

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max       | I <sub>D</sub> Max<br>T <sub>A</sub> = +25°C |
|-------------------|-------------------------------|--|
| 20V               | 38mΩ @ V <sub>GS</sub> = 4.5V | 4.8A   |
|                   | 45mΩ @ V <sub>GS</sub> = 2.5V | 4.5A   |

## Description

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- General Purpose Interfacing Switch
- Power Management Functions

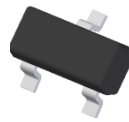
## Features

- 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)**

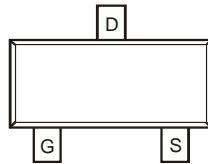
## Mechanical Data

- 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 (e3)
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)

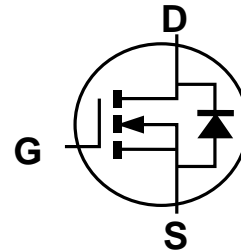
SOT23



Top View



Top View



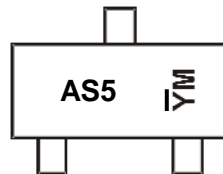
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Case  | Packaging          |
|-------------|-------|--------------------|
| DMN2055U-7  | SOT23 | 3,000/Tape & Reel  |
| DMN2055U-13 | SOT23 | 10,000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



AS5 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Last Digit of Year (ex: 8 = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|
| Code | 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> | 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>   | 4.8   | A    |
|  |              | T <sub>A</sub> = +85°C |                  | 3.8   |      |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) |              |                        | I <sub>DM</sub>  | 25    | 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>                    | 0.8         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R <sub>θJA</sub>                  | 162         | °C/W |
| Total Power Dissipation (Note 6)                 |              | P <sub>D</sub>                    | 1.2         | W    |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R <sub>θJA</sub>                  | 113         | °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</b> (Note 7)                    |                     |     |      |      |      |  |
| 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> = 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</b> (Note 7)                     |                     |     |      |      |      |  |
| 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> = 250µA                                 |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | —   | 28   | 38   | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.6A  |
|  |                     |     | 32   | 45   |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.1A  |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | —   | 0.7  | 1.0  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A  |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 8)                |                     |     |      |      |      |  |
| Input Capacitance                                      | C <sub>ISS</sub>    | —   | 400  | —    | pF   | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                 |
| Output Capacitance                                     | C <sub>OSS</sub>    | —   | 55   | —    | pF   |  |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>    | —   | 37   | —    | pF   |  |
| Gate Resistance  | R <sub>G</sub>      | —   | 3.7  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                       |
| Total Gate Charge                                      | Q <sub>G</sub>      | —   | 4.3  | —    | nC   | V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V,<br>I <sub>D</sub> = 6A                      |
| Gate-Source Charge                                     | Q <sub>GS</sub>     | —   | 0.3  | —    | nC   |  |
| Gate-Drain Charge                                      | Q <sub>GD</sub>     | —   | 4.8  | —    | nC   |  |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —   | 2.8  | —    | ns   | V <sub>DD</sub> = 10V, V <sub>GS</sub> = 5V,<br>R <sub>L</sub> = 1.7Ω, R <sub>G</sub> = 6Ω |
| Turn-On Rise Time                                      | t <sub>R</sub>      | —   | 2.7  | —    | ns   |  |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —   | 15.4 | —    | ns   |  |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | —   | 4.4  | —    | ns   |  |
| Reverse Recovery Time                                  | t <sub>RR</sub>     | —   | 6.8  | —    | ns   | I <sub>F</sub> = 1.0A, di/dt = 100A/µs   |
| Reverse Recovery Charge                                | Q <sub>RR</sub>     | —   | 1.2  | —    | nC   | I <sub>F</sub> = 1.0A, di/dt = 100A/µs   |

