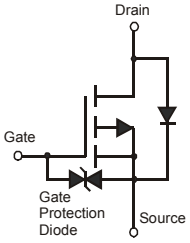
## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMG1013UWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  **https://www.diodes.com/quality/product-definitions/**

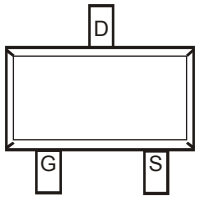
## Mechanical Data

- 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)


Top View




Equivalent Circuit



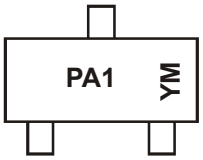

Top View

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMG1013UWQ-7 | SOT323 | 3000 / Tape & Reel |
| DMG1013UWQ-13 | SOT323 | 10000 / 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




PA1 = Product Type Marking Code
YM or YM = Date Code Marking
Y or Y= Year (ex: I = 2021)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | …… | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | V | …… | 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 | $I_D$ | -0.82<br>-0.54 | A |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | -3 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation (Note 5) | | $P_D$ | 0.31 | W |
| Thermal Resistance, Junction to Ambient | @$T_A$ = +25°C (Note 5) | $R_{\theta JA}$ | 398 | °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 | $I_{GSS}$ | - | - | ±2.0 | 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 | $R_{DS(ON)}$ | - | 0.5 | 0.75 | Ω | $V_{GS}$ = -4.5V, $I_D$ = -430mA |
| | | | 0.7 | 1.05 | | $V_{GS}$ = -2.5V, $I_D$ = -300mA |
| | | | 1.0 | 1.5 | | $V_{GS}$ = -1.8V, $I_D$ = -150mA |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | - | 0.9 | - | S | $V_{DS}$ = -10V, $I_D$ = -250mA |
| Diode Forward Voltage | $V_{SD}$ | | -0.8 | -1.2 | V | $V_{GS}$ = 0V, $I_S$ = -150mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 59.76 | - | pF | $V_{DS}$ = -16V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 12.07 | - | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 6.36 | - | pF | |
| Total Gate Charge | $Q_g$ | - | 622.4 | - | pC | $V_{GS}$ = -4.5V, $V_{DS}$ = -10V, $I_D$ = -250mA |
| Gate-Source Charge | $Q_{gs}$ | - | 100.3 | - | pC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 132.2 | - | 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 | $t_R$ | - | 8.1 | - | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | - | 28.4 | - | ns | |
| Turn-Off Fall Time | $t_F$ | - | 20.7 | - | 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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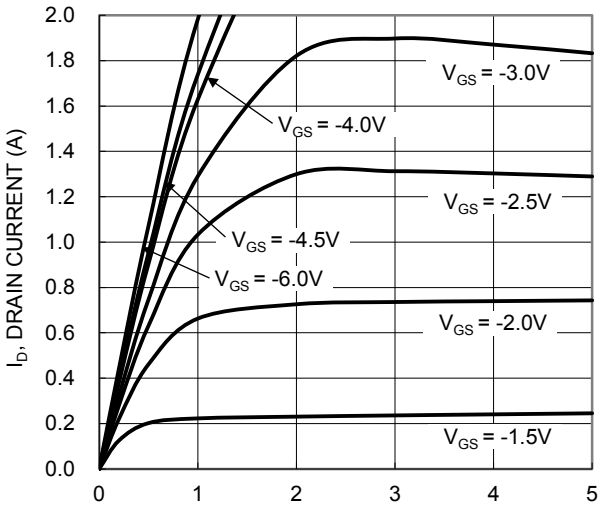

