

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max                     | $I_D$ max<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------------|----------------------------------------|
| 60V           | $2\Omega$ @ $V_{GS} = 5.0\text{V}$   | 340mA                                  |
|               | $2.5\Omega$ @ $V_{GS} = 2.5\text{V}$ | 300mA                                  |

## Description

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.

## Applications

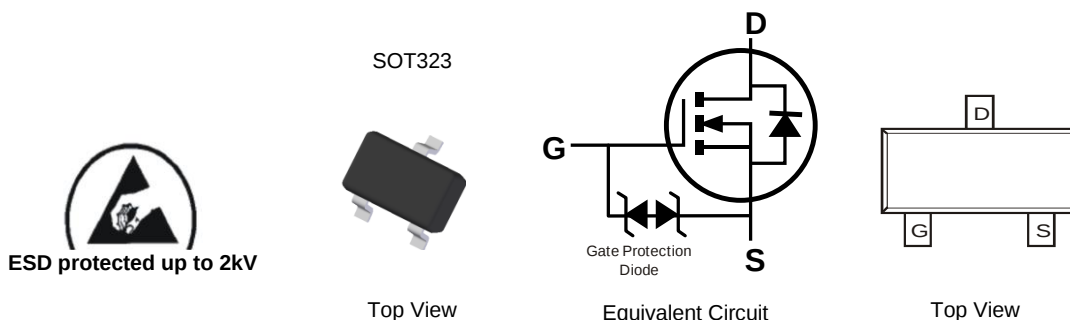
- Motor Control
- Power Management Functions
- Backlighting

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Up To 2kV
- **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: SOT323
- 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 Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208③
- Weight: 0.006 grams (Approximate)

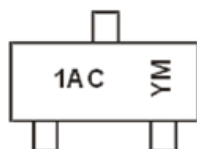


## Ordering Information (Note 4)

| Part Number  | Case   | Packaging          |
|--------------|--------|--------------------|
| DMN61D9UW-7  | SOT323 | 3,000/Tape & Reel  |
| DMN61D9UW-13 | SOT323 | 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



1AC= Product Type Marking Code  
 YM = Date Code Marking  
 Y or Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | B    | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    |

| 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 | Unit |
|-------------------------------------------------------------|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage                                        |              |                        | V <sub>DSS</sub> | 60    | V    |
| Gate-Source Voltage                                         |              |                        | V <sub>GSS</sub> | ±20   | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 5.0V    | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 340   | mA   |
|                                                             |              | T <sub>A</sub> = +70°C | I <sub>D</sub>   | 270   | mA   |
|                                                             | t < 5s       | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 400   | mA   |
|                                                             |              |                        | I <sub>D</sub>   | 300   | mA   |
| Maximum Continuous Body Diode Forward Current (Note 6)      |              |                        | I <sub>S</sub>   | 0.4   | A    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 6) |              |                        | I <sub>DM</sub>  | 1.2   | A    |

