

## Product Summary

| V <sub>(BR)DSS</sub> | R <sub>DS(ON)</sub> max        | Package | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|----------------------|--------------------------------|---------|--|
| -20V                 | 52mΩ @V <sub>GS</sub> = -4.5V  | SOT23   | -5.0A                                    |
|                      | 100mΩ @V <sub>GS</sub> = -2.5V |         | -3.6A                                    |

## Description

This MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

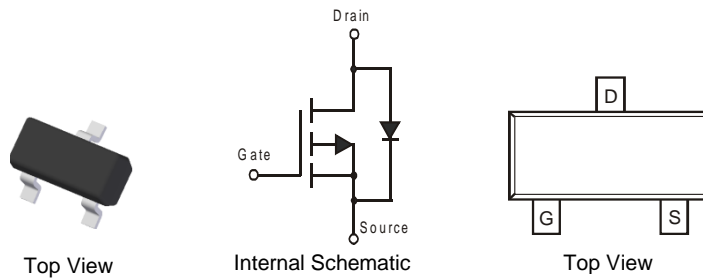
- Backlighting
- Power Management Functions
- DC-DC Converters
- Motor Control

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **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: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 **(e3)**
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (approximate)

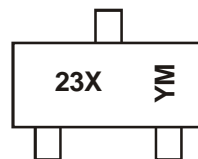


## Ordering Information (Note 4)

| Part Number  | Compliance | Case  | Packaging         |
|--------------|------------|-------|-------------------|
| DMG2305UX-7  | Standard   | SOT23 | 3000/Tape & Reel  |
| DMG2305UX-13 | Standard   | SOT23 | 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



23X = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: W = 2009)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|
| Code | 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  |              |  | Symbol           | Value        | Units |
|---|--------------|--|------------------|--------------|-------|
| Drain-Source Voltage                                      |              |  | V <sub>DSS</sub> | -20          | V     |
| Gate-Source Voltage                                       |              |  | V <sub>GSS</sub> | ±8           | V     |
| Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -4.2<br>-3.3 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -5.0<br>-4.0 | A     |
| Pulsed Drain Current (Note 6)                             |              |  | I <sub>DM</sub>  | -10          | A     |

**Thermal Characteristics**

| Characteristic                                   |              | Symbol                            | Value       | Unit |
|--|--------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                       |              | P <sub>D</sub>                    | 1.4         | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R <sub>θJA</sub>                  | 90          | °C/W |
|  | t < 10s      |                                   | 64          | °C/W |
| Thermal Resistance, Junction to Case (Note 7)    |              | R <sub>θJC</sub>                  | 33          | °C/W |
| Operating and Storage Temperature Range          |              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

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

| Characteristic                            | Symbol              | Min  | Typ  | Max  | Unit | Test Condition   |
|---|---------------------|------|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 7)</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           | I <sub>DSS</sub>    | —    | —    | -1.0 | μA   | T <sub>J</sub> = +25°C, V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V                         |
| Gate-Source Leakage                       | I <sub>GSS</sub>    | —    | —    | ±100 | nA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 7)</b>        |                     |      |      |      |      |  |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | -0.5 | —    | -0.9 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                  |
| Static Drain-Source On-Resistance         | R <sub>DS(on)</sub> | —    | 40   | 52   | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.2A  |
|   |                     |      | 52   | 100  |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.4A  |
|   |                     |      | 68   | 200  |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2A  |
| Forward Transfer Admittance               | Y <sub>fs</sub>     | —    | 9    | —    | S    | V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>   |                     |      |      |      |      |  |
| Input Capacitance                         | C <sub>iss</sub>    | —    | 808  | —    | pF   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                   |
| Output Capacitance                        | C <sub>oss</sub>    | —    | 85   | —    | pF   |  |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    | —    | 77   | —    | pF   |  |
| Gate Resistance                           | R <sub>G</sub>      | —    | 15.2 | —    | Ω    | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1.0MHz                                       |
| <b>SWITCHING CHARACTERISTICS (Note 8)</b> |                     |      |      |      |      |  |
| Total Gate Charge                         | Q <sub>g</sub>      | —    | 10.2 | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -4V,<br>I <sub>D</sub> = -3.5A                    |
| Gate-Source Charge                        | Q <sub>gs</sub>     | —    | 1.3  | —    | nC   |  |
| Gate-Drain Charge                         | Q <sub>gd</sub>     | —    | 2.2  | —    | nC   |  |
| Turn-On Delay Time                        | t <sub>D(on)</sub>  | —    | 10.8 | —    | ns   | V <sub>DS</sub> = -4V, V <sub>GS</sub> = -4.5V,<br>R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A |
| Turn-On Rise Time                         | t <sub>r</sub>      | —    | 13.7 | —    | ns   |  |
| Turn-Off Delay Time                       | t <sub>D(off)</sub> | —    | 79.3 | —    | ns   |  |
| Turn-Off Fall Time                        | t <sub>f</sub>      | —    | 34.7 | —    | ns   |  |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Repetitive rating, pulse width limited by junction temperature.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing

