

Product Summary

| BV _{DSS} | R _{DS(ON)} max | I _D max T _A = +25°C |
|-------------------|---------------------------------|--|
| -20V | 90mΩ @ V _{GS} = -4.5V | -3.1A |
| | 250mΩ @ V _{GS} = -2.5V | -1.8A |

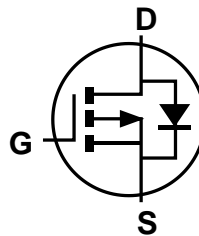
Description and Applications

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.

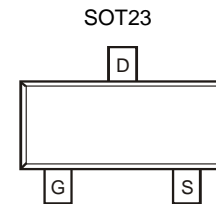
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors



Top View



Internal Schematic



Top View

Features and Benefits

- 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**

Mechanical Data

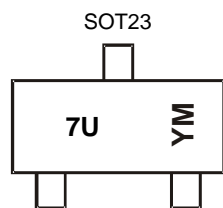
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-------------|-------|--------------------|
| DMP2170U-7 | SOT23 | 3,000/Tape & Reel |
| DMP2170U-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 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



7U = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: D = 2016)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|------|------|------|------|------|------|------|------|------|
| Code | D | E | F | G | H | I | J | K |

| 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 | Units |
|---|-----------|----------|-------|
| Drain-Source Voltage | V_{DSS} | -20 | V |
| Gate-Source Voltage | V_{GSS} | ± 12 | V |
| Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$ | I_D | -3.1 | A |
| Steady State $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | | -2.5 | |
| Maximum Continuous Body Diode Forward Current (Note 6) | I_S | -1.25 | A |
| Pulsed Drain Current (10 μs pulse, duty cycle = 1%) | I_{DM} | -13 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------------|
| Total Power Dissipation (Note 5) | P_D | 0.78 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 163 | $^\circ\text{C/W}$ |
| Steady State | | 1.28 | |
| Total Power Dissipation (Note 6) | P_D | 1.28 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 99 | $^\circ\text{C/W}$ |
| Steady State | | | |
| 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 $T_J = +25^\circ\text{C}$ | I_{DSS} | - | - | -1.0 | μA | $V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | - | - | ± 100 | nA | $V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -0.4 | -1.01 | -1.25 | V | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | - | 62 | 90 | m Ω | $V_{GS} = -4.5\text{V}, I_D = -3.5\text{A}$ |
| | | - | 92 | 180 | | $V_{GS} = -2.7\text{V}, I_D = -3.0\text{A}$ |
| | | - | 101 | 250 | | $V_{GS} = -2.5\text{V}, I_D = -2.6\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | -0.8 | -1.1 | V | $V_{GS} = 0\text{V}, I_S = -1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{ISS} | - | 303 | - | pF | $V_{DS} = -10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{OSS} | - | 46 | - | pF | |
| Reverse Transfer Capacitance | C_{RSS} | - | 37 | - | pF | |
| Gate Resistance | R_g | - | 16 | - | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge ($V_{GS} = -4.5\text{V}$) | Q_g | - | 3.6 | - | nC | $V_{DS} = -10\text{V}, I_D = -1.5\text{A}$ |
| Total Gate Charge ($V_{GS} = -10\text{V}$) | Q_g | - | 7.8 | - | nC | |
| Gate-Source Charge | Q_{GS} | - | 0.6 | - | nC | |
| Gate-Drain Charge | Q_{gd} | - | 1.1 | - | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | - | 5.4 | - | ns | $V_{DD} = -10\text{V}, V_{GS} = -4.5\text{V}, I_D = -3.5\text{A}, R_G = 6\Omega$ |
| Turn-On Rise Time | t_R | - | 18.3 | - | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | - | 16.2 | - | ns | |
| Turn-Off Fall Time | t_F | - | 13.6 | - | ns | |
| Body Diode Reverse Recovery Time | t_{RR} | - | 5.5 | - | ns | $I_S = -2.0\text{A}, di/dt = -100\text{A}/\mu\text{s}$ |
| Body Diode Reverse Recovery Charge | Q_{RR} | - | 1.23 | - | nC | $I_S = -2.0\text{A}, di/dt = -100\text{A}/\mu\text{s}$ |