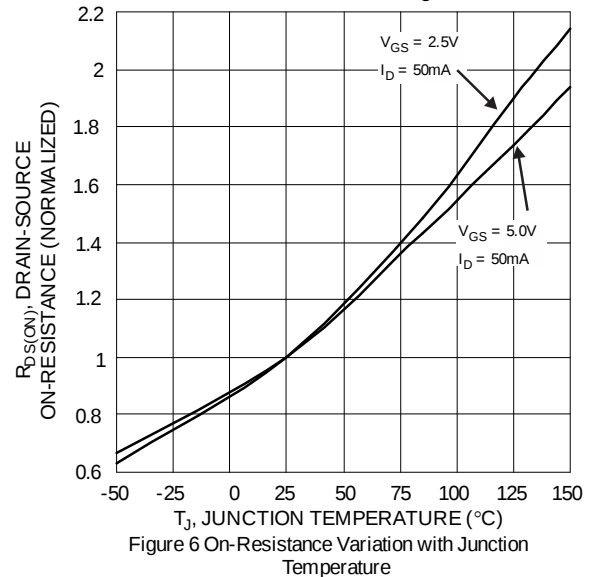
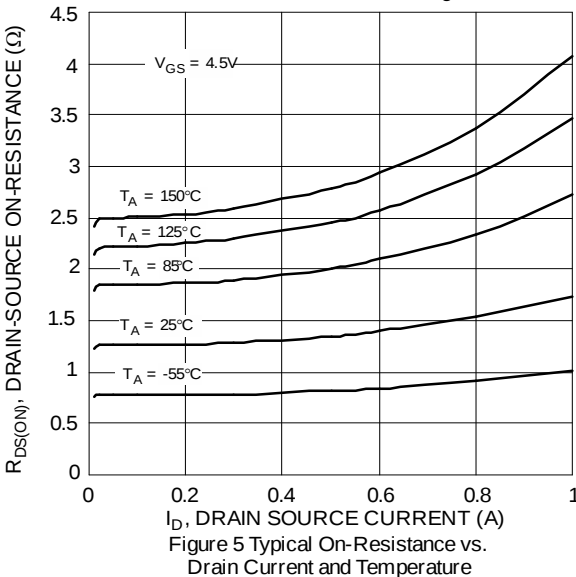
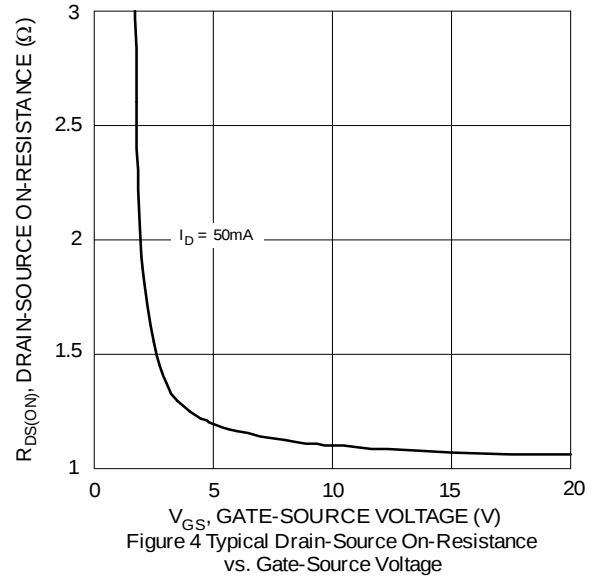
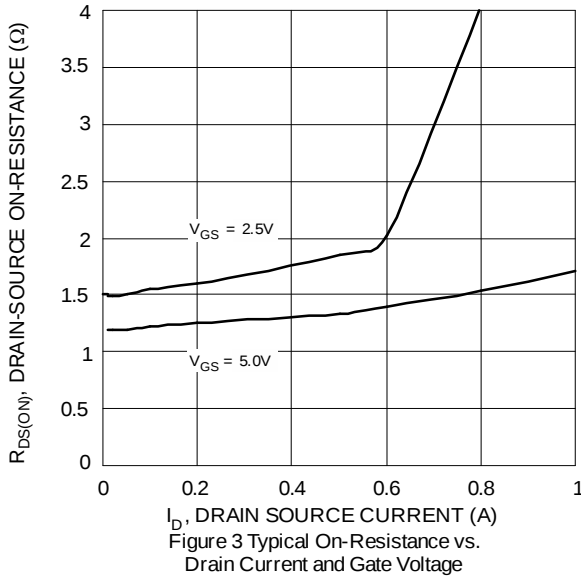
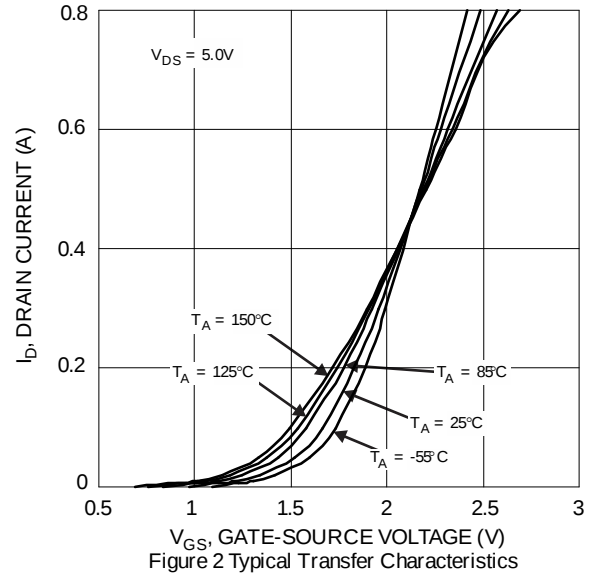
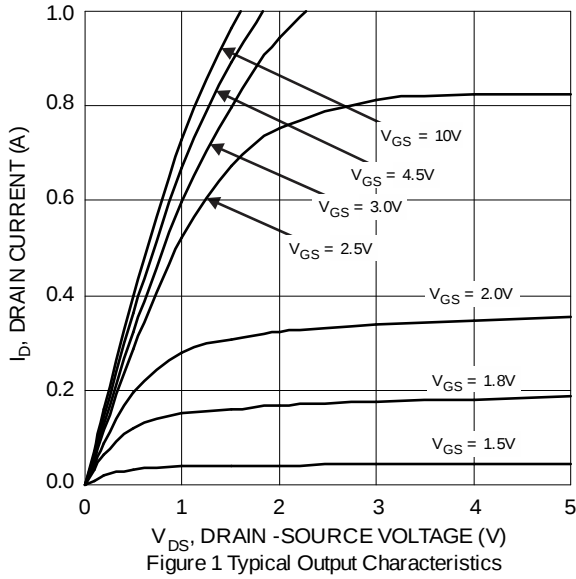
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   |              |  | Symbol                            | Value       | Unit |
|--------------------------------------------------|--------------|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 |              |  | P <sub>D</sub>                    | 320         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State |  | R <sub>θJA</sub>                  | 393         | °C/W |
|                                                  | t < 5s       |  | R <sub>θJA</sub>                  | 306         | °C/W |
| Total Power Dissipation (Note 6)                 |              |  | P <sub>D</sub>                    | 440         | mW   |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State |  | R <sub>θJA</sub>                  | 289         | °C/W |
|                                                  | t < 5s       |  | R <sub>θJA</sub>                  | 235         | °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> = 250µA                                                  |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | —   | —    | 1.0 | µA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                   |
| Gate-Source Leakage                     | I <sub>GSS</sub>    | —   | —    | ±10 | µA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                  |
| <b>ON CHARACTERISTICS (Note 7)</b>      |                     |     |      |     |      |                                                                                               |
| Gate Threshold Voltage                  | V <sub>GS(TH)</sub> | 0.5 | —    | 1.0 | V    | V <sub>DS</sub> = 10V, I <sub>D</sub> = 250µA                                                 |
| Static Drain-Source On-Resistance       | R <sub>DS(ON)</sub> | —   | 1.2  | 2.0 | Ω    | V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 0.05A                                                |
|                                         |                     |     | 1.6  | 2.5 |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 0.05A                                                |
|                                         |                     |     | 2.5  | 3.5 |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 0.05A                                                |
|                                         |                     |     | —    | —   |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 0.05A                                                |
