

## 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

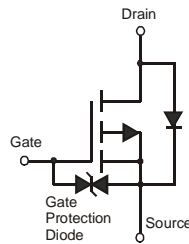
- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method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



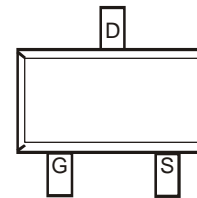
ESD PROTECTED



Top View



Equivalent Circuit



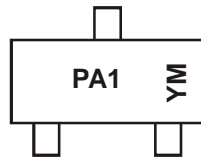
Top View

## Ordering Information (Note 5)

| 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) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



PA1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: D = 2016)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2008 | ... | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|------|------|-----|------|------|------|------|------|------|------|------|------|------|
| Code | V    | ... | C    | D    | 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                    |              |                        | Symbol           | Value | Unit |
|-----------------------------------|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage              |              |                        | V <sub>DSS</sub> | -20   | V    |
| Gate-Source Voltage               |              |                        | V <sub>GSS</sub> | ±6    | V    |
| Continuous Drain Current (Note 6) | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | -0.82 | A    |
|                                   |              | T <sub>A</sub> = +85°C |                  | -0.54 |      |
| Pulsed Drain Current (Note 7)     |              |                        | I <sub>DM</sub>  | -3    | A    |

