# DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

NEW PRODUCT

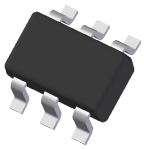
## Features

- Low Gate Charge
- Low $R_{DS(ON)}$:
  - 24mΩ @ $V_{GS}$ = 4.5V
  - 28mΩ @ $V_{GS}$ = 2.5V
  - 34mΩ @ $V_{GS}$ = 1.8V
- Low Input/Output Leakage
- **ESD Protected up to 2kV HBM**
- **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**

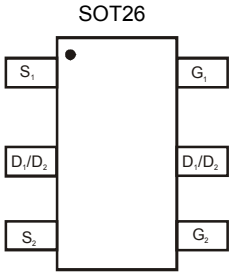
## Mechanical Data

- Case: SOT26
- Case Material - Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin annealed over Copper leadframe Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.0008 grams (approximate)

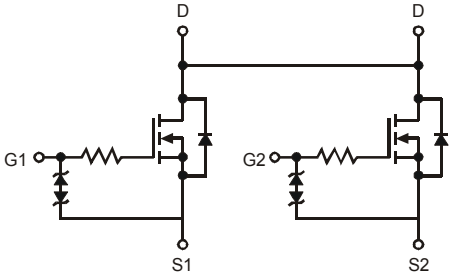
ESD PROTECTED TO 2kV



Top View




Top View
Pin Configuration



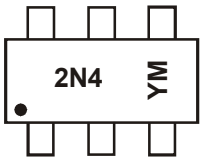

Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMG6968UDM-7 | SOT26 | 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 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




2N4 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: W = 2009)
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 |

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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage (Note 5) | | $V_{GSS}$ | ±12 | V |
| Drain Current (Note 6) Continuous | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 6.5<br>5.2 | A |
| Pulsed Drain Current (Note 7) | | $I_{DM}$ | 30 | A |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 6) | $P_D$ | 0.85 | W |
| Thermal Resistance, Junction to Ambient (Note 6) t ≤10s | $R_{\theta JA}$ | 147 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 5. AEC-Q101 VGS maximum is ±9.6V.
6. Device mounted on 1"x1", FR-4 PC board with 2 oz. Copper and test pulse width t ≤10s.
7. Repetitive Rating, pulse width limited by junction temperature.

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **STATIC CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | — | — | V | $I_D$ = 250μA, $V_{GS}$ = 0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 20V, $V_{GS}$ = 0V |
| Gate-Body Leakage Current | $I_{GSS}$ | — | — | ±10 | μA | $V_{DS}$ = 0V, $V_{GS}$ = ±10V |
| Gate-Source Breakdown Voltage | $BV_{SGS}$ | ±12 | — | — | V | $V_{DS}$ = 0V, $I_G$ = ±250μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.5 | — | 0.9 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| Static Drain-Source On-Resistance (Note 8) | $R_{DS\ (ON)}$ | — | 17<br>20<br>26 | 24<br>28<br>34 | mΩ | $V_{GS}$ = 4.5V, $I_D$ = 6.5A<br>$V_{GS}$ = 2.5V, $I_D$ = 5.5A<br>$V_{GS}$ = 1.8V, $I_D$ = 3.5A |
| Forward Transfer Admittance | $\|Y_{FS}\|$ | — | 8 | — | S | $V_{DS}$ = 10V, $I_D$ = 5A |
| Diode Forward Voltage (Note 8) | $V_{SD}$ | — | 0.7 | 1.0 | V | $I_S$ = 2.25A, $V_{GS}$ = 0V |
| **DYNAMIC CHARACTERISTICS (Note 9)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 143 | — | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 74 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 29 | — | pF | |
| Gate Resisitance | $R_G$ | — | 202 | — | Ω | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz |
| **SWITCHING CHARACTERISTICS (Note 9)** | | | | | | |
| Total Gate Charge | $Q_g$ | — | 8.8 | — | nC | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$ = 6.5A |
| Gate-Source Charge | $Q_{gs}$ | — | 1.4 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 3.0 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 53 | — | ns | $V_{DD}$ = 10V, $V_{GS}$ = 4.5V,<br>$R_L$ = 10Ω, $R_G$ = 6Ω |
| Turn-On Rise Time | $t_r$ | — | 78 | — | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 562 | — | ns | |
| Turn-Off Fall Time | $t_f$ | — | 234 | — | ns | |

Notes: 8. Test pulse width t = 300ms.
9. Guaranteed by design. Not subject to production testing.

