

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = +25^\circ\text{C}$ |
|---------------|-----------------------------|------------------------------------|
| 25V | 4Ω @ $V_{GS} = 4.5\text{V}$ | 0.24A |
| | 5Ω @ $V_{GS} = 2.7\text{V}$ | 0.22A |

Description

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

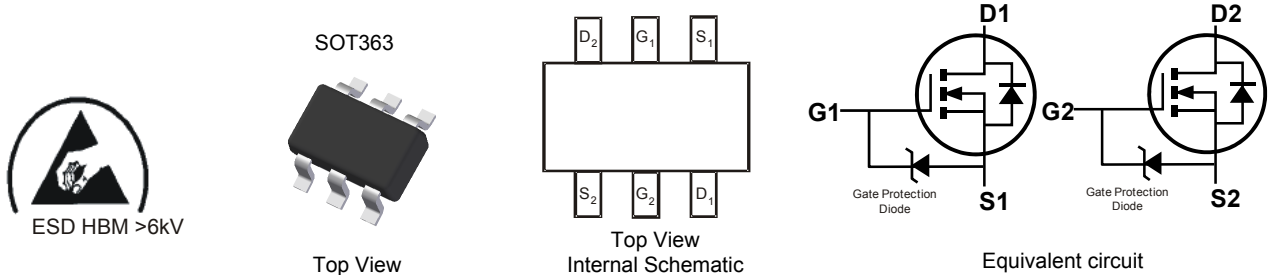
- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Small Surface Mount Package
- ESD Protected Gate (>6kV Human Body Model)
- **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: SOT363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 (E3)
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)

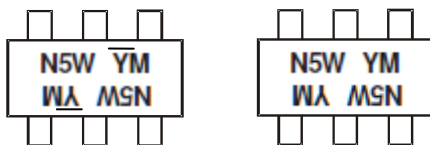


Ordering Information (Note 4)

| Part Number | Compliance | Case | Packaging |
|---------------|------------|--------|--------------------|
| DMG6301UDW-7 | Standard | SOT363 | 3,000/Tape & Reel |
| DMG6301UDW-13 | Standard | SOT363 | 10,000/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 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



N5W= 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 Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|------|------|------|------|------|------|------|------|
| Code | Z | A | B | C | D | E | F |

| 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 | Units | |
|--|-----------|--|--------------|---|
| Drain-Source Voltage | V_{DSS} | 25 | V | |
| Gate-Source Voltage | V_{GSS} | 8 | V | |
| Continuous Drain Current, $V_{GS} = 4.5\text{V}$ (Note 6) | I_D | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | 0.24 0.19 | A |
| Continuous Drain Current, $V_{GS} = 2.7\text{V}$ (Note 6) | | $T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$ | 0.22 0.17 | A |
| Pulsed Drain Current (10 μs pulse, duty cycle = 1%) | I_{DM} | 1.5 | A | |

Thermal Characteristics

| Characteristic | Symbol | Value | Units | |
|---|-----------------|-------------|------------------|--------------------|
| Total Power Dissipation | P_D | (Note 5) | 0.3 | W |
| | | (Note 6) | 0.37 | |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | (Note 5) | 409 | $^\circ\text{C/W}$ |
| | | (Note 6) | 334 | |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 137 | $^\circ\text{C}$ | |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ | |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|--------------|------|------|-----|---------------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 25 | — | — | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 1 | μA | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Body Leakage | I_{GSS} | — | — | 100 | nA | $V_{GS} = 8\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.65 | 0.85 | 1.5 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 3.8 | 4 | Ω | $V_{GS} = 4.5\text{V}, I_D = 0.4\text{A}$ |
| | | — | 3.1 | 5 | Ω | $V_{GS} = 2.7\text{V}, I_D = 0.2\text{A}$ |
| Forward Transconductance | $ Y_{fs} $ | — | 1 | — | S | $V_{DS} = 5\text{V}, I_D = 0.4\text{A}$ |
| Diode Forward Voltage | V_{SD} | — | 0.76 | 1.2 | V | $V_{DS} = V_{GS}, I_D = 0.25\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | 27.9 | — | pF | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 6.1 | — | | |
| Reverse Transfer Capacitance | C_{rss} | — | 2 | — | | |
| Total Gate Charge | Q_g | — | 0.36 | — | nC | $V_{GS} = 4.5\text{V}, V_{DS} = 5\text{V}, I_D = 0.2\text{A}$ |
| Gate-Source Charge | Q_{gs} | — | 0.06 | — | | |
| Gate-Drain Charge | Q_{gd} | — | 0.04 | — | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 2.9 | — | nS | $V_{GS} = 4.5\text{V}, V_{DS} = 6\text{V}, I_D = 0.5\text{A}, R_{\theta} = 50\Omega$ |
| Turn-On Rise Time | t_r | — | 1.8 | — | | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 6.6 | — | | |
| Turn-Off Fall Time | t_f | — | 2.3 | — | | |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