Figure 1. Typical Output Characteristic

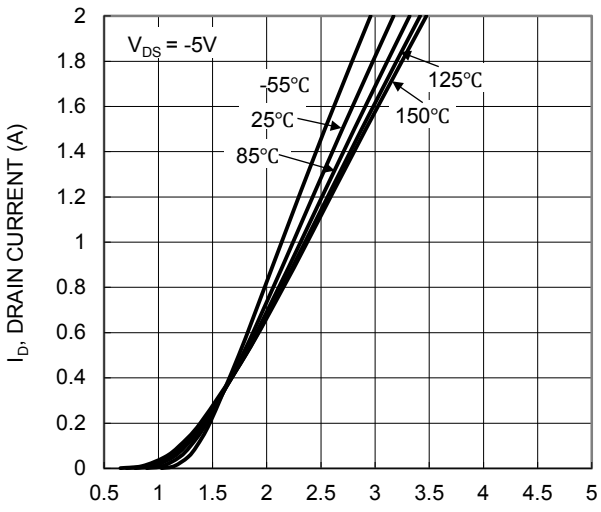

Figure 2. Typical Transfer Characteristic

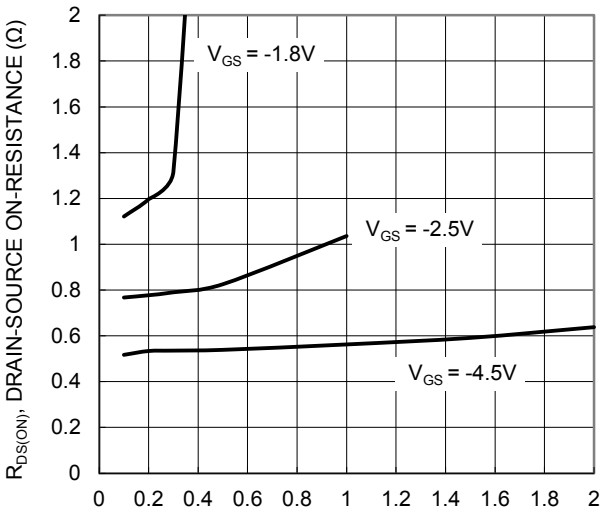

Figure 3. Typical On-Resistance vs Drain Current and Gate Voltage

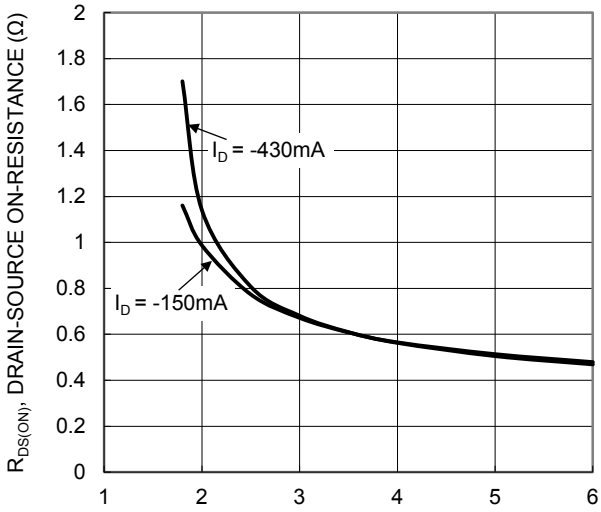

Figure 4. Typical Transfer Characteristic

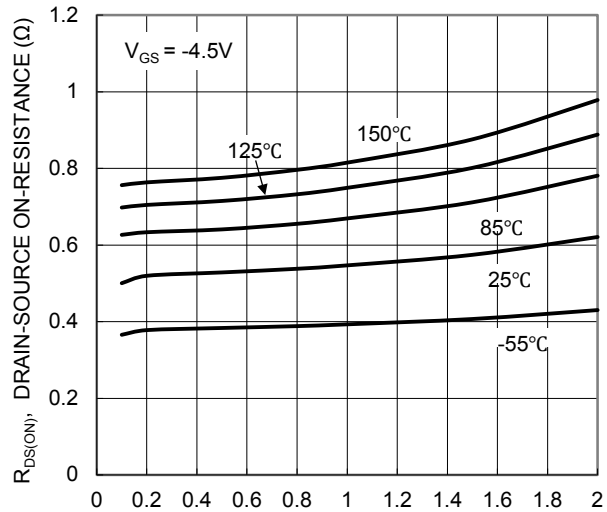

Figure 5. Typical On-Resistance vs Drain Current and Junction Temperature

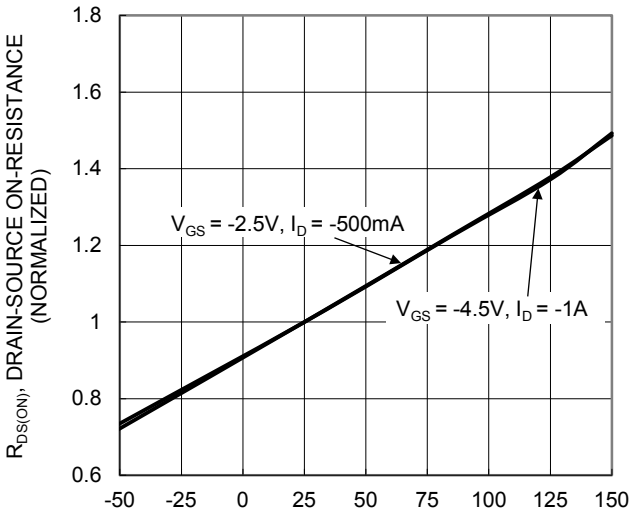

Figure 6. On-Resistance Variation with Junction Temperature


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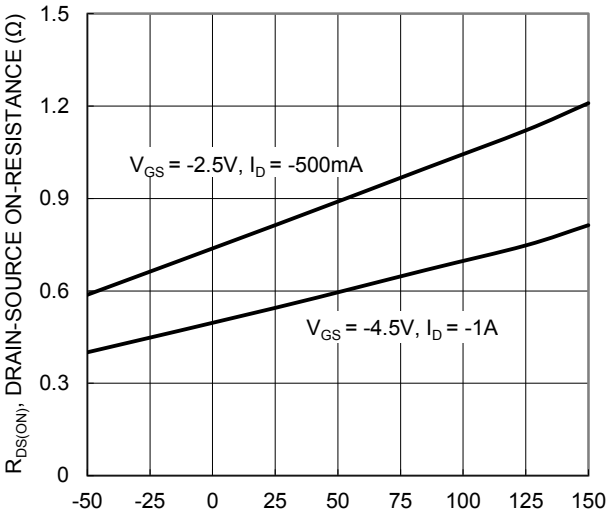


