

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$                | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|-----------------------------------------|------------------------------------------------|
| -20V          | 120m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -3A                                            |
|               | 150m $\Omega$ @ $V_{GS} = -2.5\text{V}$ |                                                |

## 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.

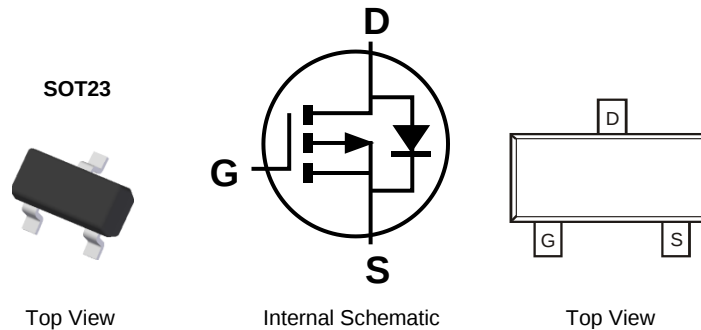
- Backlighting
- Power Management Functions
- DC-DC Converters
- Motor Control

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## 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
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)

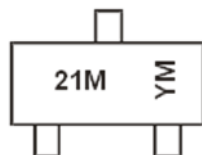


## Ordering Information (Note 4)

| Part Number | Case  | Packaging          |
|-------------|-------|--------------------|
| DMG2301L-7  | SOT23 | 3,000/Tape & Reel  |
| DMG2301L-13 | SOT23 | 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



21M = Product Type Marking Code  
YM = Date Code Marking  
Y or  $\bar{Y}$  = Year (ex: C = 2015)  
M = Month (ex: 9 = September)

### Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|
| Code | B    | C    | D    | E    | F    | G    | H    |

| 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 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -3<br>-1 | A     |
| Pulsed Drain Current (Note 6)                             |              |                                                  | I <sub>DM</sub>  | -10      | A     |
| Drain-Source Diode Forward Current ( t < 5 sec)           |              |                                                  | I <sub>S</sub>   | -0.75    | A     |