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

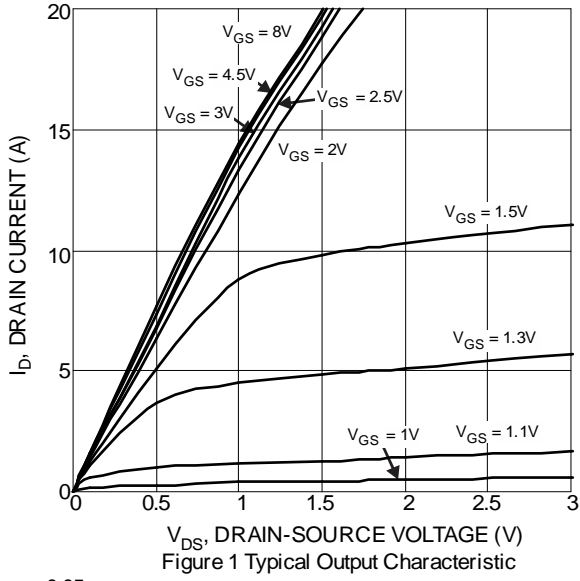


Figure 1 Typical Output Characteristic

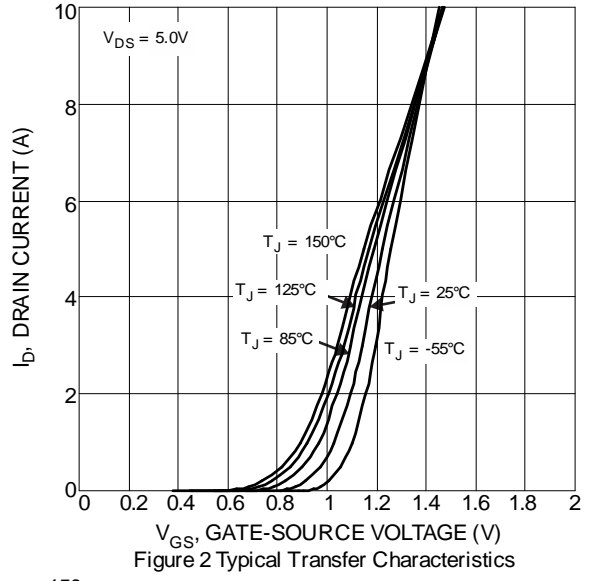


Figure 2 Typical Transfer Characteristics

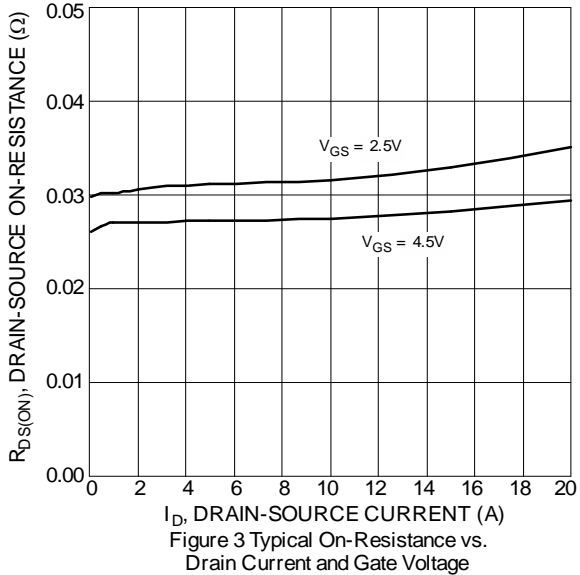


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

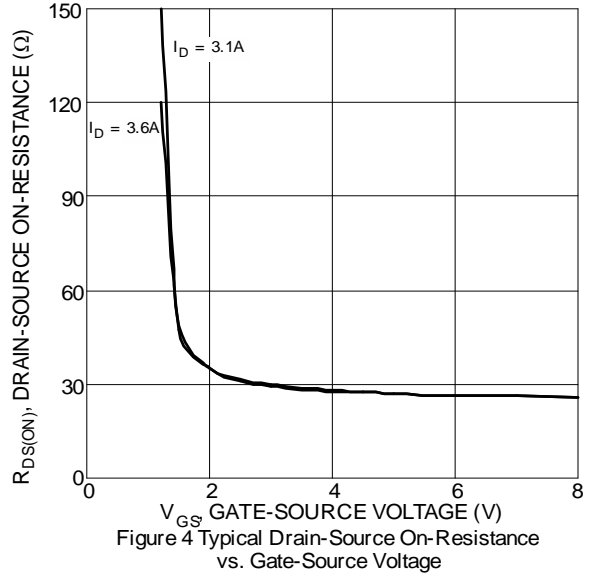


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

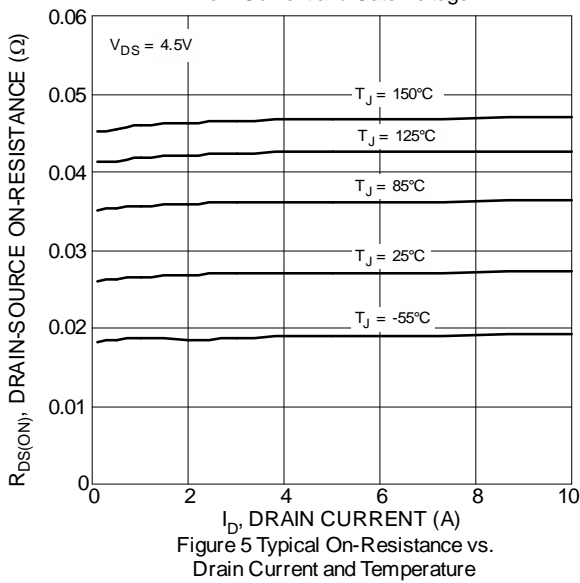


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

