

Product Summary

| BV _{DSS} | R _{DS(on)} | I _D T _A = +25°C |
|-------------------|--------------------------------|--|
| 20V | 240mΩ @ V _{GS} = 4.5V | 1.2A |
| | 300mΩ @ V _{GS} = 2.5V | 1.04A |

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(on)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- DC-DC Converters
- Load Switch
- Power Management Functions

Mechanical Data

- Case: SOT523
- 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 Lead-Frame. Solderable per MIL-STD-202, Method 208 (e3)
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

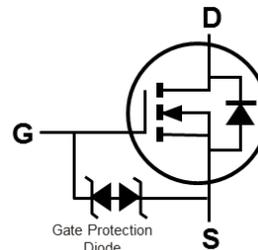


ESD PROTECTED

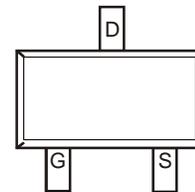
SOT523



Top View



Equivalent Circuit



Top View

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---------------|--------|-------------------|
| DMN2310UTQ-7 | SOT523 | 3000/Tape & Reel |
| DMN2310UTQ-13 | SOT523 | 10000/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



BE7 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | H | I | J | K | L | M | N | O | P | R | S | T |

| 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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|---------------------------|-----------|---------|------|
| Drain-Source Voltage | | | V_{DSS} | 20 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 8 | V |
| Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$ | Steady State | $T_A = +25^\circ\text{C}$ | I_D | 1.2 | A |
| | | $T_A = +75^\circ\text{C}$ | | 1.0 | |
| Maximum Continuous Body Diode Forward Current (Note 6) | | | I_S | 0.6 | A |
| Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%) | | | I_{DM} | 4.2 | A |

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|--|-----------------|------------|--------------------|
| Total Power Dissipation (Note 5) | | | P_D | 0.29 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | | $R_{\theta JA}$ | 435 | $^\circ\text{C/W}$ |
| Total Power Dissipation (Note 6) | | | P_D | 0.49 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | | $R_{\theta JA}$ | 253 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|------|------|------|---------------|---|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 20 | — | — | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1.0 | μA | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | 10 | μA | $V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.45 | — | 0.95 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 174 | 240 | m Ω | $V_{GS} = 4.5\text{V}, I_D = 300\text{mA}$ |
| | | — | 211 | 300 | | $V_{GS} = 2.5\text{V}, I_D = 250\text{mA}$ |
| | | — | 263 | 400 | | $V_{GS} = 1.8\text{V}, I_D = 100\text{mA}$ |
| Diode Forward Voltage | V_{SD} | — | 0.8 | 1.2 | V | $V_{GS} = 0\text{V}, I_S = 1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | 38 | — | pF | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 10 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 6 | — | pF | |
| Gate Resistance | R_g | — | 1.42 | — | k Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Total Gate Charge | Q_g | — | 0.7 | — | nC | $V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V}, I_D = 1\text{A}$ |
| Gate-Source Charge | Q_{gs} | — | 0.1 | — | nC | |
| Gate-Drain Charge | Q_{gd} | — | 0.1 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 8 | — | ns | $V_{DD} = 10\text{V}, V_{GS} = 5\text{V}, R_L = 1.7\Omega, R_G = 6\Omega$ |
| Turn-On Rise Time | t_R | — | 138 | — | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 154 | — | ns | |
| Turn-Off Fall Time | t_F | — | 180 | — | ns | |