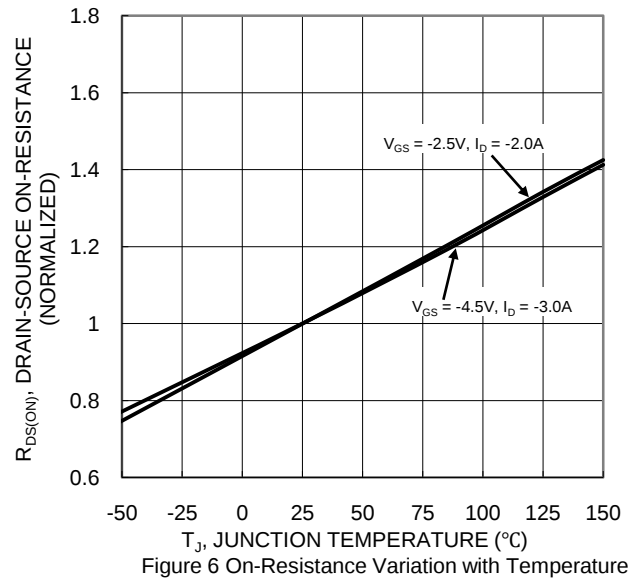
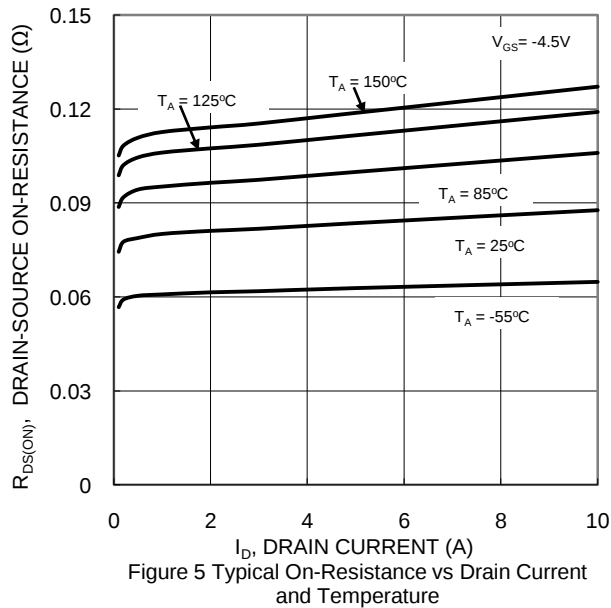
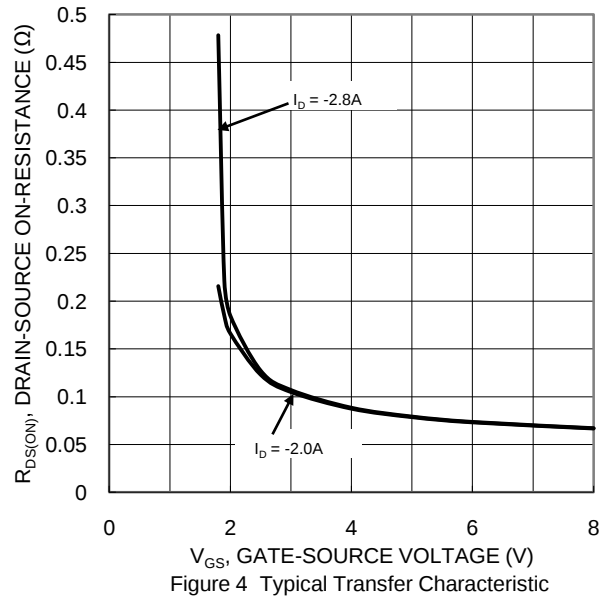
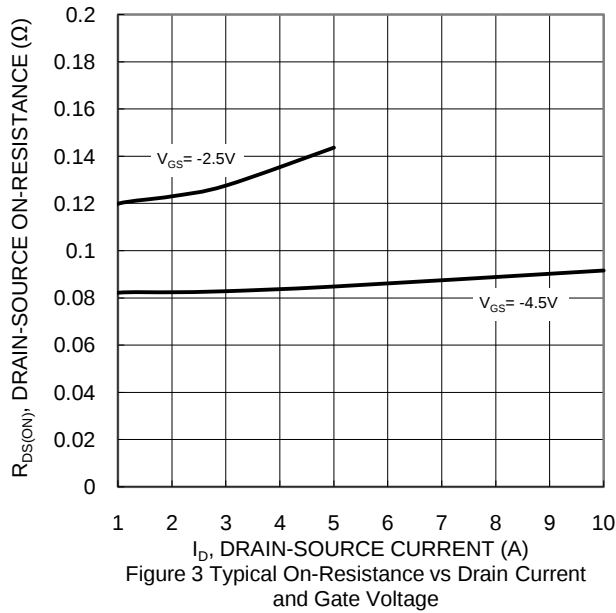
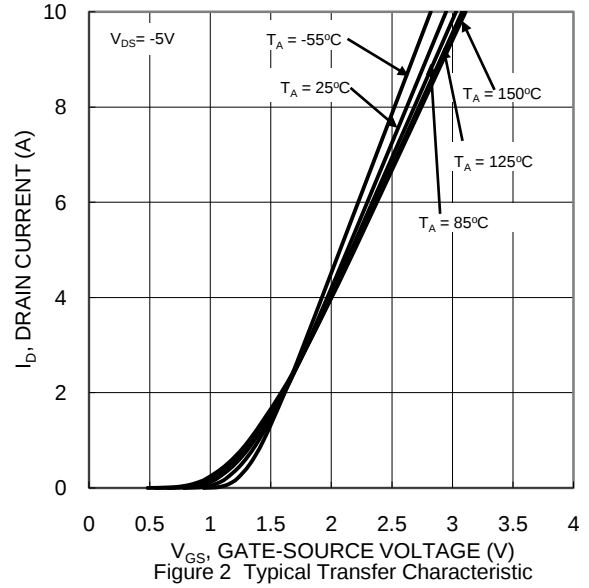
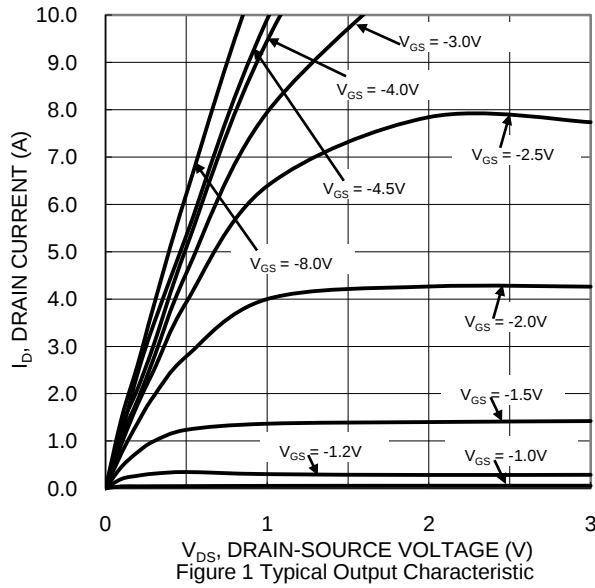
**Thermal Characteristics**