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

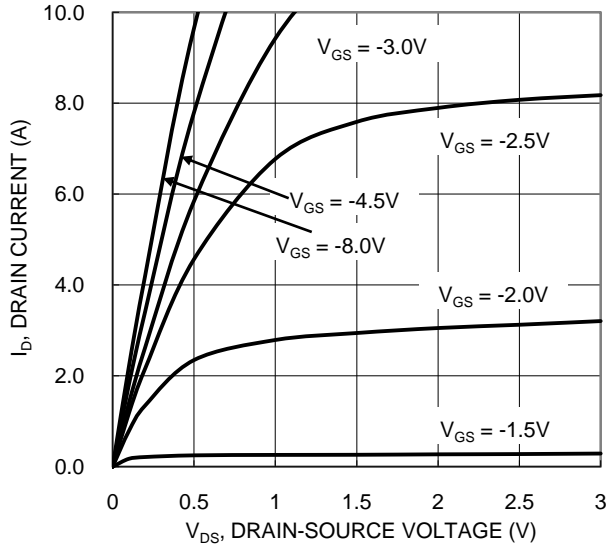


Figure 1. Typical Output Characteristic

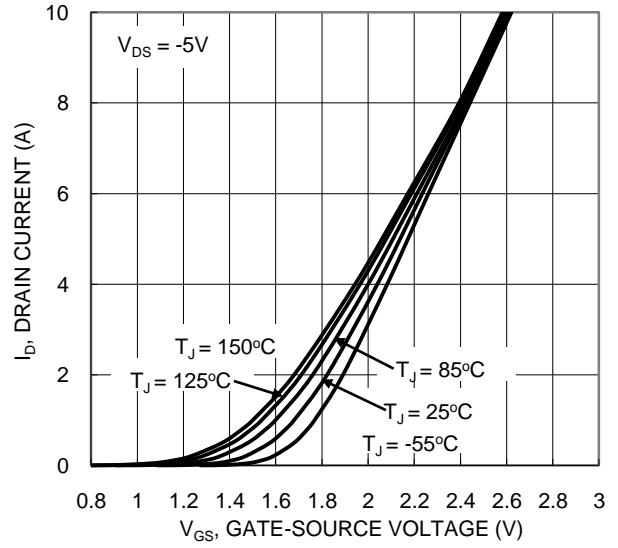


Figure 2. Typical Transfer Characteristic

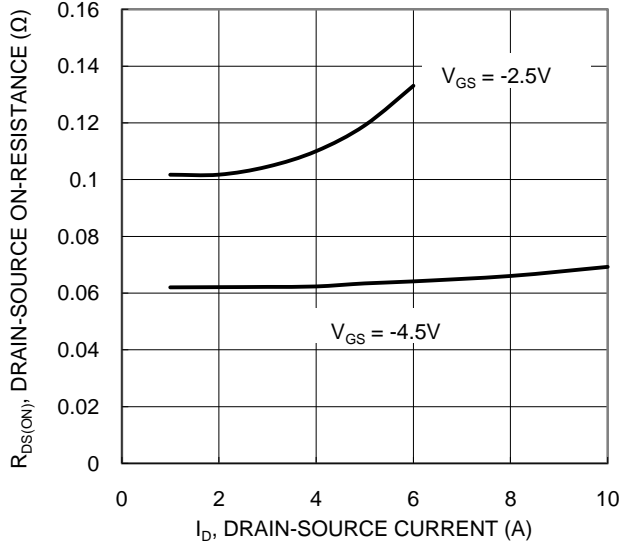


Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

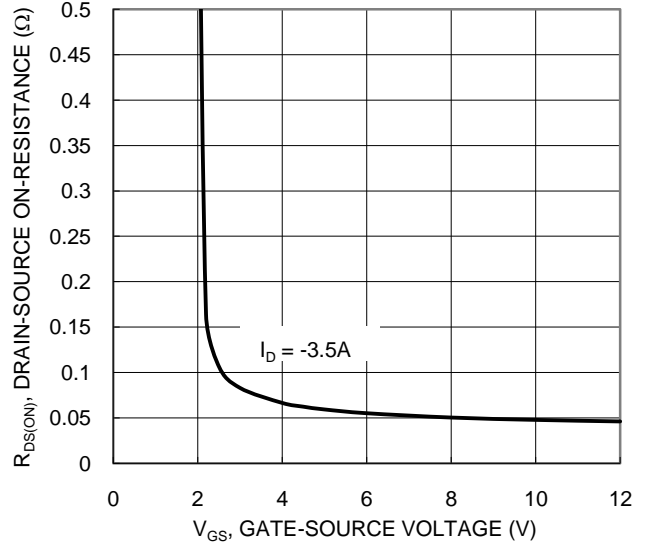


Figure 4. Typical Transfer Characteristic

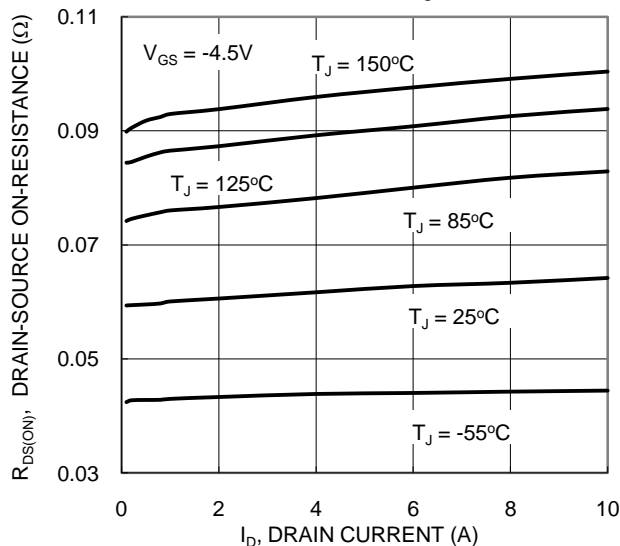


Figure 5. Typical On-Resistance vs Drain Current and Junction Temperature