**Thermal Characteristics**

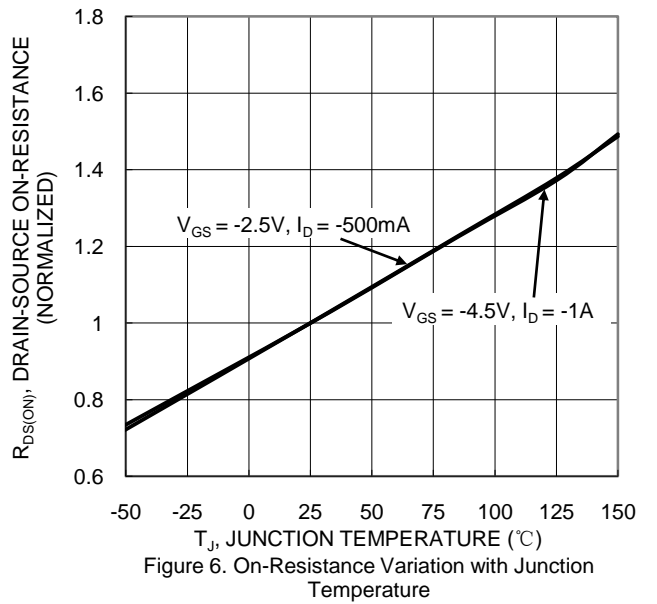
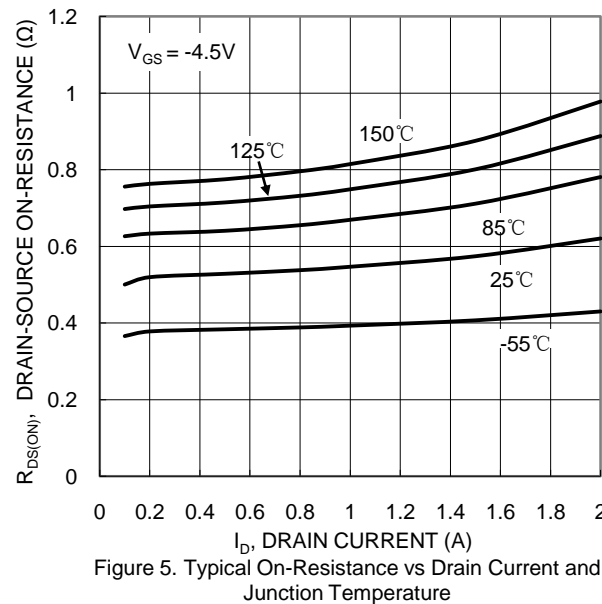
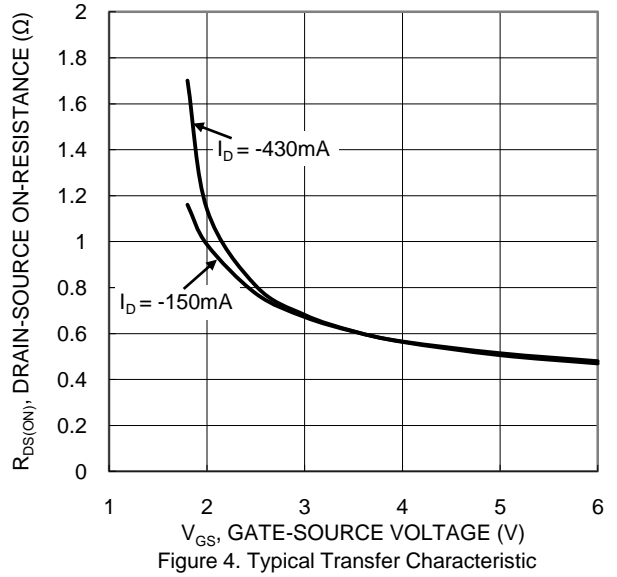
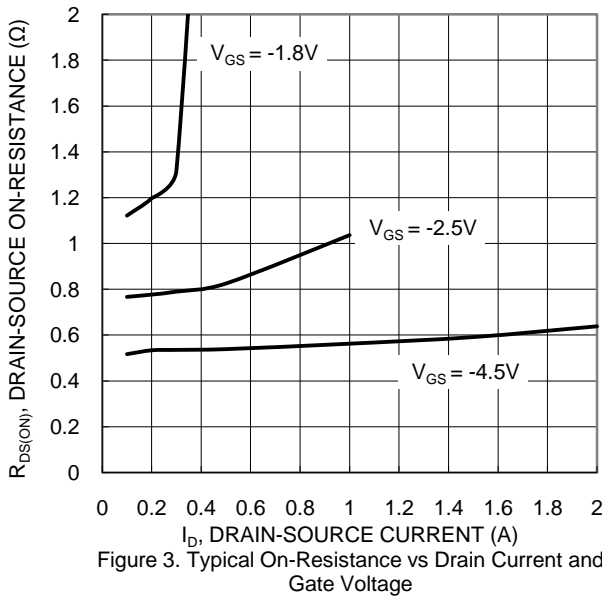
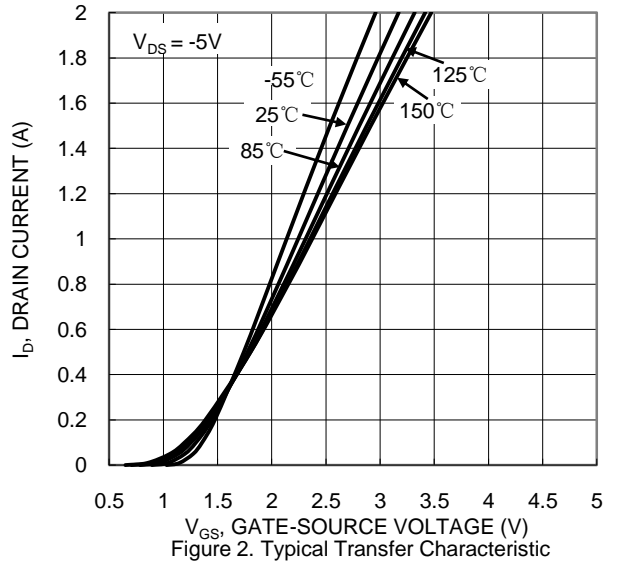
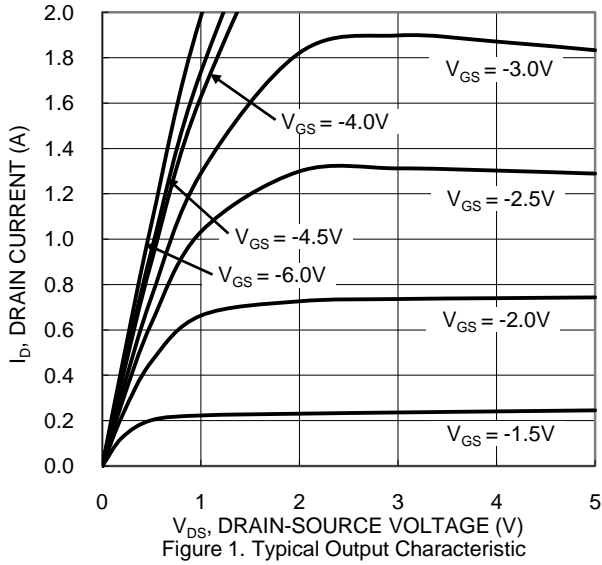
| Characteristic   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)   | P <sub>D</sub>                    | 0.31        | W    |
| Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 6) | R <sub>θJA</sub>                  | 398         | °C/W |
| Operating and Storage Temperature Range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

