

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | Package | I _D T _A = +25°C |
|-------------------|--------------------------------|---------|------------------------------------------|
| -20V | 52mΩ @V _{GS} = -4.5V | SOT23 | -5.0A |
| | 100mΩ @V _{GS} = -2.5V | | -3.6A |

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**
- **PPAP Capable (Note 4)**

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

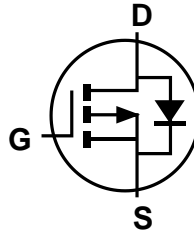
- Backlighting
- Power Management Functions
- DC-DC Converters
- Motor Control

Mechanical Data

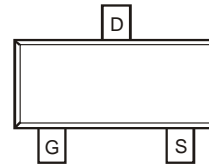
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



Top View



Internal Schematic



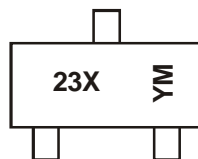
Top View

Ordering Information (Note 5)

| Part Number | Compliance | Case | Packaging |
|---------------|------------|-------|--------------------|
| DMG2305UXQ-7 | Automotive | SOT23 | 3,000/Tape & Reel |
| DMG2305UXQ-13 | Automotive | SOT23 | 10,000/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



23X = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: F = 2018)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2009 | ~ | 2016 | 2017 | 2018 | 2019 | 2020 | | | | | |
|-------|------|-----|------|------|------|------|------|-----|-----|-----|-----|-----|
| Code | W | ~ | D | E | F | G | H | | | | | |
| 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°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit | |
|-----------------------------------------------------------|--------------|------------------|--------------------------------------------------|--------------|---|
| Drain-Source Voltage | | V _{DSS} | -20 | V | |
| Gate-Source Voltage | | V _{GSS} | ±8 | V | |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | I _D | T _A = +25°C T _A = +70°C | -4.2 -3.3 | A |
| | t < 10s | | T _A = +25°C T _A = +70°C | -5.0 -4.0 | A |
| Pulsed Drain Current (Note 7) | | I _{DM} | -15 | A | |

Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|--------------------------------------------------|--------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 6) | | P _D | 1.4 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 90 | °C/W |
| | t < 10s | | 64 | °C/W |
| Thermal Resistance, Junction to Case (Note 8) | | R _{θJC} | 33 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|----------------------------------------------------------|---------------------|------|------|------|------|----------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| 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} | — | — | -1.0 | μA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.5 | — | -0.9 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 40 | 52 | mΩ | V _{GS} = -4.5V, I _D = -4.2A |
| | | | 52 | 100 | | V _{GS} = -2.5V, I _D = -3.4A |
| | | | 68 | 200 | | V _{GS} = -1.8V, I _D = -2A |
| Forward Transfer Admittance | Y _{FS} | — | 9 | — | S | V _{DS} = -5V, I _D = -4A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 808 | — | pF | V _{DS} = -15V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 85 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 77 | — | pF | |
| Gate Resistance | R _G | — | 15.2 | — | Ω | V _{GS} = 0V, V _{DS} = 0V, f = 1.0MHz |
| SWITCHING CHARACTERISTICS (Note 9) | | | | | | |
| Total Gate Charge | Q _G | — | 10.2 | — | nC | V _{GS} = -4.5V, V _{DS} = -4V, I _D = -3.5A |
| Gate-Source Charge | Q _{GS} | — | 1.3 | — | nC | |
| Gate-Drain Charge | Q _{GD} | — | 2.2 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 10.8 | — | ns | V _{DS} = -4V, V _{GS} = -4.5V, R _G = 6Ω, I _D = -1A |
| Turn-On Rise Time | t _R | — | 13.7 | — | ns | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 79.3 | — | ns | |
| Turn-Off Fall Time | t _F | — | 34.7 | — | ns | |

