## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max | $I_D$ Max $T_A$ = +25°C |
|---|---|---|
| 20V | 29mΩ @ $V_{GS}$ = 4.5V | 5.9A |
| | 50mΩ @ $V_{GS}$ = 2.5V | 4.3A |

## 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.

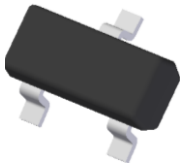
## Features and Benefits

- Low On-Resistance
- 29mΩ @$V_{GS}$ = 4.5V
- 50mΩ @$V_{GS}$ = 2.5V
- 100mΩ @$V_{GS}$ = 2.0V
- Very Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- **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)**

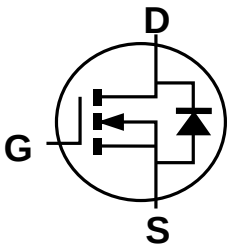
## Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

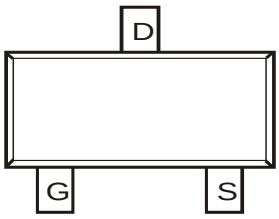
**SOT23**



Top View




Equivalent Circuit



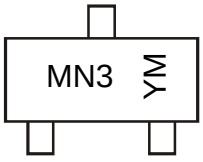

Top View
Pin-Out

## Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---|---|---|
| DMN2050LQ-7 | SOT23 | 3000/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




MN3 = Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: G = 2019)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | ~ | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|
| Code | V | ~ | 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 |


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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±12 | V |
| Drain Current (Note 6) | $I_D$ | 5.9 | A |
| Pulsed Drain Current (Note 7) | $I_{DM}$ | 21 | A |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 6) | $P_D$ | 1.4 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 90 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 20V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±12V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.45 | — | 1.4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 24 | 29 | mΩ | $V_{GS}$ = 4.5V, $I_D$ = 5.0A |
| | | | 42 | 50 | | $V_{GS}$ = 2.5V, $I_D$ = 3.1A |
| | | | 68 | 100 | | $V_{GS}$ = 2.0V, $I_D$ = 1.5A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | — | 8 | — | s | $V_{DS}$ = 5V, $I_D$ = 2.1A |
| Diode Forward Voltage (Note 8) | $V_{SD}$ | — | 0.9 | 1.4 | V | $V_{GS}$ = 0V, $I_S$ = 2.0A |
| **DYNAMIC CHARACTERISTICS (Note 9)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 532 | — | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 144 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 117 | — | pF | |
| Gate Resistance | $R_g$ | — | 1.3 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| **SWITCHING CHARACTERISTICS** (Note 9) | | | | | | |
| Total Gate Charge | $Q_g$ | — | 6.7 | — | nC | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V, $I_D$ = 5.0A |
| Gate-Source Charge | $Q_{gs}$ | — | 0.8 | — | | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V, $I_D$ = 5.0A |
| Gate-Drain Charge | $Q_{gd}$ | — | 3.0 | — | | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V, $I_D$ = 5.0A |

Notes: 6. Device mounted on FR-4 PCB, on 2oz Copper pad layout with $R_{\theta JA}$ = 90°C/W.
7. Repetitive rating, pulse width limited by junction temperature.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.


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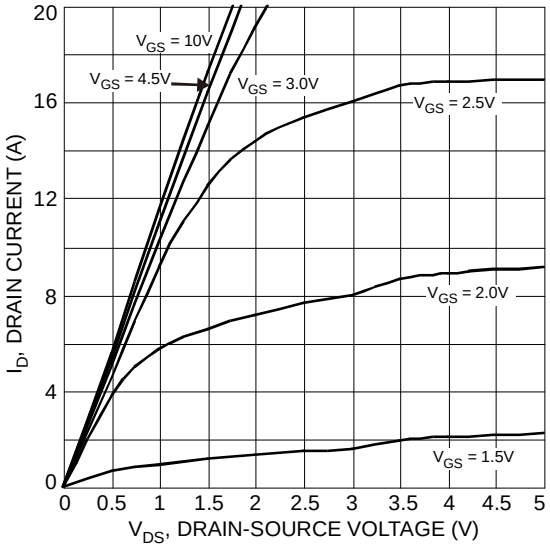