Figure 7. On-Resistance Variation with Junction Temperature

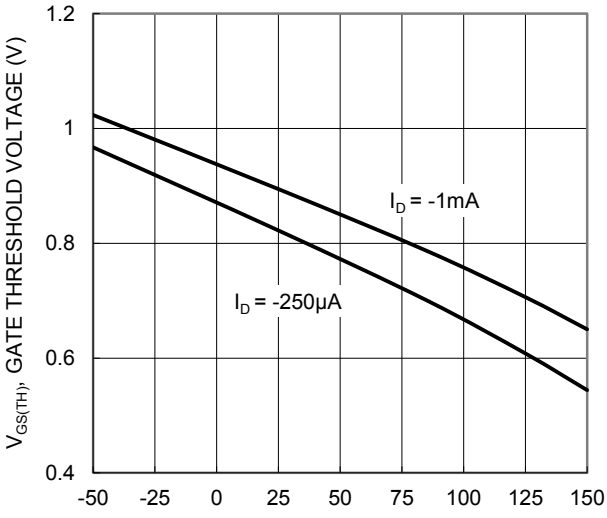


Figure 8. Gate Threshold Variation vs Junction Temperature

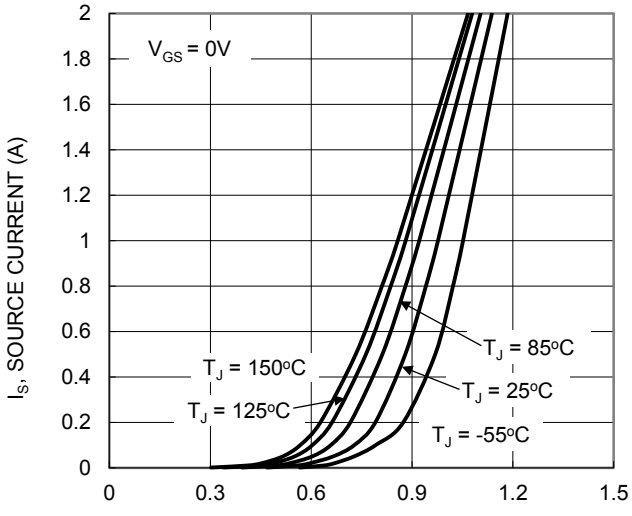


Figure 9. Diode Forward Voltage vs Current

