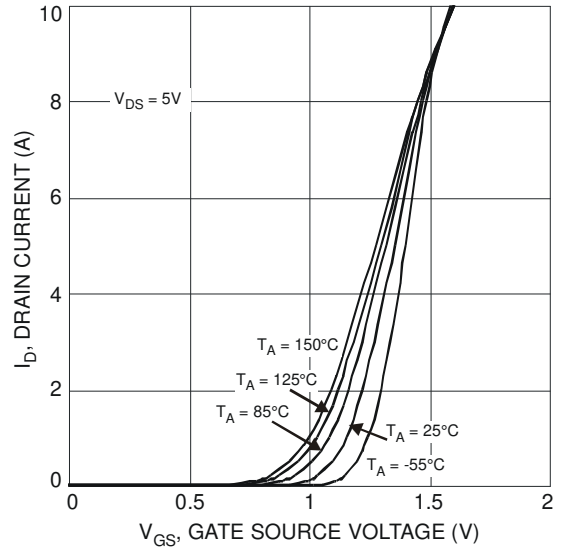


Fig. 2 Typical Transfer Characteristics

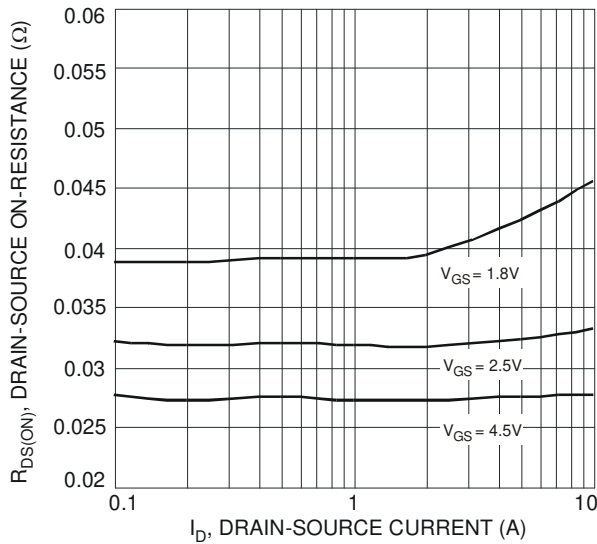


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

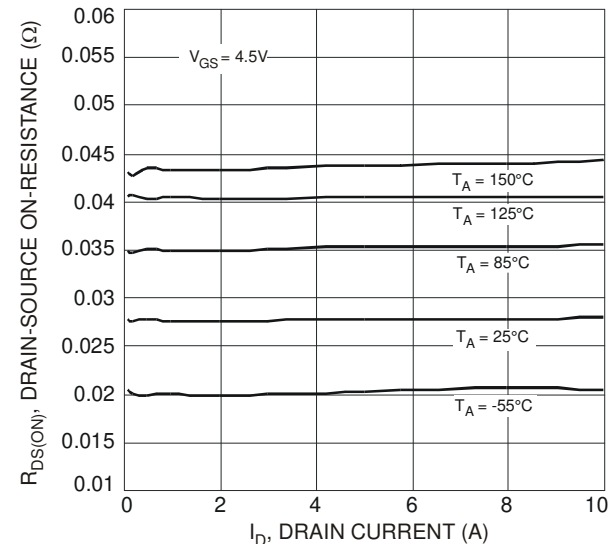


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

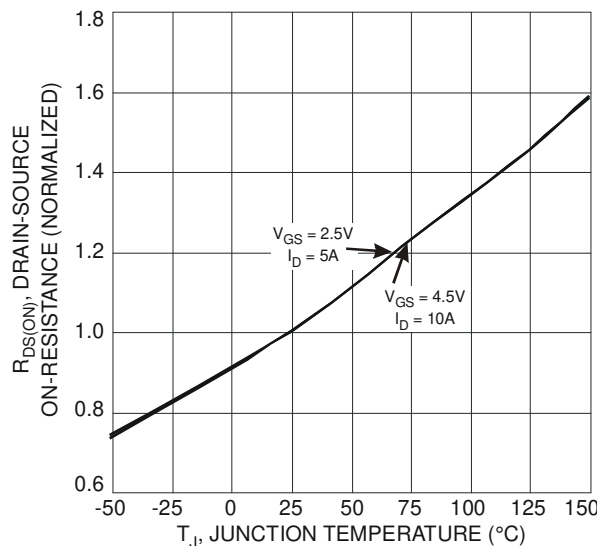


Fig. 5 On-Resistance Variation with Temperature

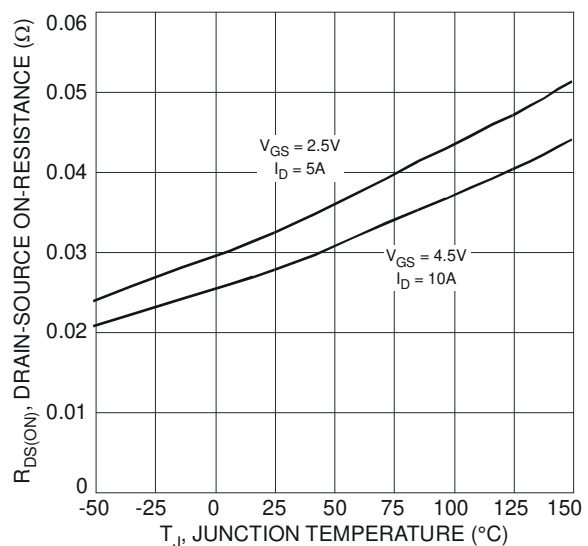


Fig. 6 On-Resistance Variation with Temperature

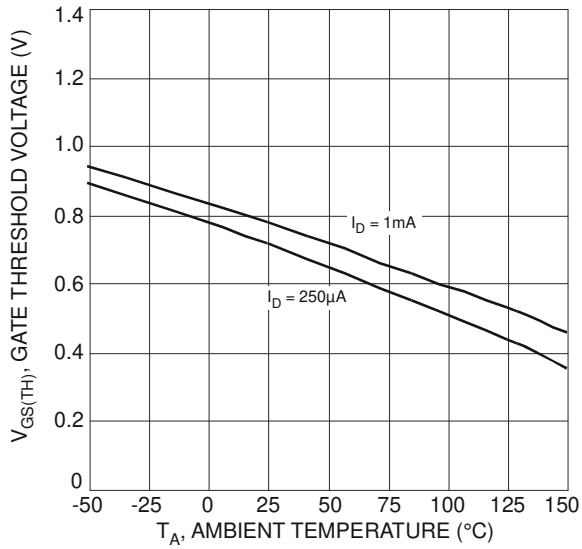


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

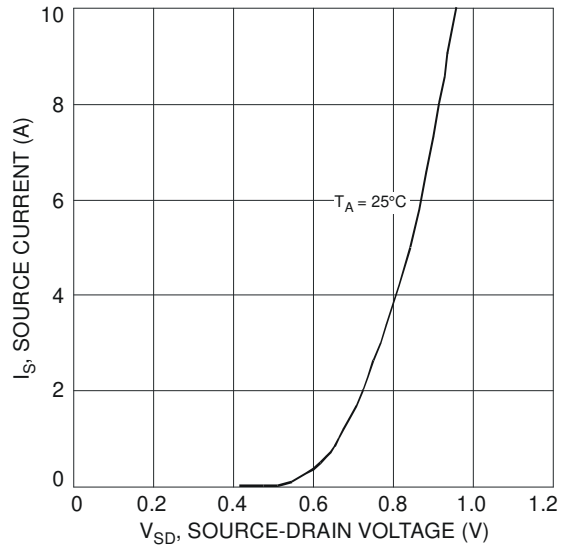


Fig. 8 Diode Forward Voltage vs. Current

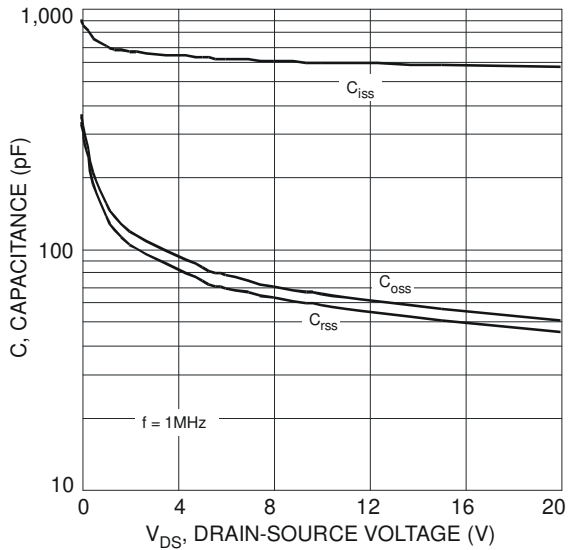


