

Product Summary

| BV_{DSS} | $R_{DS(ON)}$ Max | I_D Max $T_A = +25^\circ\text{C}$ |
|------------|---|--|
| -60V | 155m Ω @ $V_{GS} = -10\text{V}$ | -2.4A |
| | 240m Ω @ $V_{GS} = -4.5\text{V}$ | -1.9A |

Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 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**
- **PPAP Capable (Note 4)**

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

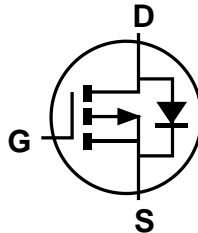
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Load Switch

Mechanical Data

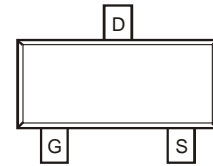
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)



Top View



Internal Schematic



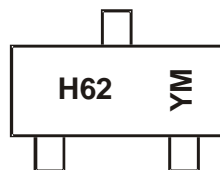
Top View

Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---------------|-------|--------------------|
| DMPH6250SQ-7 | SOT23 | 3000/Tape & Reel |
| DMPH6250SQ-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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



H62 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: F = 2018)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|------|------|------|------|------|------|------|------|------|
| Code | E | F | G | H | I | J | K | L |

| 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} | -60 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Continuous Drain Current (Note 7) $V_{GS} = -10\text{V}$ | I_D | Steady State $T_A = +25^\circ\text{C}$ $T_A = +100^\circ\text{C}$ | A |
| | | -2.4 -1.5 | |
| Pulsed Drain Current (380 μs Pulse, Duty Cycle = 1%) | I_{DM} | -13 | A |
| Maximum Continuous Body Diode Forward Current (Note 7) | I_S | -1.6 | A |
| Pulsed Body Diode Forward Current (380 μs Pulse, Duty Cycle = 1%) | I_{SM} | -13 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 6) | P_D | 0.92 | W |
| Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 6) | $R_{\theta JA}$ | 165 | $^\circ\text{C/W}$ |
| Power Dissipation (Note 7) | P_D | 1.62 | W |
| Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 7) | $R_{\theta JA}$ | 93.1 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|------|------|-----------|---------------|--|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | -60 | — | — | 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 | $V_{DS} = -60\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -1.0 | -1.9 | -3.0 | V | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 112 | 155 | m Ω | $V_{GS} = -10\text{V}, I_D = -2\text{A}$ |
| | | — | 149 | 240 | | $V_{GS} = -4.5\text{V}, I_D = -2\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | -0.8 | -1.2 | V | $V_{GS} = 0\text{V}, I_S = -1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C_{iss} | — | 512 | — | pF | $V_{DS} = -30\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 31.3 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 23.2 | — | pF | |
| Gate Resistance | R_g | — | 11.9 | — | 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 | — | 4.0 | — | nC | $V_{DS} = -30\text{V}, I_D = -2\text{A}$ |
| Total Gate Charge ($V_{GS} = -10\text{V}$) | Q_g | — | 8.3 | — | nC | |
| Gate-Source Charge | Q_{gs} | — | 1.2 | — | nC | |
| Gate-Drain Charge | Q_{gd} | — | 1.7 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 12.5 | — | ns | $V_{DD} = -30\text{V}, V_{GS} = -10\text{V}, I_D = -1.0\text{A}, R_G = 50\Omega$ |
| Turn-On Rise Time | t_R | — | 13.4 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 96.0 | — | ns | |
| Turn-Off Fall Time | t_F | — | 39.1 | — | ns | |
| Body Diode Reverse Recovery Time | t_{RR} | — | 9.6 | — | ns | $I_F = -1\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |
| Body Diode Reverse Recovery Charge | Q_{RR} | — | 3.1 | — | nC | $I_F = -1\text{A}, di/dt = 100\text{A}/\mu\text{s}$ |

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PCB, 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.