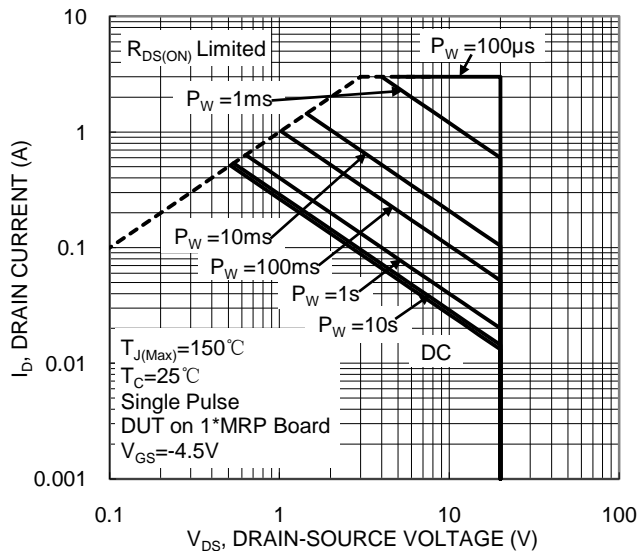
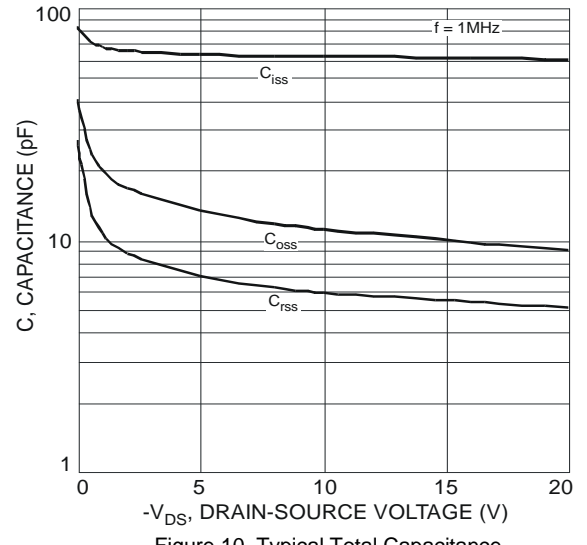
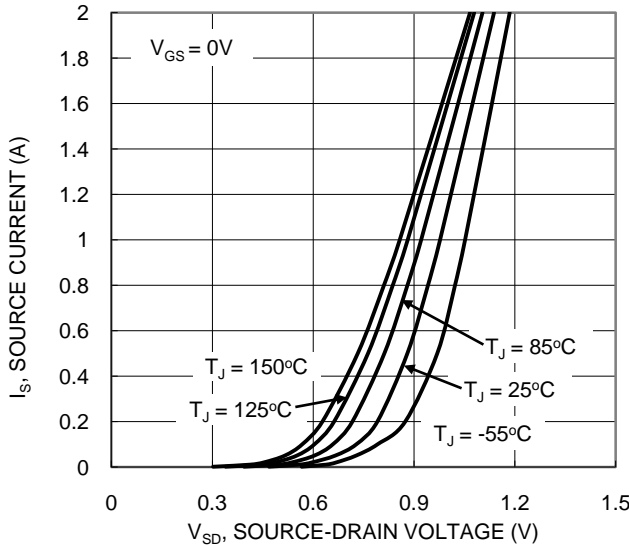
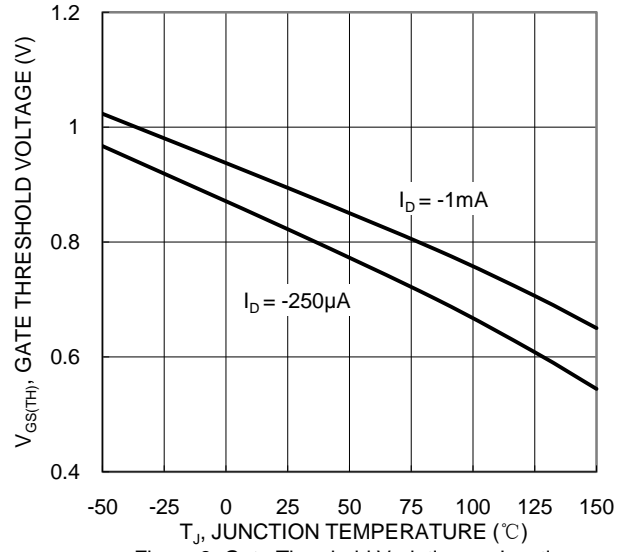
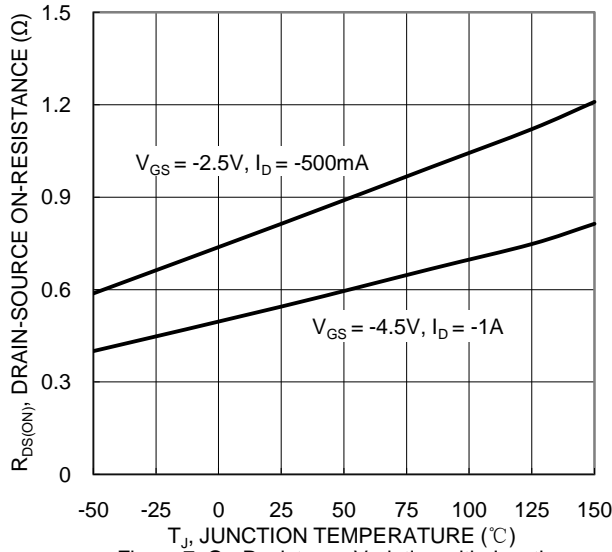
Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.  
7. Repetitive rating, pulse width limited by junction temperature.