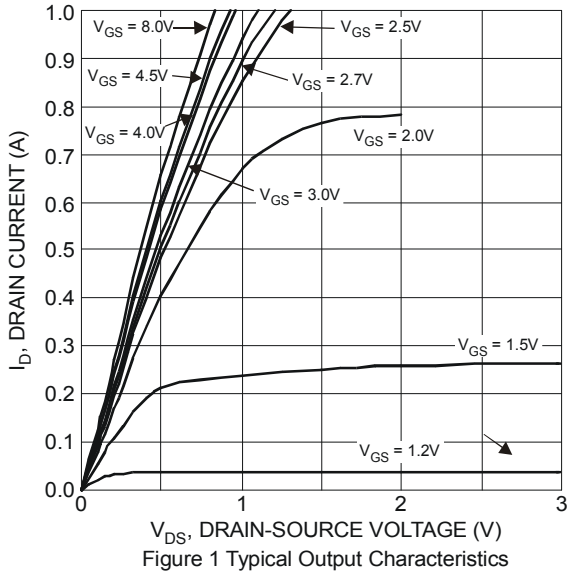


Figure 1 Typical Output Characteristics

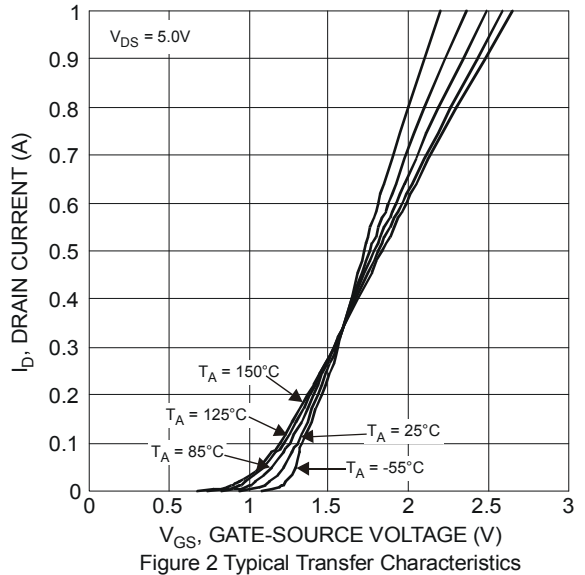


Figure 2 Typical Transfer Characteristics

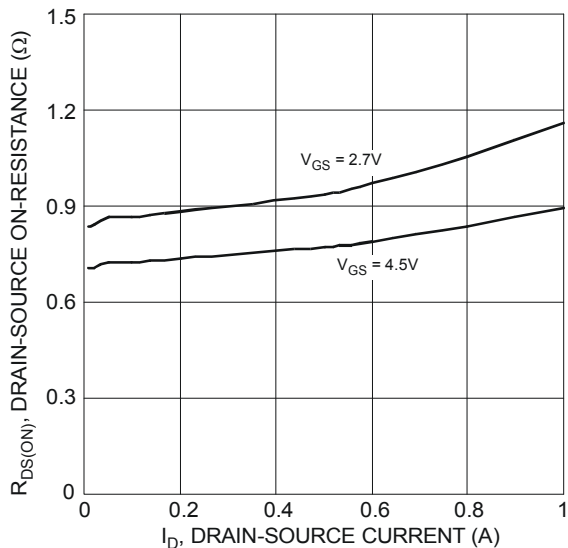


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

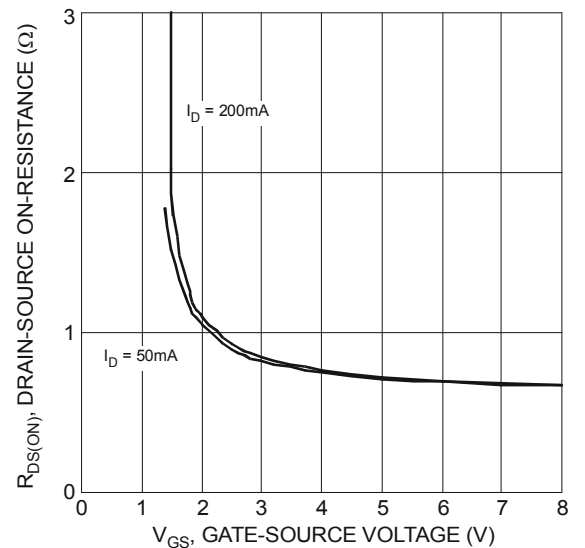


Figure 4 Typical Transfer Characteristics

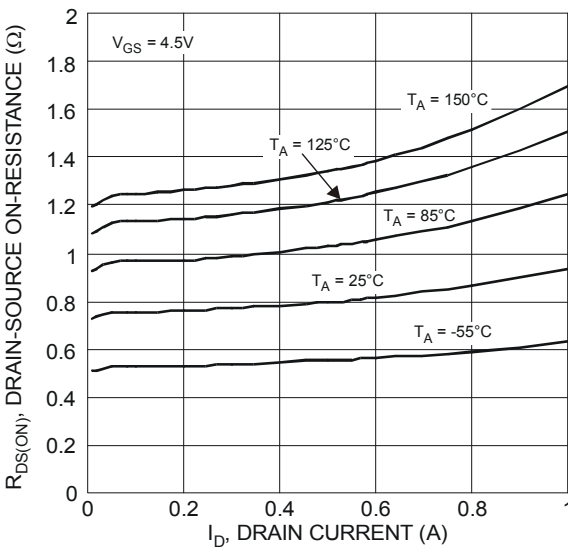


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