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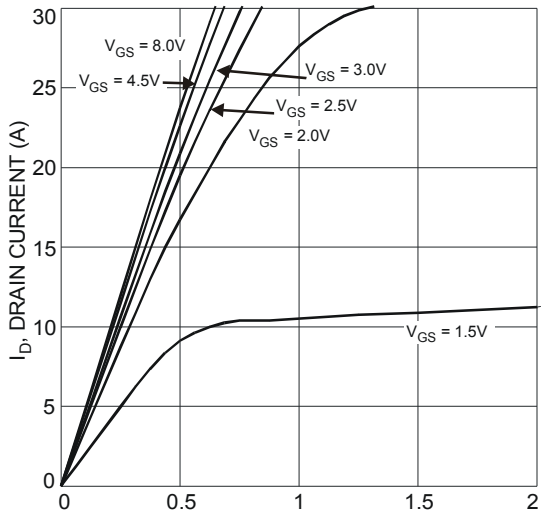


Fig. 1 Typical Output Characteristics

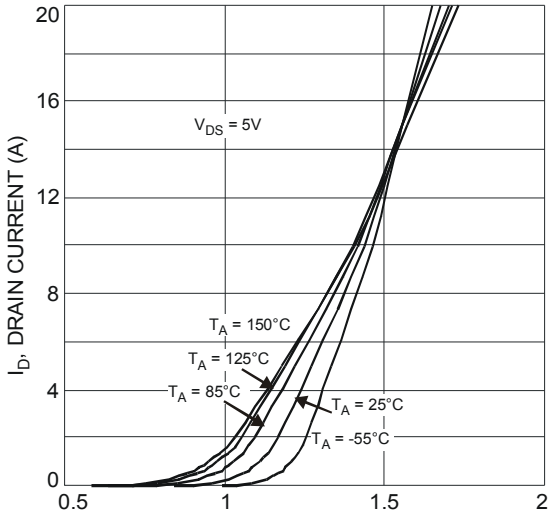


Fig. 2 Typical Transfer Characteristics

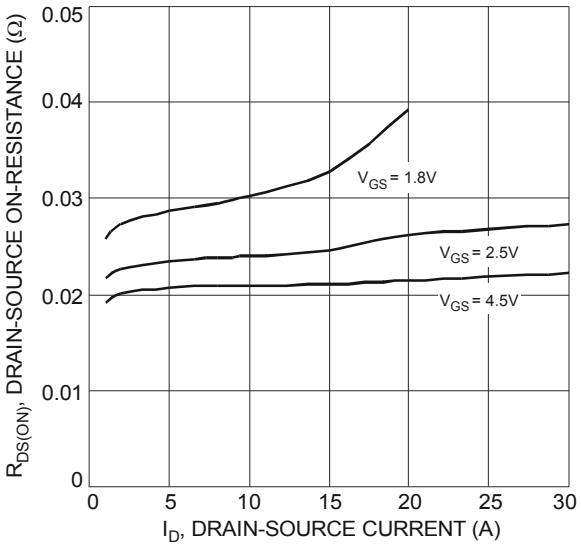


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

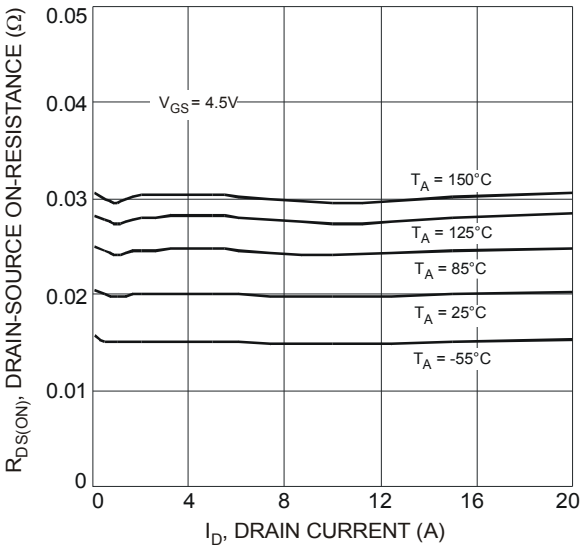


Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

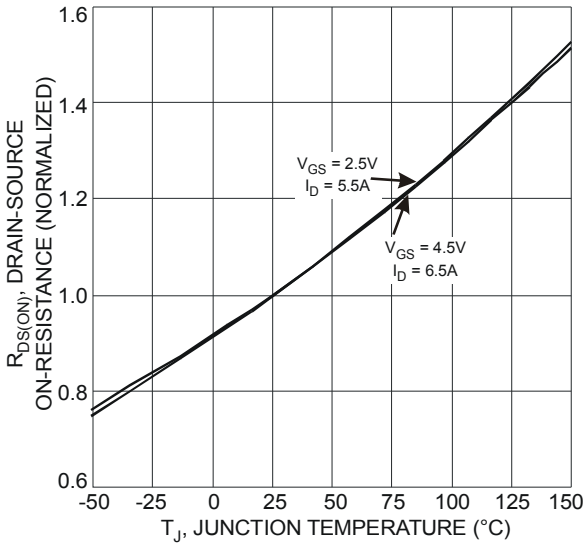


Fig. 5 On-Resistance Variation with Temperature

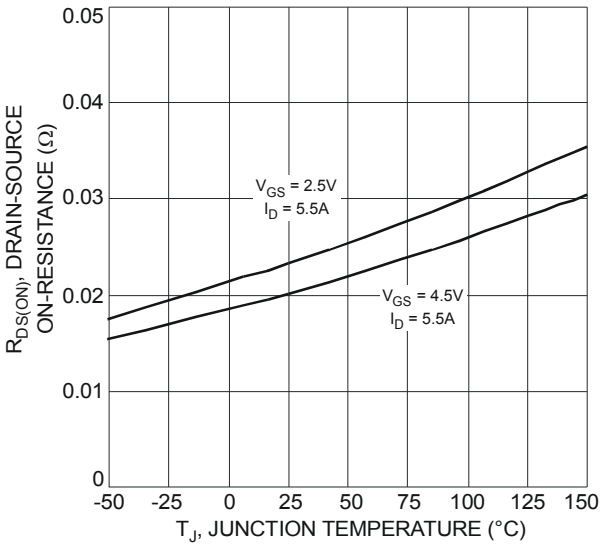


Fig. 6 On-Resistance Variation with Temperature

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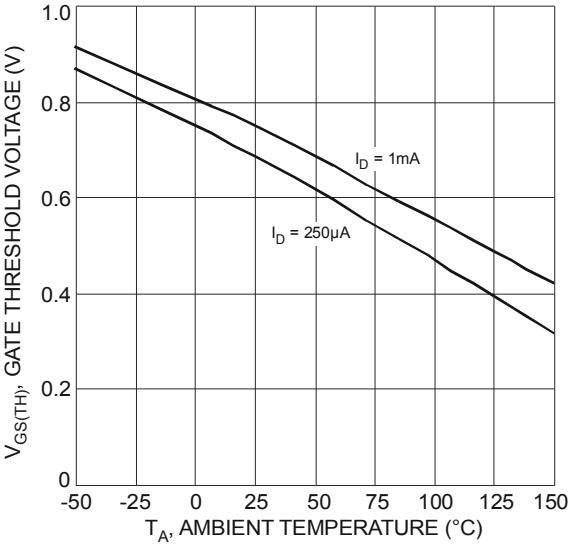