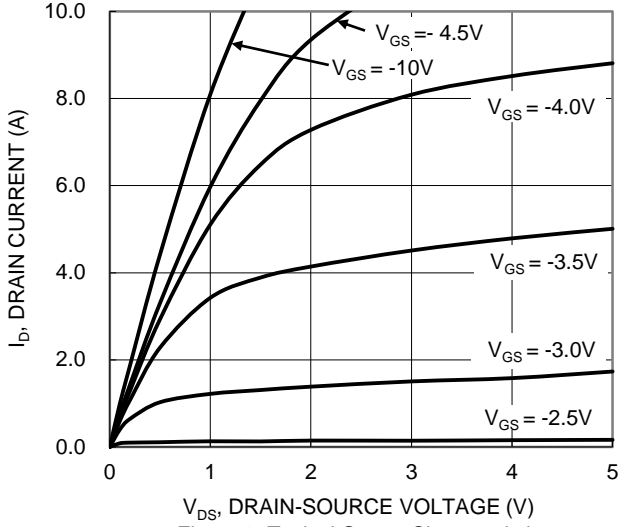


Figure 1. Typical Output Characteristic

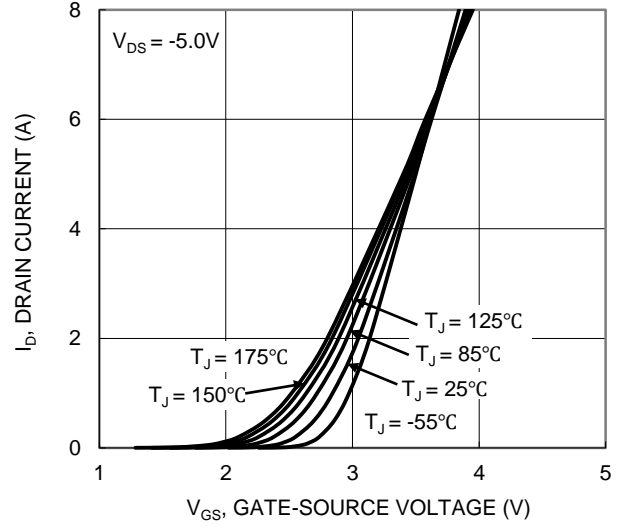


Figure 2. Typical Transfer Characteristic

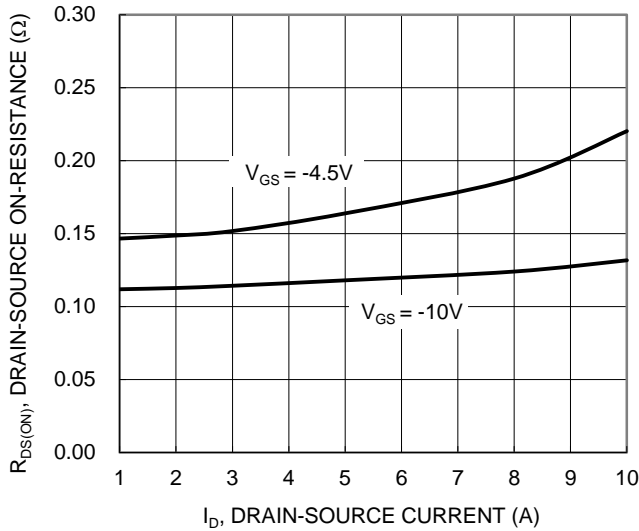


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

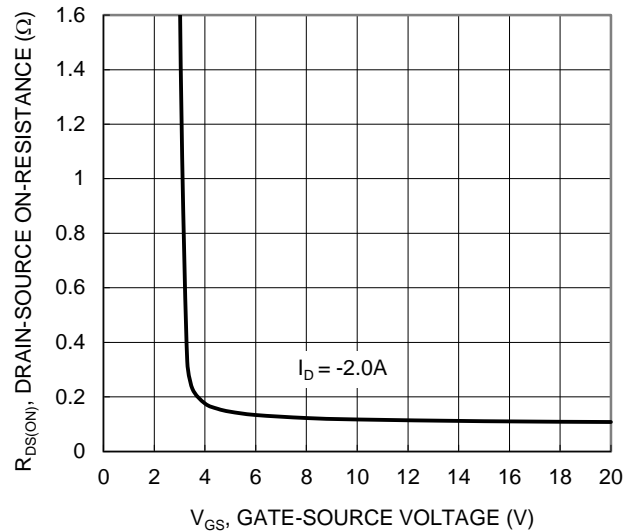


Figure 4. Typical Transfer Characteristic