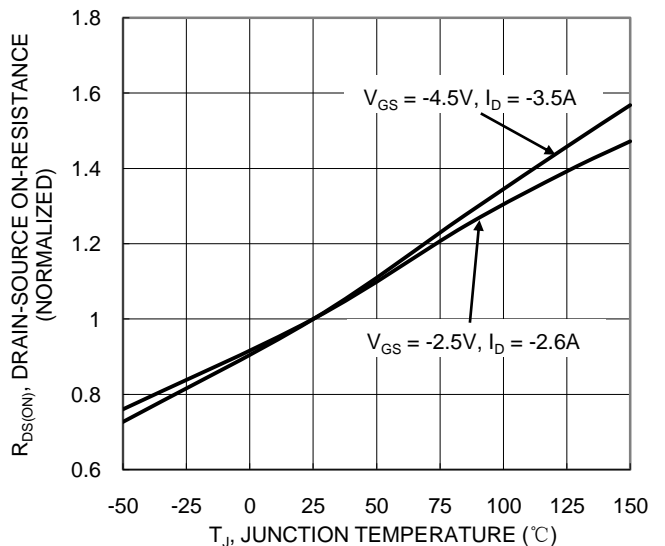
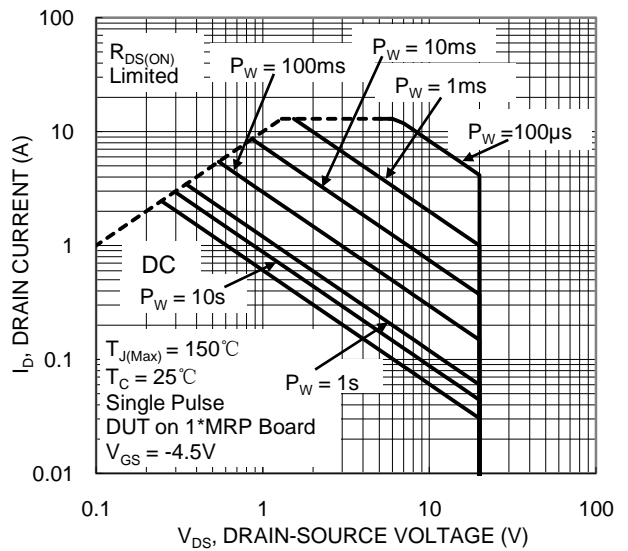
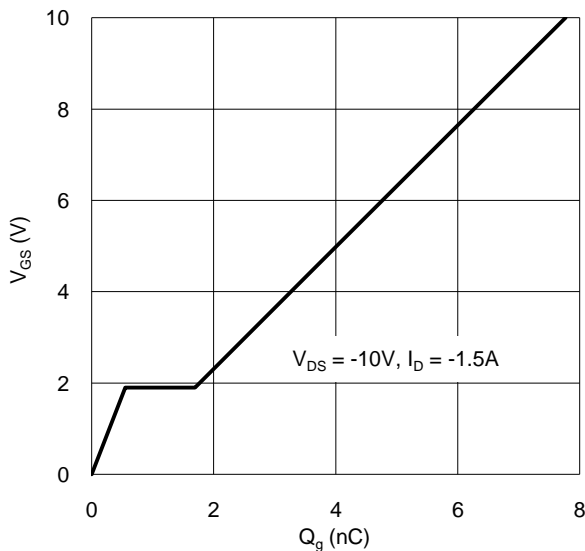
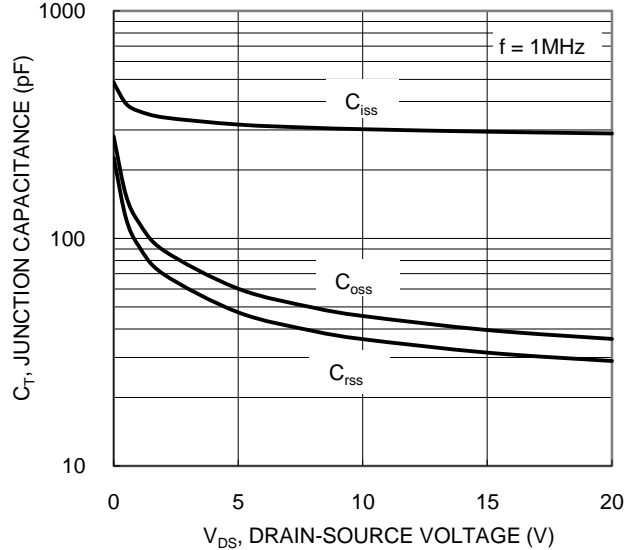
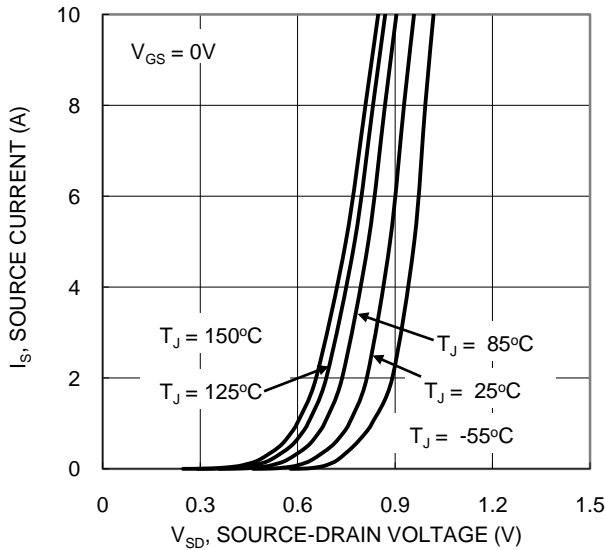
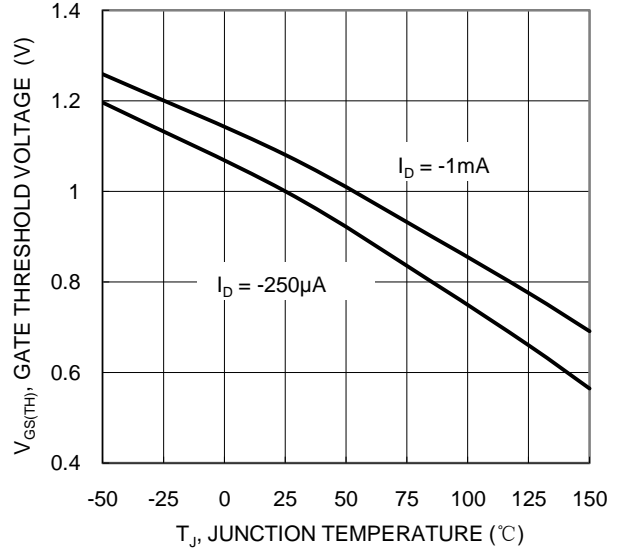
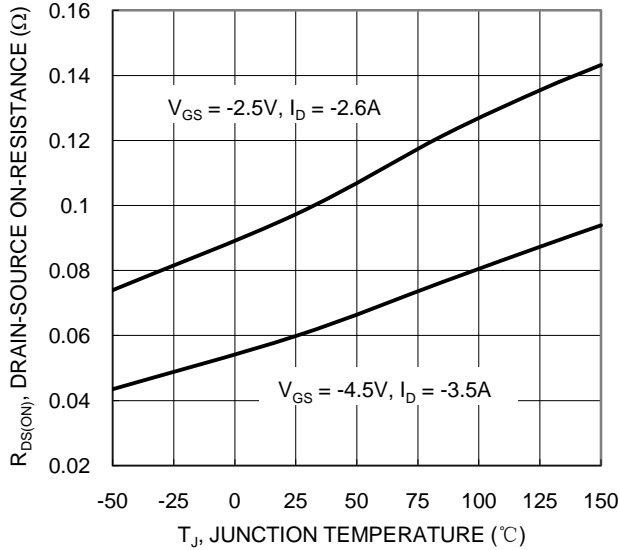