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

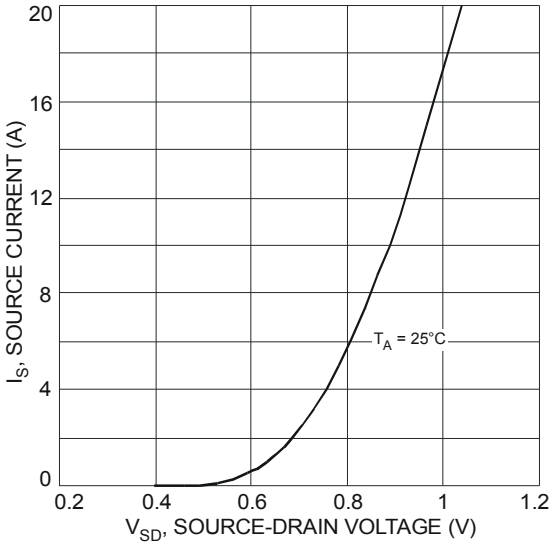


Fig. 8 Diode Forward Voltage vs. Current

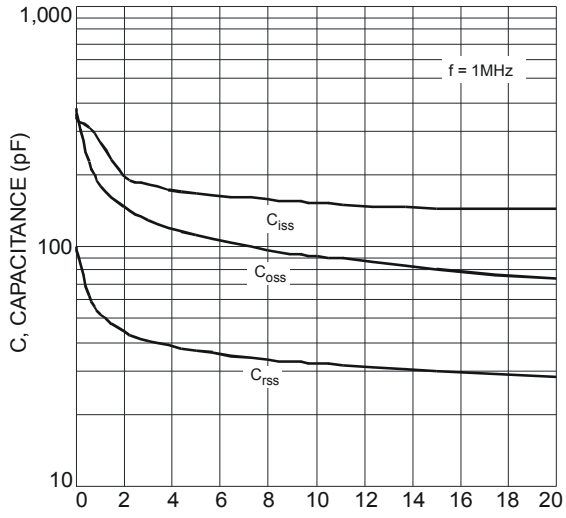


Fig. 9 Typical Capacitance

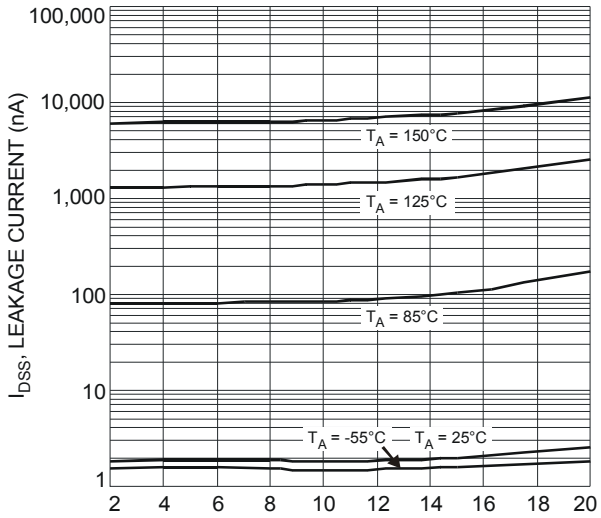


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

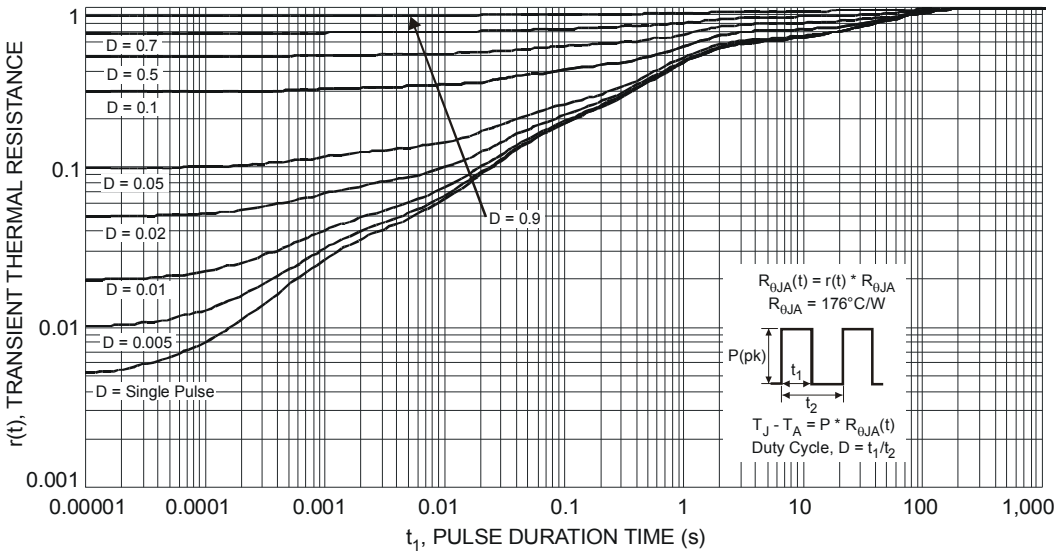


Fig. 11 Transient Thermal Response

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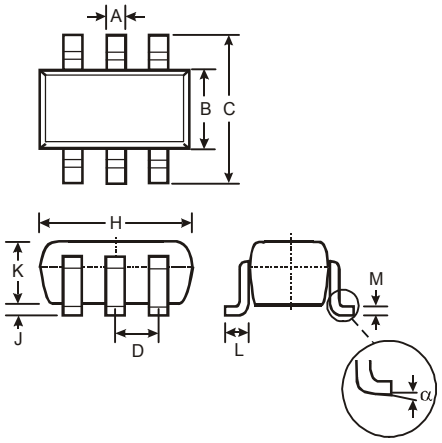
## Package Outline Dimensions

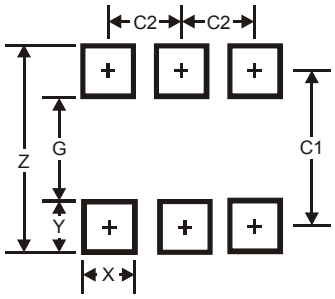
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.




| SOT26 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| 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 | 3.20 |
| G | 1.60 |
| X | 0.55 |
| Y | 0.80 |
| C1 | 2.40 |
| C2 | 0.95 |

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