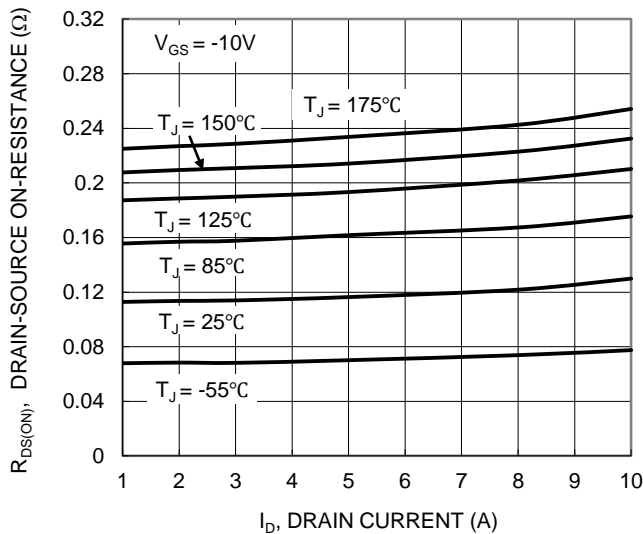


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

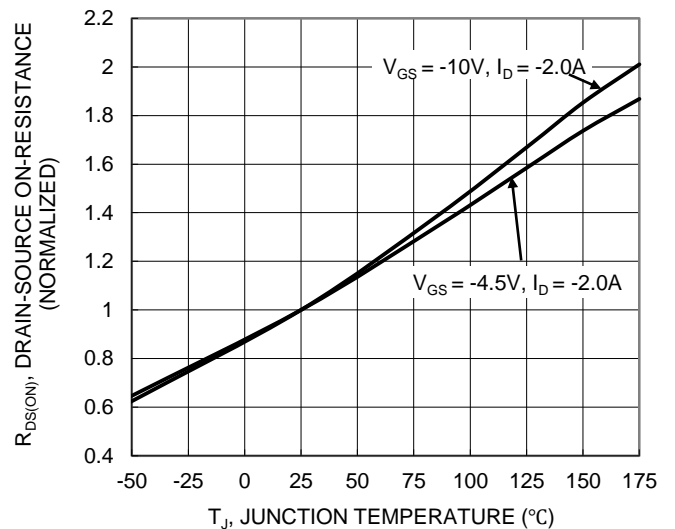


Figure 6. On-Resistance Variation with Temperature

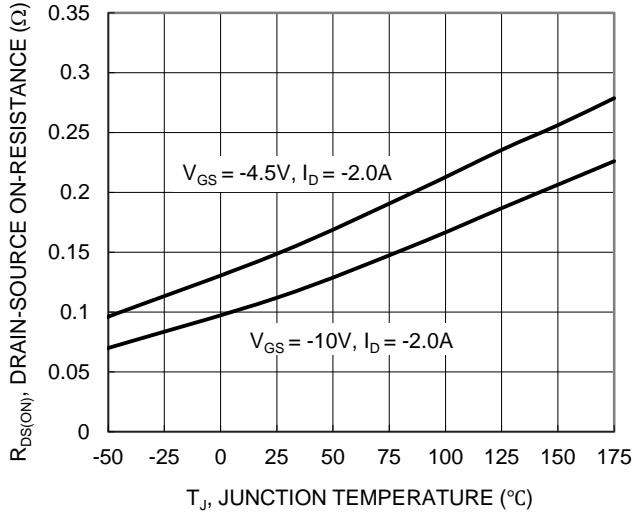


Figure 7. On-Resistance Variation with Temperature

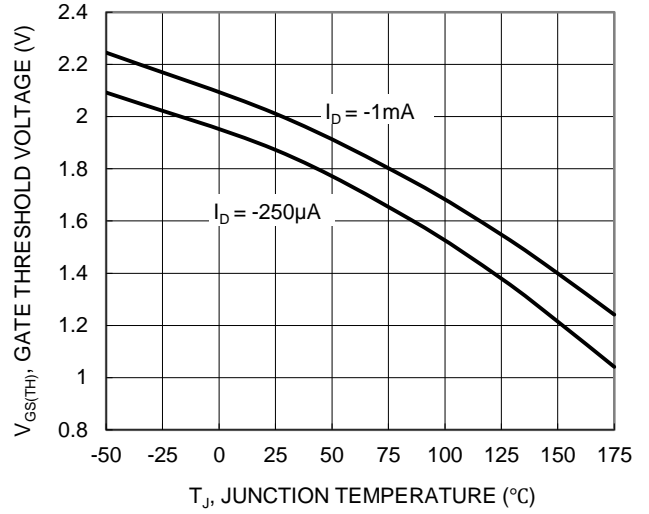


