## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | Package | $I_D$ $T_A$ = +25°C |
|---|---|---|---|
| 60V | 3Ω @ $V_{GS}$ = 10V | SOT23 | 310mA |
| | 4Ω @ $V_{GS}$ = 5V | | 270mA |

## 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
- **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**

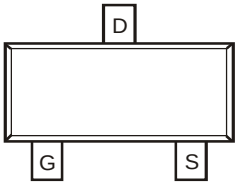
## Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208 e3
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)

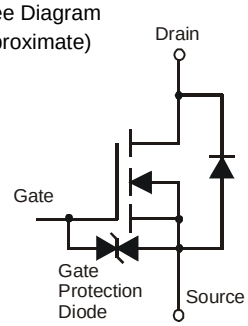
ESD PROTECTED TO 1kV

SOT23

Top View




Top View
Pin Configuration



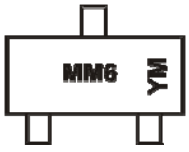

Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMN65D8L-7 | SOT23 | 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 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.

## Marking Information




MM6 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|
| Code | 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 |

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

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 60 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 310<br>240 | mA |
| Continuous Drain Current (Note 6) $V_{GS}$ = 5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 270<br>210 | mA |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | $I_{DM}$ | 800 | mA |
| Maximum Body Diode Continuous Current (Note 5) | | | $I_S$ | 500 | mA |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation | (Note 6) | $P_D$ | 370 | mW |
| | (Note 5) | | 540 | |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 348 | °C/W |
| | (Note 5) | | 241 | |
| Thermal Resistance, Junction to Case | (Note 5) | $R_{\theta JC}$ | 91 | |
| 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 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 60 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1.0 | µA | $V_{DS}$ = 60V, $V_{GS}$ = 0V |
| Gate-Body Leakage | $I_{GSS}$ | — | — | ±5 | µA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.2 | — | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | — | 2 | 3 | Ω | $V_{GS}$ = 10V, $I_D$ = 0.115A |
| | | — | 2.5 | 4 | Ω | $V_{GS}$ = 5V, $I_D$ = 0.115A |
| Forward Transconductance | $g_{FS}$ | 80 | 290 | — | mS | $V_{DS}$ = 10V, $I_D$ = 0.115A |
| Diode Forward Voltage | $V_{SD}$ | — | 0.8 | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 115mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 22.0 | — | pF | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 3.2 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 2.0 | — | | |
| Gate Resistance | $R_G$ | — | 79.9 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge $V_{GS}$ = 10V | $Q_g$ | — | 0.87 | — | nC | $V_{GS}$ = 10V, $V_{DS}$ = 30V, $I_D$ = 150mA |
| Total Gate Charge $V_{GS}$ = 4.5V | $Q_g$ | — | 0.43 | — | | |
| Gate-Source Charge | $Q_{gs}$ | — | 0.11 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 0.11 | — | | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 2.7 | — | nS | $V_{DD}$ = 30V, $I_D$ = 0.115A, $V_{GEN}$ = 10V, $R_{GEN}$ = 25Ω |
| Turn-On Rise Time | $t_r$ | — | 2.8 | — | | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 12.6 | — | | |
| Turn-Off Fall Time | $t_f$ | — | 7.3 | — | | |

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

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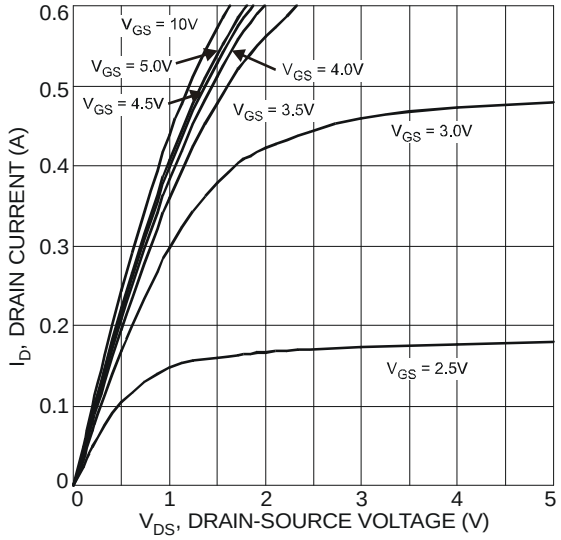