Fig. 9 Typical Capacitance

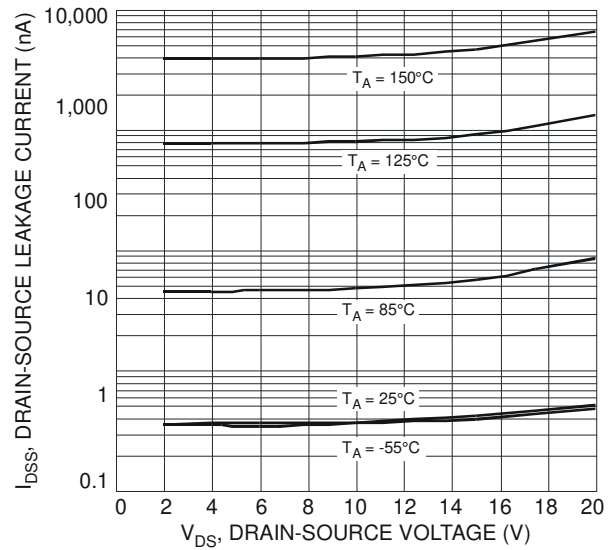


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

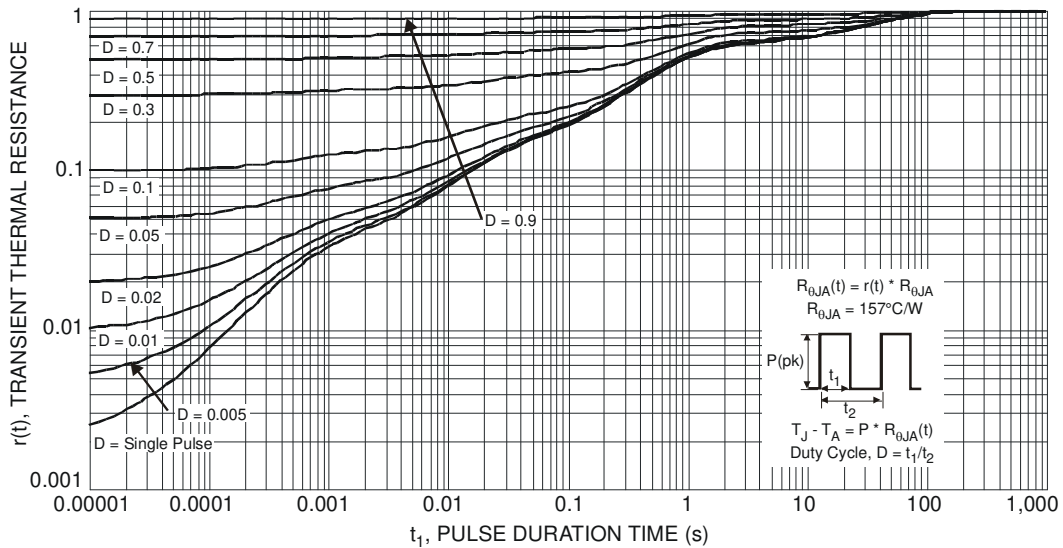
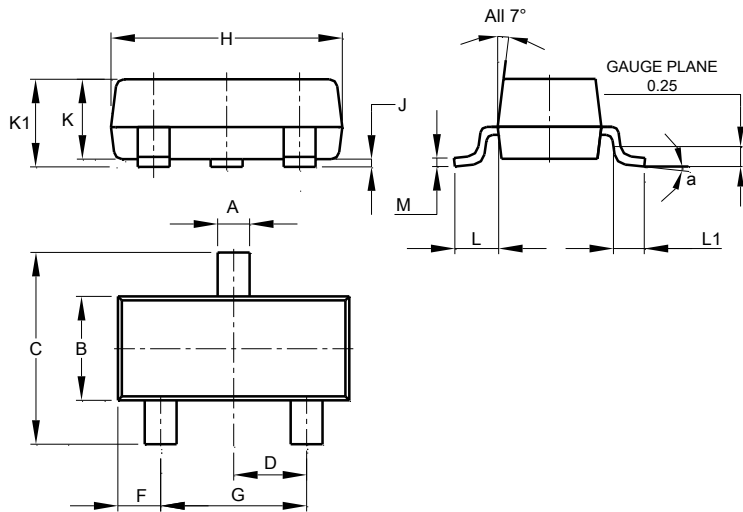


Fig. 11 Transient Thermal Response

**Package Outline Dimensions**

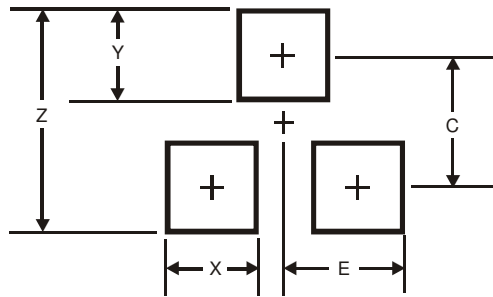
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT23                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.37  | 0.51  | 0.40  |
| B                    | 1.20  | 1.40  | 1.30  |
| C                    | 2.30  | 2.50  | 2.40  |
| D                    | 0.89  | 1.03  | 0.915 |
| F                    | 0.45  | 0.60  | 0.535 |
| G                    | 1.78  | 2.05  | 1.83  |
| H                    | 2.80  | 3.00  | 2.90  |
| J                    | 0.013 | 0.10  | 0.05  |
| K                    | 0.890 | 1.00  | 0.975 |
| K1                   | 0.903 | 1.10  | 1.025 |
| L                    | 0.45  | 0.61  | 0.55  |
| L1                   | 0.25  | 0.55  | 0.40  |
| M                    | 0.085 | 0.150 | 0.110 |
| α                    | 8°    |       |       |
| 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) |
|------------|---------------|
| Z          | 2.9           |
| X          | 0.8           |
| Y          | 0.9           |
| C          | 2.0           |
| E          | 1.35          |

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