Figure 8. Gate Threshold Variation vs. Junction Temperature

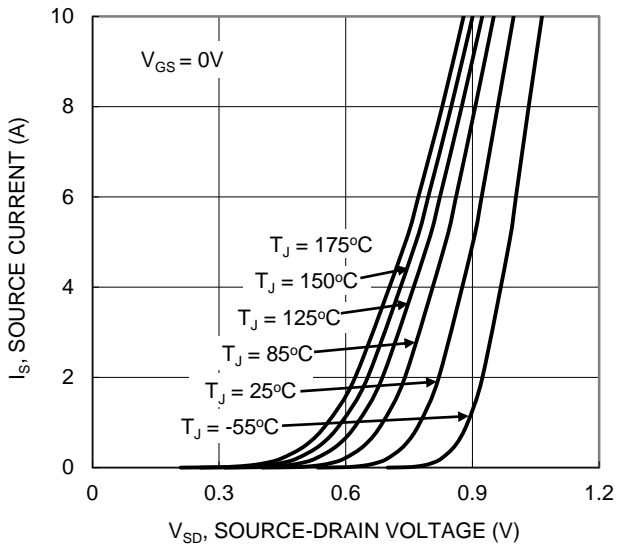


Figure 9. Diode Forward Voltage vs. Current

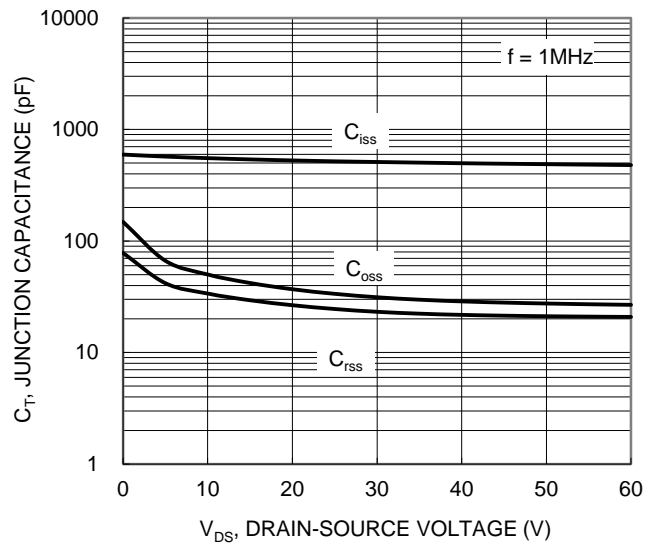


Figure 10. Typical Junction Capacitance

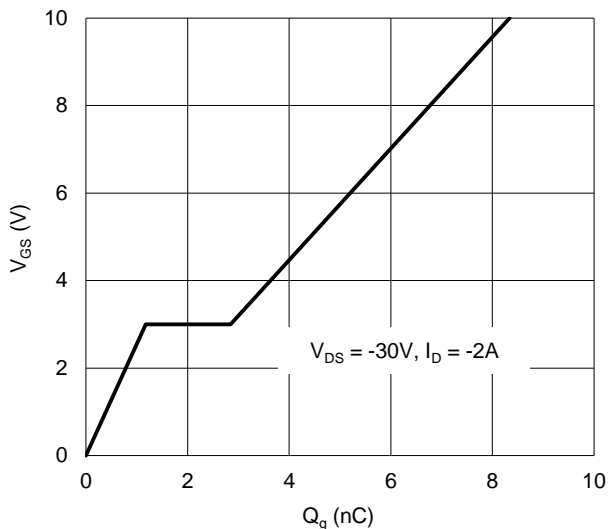


Figure 11. Gate Charge

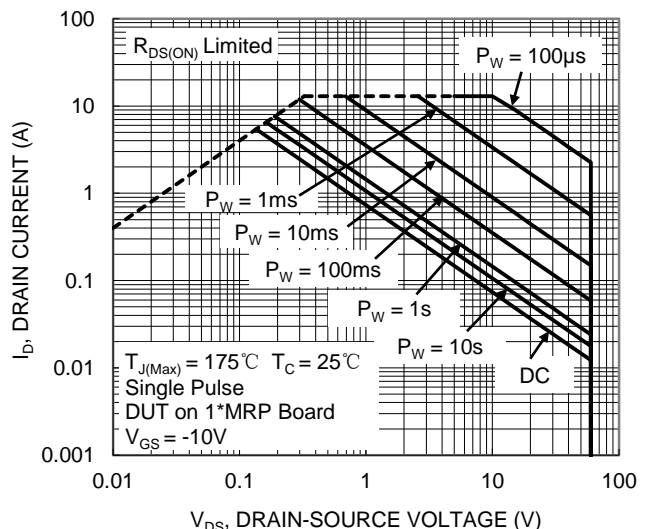