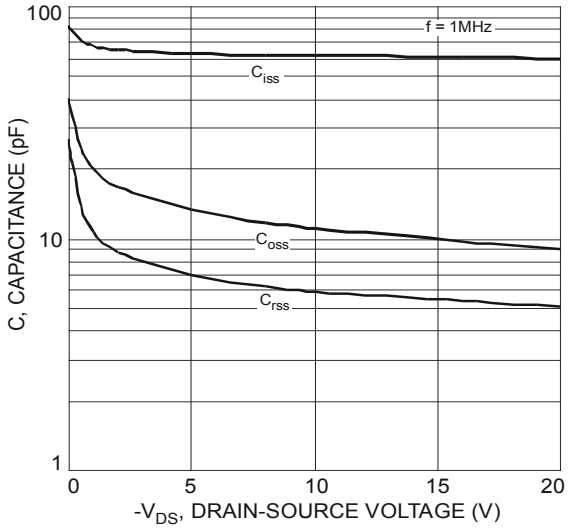


Figure 10. Typical Total Capacitance

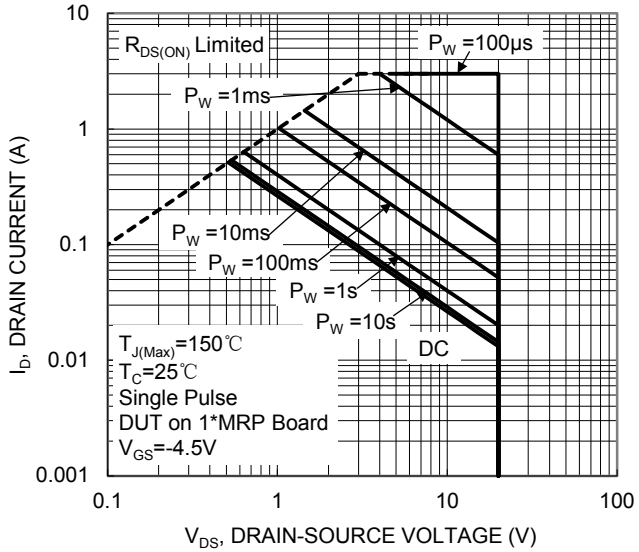


Figure 11. SOA, Safe Operation Area


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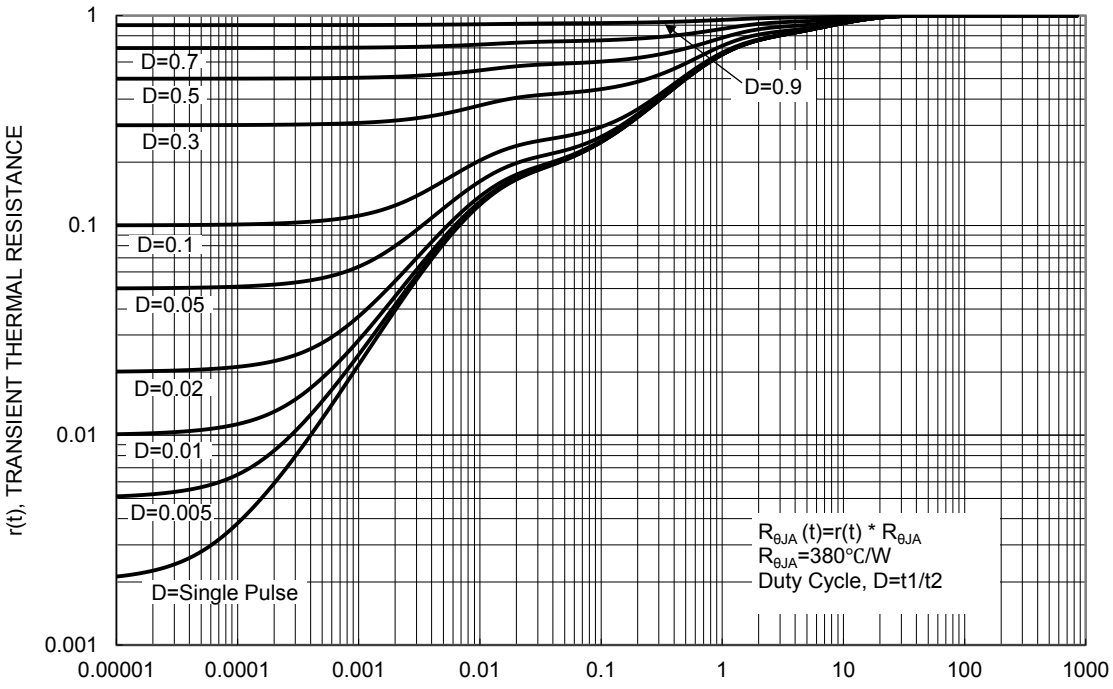