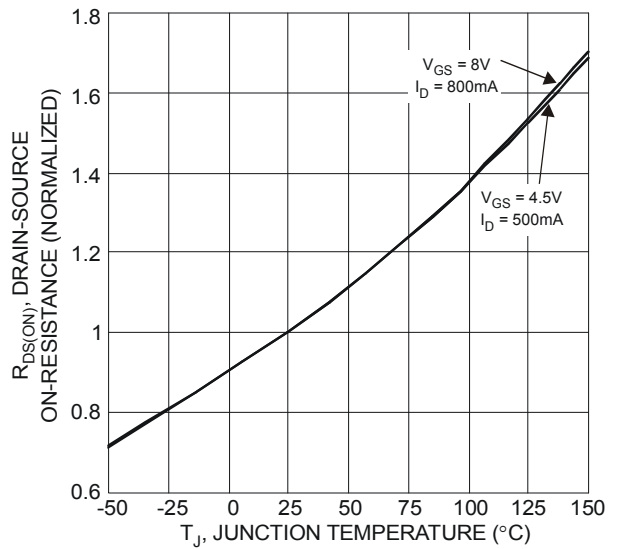


Figure 6 On-Resistance Variation with Temperature

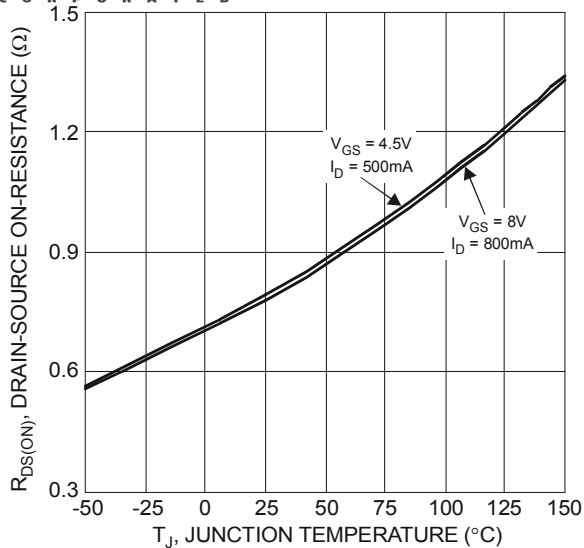


Figure 7 On-Resistance Variation with Temperature

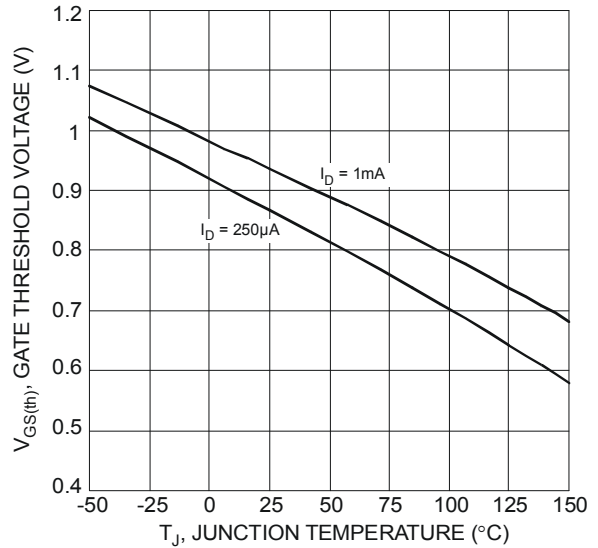


Figure 8 Gate Threshold Variation vs. Ambient Temperature

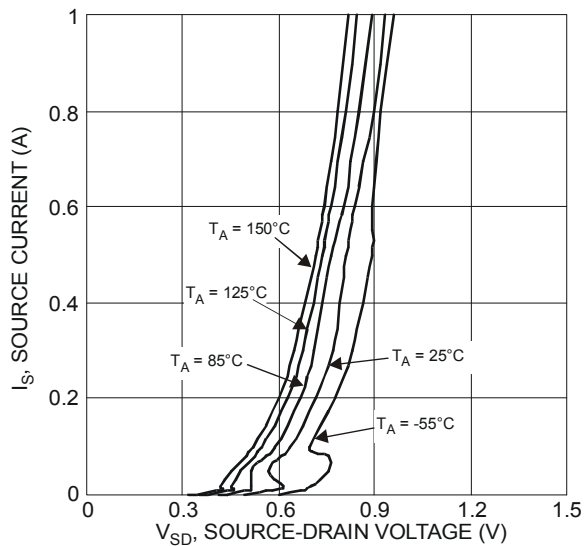


Figure 9 Diode Forward Voltage vs. Current

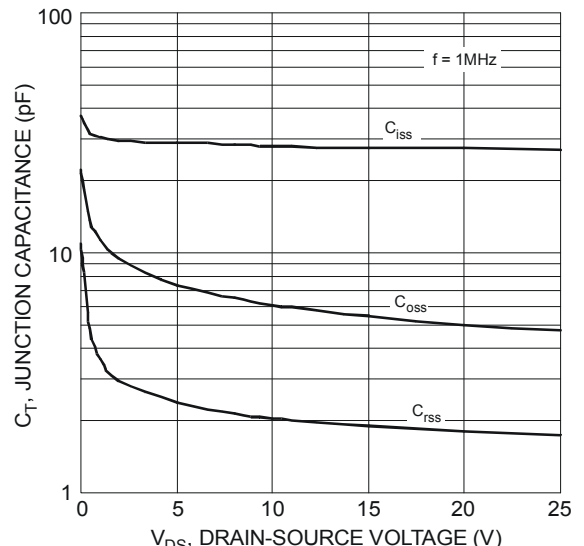


Figure 10 Typical Junction Capacitance

