## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ $T_A = 25°C$ |
|---|---|---|
| 30V | 38mΩ @ $V_{GS}$ = -10V | 5.8A |
| | 64mΩ @ $V_{GS}$ = -4.5V | 4.5A |

## Features and Benefits

- Low On-Resistance:
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead-Free Finish; RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Description and Applications

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.

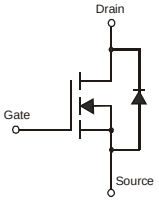
- Load Switch
- DC-DC Converters
- Power management functions

## Mechanical Data

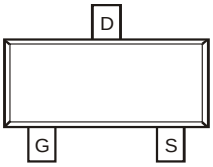
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

SOT23

Top View




Equivalent Circuit



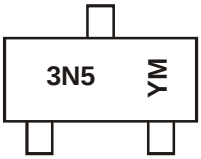

Top View

## Ordering Information (Note 3)

| Part Number | Case | Packaging |
|---|---|---|
| DMN3051L-7 | SOT23 | 3000/Tape & Reel |

Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

## Marking Information




3N5 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: U = 2007)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | U | V | W | X | Y | Z | A | B | C | D | E |

| 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 | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 5) $V_{GS}$ = 10V | Steady State | $T_A$ = 25°C<br>$T_A$ = 70°C | $I_D$ | 4.5<br>3.5 | A |
| | t<5s | $T_A$ = 25°C<br>$T_A$ = 70°C | $I_D$ | 5.8<br>4.9 | A |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | 20 | A |
| Maximum Body Diode Forward Current (Note 5) | | | $I_S$ | 2 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 4) | $T_A$ = 25°C | $P_D$ | 0.7 | W |
| | $T_A$ = 70°C | | 0.44 | |
| Thermal Resistance, Junction to Ambient (Note 4) | Steady state | $R_{\theta JA}$ | 182 | °C/W |
| | t < 5s | | 109 | |
| Total Power Dissipation (Note 5) | $T_A$ = 25°C | $P_D$ | 1.4 | W |
| | $T_A$ = 70°C | | 0.85 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | $R_{\theta JA}$ | 94 | °C/W |
| | t < 5s | | 56 | |
| Thermal Resistance, Junction to Case (Note 5) | | $R_{\theta JC}$ | 25 | |
| 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 6)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 800 | nA | $V_{DS}$ = 28V, $V_{GS}$ = 0V |
| Gate-Body Leakage | $I_{GSS}$ | — | — | ±80<br>±800 | nA | $V_{GS}$ = ±12V, $V_{DS}$ = 0V<br>$V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.3 | 1.9 | 2.2 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | —<br>— | 33<br>54 | 38<br>64 | mΩ | $V_{GS}$ = 10V, $I_D$ = 5.8A<br>$V_{GS}$ = 4.5V, $I_D$ = 5.0A |
| Forward Transconductance | $\|Y_{fs}\|$ | — | 5 | — | S | $V_{DS}$ = 5V, $I_D$ = 3.1A |
| Source-Drain Diode Forward Voltage | $V_{SD}$ | — | 0.78 | 1.16 | V | $V_{GS}$ = 0V, $I_S$ = 2.0A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 424 | — | pF | $V_{DS}$ = 5V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 115 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 81 | — | pF | |
| Gate Resistance | $R_g$ | - | 1.51 | - | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_g$ | - | 9.0 | - | nC | $V_{GS}$ = 10V, $V_{DS}$ = 15V, $I_D$ = 5.8A |
| Gate-Source Charge | $Q_{gs}$ | - | 1.3 | - | nC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 1.3 | - | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 3.4 | - | ns | $V_{DD}$ = 15V, $V_{GS}$ = 10V,<br>$R_L$ = 2.6Ω, $R_G$ = 3Ω |
| Turn-On Rise Time | $t_r$ | - | 6.2 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 13.9 | - | ns | |
| Turn-Off Fall Time | $t_f$ | - | 2.8 | - | ns | |

Notes:
4. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2 oz. Copper, single sided.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to production testing.