Fig. 1 Typical Output Characteristic

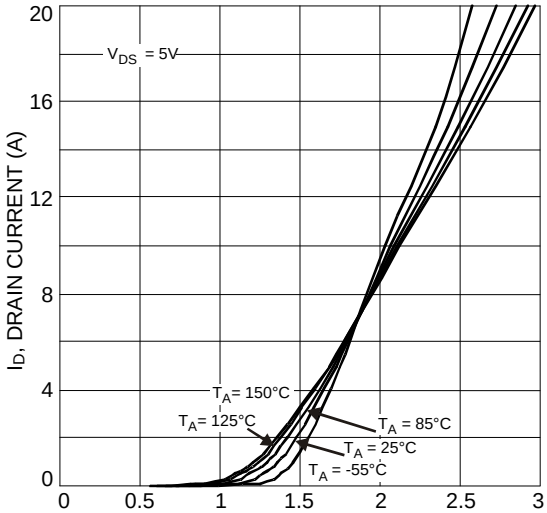



Fig. 2 Typical Transfer Characteristic

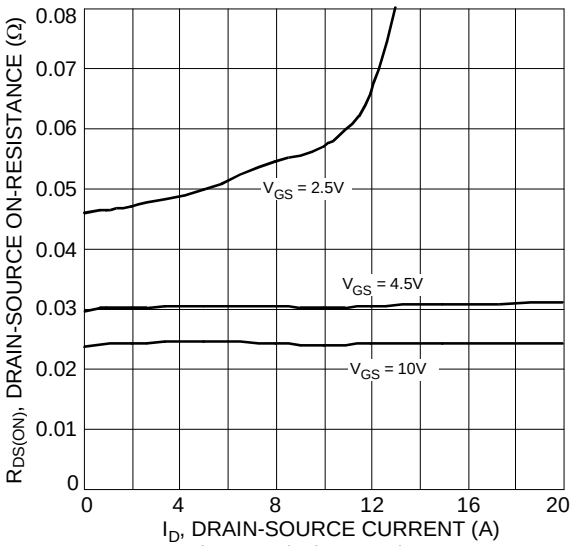



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

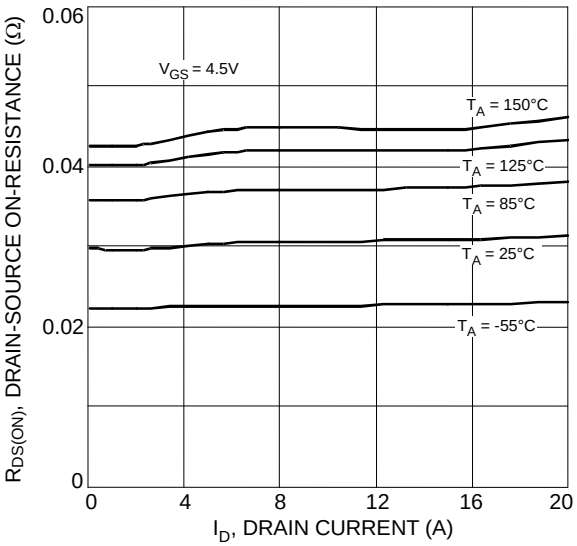



Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

