## Features

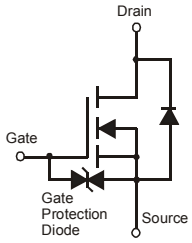
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected Up To 2kV**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications 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/**

## Mechanical Data

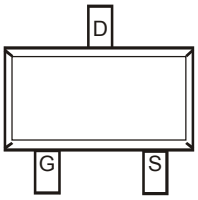
- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish – Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (Approximate)


ESD PROTECTED TO 2kV


TOP VIEW



EQUIVALENT CIRCUIT



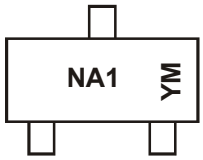
TOP VIEW

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMG1012UW-7 | SOT323 | 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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

## Marking Information




NA1 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: I = 2021)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2009 | …… | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | W | …… | I | J | K | L | M | N | O | P | R | S |

| 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 | | | $V_{GSS}$ | ±6 | V |
| Continuous Drain Current (Note 5) | Steady State | $T_A$ = +25°C<br>$T_A$ = +85°C | $I_D$ | 1.0<br>0.64 | A |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | 6 | A |

## Thermal Characteristics

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 0.29 | W |
| Thermal Resistance, Junction to Ambient @$T_A$ = +25°C (Note 5) | $R_{\theta JA}$ | 425 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Repetitive rating, pulse width limited by junction temperature.

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | - | - | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | - | - | 100 | nA | $V_{DS}$ = 20V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | - | - | ±1.0 | µA | $V_{GS}$ = ±4.5V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.5 | - | 1.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | - | 0.3 | 0.45 | Ω | $V_{GS}$ = 4.5V, $I_D$ = 600mA |
| | | | 0.4 | 0.6 | | $V_{GS}$ = 2.5V, $I_D$ = 500mA |
| | | | 0.5 | 0.75 | | $V_{GS}$ = 1.8V, $I_D$ = 350mA |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | - | 1.4 | - | S | $V_{DS}$ = 10V, $I_D$ = 400mA |
| Diode Forward Voltage | $V_{SD}$ | - | 0.7 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 150mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 60.67 | - | pF | $V_{DS}$ = 16V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 9.68 | - | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 5.37 | - | pF | |
| Total Gate Charge | $Q_g$ | - | 736.6 | - | pC | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$ = 250mA |
| Gate-Source Charge | $Q_{gs}$ | - | 93.6 | - | pC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 116.6 | - | pC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 5.1 | - | ns | $V_{DD}$ = 10V, $V_{GS}$ = 4.5V, $R_L$ = 47Ω, $R_G$ = 10Ω, $I_D$ = 200mA |
| Turn-On Rise Time | $t_R$ | - | 7.4 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 26.7 | - | ns | |
| Turn-Off Fall Time | $t_F$ | - | 12.3 | - | ns | |

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.


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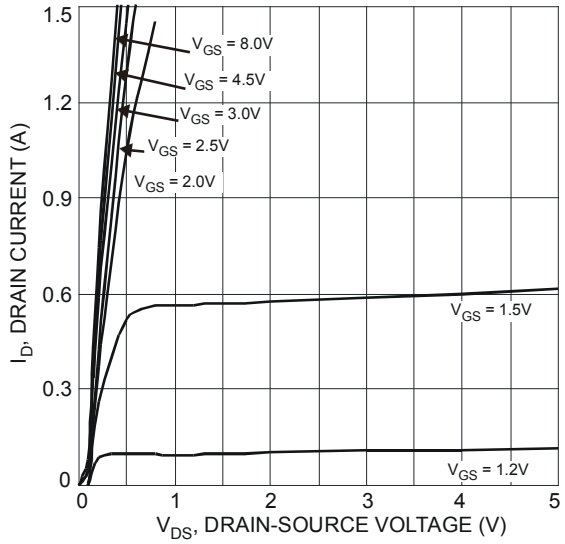



