## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ max | $I_D$ max |
|---|---|---|
| 50V | 4Ω @ $V_{GS}$ = 4V | 160mA |

## Features and Benefits

- Low On-Resistance
- Very Low Gate Threshold Voltage
- Low Input Capacitance
- ESD Protected Gate to 2kV
- **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 or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

## 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.

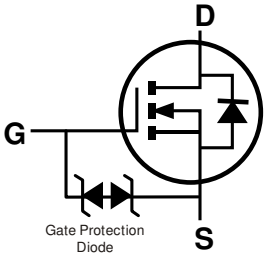
- Motor Driving
- Power Management Functions
- Load Switching

## Mechanical Data

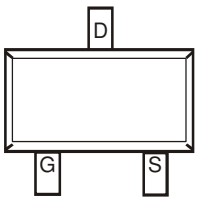
- Case: SOT523
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)


SOT523

Top View




Equivalent Circuit



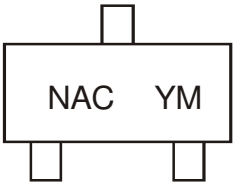

Top View

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMN55D0UT-7 | SOT523 | 3,000/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




NAC = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: H = 2020)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | … | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | V | … | H | I | J | K | L | M | N | O | P | R |

| 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°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 50 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±12 | V |
| Drain Current (Note 5) Continuous | $I_D$ | 160 | mA |
| Pulsed Drain Current (Note 5) | $I_{DM}$ | 560 | mA |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 200 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 625 | °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** (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 50 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | µA | $V_{DS}$ = 50V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | 1.0<br>5.0 | µA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V<br>$V_{GS}$ = ±12V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS** (Note 6) | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.7 | 0.8 | 1.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 3.1 | 4 | Ω | $V_{GS}$ = 4V, $I_D$ = 100mA |
| | | — | 4 | 5 | | $V_{GS}$ = 2.5V, $I_D$ = 80mA |
| Forward Transconductance | $g_{FS}$ | 180 | — | — | mS | $V_{DS}$ = 10V, $I_D$ = 100mA, f = 1.0kHz |
| Diode Forward Voltage | $V_{SD}$ | — | 0.70 | 1.3 | V | $V_{GS}$ = 0V, $I_S$ = 100mA |
| **DYNAMIC CHARACTERISTICS** (Note 7) | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 25 | — | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 5 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 2.1 | — | pF | |
| Gate Resistance | $R_G$ | — | 500 | — | Ω | f = 1MHz, $V_{GS}$ = 0V, $V_{DS}$ = 0V |
| Total Gate Charge ($V_{GS}$ = 4V) | $Q_G$ | — | 295 | — | pC | $V_{DS}$ = 10V, $I_D$ = 100mA |
| Total Gate Charge ($V_{GS}$ = 8V) | $Q_G$ | — | 636 | — | pC | |
| Gate-Source Charge | $Q_{GS}$ | — | 72 | — | pC | |
| Gate-Drain Charge | $Q_{GD}$ | — | 18 | — | pC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 6.0 | — | ns | $V_{DD}$ = 10V, $V_{GS}$ = 4V, $R_G$ = 25Ω, $I_D$ = 100mA |
| Turn-On Rise Time | $t_R$ | — | 4.4 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 23.4 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 11.0 | — | ns | |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