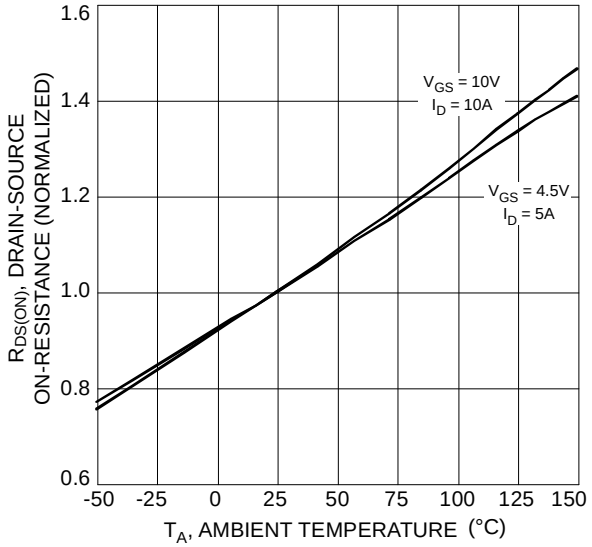



Fig. 5 On-Resistance Variation with Temperature

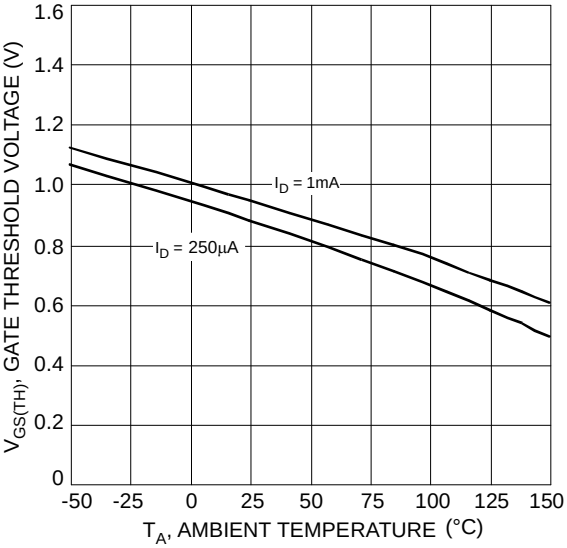



Fig. 6 Gate Threshold Variation vs. Ambient Temperature


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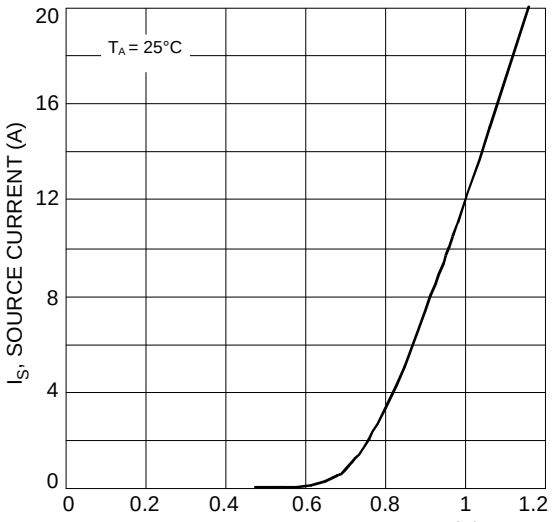