Figure 12. SOA, Safe Operation Area

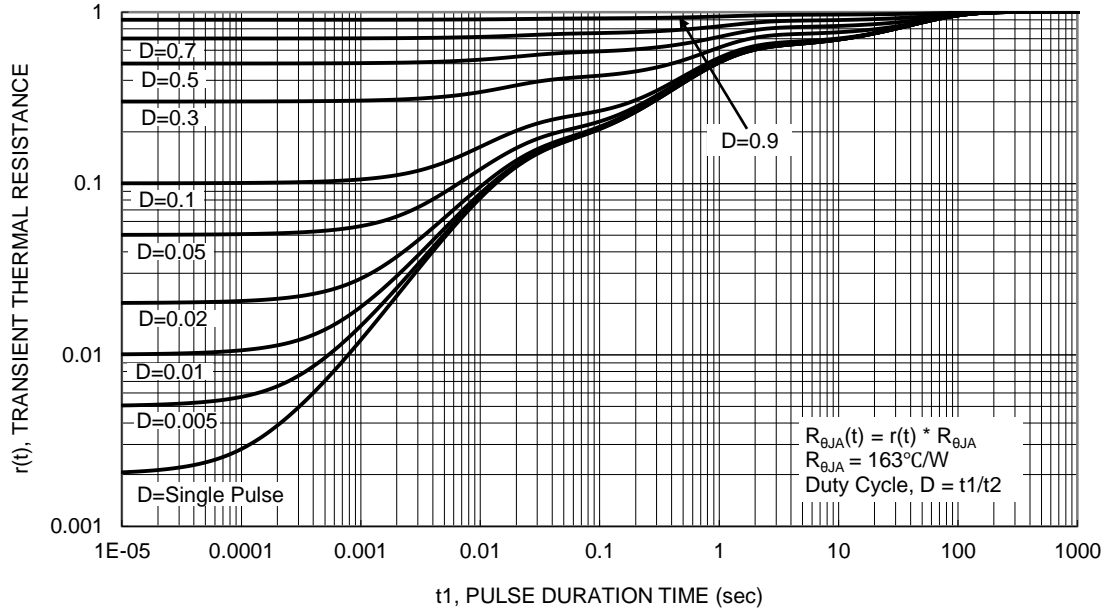
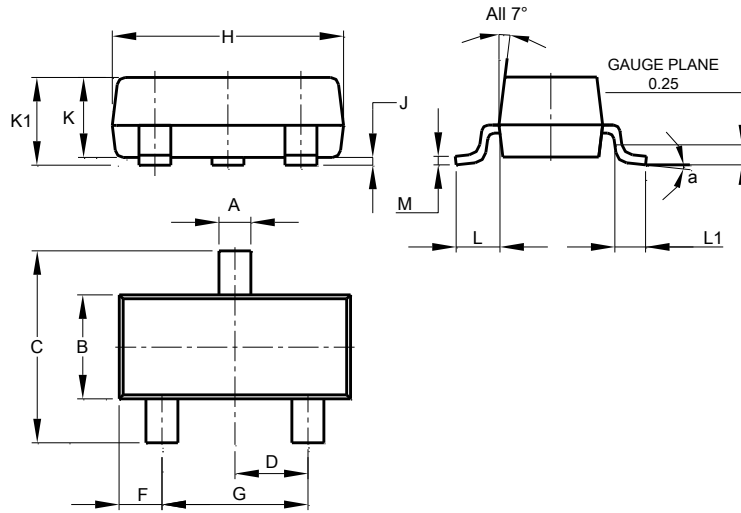


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SOT23

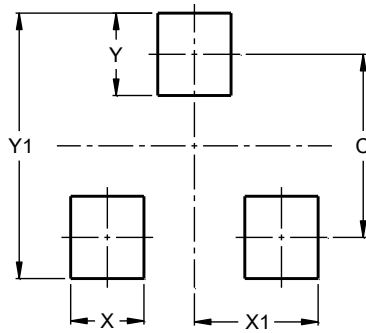


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10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