Fig. 1 Typical Output Characteristics

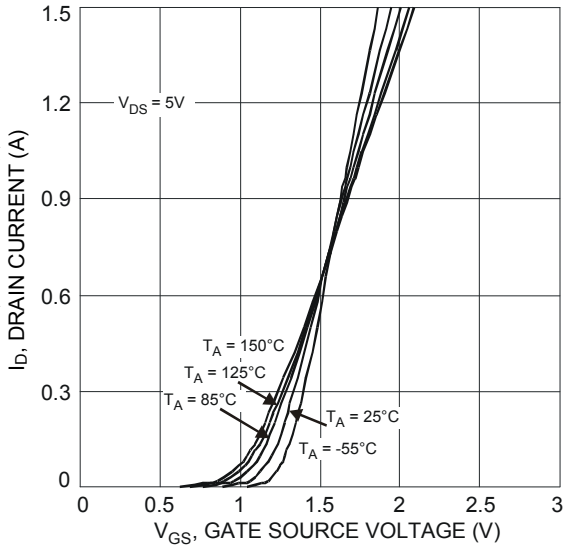



Fig. 2 Typical Transfer Characteristics

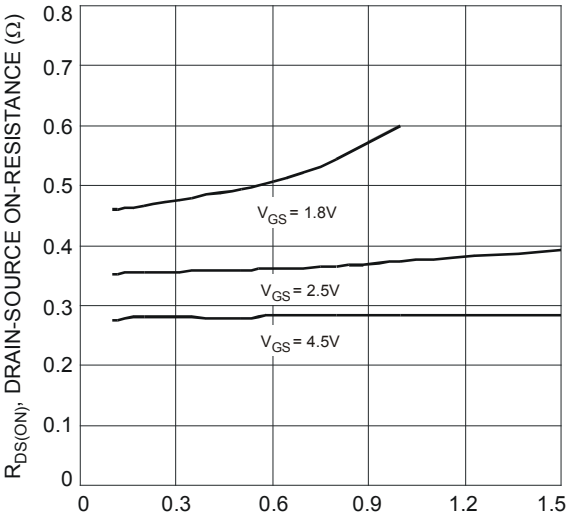



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

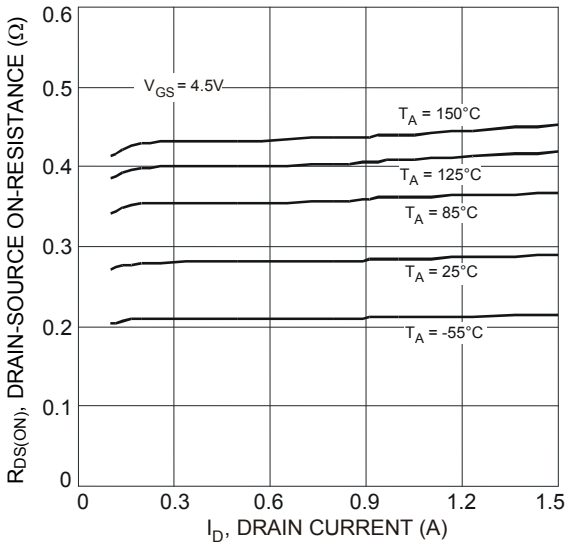



Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

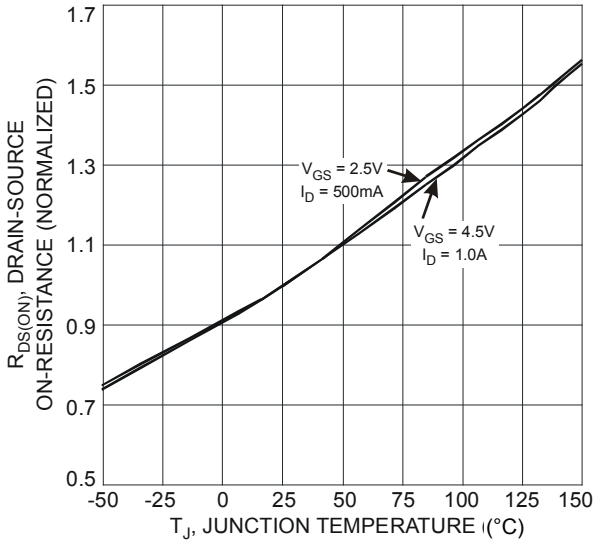



Fig. 5 On-Resistance Variation with Temperature

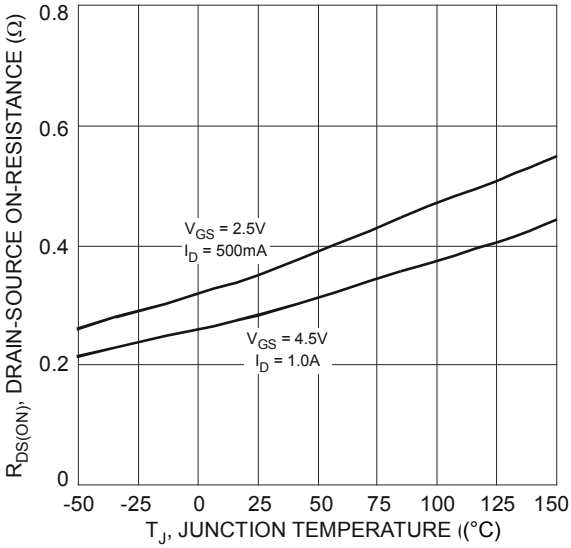



Fig. 6 On-Resistance Variation with Temperature


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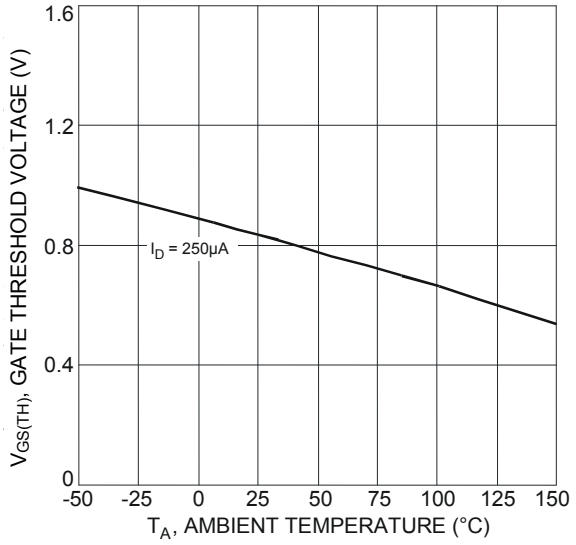



