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## 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**

## Mechanical Data

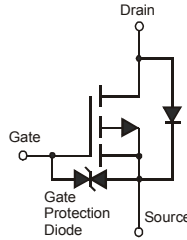
- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.006 grams (approximate)



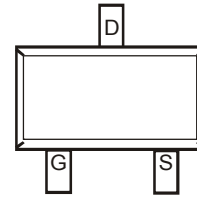
ESD PROTECTED



Top View



Equivalent Circuit



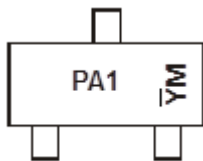
Top View

## Ordering Information (Note 4)

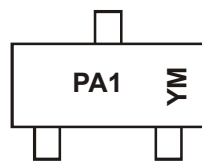
| Part Number | Case    | Packaging          |
|-------------|---------|--------------------|
| DMG1013UW-7 | SOT-323 | 3000 / Tape & Reel |

- 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

## Marking Information



Chengdu A/T Site



Shanghai A/T Site

PA1 = Product Type Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 YM = Date Code Marking for CAT (Chengdu Assembly/ Test site)  
 Y or Ȳ = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|
| Code | V    | W    | X    | Y    | Z    | A    | B    | C    |

| 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                    |              |                           | Symbol    | Value   | Unit |
|-----------------------------------|--------------|---------------------------|-----------|---------|------|
| Drain-Source Voltage              |              |                           | $V_{DSS}$ | -20     | V    |
| Gate-Source Voltage               |              |                           | $V_{GSS}$ | $\pm 6$ | V    |
| Continuous Drain Current (Note 5) | Steady State | $T_A = +25^\circ\text{C}$ | $I_D$     | -0.82   | A    |
|                                   |              | $T_A = +85^\circ\text{C}$ |           | -0.54   |      |
| Pulsed Drain Current (Note 6)     |              |                           | $I_{DM}$  | -6      | A    |

**Thermal Characteristics**

| Characteristic   | Symbol          | Value       | Unit               |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 5)   | $P_D$           | 0.31        | W                  |
| Thermal Resistance, Junction to Ambient @ $T_A = +25^\circ\text{C}$ (Note 5) | $R_{\theta JA}$ | 398         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range                                      | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

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

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic  | Symbol       | Min  | Typ   | Max       | Unit          | Test Condition   |
|---|--------------|------|-------|-----------|---------------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>                       |              |      |       |           |               |  |
| Drain-Source Breakdown Voltage                            | $BV_{DSS}$   | -20  | -     | -         | V             | $V_{GS} = 0V, I_D = -250\mu\text{A}$   |
| Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$ | $I_{DSS}$    | -    | -     | -100      | nA            | $V_{DS} = -20V, V_{GS} = 0V$   |
| Gate-Source Leakage                                       | $I_{GSS}$    | -    | -     | $\pm 2.0$ | $\mu\text{A}$ | $V_{GS} = \pm 4.5V, V_{DS} = 0V$   |
| <b>ON CHARACTERISTICS (Note 7)</b>                        |              |      |       |           |               |  |
| Gate Threshold Voltage                                    | $V_{GS(th)}$ | -0.5 | -     | -1.0      | V             | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$   |
| Static Drain-Source On-Resistance                         | $R_{DS(on)}$ | -    | 0.5   | 0.75      | $\Omega$      | $V_{GS} = -4.5V, I_D = -430\text{mA}$  |
|   |              |      | 0.7   | 1.05      |               | $V_{GS} = -2.5V, I_D = -300\text{mA}$  |
|   |              |      | 1.0   | 1.5       |               | $V_{GS} = -1.8V, I_D = -150\text{mA}$  |
| Forward Transfer Admittance                               | $ Y_{fs} $   | -    | 0.9   | -         | S             | $V_{DS} = -10V, I_D = -250\text{mA}$   |
| Diode Forward Voltage                                     | $V_{SD}$     | -    | -0.8  | -1.2      | V             | $V_{GS} = 0V, I_S = -150\text{mA}$   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>                   |              |      |       |           |               |  |
| Input Capacitance   | $C_{iss}$    | -    | 59.76 | -         | pF            | $V_{DS} = -16V, V_{GS} = 0V,$<br>$f = 1.0\text{MHz}$   |
| Output Capacitance  | $C_{oss}$    | -    | 12.07 | -         | pF            |  |
| Reverse Transfer Capacitance                              | $C_{rss}$    | -    | 6.36  | -         | pF            |  |
| Total Gate Charge   | $Q_g$        | -    | 622.4 | -         | pC            | $V_{GS} = -4.5V, V_{DS} = -10V,$<br>$I_D = -250\text{mA}$                                      |
| 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            | $V_{DD} = -10V, V_{GS} = -4.5V,$<br>$R_L = 47\Omega, R_G = 10\Omega,$<br>$I_D = -200\text{mA}$ |
| 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.