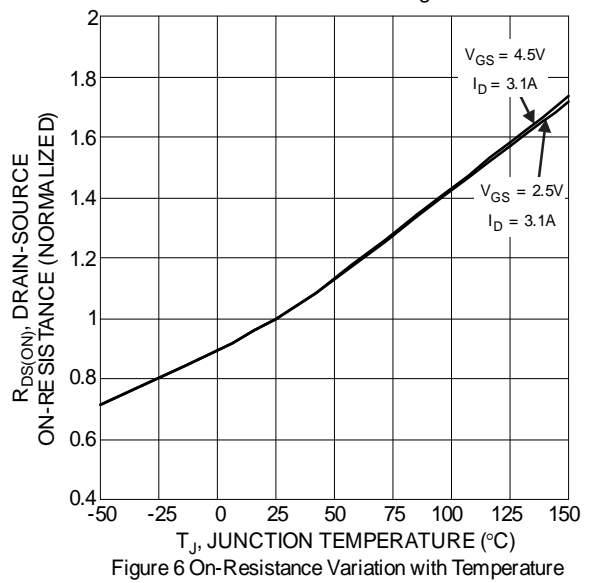


Figure 6 On-Resistance Variation with Temperature

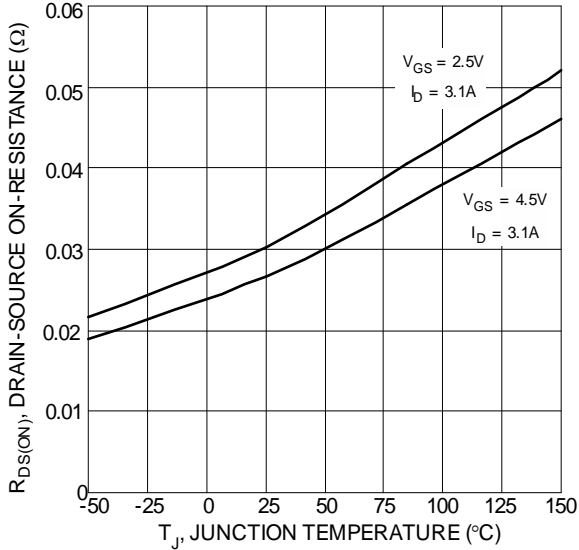


Figure 7 On-Resistance Variation with Temperature

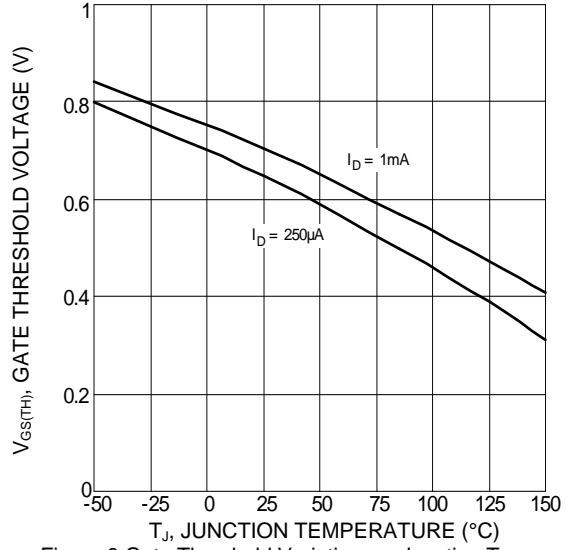


Figure 8 Gate Threshold Variation vs. Junction Temperature

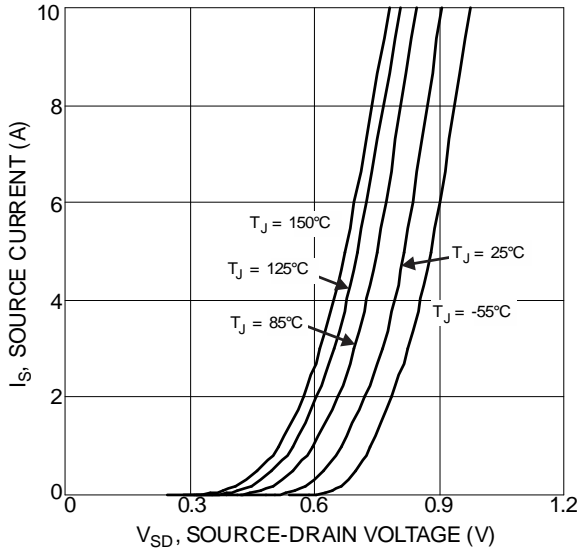


Figure 9 Diode Forward Voltage vs. Current

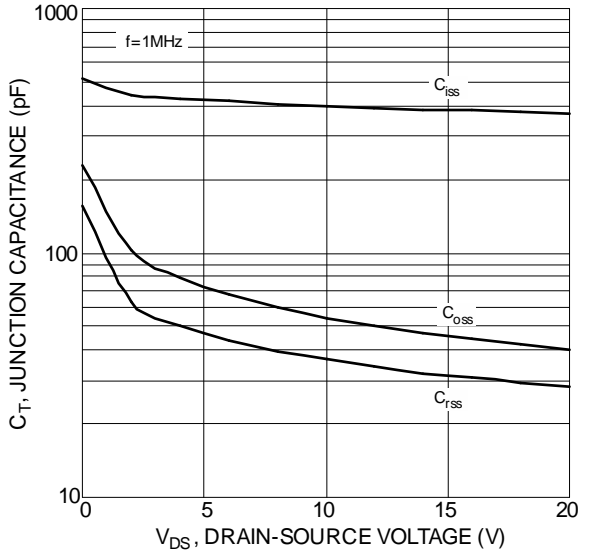


Figure 10 Typical Junction Capacitance

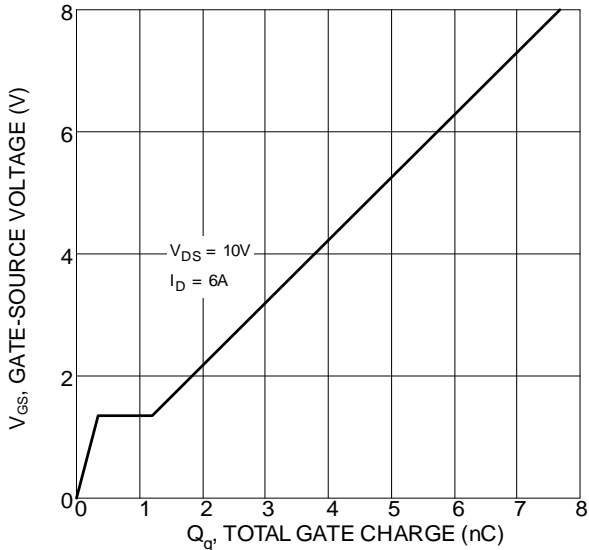


Figure 11 Gate Charge