Fig. 7 Gate Threshold Variation vs. Ambient Temperature

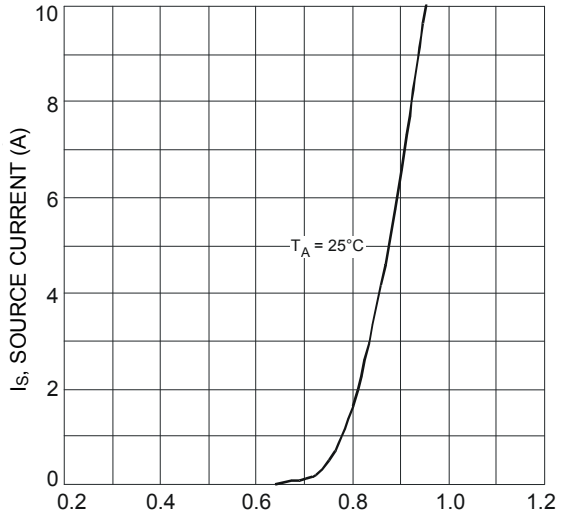



Fig. 8 Diode Forward Voltage vs. Current

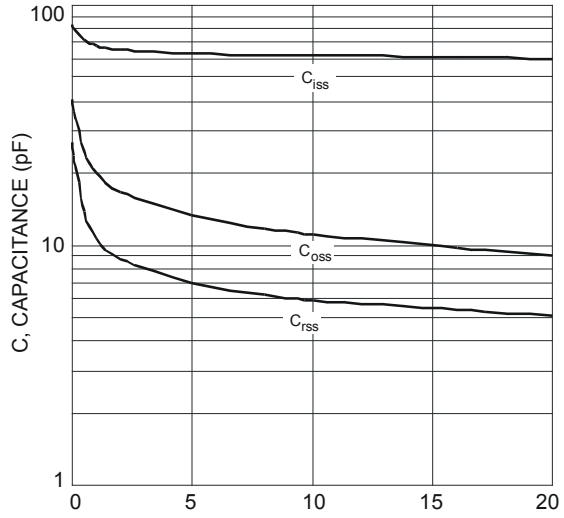



Fig. 9 Typical Capacitance

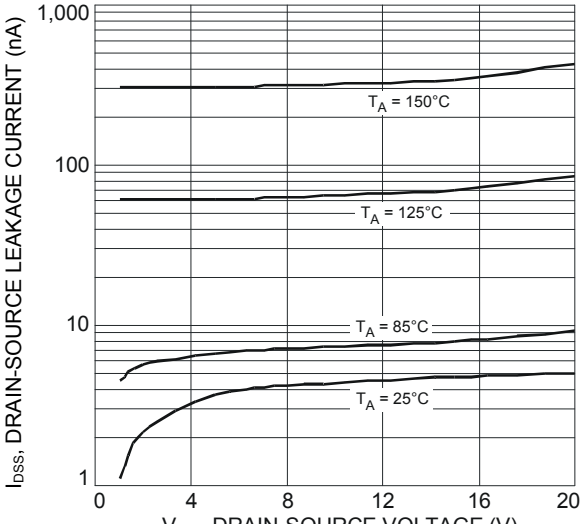



Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

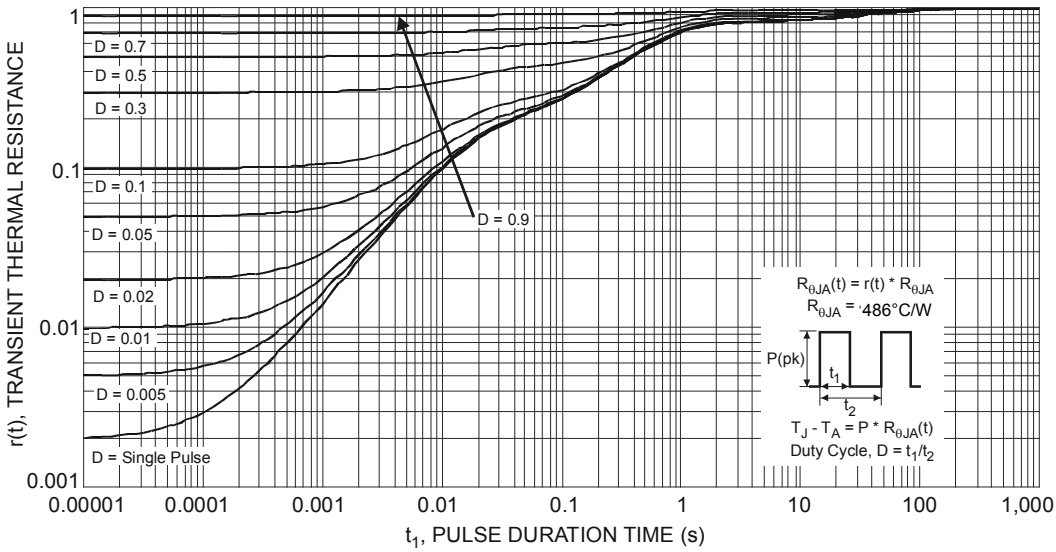


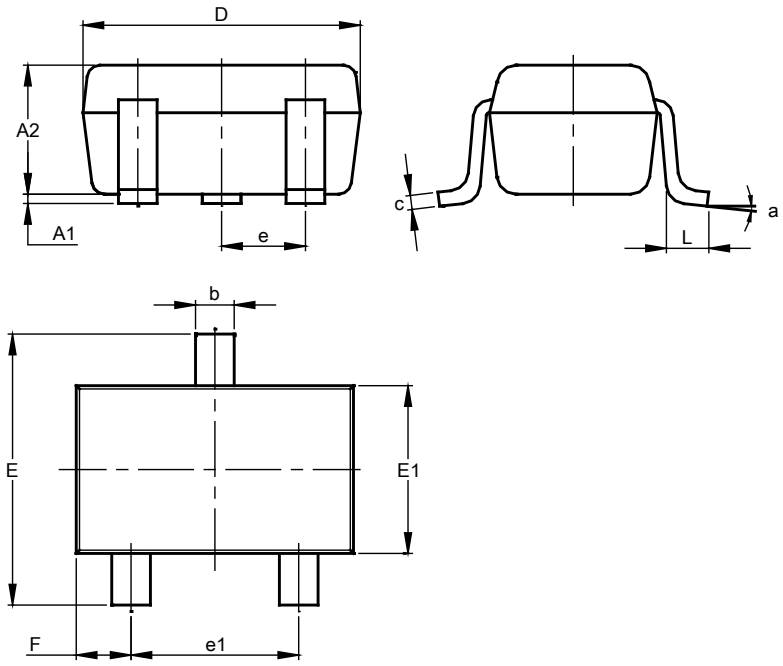

Fig. 11 Transient Thermal Response


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## Package Outline Dimensions

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

**SOT323**

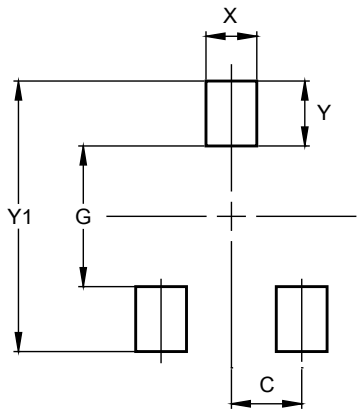



| SOT323 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.80 | 1.00 | 0.90 |
| **b** | 0.20 | 0.40 | 0.30 |
| **c** | 0.08 | 0.18 | 0.13 |
| **D** | 1.80 | 2.20 | 2.00 |
| **E** | 2.00 | 2.45 | 2.225 |
| **E1** | 1.15 | 1.35 | 1.25 |
| **e** | -- | -- | 0.65 |
| **e1** | 1.20 | 1.40 | 1.30 |
| **F** | 0.25 | 0.475 | 0.3625 |
| **L** | 0.25 | 0.46 | 0.355 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT323**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.650 |
| **G** | 1.300 |
| **X** | 0.470 |
| **Y** | 0.600 |
| **Y1** | 2.500 |


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