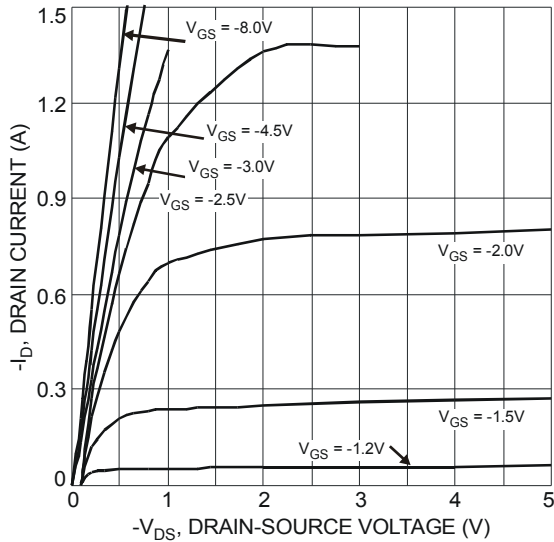


Fig. 1 Typical Output Characteristic

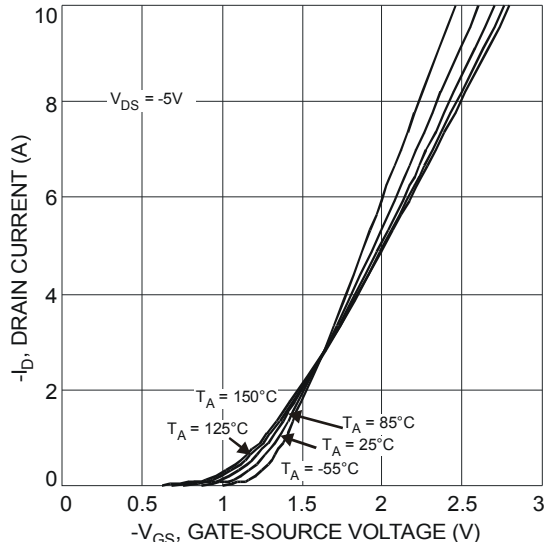


Fig. 2 Typical Transfer Characteristic

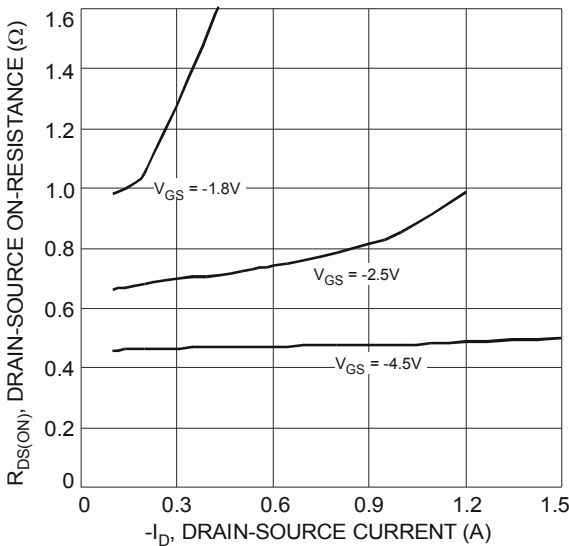


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

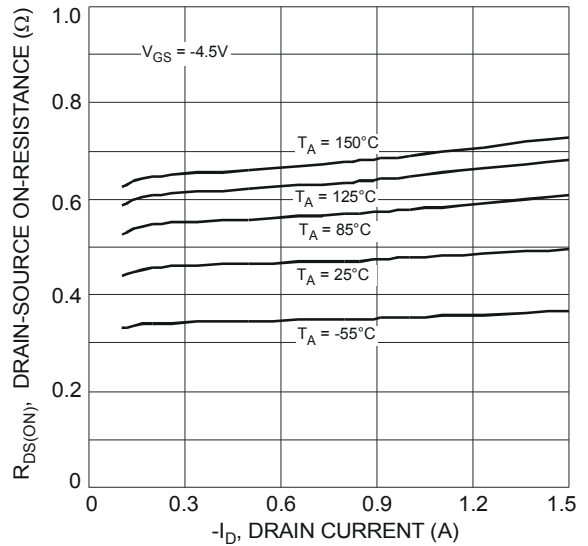


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

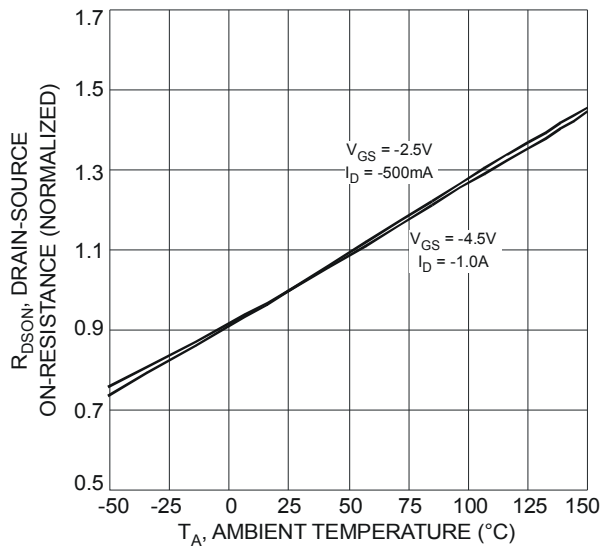


Fig. 5 On-Resistance Variation with Temperature