| Forward Transconductance                | Y <sub>fs</sub>     | 200 | —    | —   | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.2A                                                  |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —   | 0.75 | 1.4 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA                                                  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b> |                     |     |      |     |      |                                                                                               |
| Input Capacitance                       | C <sub>iss</sub>    | —   | 28.5 | —   | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                     |
| Output Capacitance                      | C <sub>oss</sub>    | —   | 3.9  | —   | pF   |                                                                                               |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —   | 2.5  | —   | pF   |                                                                                               |
| Gate Resistance                         | R <sub>g</sub>      | —   | 65   | —   | Ω    | f = 1MHz, V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V                                          |
| Total Gate Charge                       | Q <sub>g</sub>      | —   | 0.4  | —   | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 250mA                      |
| Gate-Source Charge                      | Q <sub>gs</sub>     | —   | 0.1  | —   | nC   |                                                                                               |
| Gate-Drain Charge                       | Q <sub>gd</sub>     | —   | 0.1  | —   | nC   |                                                                                               |
| Turn-On Delay Time                      | t <sub>D(ON)</sub>  | —   | 2.1  | —   | ns   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V,<br>R <sub>G</sub> = 25Ω, I <sub>D</sub> = 200mA |
| Turn-On Rise Time                       | t <sub>R</sub>      | —   | 1.8  | —   | ns   |                                                                                               |
| Turn-Off Delay Time                     | t <sub>D(OFF)</sub> | —   | 14.4 | —   | ns   |                                                                                               |
| Turn-Off Fall Time                      | t <sub>F</sub>      | —   | 8.4  | —   | ns   |                                                                                               |

- Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  7. Short duration pulse test used to minimize self-heating effect.
  8. Guaranteed by design. Not subject to product testing.



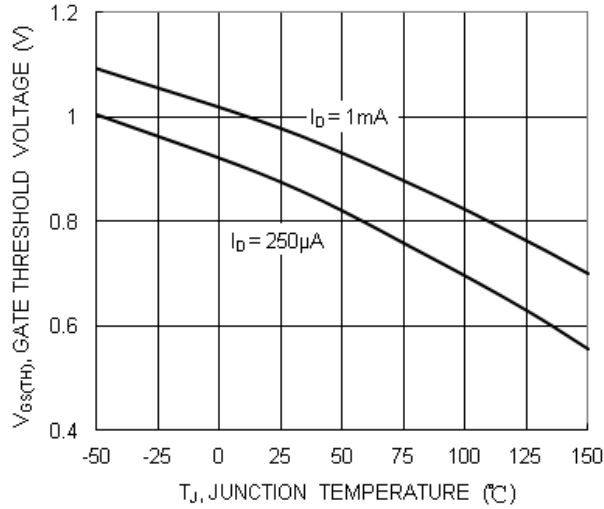


Figure 7. Gate Threshold Variation vs. Junction Temperature

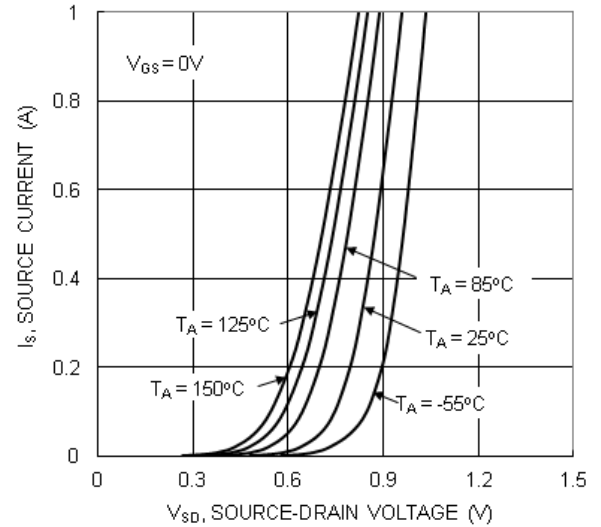


Figure 8. Diode Forward Voltage vs. Current

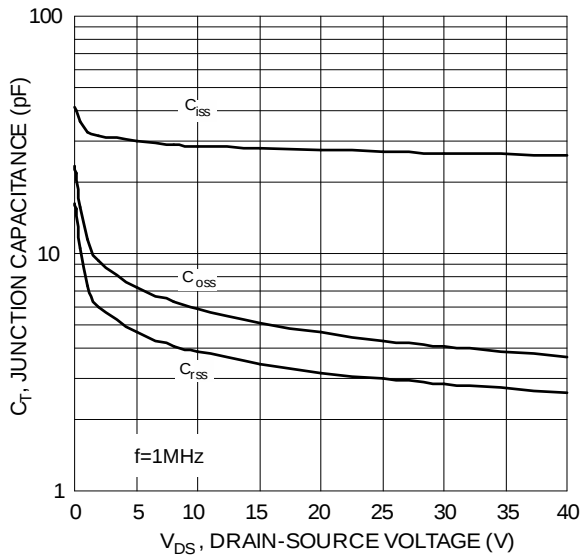


Figure 9 Typical Junction Capacitance

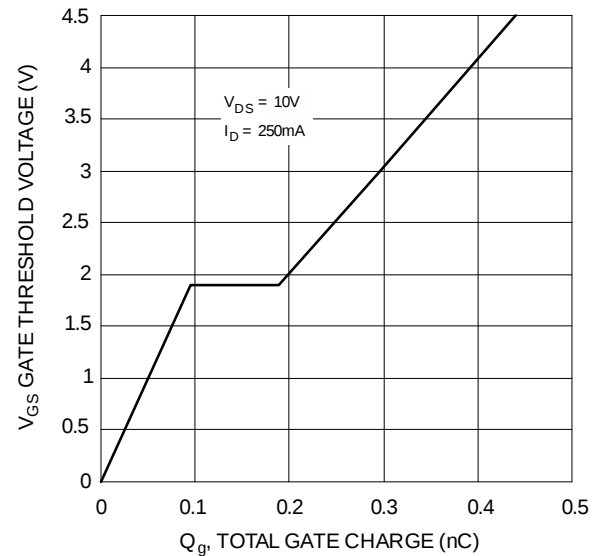


Figure 10 Gate Charge

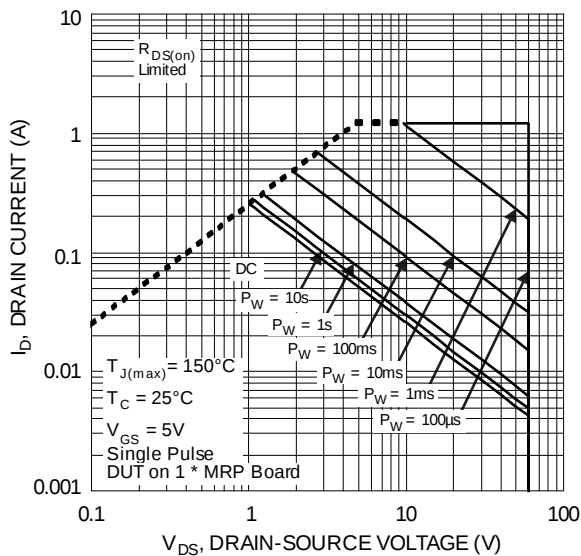
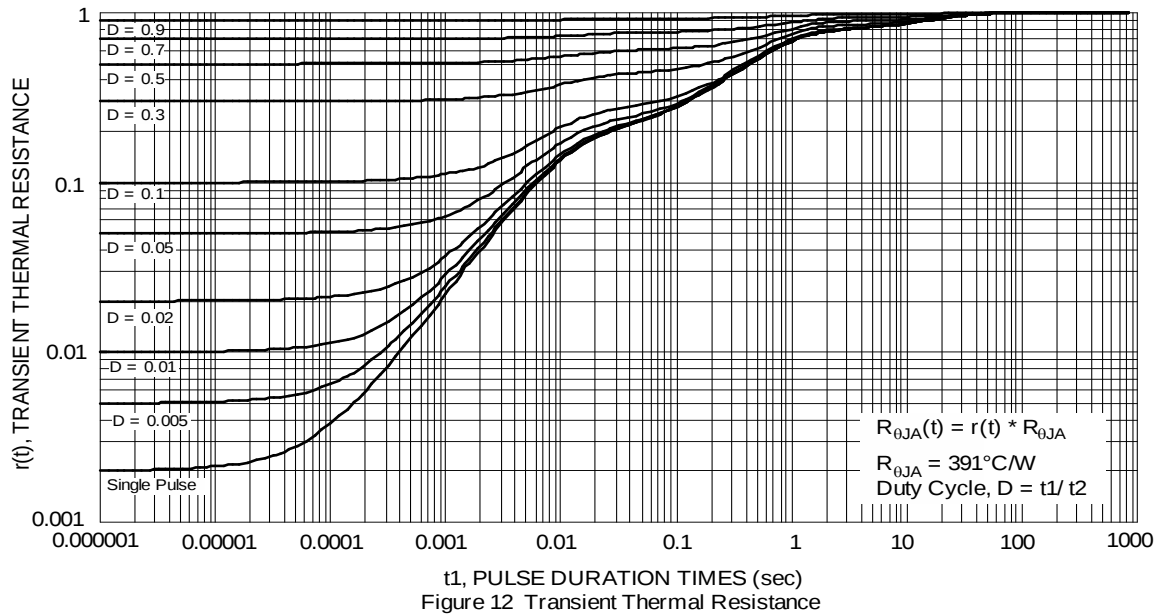