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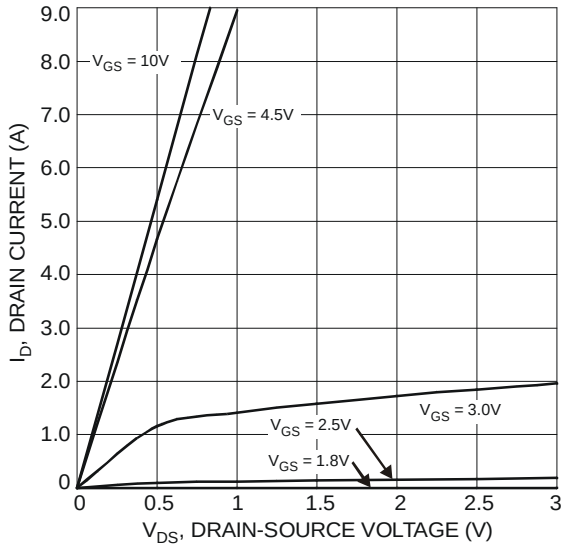


Fig. 1 Typical Output Characteristics

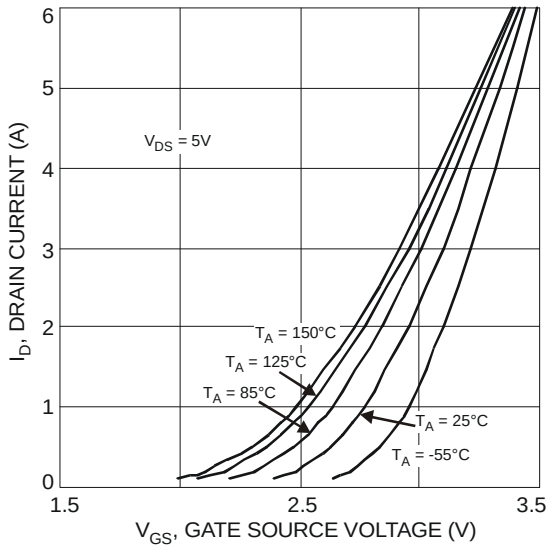


Fig. 2 Typical Transfer Characteristics

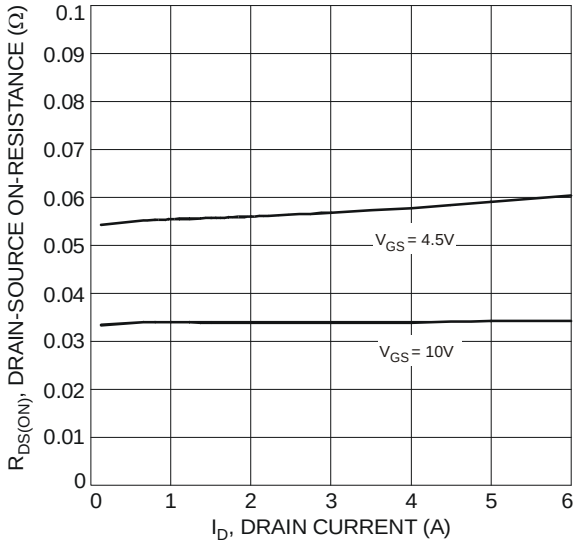


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