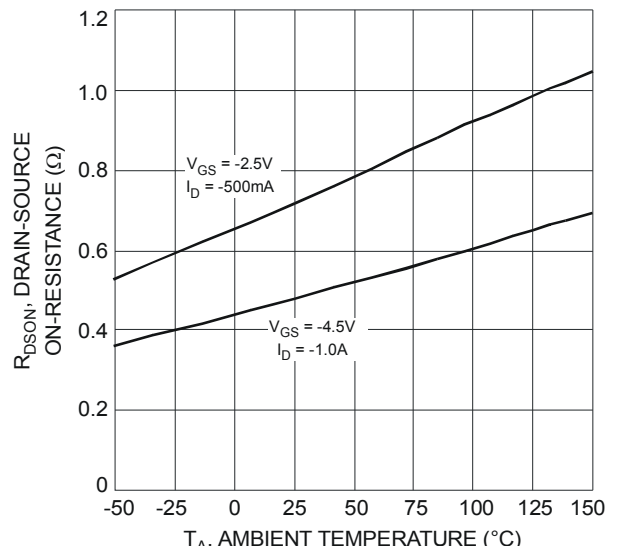


Fig. 6 On-Resistance Variation with Temperature

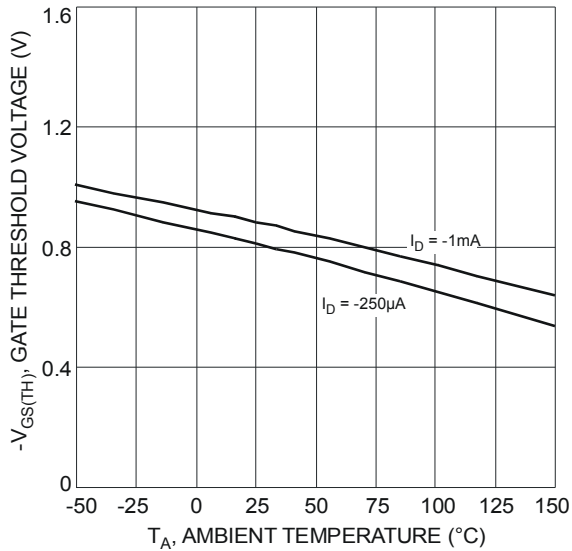


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

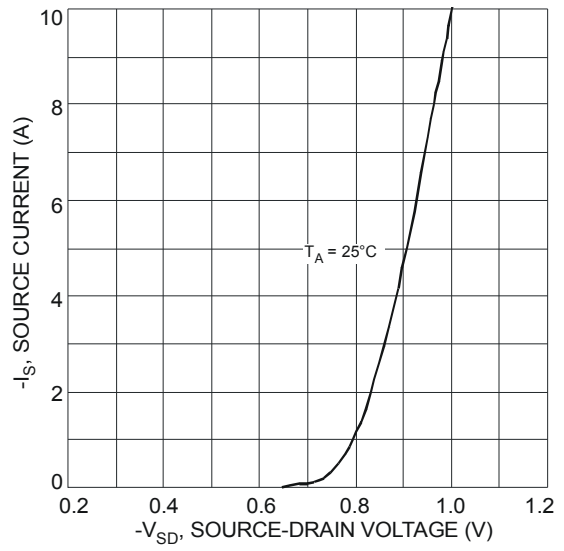


Fig. 8 Diode Forward Voltage vs. Current

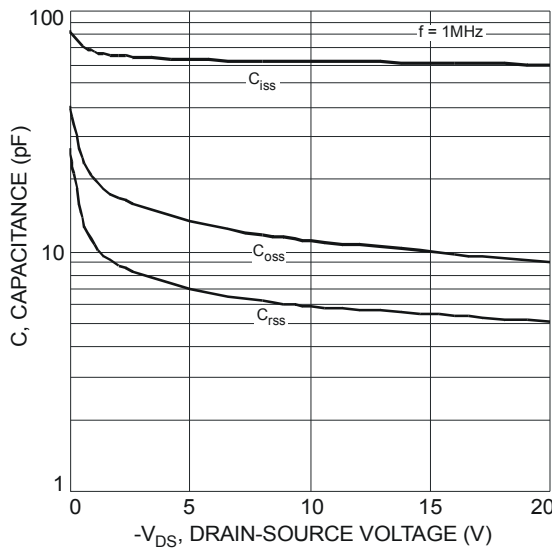


Fig. 9 Typical Total Capacitance

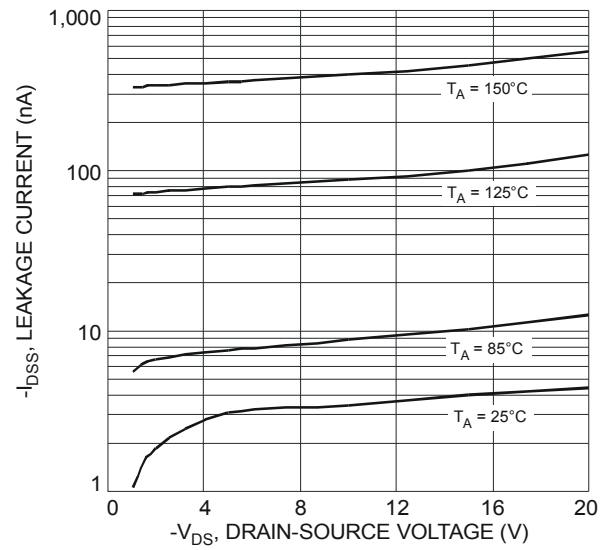


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

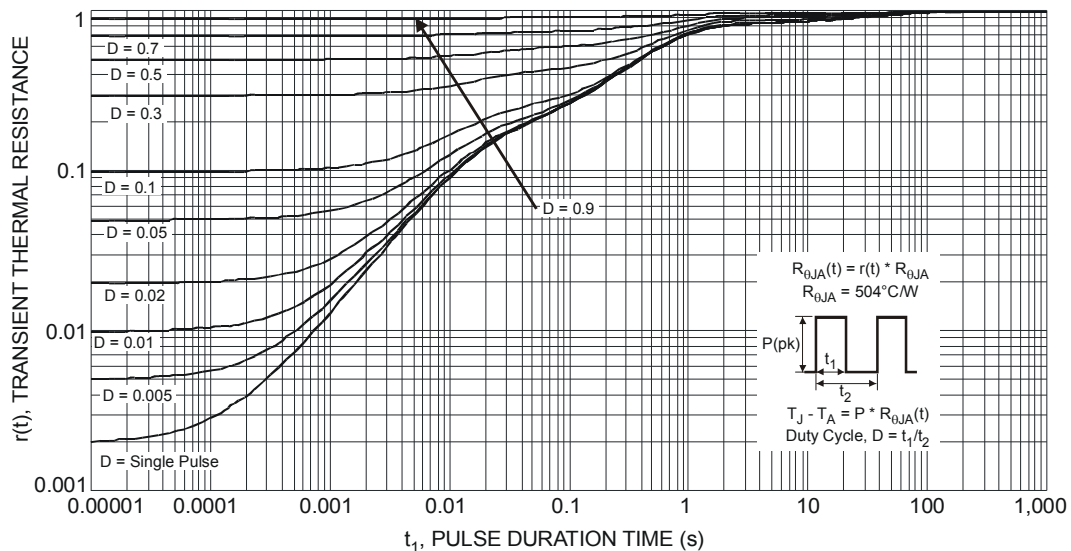