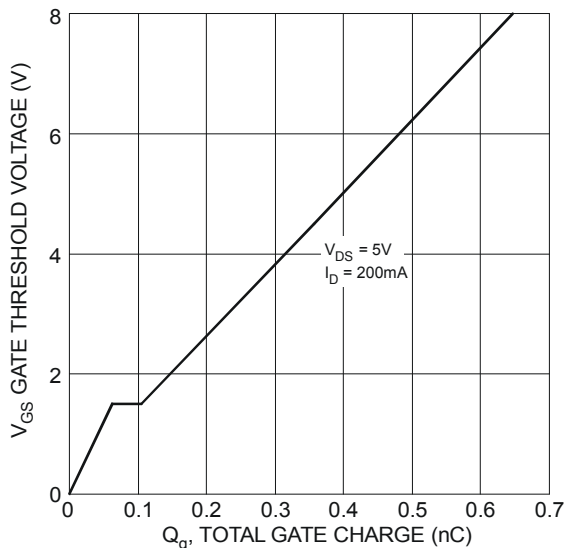
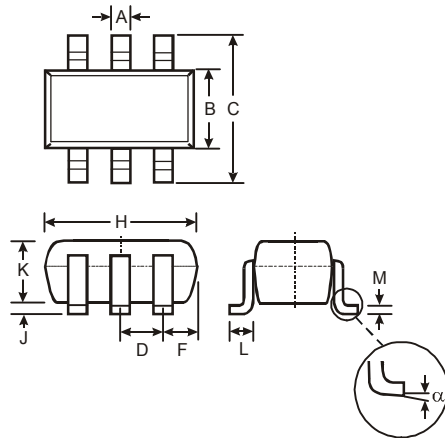


Figure 11 Gate Charge

Package Outline Dimensions

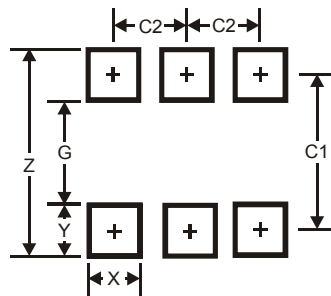
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT363 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| 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 | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

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