Figure 12. Transient Thermal Resistance


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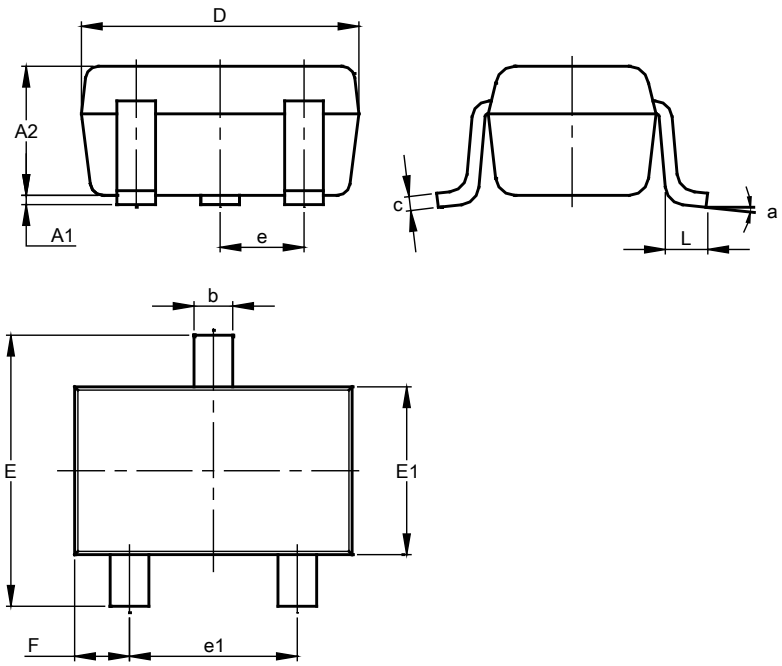
## Package Outline Dimensions

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

**SOT323**

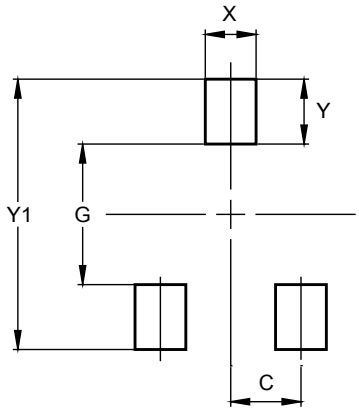



| SOT323 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.90 | 1.00 | 0.95 |
| **b** | 0.25 | 0.40 | 0.30 |
| **c** | 0.10 | 0.18 | 0.11 |
| **D** | 1.80 | 2.20 | 2.15 |
| **E** | 2.00 | 2.20 | 2.10 |
| **E1** | 1.15 | 1.35 | 1.30 |
| **e** | 0.650 BSC | | |
| **e1** | 1.20 | 1.40 | 1.30 |
| **F** | 0.375 | 0.475 | 0.425 |
| **L** | 0.25 | 0.40 | 0.30 |
| **a** | 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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