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

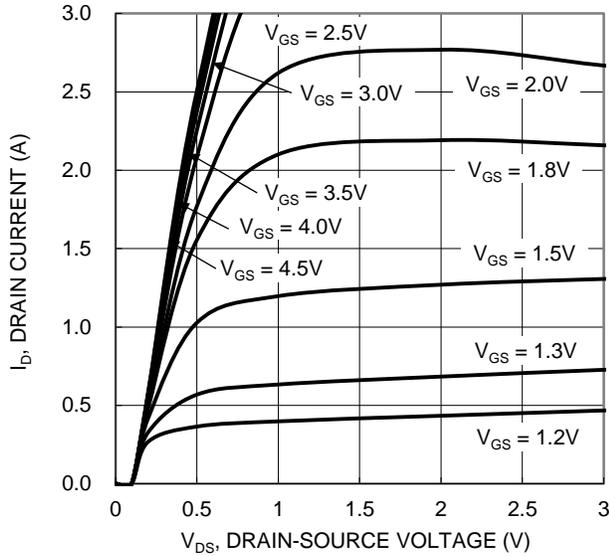


Figure 1. Typical Output Characteristic

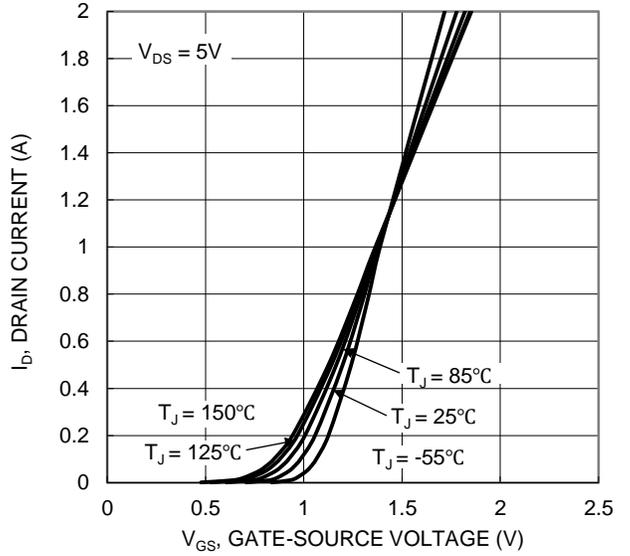


Figure 2. Typical Transfer Characteristic

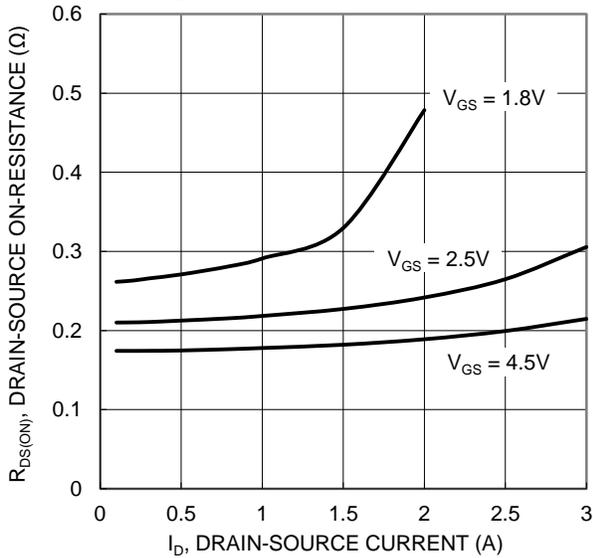


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

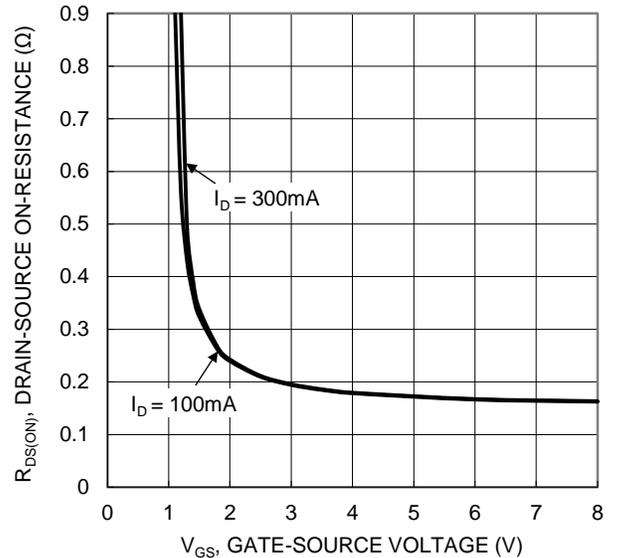


Figure 4. Typical Transfer Characteristic