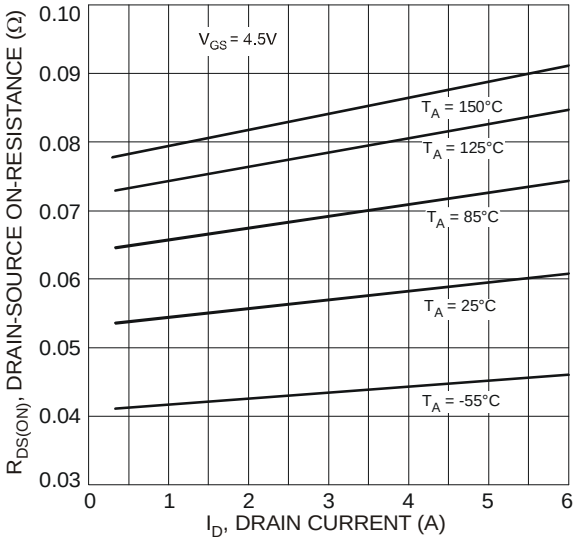


Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

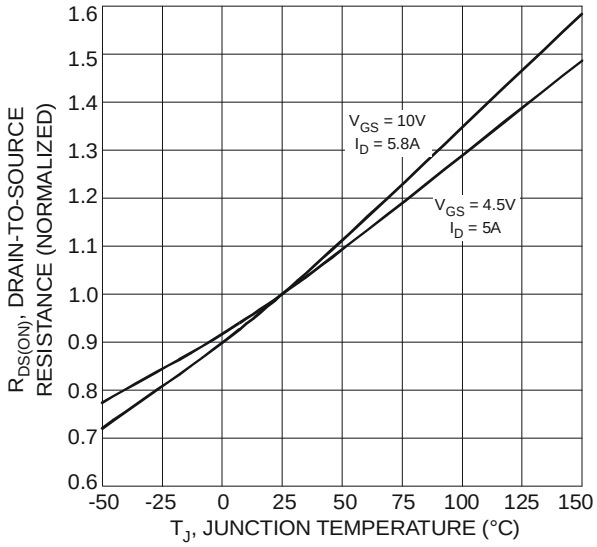


Fig. 5 On-Resistance Variation with Temperature

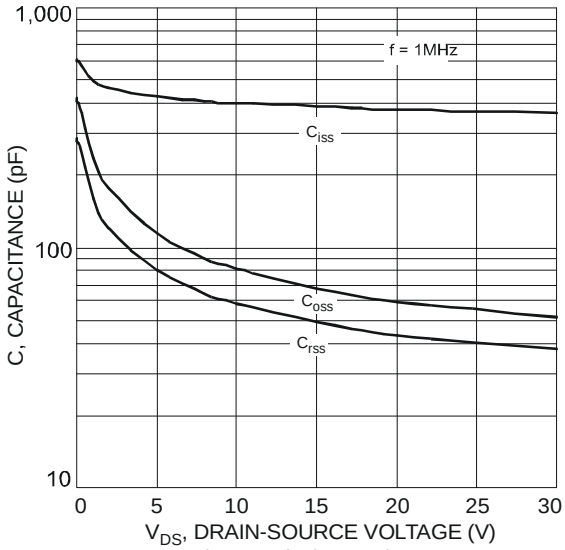


Fig. 6 Typical Capacitance


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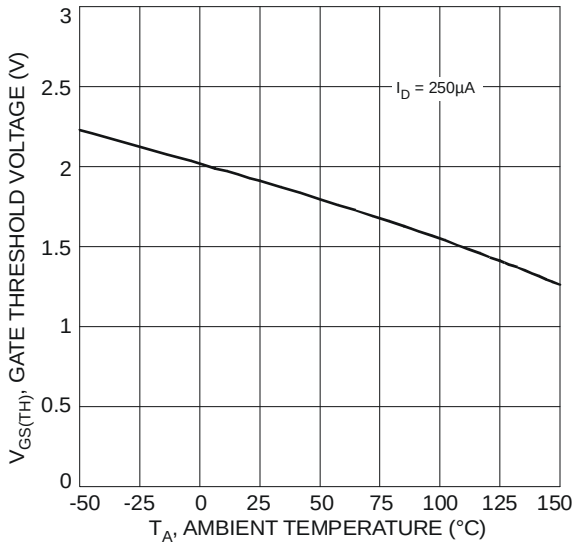