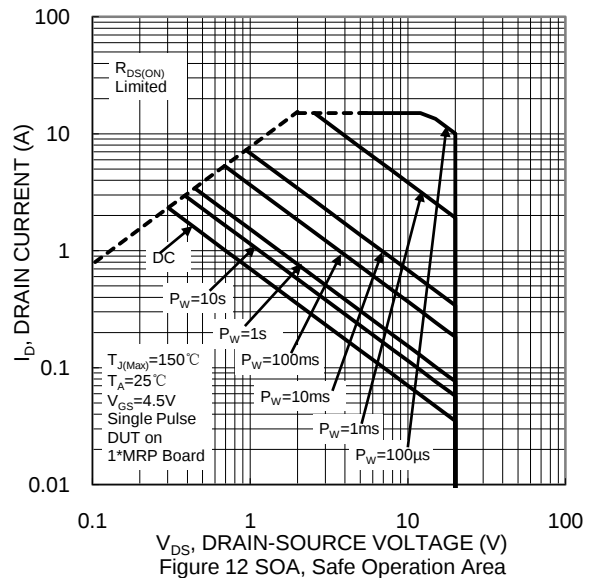
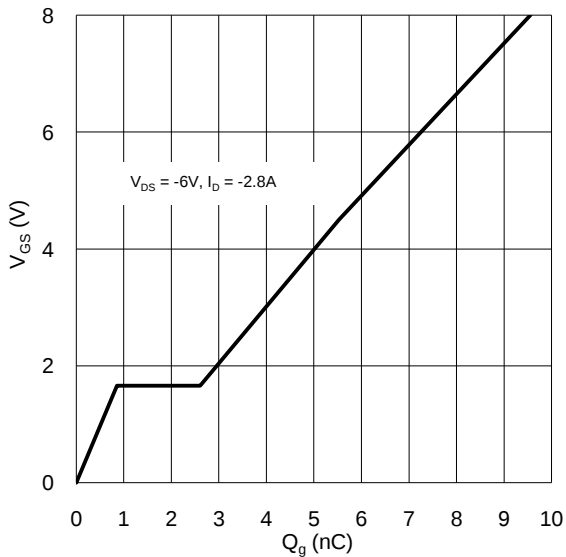
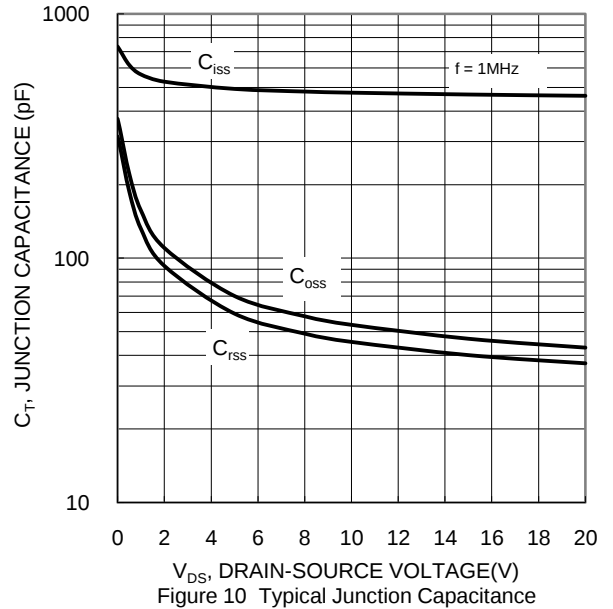
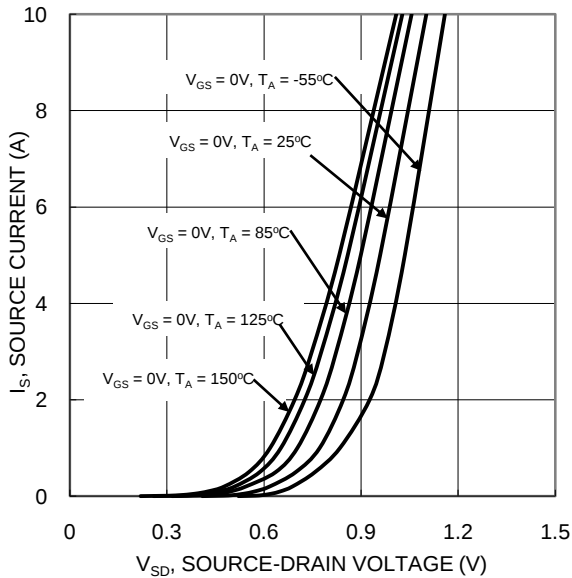
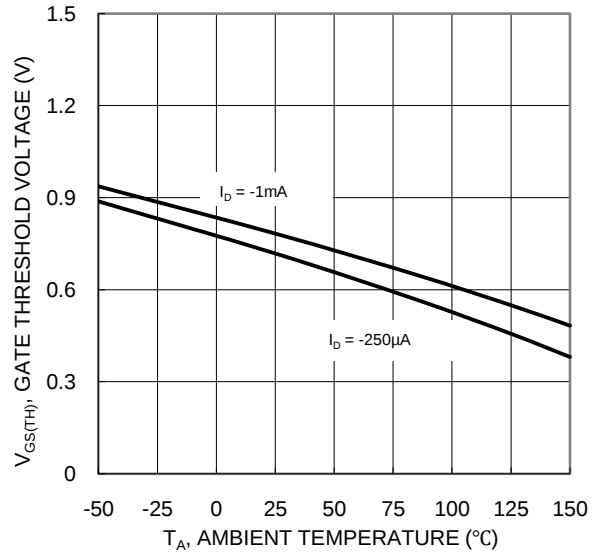
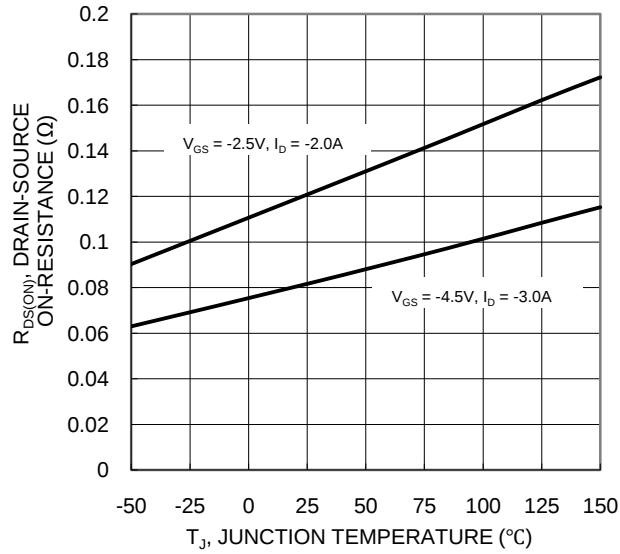
| Characteristic                                                           | Symbol                            | Value       | Unit |
|--------------------------------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                                               | P <sub>D</sub>                    | 1.5         | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5) | R <sub>θJA</sub>                  | 83          | °C/W |
| Operating and Storage Temperature Range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