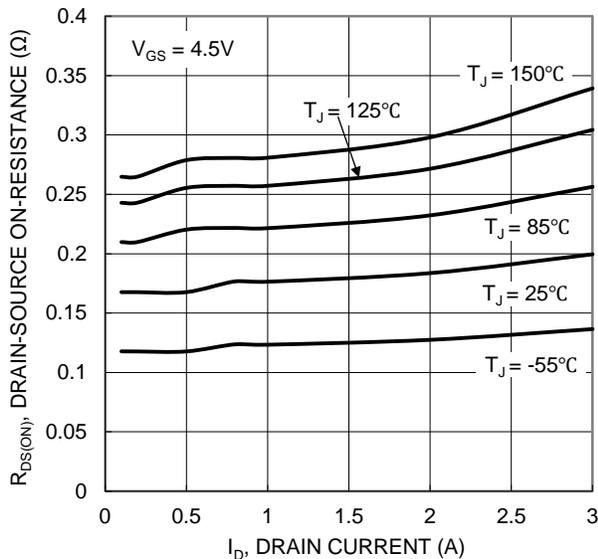


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

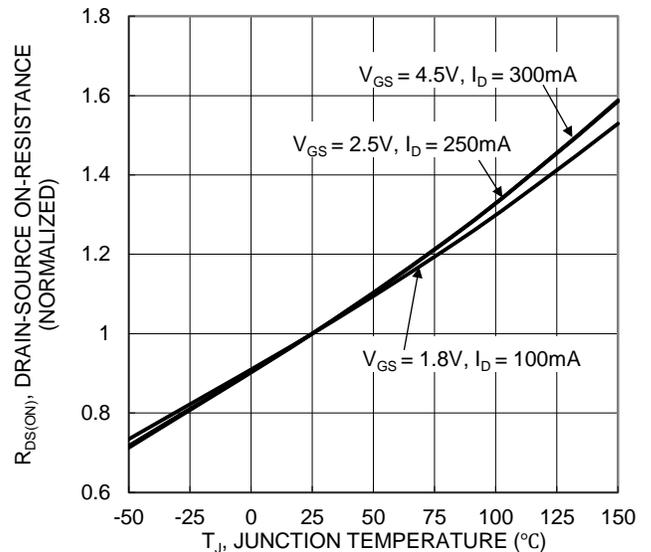


Figure 6. On-Resistance Variation with Junction Temperature

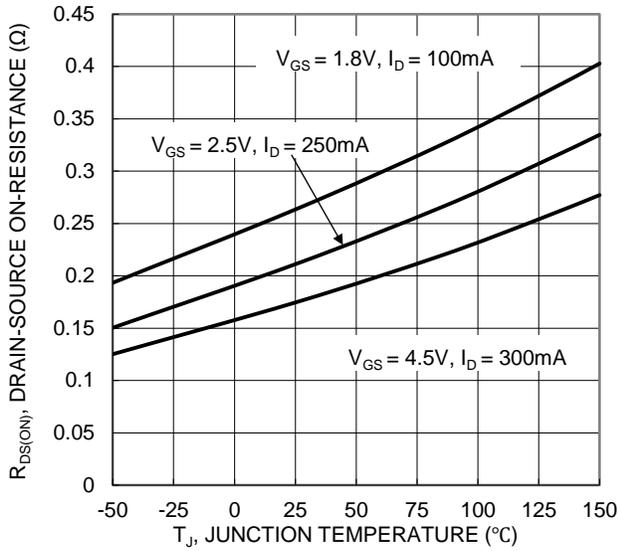


Figure 7. On-Resistance Variation with Junction Temperature

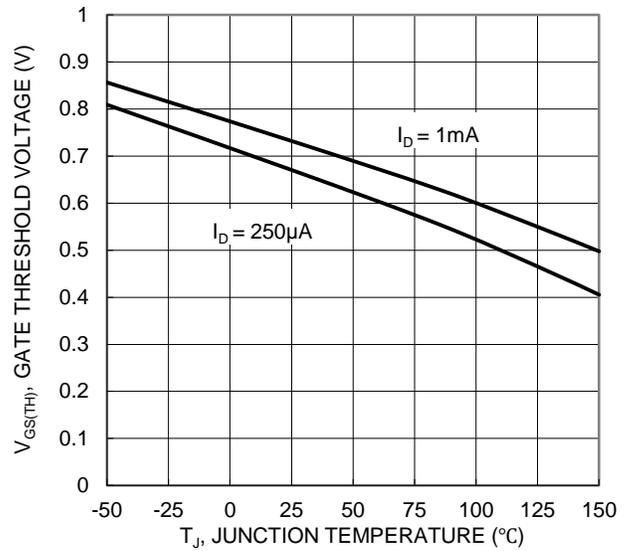