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

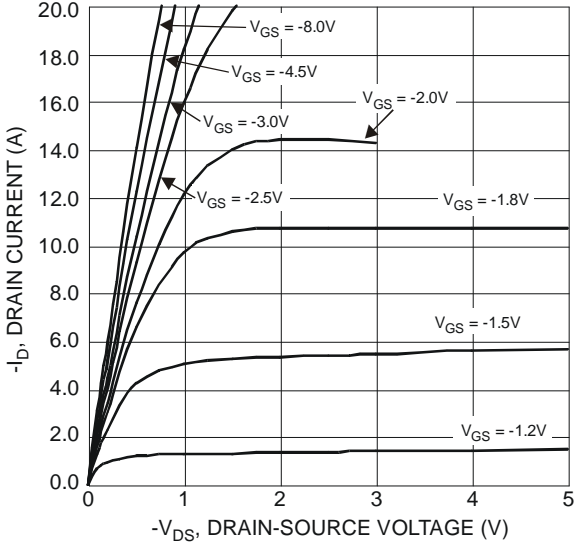


Figure 1 Typical Output Characteristics

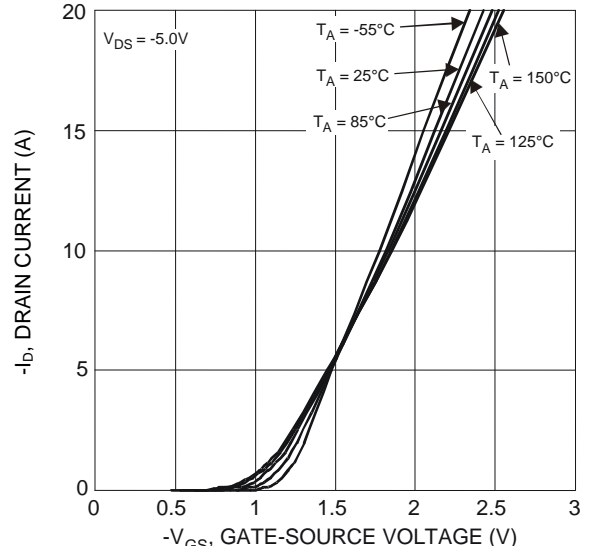


Figure 2 Typical Transfer Characteristics

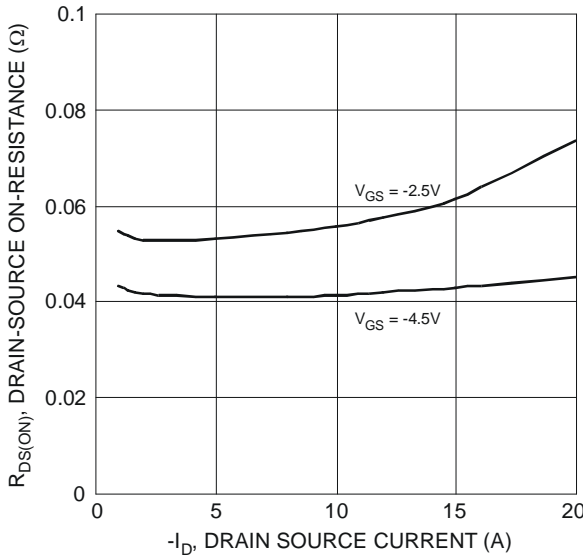


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

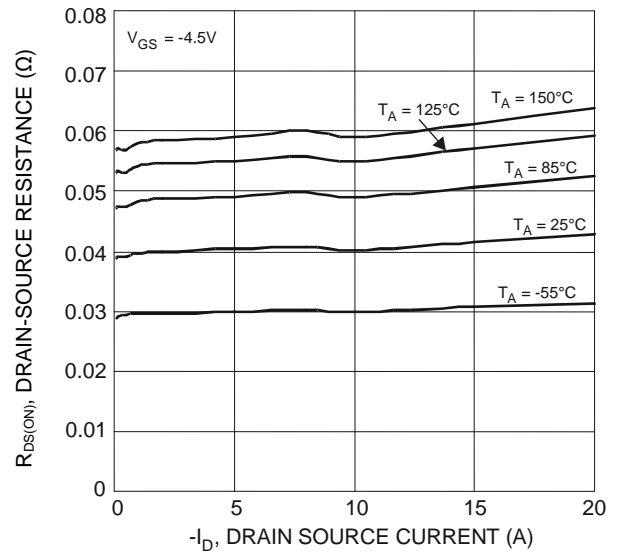