Figure 6. On-Resistance Variation with Junction Temperature



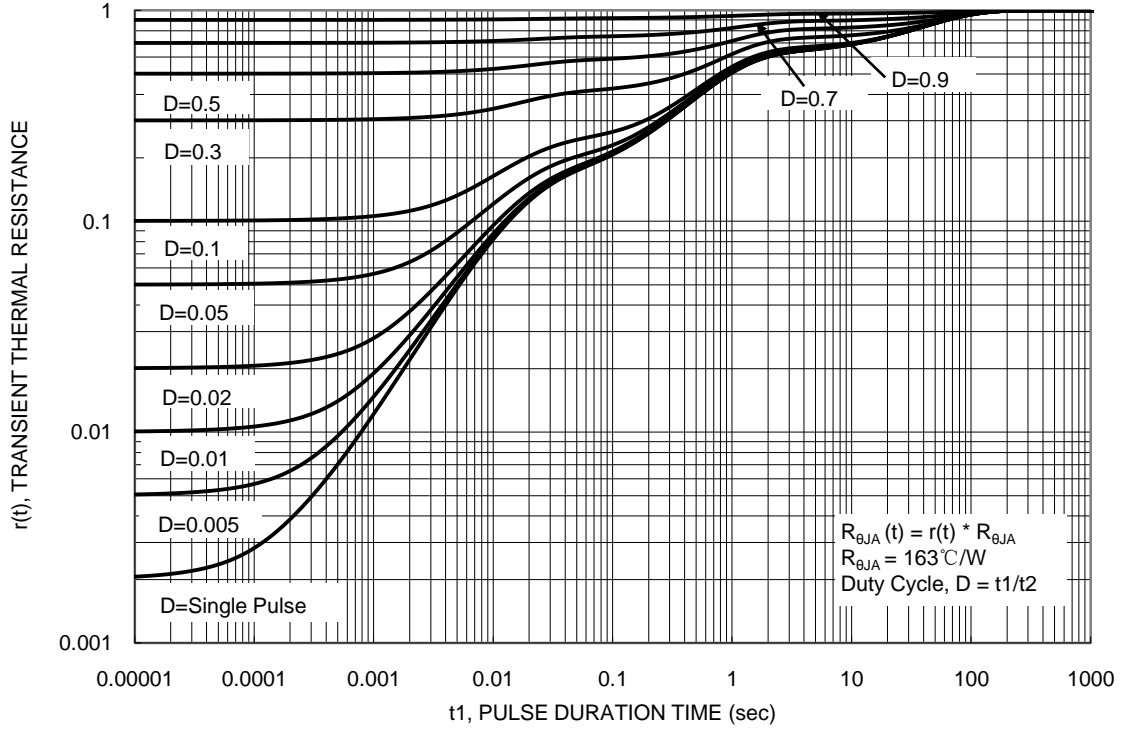
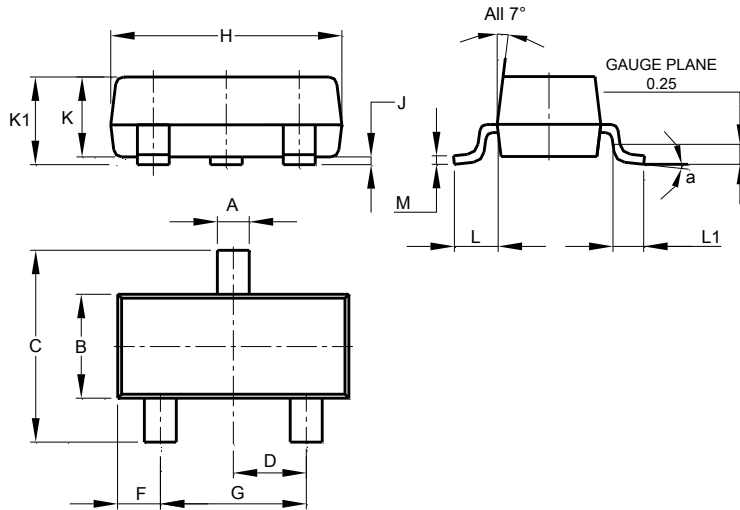


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SOT23

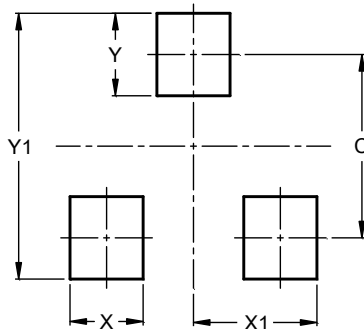


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 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° | -- |
| All Dimensions in mm | | | |

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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