Figure 8. Gate Threshold Variation vs. Junction Temperature

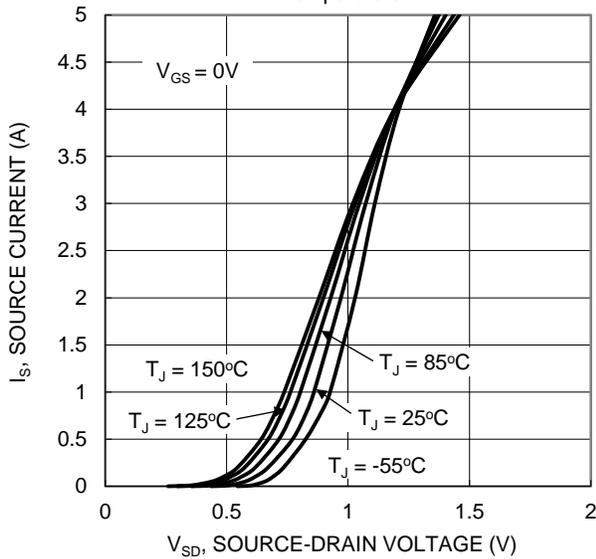


Figure 9. Diode Forward Voltage vs. Current

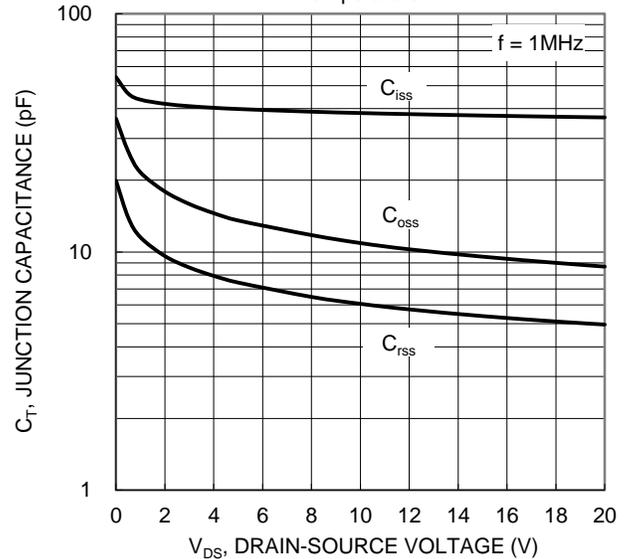


Figure 10. Typical Junction Capacitance

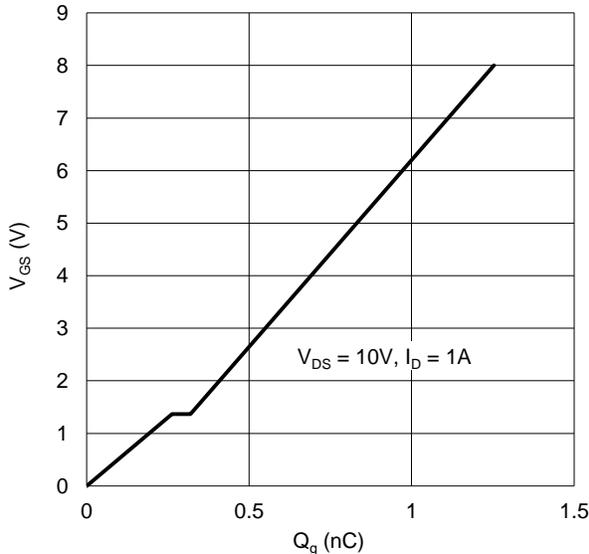


Figure 11. Gate Charge

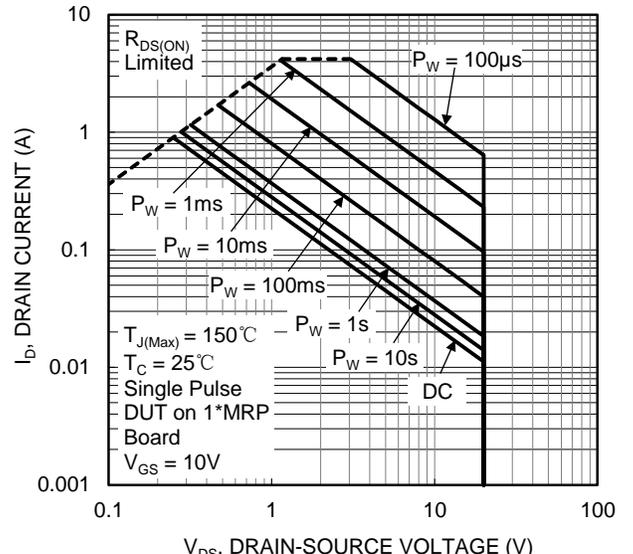


Figure 12. SOA, Safe Operation Area

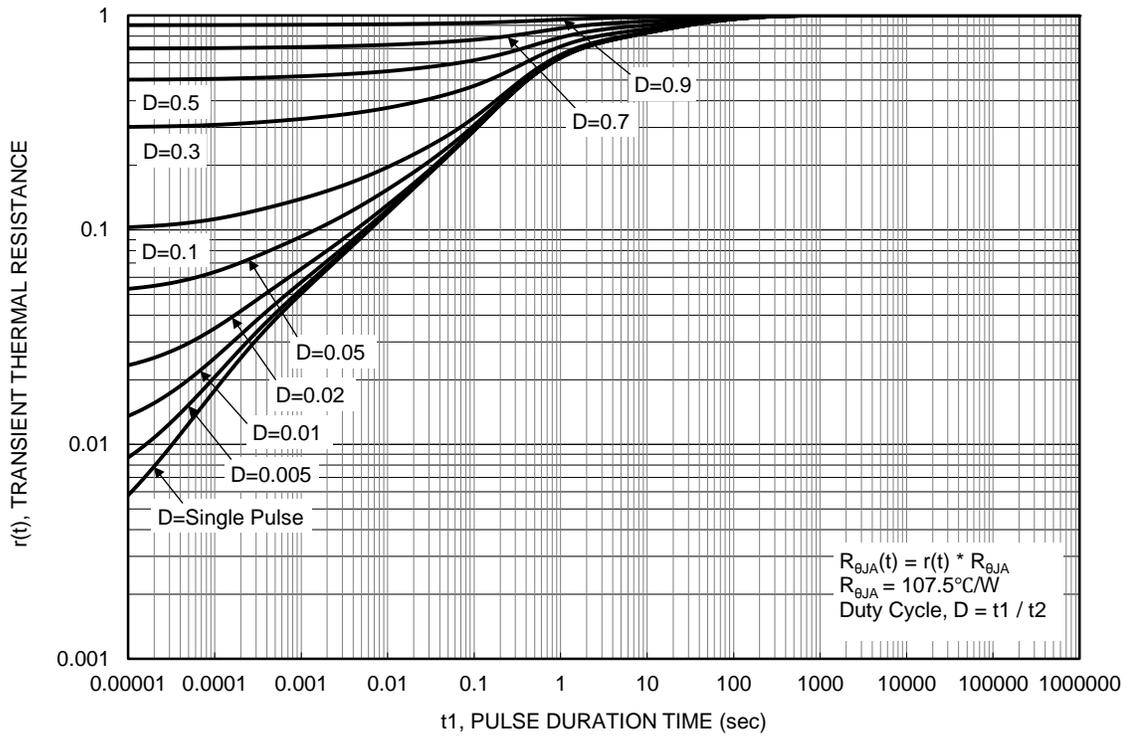