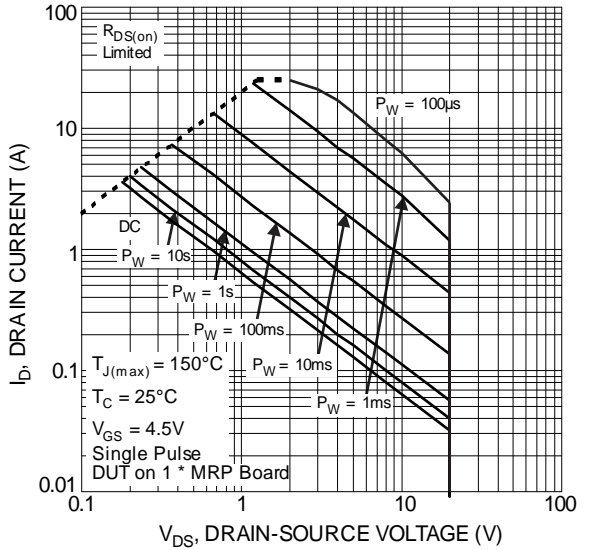


Figure 12 SOA, Safe Operation Area

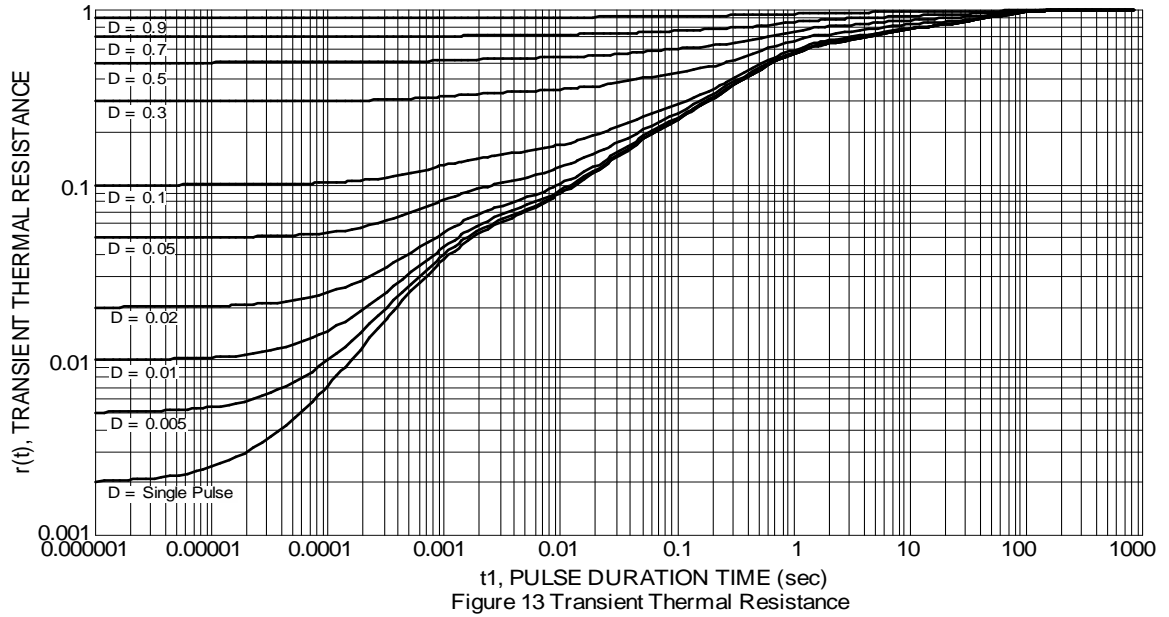
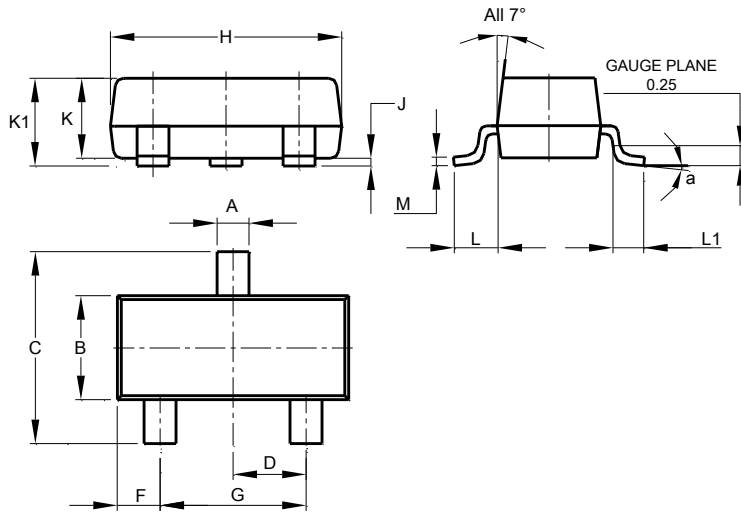


Figure 13 Transient Thermal Resistance

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**

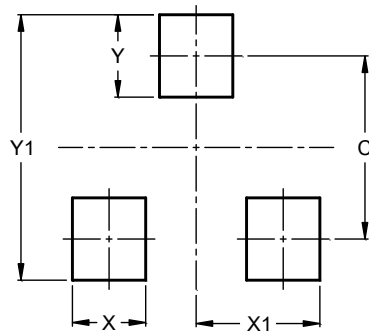


| SOT23                       |       |       |       |
|-----------------------------|-------|-------|-------|
| Dim                         | Min   | Max   | Typ   |
| A                           | 0.37  | 0.51  | 0.40  |
| B                           | 1.20  | 1.40  | 1.30  |
| C                           | 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                           | 0°    | 8°    | --    |
| <b>All Dimensions in mm</b> |       |       |       |

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.0           |
| X          | 0.8           |
| X1         | 1.35          |
| Y          | 0.9           |
| Y1         | 2.9           |

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