Fig. 7 Diode Forward Voltage vs. Current

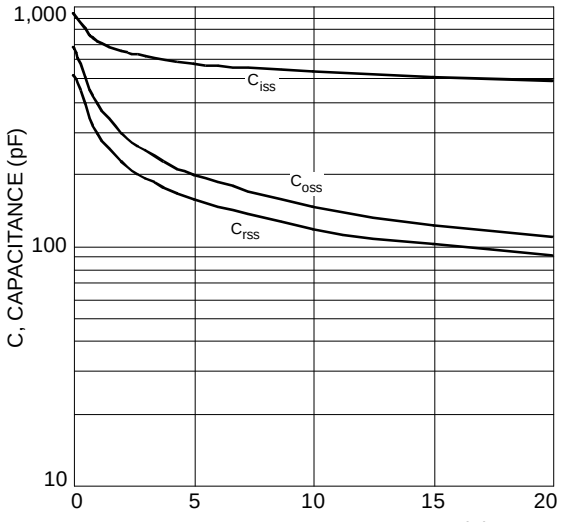



Fig. 8 Typical Total Capacitance

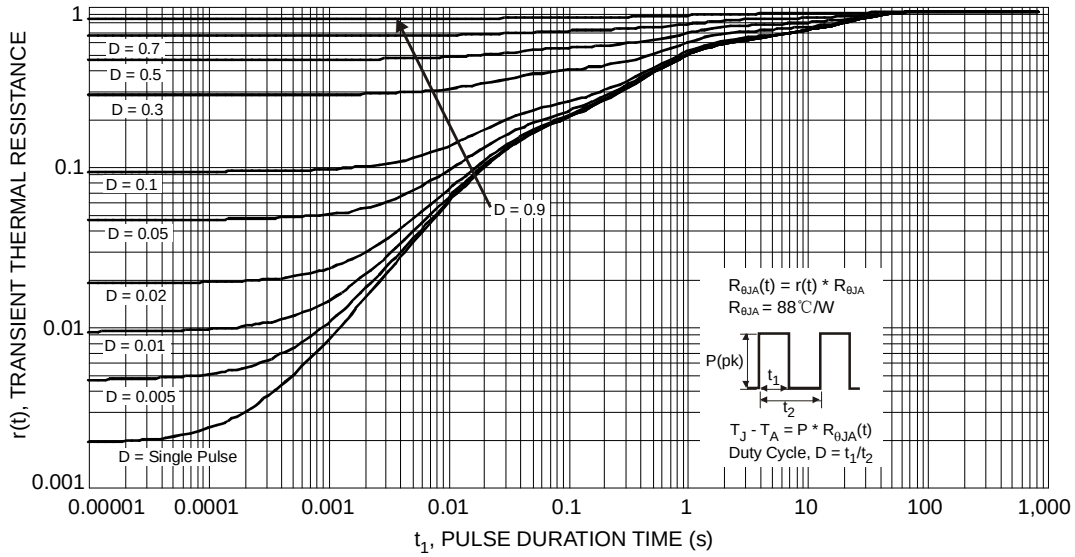


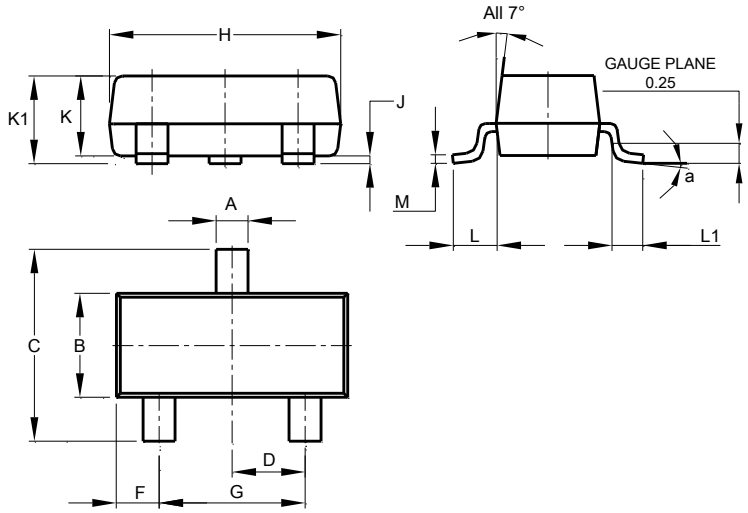

Fig. 9 Transient Thermal Response


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## Package Outline Dimensions

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

**SOT23**

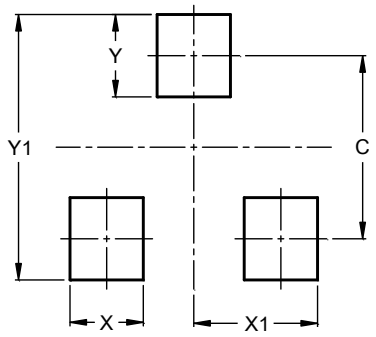



| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J**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