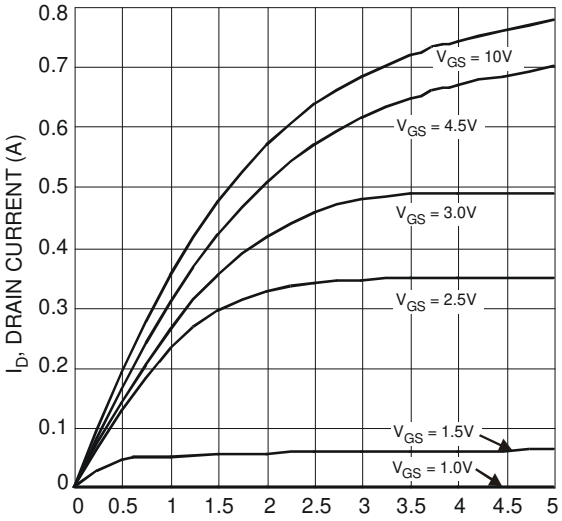



Fig. 1 Typical Output Characteristics

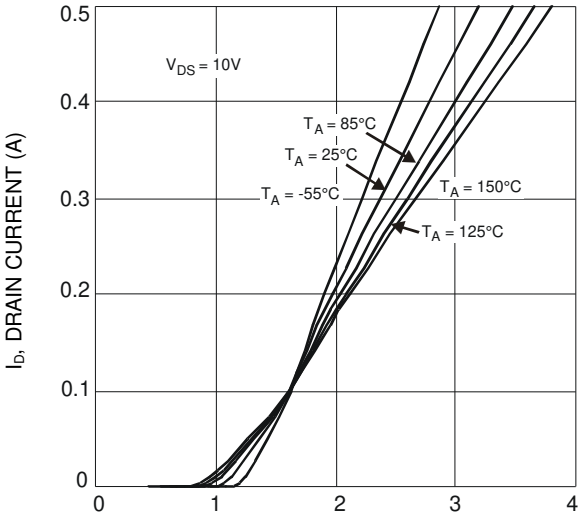



Fig. 2 Typical Transfer Characteristics

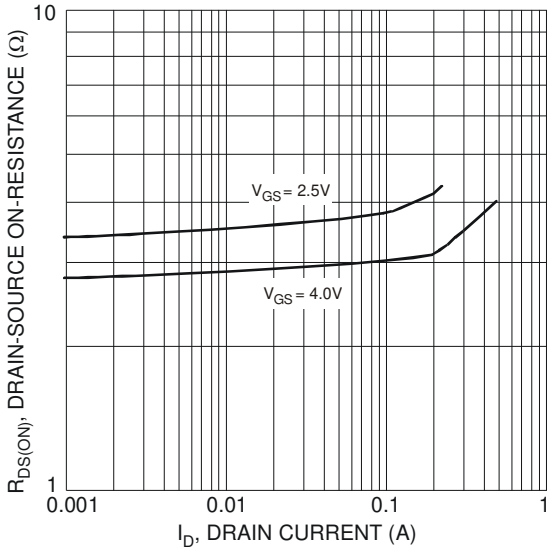



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

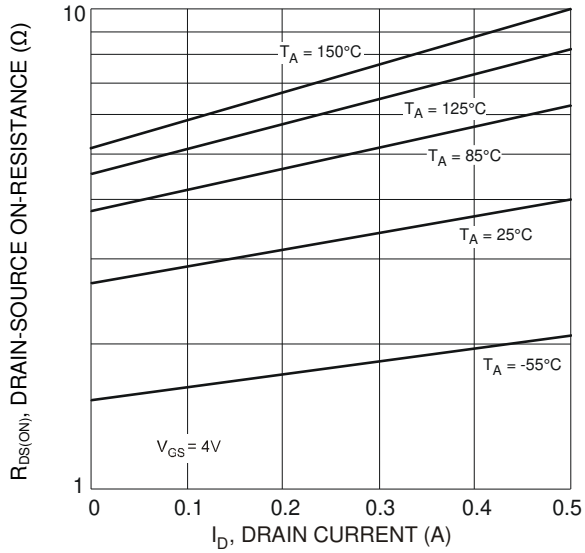



Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

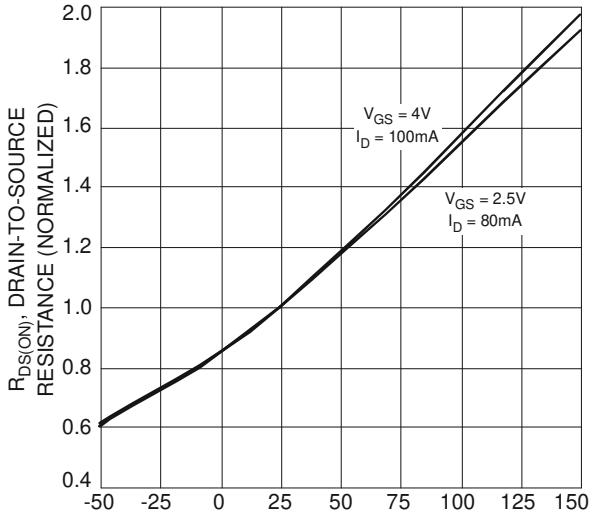



Fig. 5 On-Resistance Variation with Temperature

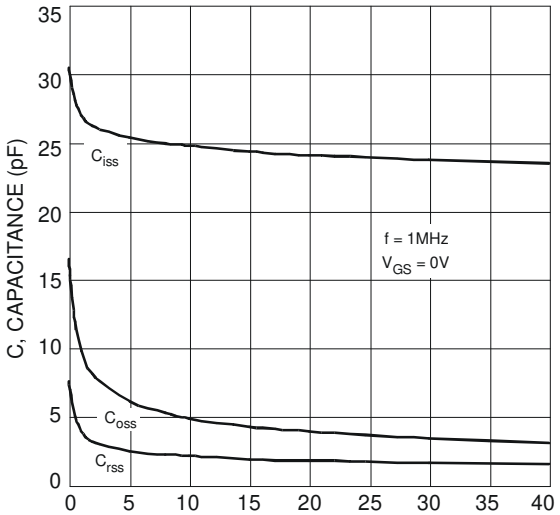