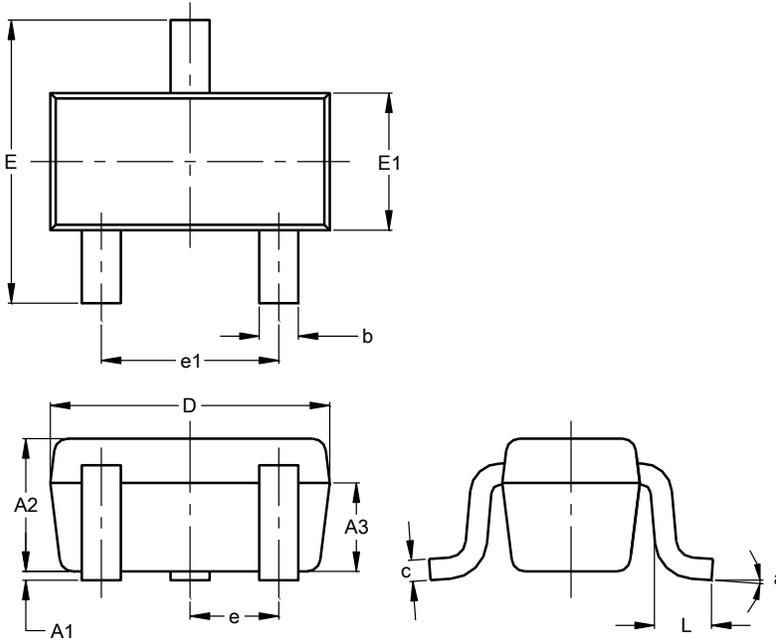


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

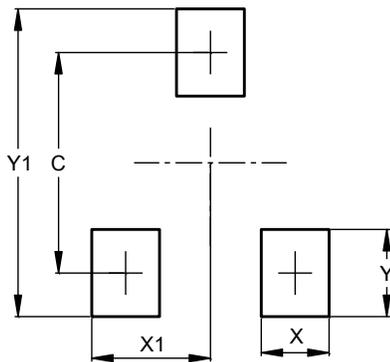
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT523 | | | |
|----------------------|----------|------|------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.60 | 0.80 | 0.75 |
| A3 | 0.45 | 0.65 | 0.50 |
| b | 0.15 | 0.30 | 0.22 |
| c | 0.10 | 0.20 | 0.12 |
| D | 1.50 | 1.70 | 1.60 |
| E | 1.45 | 1.75 | 1.60 |
| E1 | 0.75 | 0.85 | 0.80 |
| e | 0.50 BSC | | |
| e1 | 0.90 | 1.10 | 1.00 |
| L | 0.20 | 0.40 | 0.33 |
| a | 0° | -- | 8° |
| All Dimensions in mm | | | |

Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.29 |
| X | 0.40 |
| X1 | 0.70 |
| Y | 0.51 |
| Y1 | 1.80 |

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