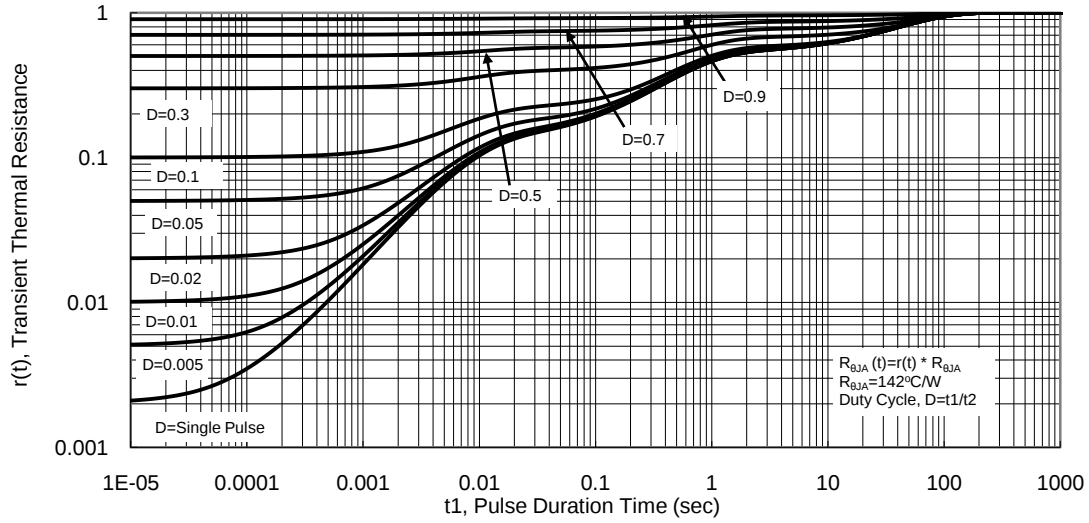
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified)