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol              | Min  | Typ   | Max  | Unit | Test Condition   |
|--|---------------------|------|-------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 8)</b>                    |                     |      |       |      |      |  |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | -20  | -     | -    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | -    | -     | -100 | nA   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | -    | -     | ±2.0 | μA   | V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |      |       |      |      |  |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | -0.5 | -     | -1.0 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA  |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | -    | 0.5   | 0.75 | Ω    | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -430mA   |
|  |                     |      | 0.7   | 1.05 |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -300mA   |
|  |                     |      | 1.0   | 1.5  |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -150mA   |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | -    | 0.9   | -    | S    | V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA  |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | -    | -0.8  | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -150mA  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |      |       |      |      |  |
| Input Capacitance                                      | C <sub>iss</sub>    | -    | 59.76 | -    | pF   | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz  |
| Output Capacitance                                     | C <sub>oss</sub>    | -    | 12.07 | -    | pF   |  |
| Reverse Transfer Capacitance                           | C <sub>riss</sub>   | -    | 6.36  | -    | pF   |  |
| Total Gate Charge                                      | Q <sub>g</sub>      | -    | 622.4 | -    | pC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V,<br>I <sub>D</sub> = -250mA  |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | -    | 100.3 | -    | pC   |  |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | -    | 132.2 | -    | pC   |  |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | -    | 5.1   | -    | ns   | V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V,<br>R <sub>L</sub> = 47Ω, R <sub>G</sub> = 10Ω,<br>I <sub>D</sub> = -200mA |
| Turn-On Rise Time                                      | t <sub>R</sub>      | -    | 8.1   | -    | ns   |  |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | -    | 28.4  | -    | ns   |  |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | -    | 20.7  | -    | ns   |  |