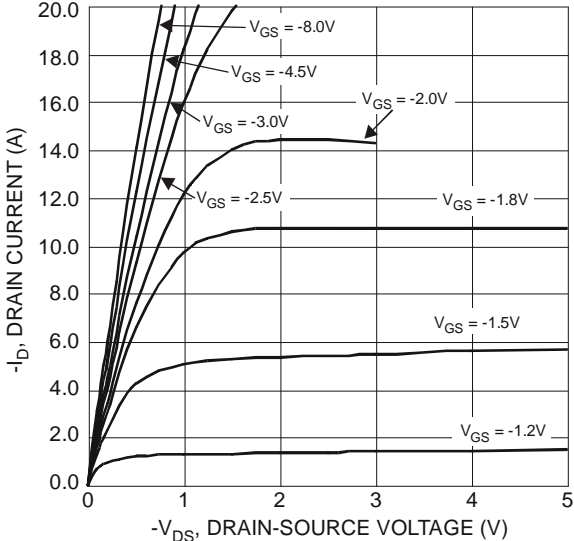


Figure 1 Typical Output Characteristics

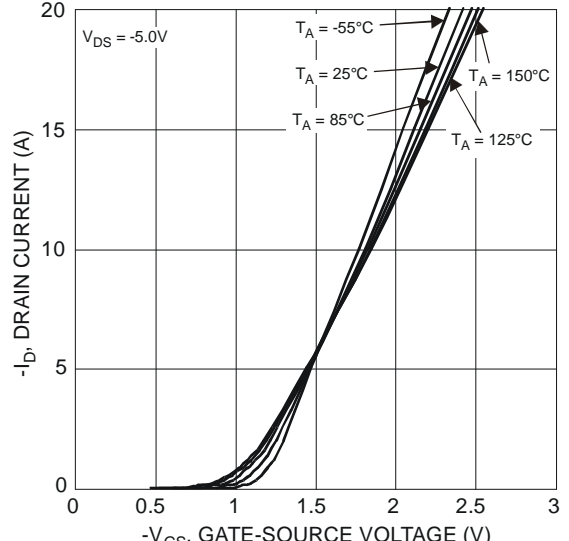


Figure 2 Typical Transfer Characteristics

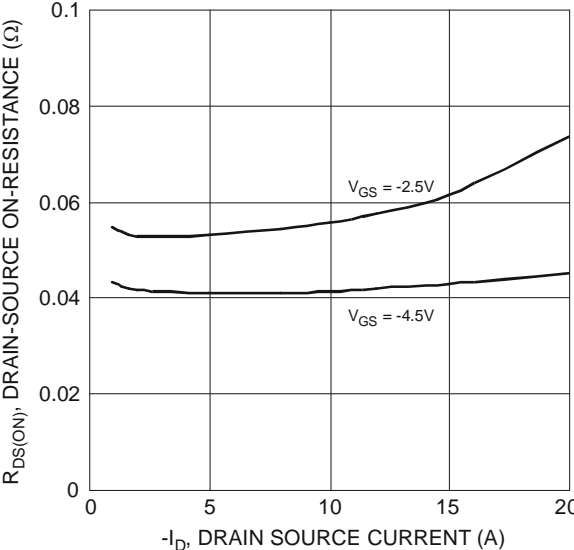


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

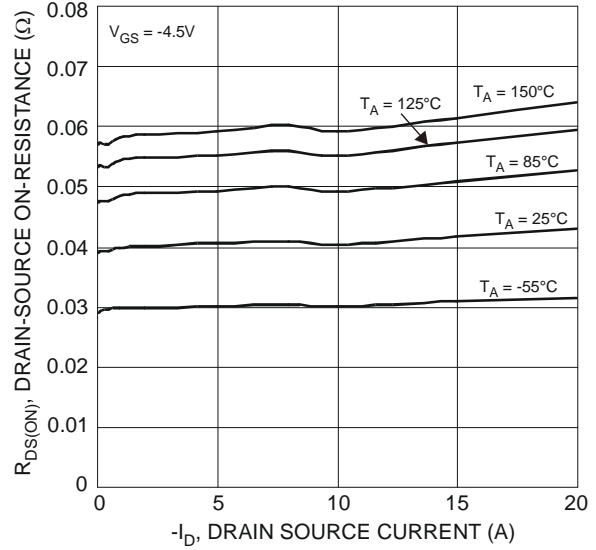


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

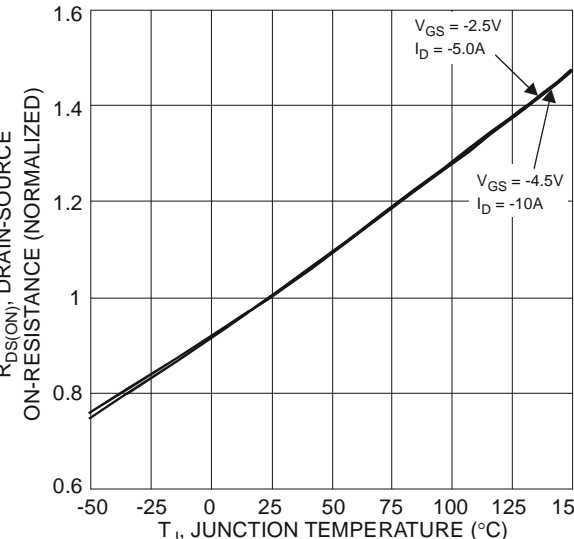


Figure 5 On-Resistance Variation with Temperature

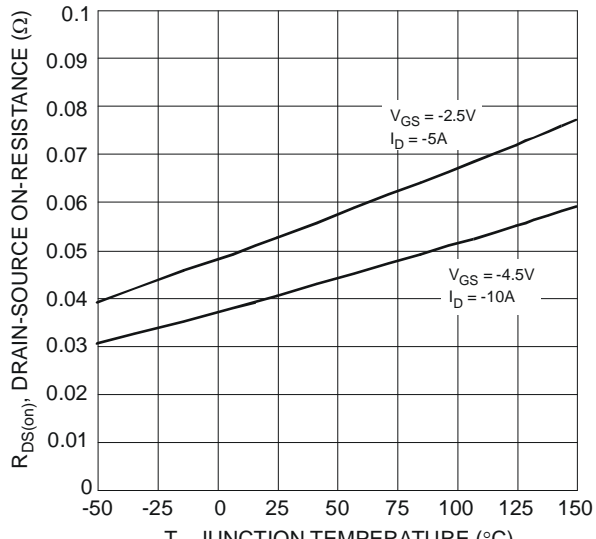


Figure 6 On-Resistance Variation with Temperature

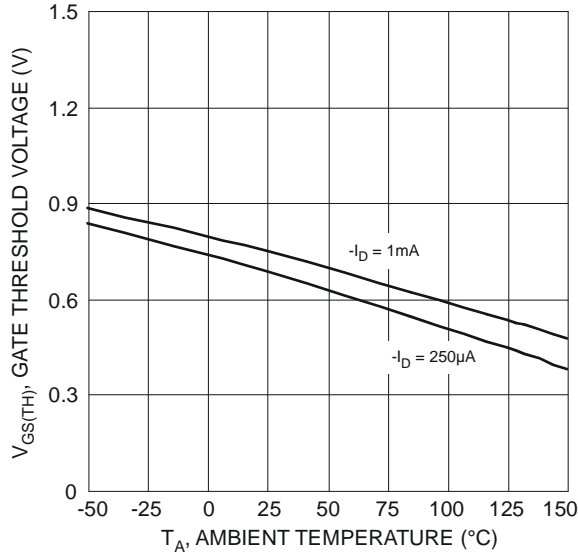