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

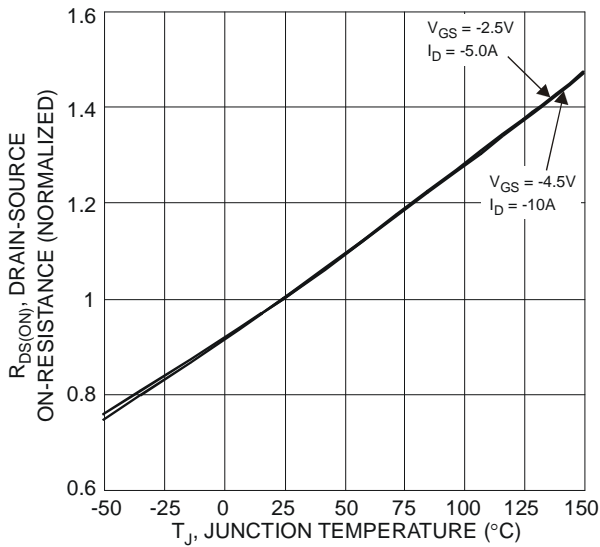


Figure 5 On-Resistance Variation with Temperature

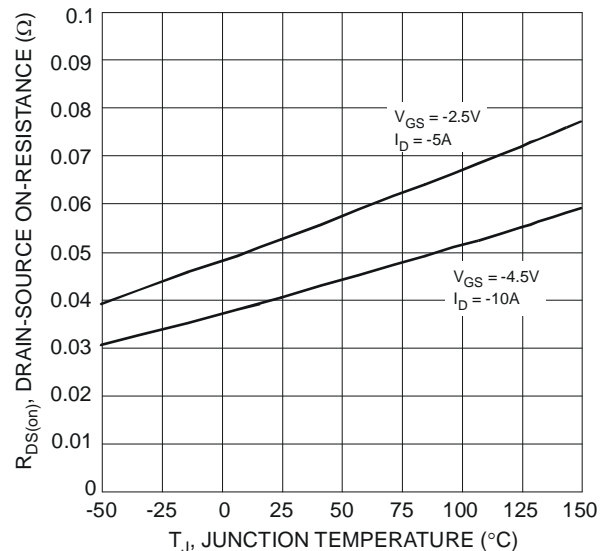


Figure 6 On-Resistance Variation with Temperature

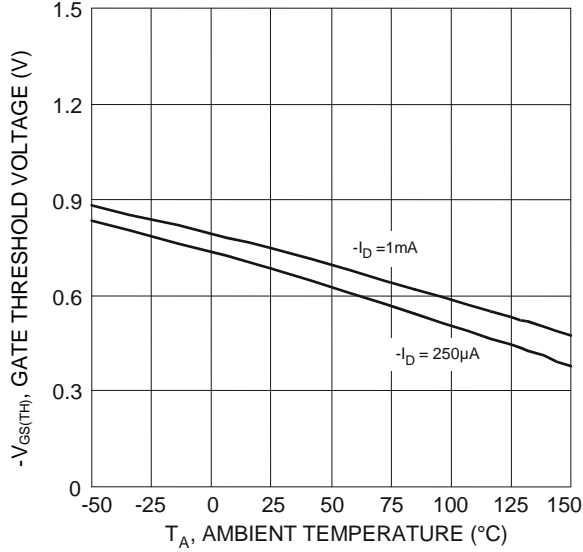


Figure 7 Gate Threshold Variation vs. Ambient Temperature

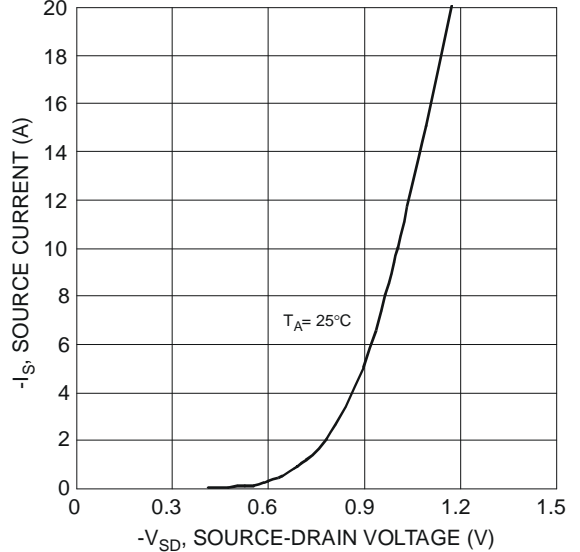