| Characteristic                                         | Symbol              | Min  | Typ | Max  | Unit | Test Condition                                                                                 |
|--------------------------------------------------------|---------------------|------|-----|------|------|------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>                    |                     |      |     |      |      |                                                                                                |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | -20  | —   | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                  |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —    | —   | -1.0 | μA   | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V                                                   |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —    | —   | ±100 | nA   | V <sub>GS</sub> = ±6V, V <sub>DS</sub> = 0V                                                    |
| <b>ON CHARACTERISTICS (Note 7)</b>                     |                     |      |     |      |      |                                                                                                |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | -0.4 | —   | -1.2 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                    |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | —    | —   | 120  | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.8A                                                |
|                                                        |                     |      |     | 150  |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.0A                                                |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | —    | —   | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.75A                                                  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>                |                     |      |     |      |      |                                                                                                |
| Input Capacitance                                      | C <sub>iss</sub>    | —    | 476 | —    | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                     |
| Output Capacitance                                     | C <sub>oss</sub>    | —    | 53  | —    | pF   |                                                                                                |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —    | 45  | —    | pF   |                                                                                                |
| Total Gate Charge                                      | Q <sub>g</sub>      | —    | 5.5 | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -6V, I <sub>D</sub> = -2.8A                         |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —    | 0.9 | —    | nC   |                                                                                                |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —    | 1.8 | —    | nC   |                                                                                                |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —    | 5   | —    | ns   | V <sub>DS</sub> = -6V, V <sub>GS</sub> = -4.5V,<br>R <sub>GEN</sub> = 6Ω, I <sub>D</sub> = -1A |
| Turn-On Rise Time                                      | t <sub>R</sub>      | —    | 10  | —    | ns   |                                                                                                |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —    | 30  | —    | ns   |                                                                                                |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | —    | 20  | —    | ns   |                                                                                                |

- Notes:
5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  6. Repetitive rating, pulse width limited by junction temperature.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to production testing.

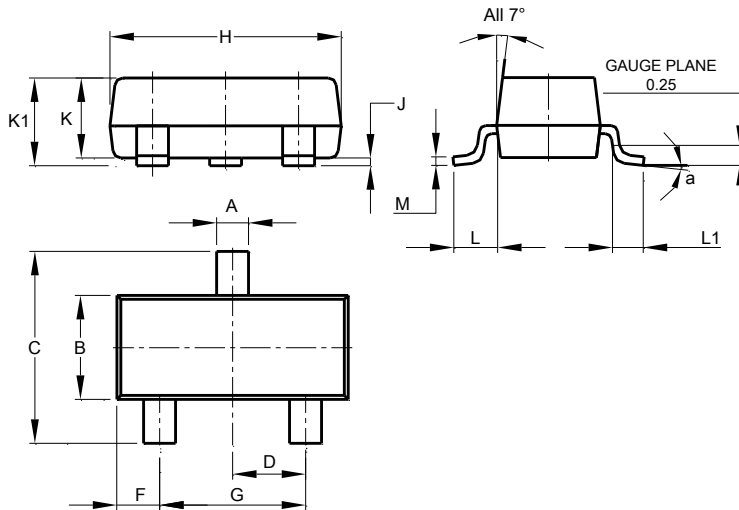






## Package Outline Dimensions

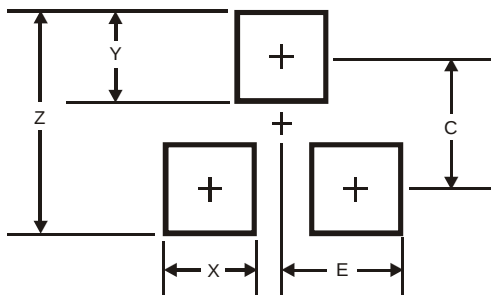
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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 |
| a                    | 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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