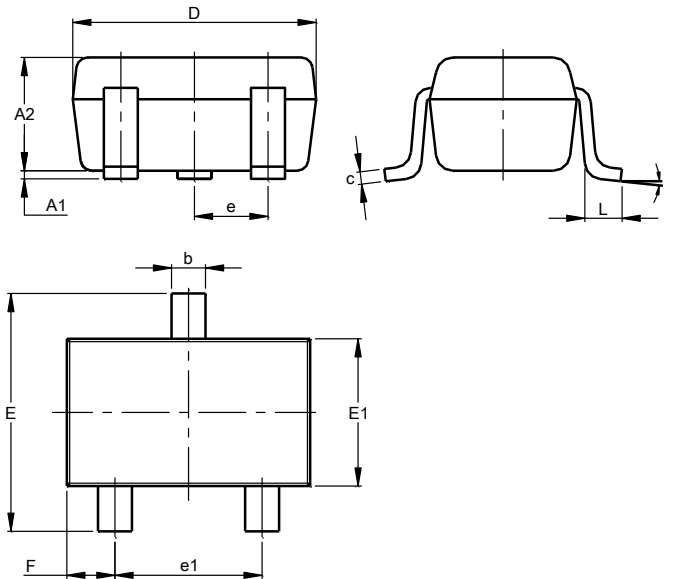


Figure 11 SOA, Safe Operation Area



## Package Outline Dimensions

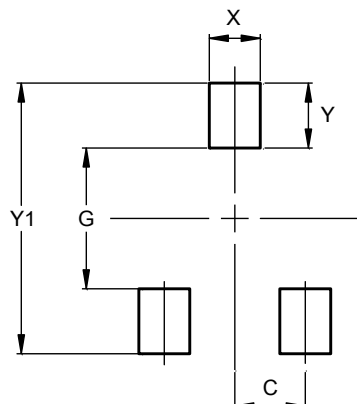
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SOT323               |           |       |       |
|----------------------|-----------|-------|-------|
| Dim                  | Min       | Max   | Typ   |
| A1                   | 0.00      | 0.10  | 0.05  |
| A2                   | 0.90      | 1.00  | 0.95  |
| b                    | 0.25      | 0.40  | 0.30  |
| c                    | 0.10      | 0.18  | 0.11  |
| D                    | 1.80      | 2.20  | 2.15  |
| E                    | 2.00      | 2.20  | 2.10  |
| E1                   | 1.15      | 1.35  | 1.30  |
| e                    | 0.650 BSC |       |       |
| e1                   | 1.20      | 1.40  | 1.30  |
| F                    | 0.375     | 0.475 | 0.425 |
| L                    | 0.25      | 0.40  | 0.30  |
| 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) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.470         |
| Y          | 0.600         |
| Y1         | 2.500         |

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