Fig. 6 Typical Capacitance

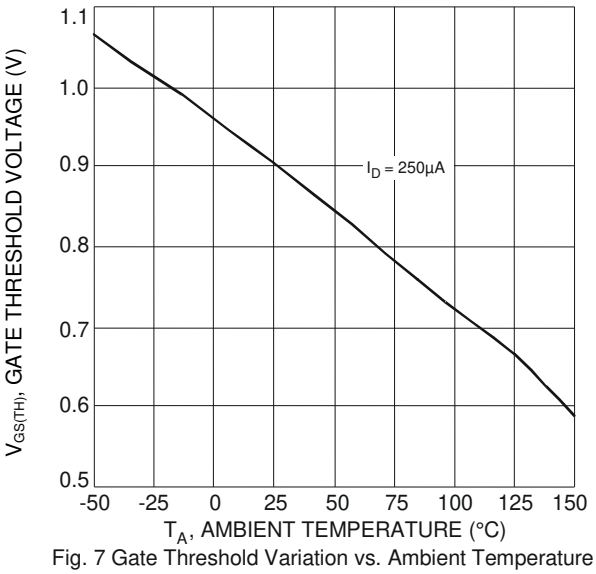



Fig. 7 Gate Threshold Variation vs. Ambient Temperature

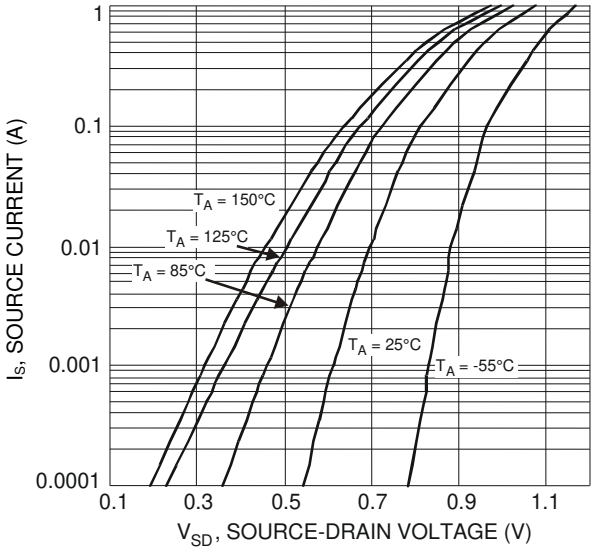



Fig. 8 Diode Forward Voltage vs. Current

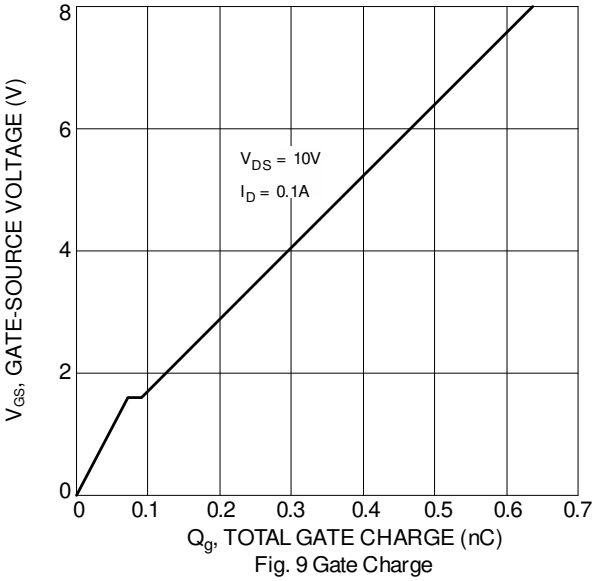



Fig. 9 Gate Charge

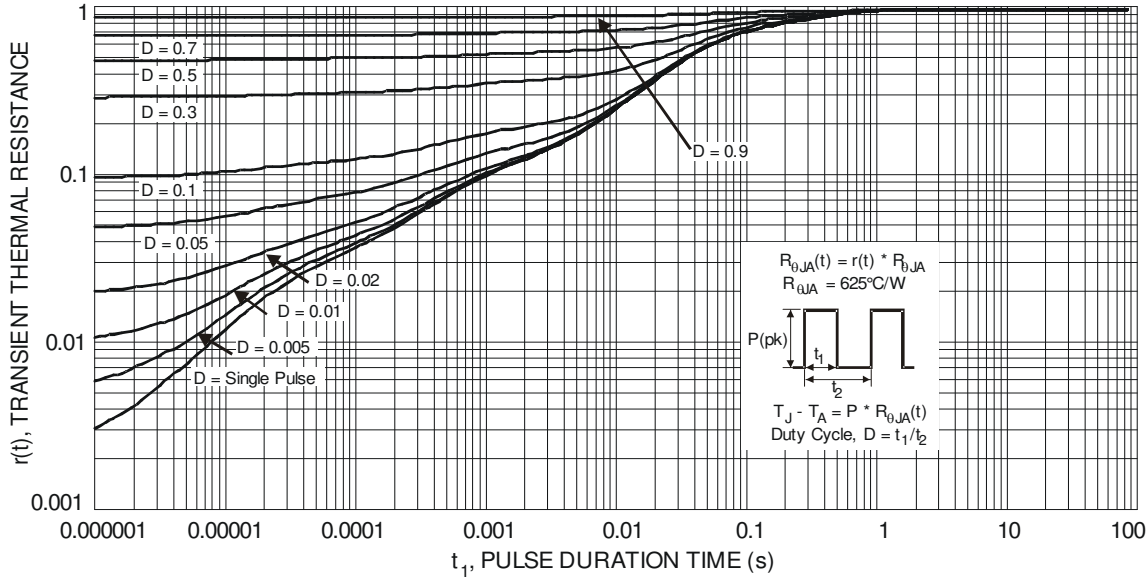
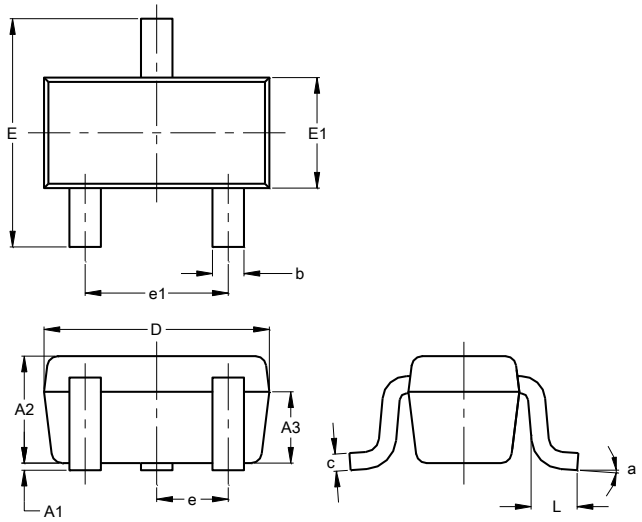



Fig. 10 Transient Thermal Response

## Package Outline Dimensions

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

**SOT523**

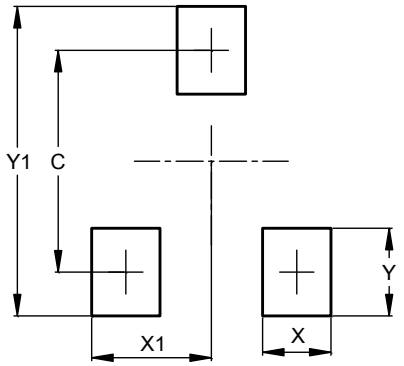



| SOT523 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.60 | 0.80 | 0.75 |
| **A3** | 0.45 | 0.65 | 0.50 |
| **b** | 0.15 | 0.30 | 0.22 |
| **c** | 0.10 | 0.20 | 0.12 |
| **D** | 1.50 | 1.70 | 1.60 |
| **E** | 1.45 | 1.75 | 1.60 |
| **E1** | 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.

**SOT523**




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

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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