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





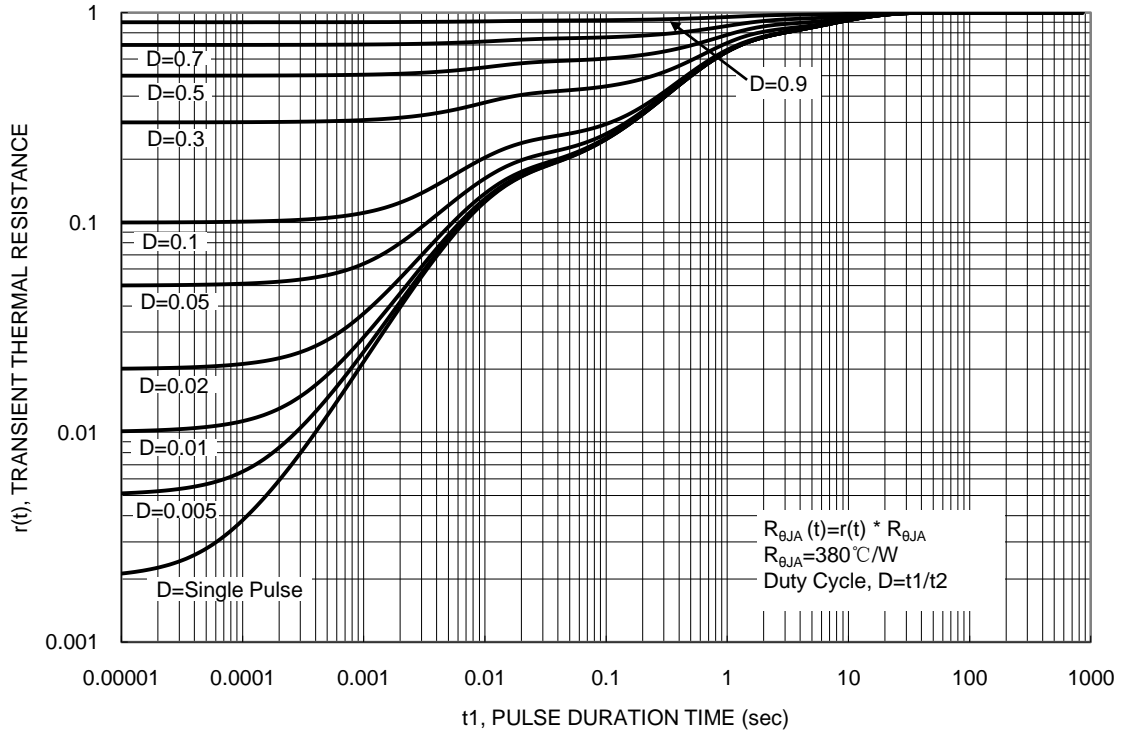
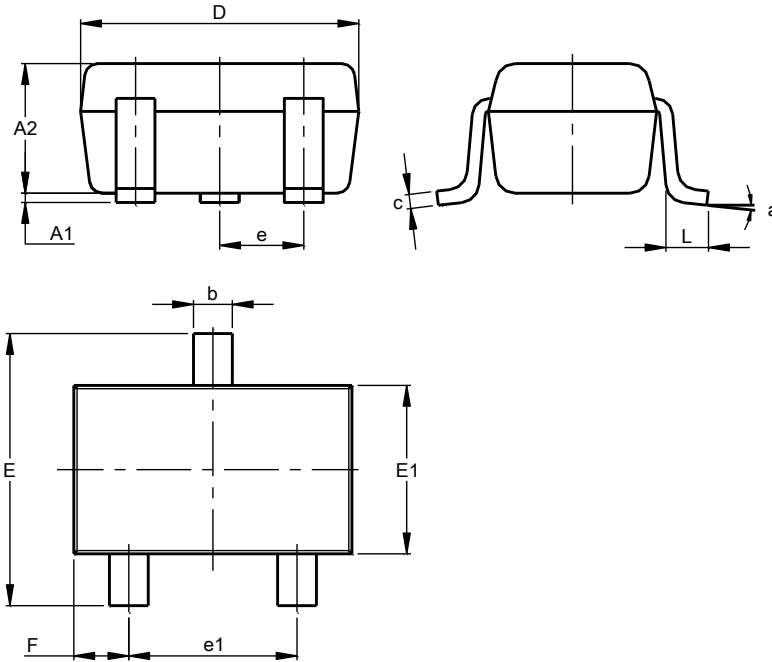


Figure 12. Transient Thermal Resistance

**Package Outline Dimensions**

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

**SOT323**

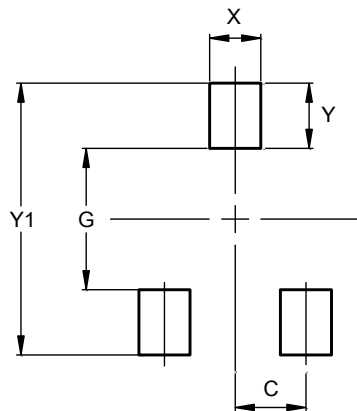


| SOT323               |           |       |       |
|----------------------|-----------|-------|-------|
| Dim                  | Min       | Max   | Typ   |
| A1                   | 0.00      | 0.10  | 0.05  |
| A2                   | 0.90      | 1.00  | 0.95  |
| b                    | 0.25      | 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 AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) 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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