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

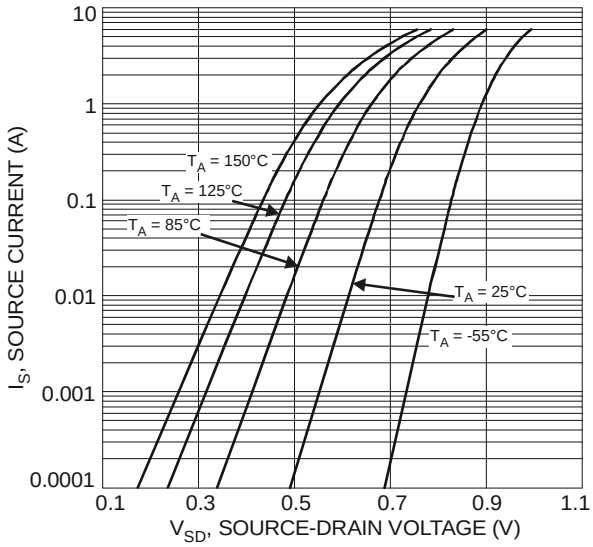


Fig. 8 Diode Forward Voltage vs. Current

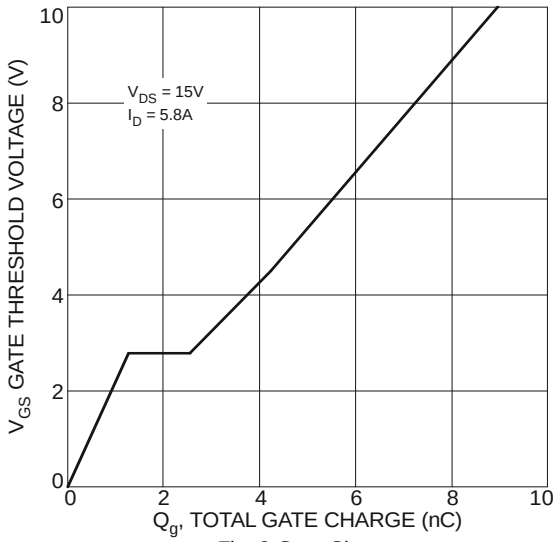


Fig. 9 Gate Charge

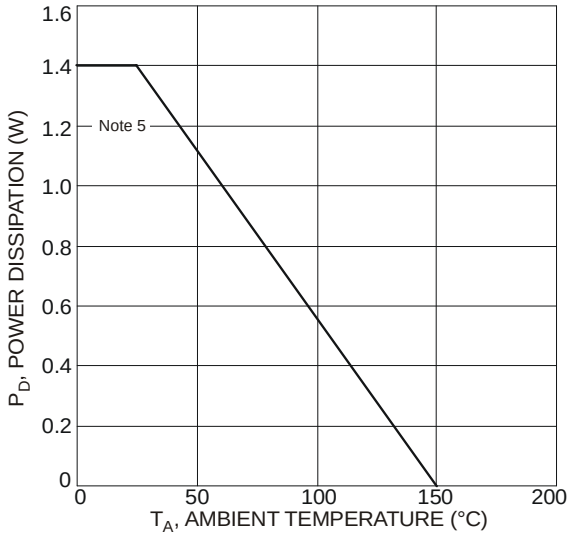


Fig. 10 Power Derating

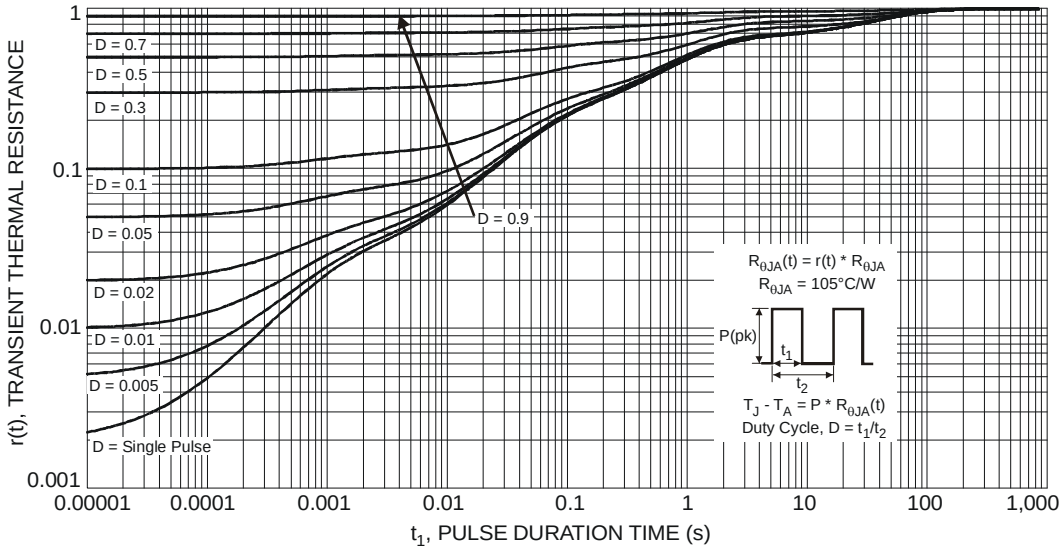


Fig. 11 Transient Thermal Response


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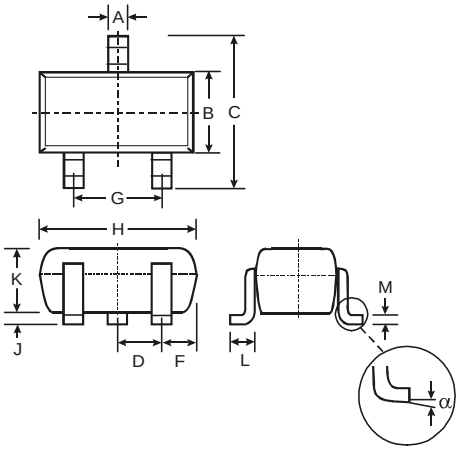
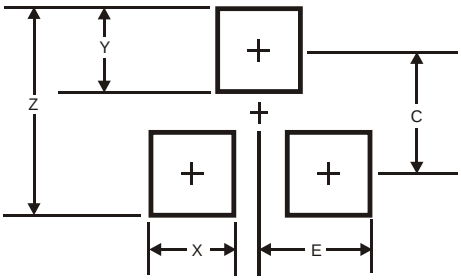
## Package Outline Dimensions




| SOT23 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.37 | 0.51 |
| **B** | 1.20 | 1.40 |
| **C** | 2.30 | 2.50 |
| **D** | 0.89 | 1.03 |
| **F** | 0.45 | 0.60 |
| **G** | 1.78 | 2.05 |
| **H** | 2.80 | 3.00 |
| **J** | 0.013 | 0.10 |
| **K** | 0.903 | 1.10 |
| **L** | 0.45 | 0.61 |
| **M** | 0.085 | 0.180 |
| **α** | 0° | 8° |
| **All Dimensions in mm** | | |

## Suggested Pad Layout




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 2.9 |
| **X** | 0.8 |
| **Y** | 0.9 |
| **C** | 2.0 |
| **E** | 1.35 |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