Figure 7 Gate Threshold Variation vs. Ambient Temperature

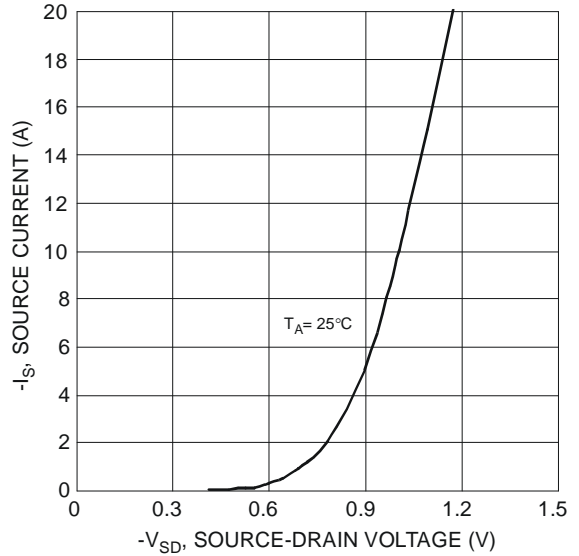
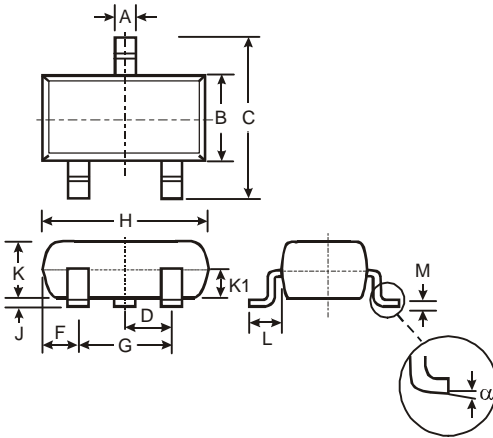


Figure 8 Diode Forward Voltage vs. Current

## Package Outline Dimensions

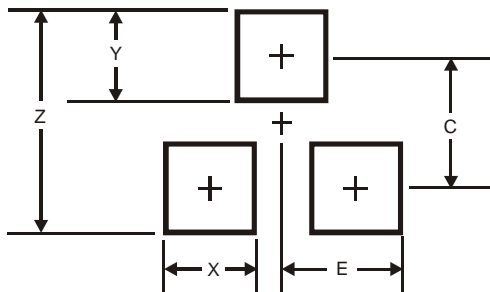
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT23                |       |      |       |
|----------------------|-------|------|-------|
| Dim                  | Min   | Max  | Typ   |
| A                    | 0.37  | 0.51 | 0.40  |
| B                    | 1.20  | 1.40 | 1.30  |
| C                    | 2.30  | 2.50 | 2.40  |
| D                    | 0.89  | 1.03 | 0.915 |
| F                    | 0.45  | 0.60 | 0.535 |
| G                    | 1.78  | 2.05 | 1.83  |
| H                    | 2.80  | 3.00 | 2.90  |
| J                    | 0.013 | 0.10 | 0.05  |
| K                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| $\alpha$             | 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          | 2.9           |
| X          | 0.8           |
| Y          | 0.9           |
| C          | 2.0           |
| E          | 1.35          |

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