Figure 8 Diode Forward Voltage vs. Current

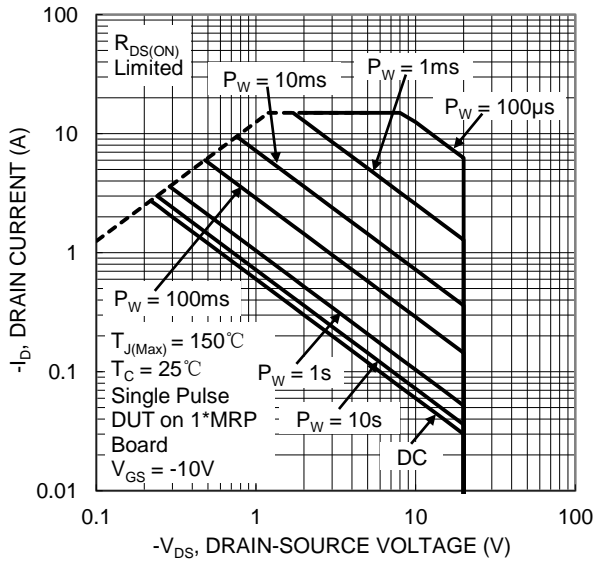
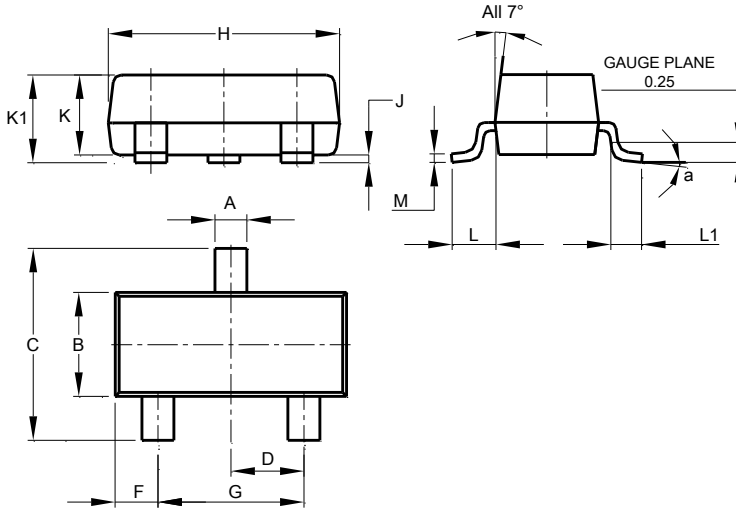


Figure 9 SOA, Safe Operation Area

Package Outline Dimensions

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

SOT23

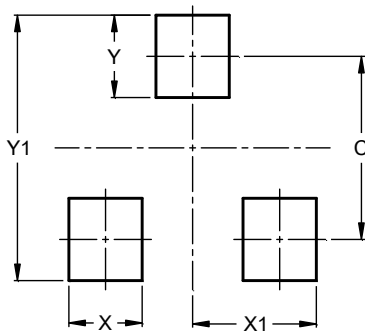


| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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