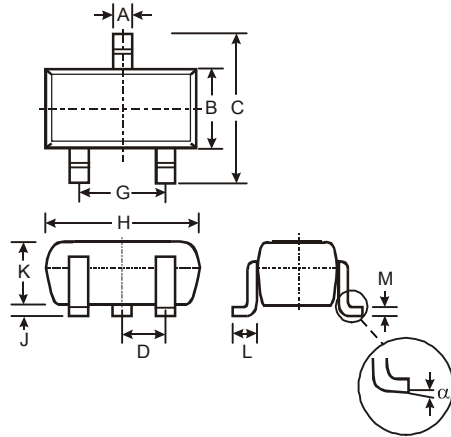


Fig. 11 Transient Thermal Response

**Package Outline Dimensions**

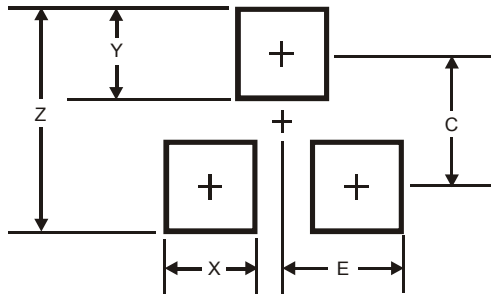
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT-323              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.25 | 0.40 | 0.30 |
| B                    | 1.15 | 1.35 | 1.30 |
| C                    | 2.00 | 2.20 | 2.10 |
| D                    | -    | -    | 0.65 |
| G                    | 1.20 | 1.40 | 1.30 |
| H                    | 1.80 | 2.20 | 2.15 |
| J                    | 0.0  | 0.10 | 0.05 |
| K                    | 0.90 | 1.00 | 0.95 |
| L                    | 0.25 | 0.40 | 0.30 |
| M                    | 0.10 | 0.18 | 0.11 |
| α                    | 0°   | 8°   | -    |
| All Dimensions in mm |      |      |      |

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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