Figure 1. Typical Output Characteristic

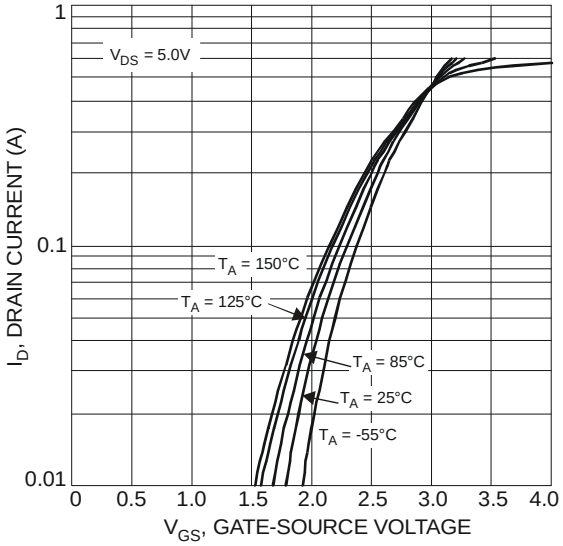



Figure 2. Typical Transfer Characteristics

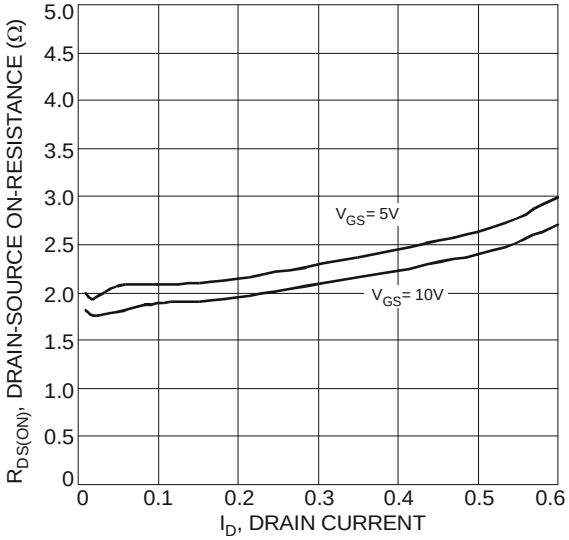



Figure 3. Typical On-Resistance vs. Drain Current and Temperature

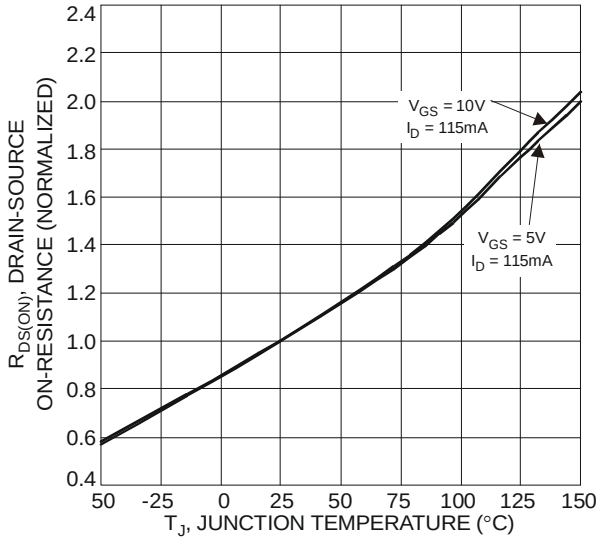



Figure 4. On-Resistance Variation with Temperature

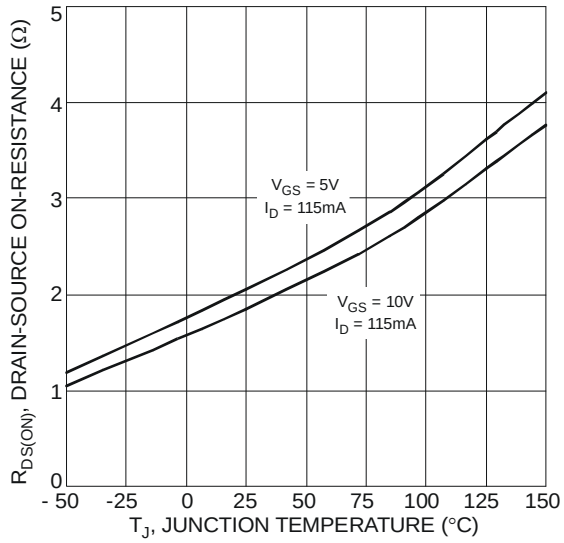



Figure 5. On-Resistance Variation with Temperature

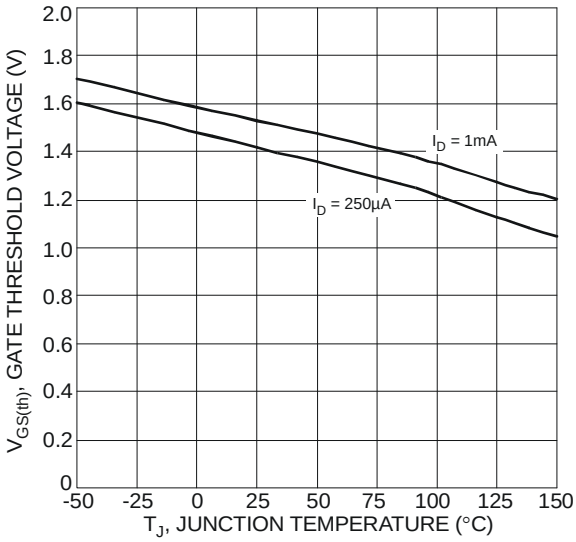



Figure 6. Gate Threshold Variation vs. Ambient Temperature

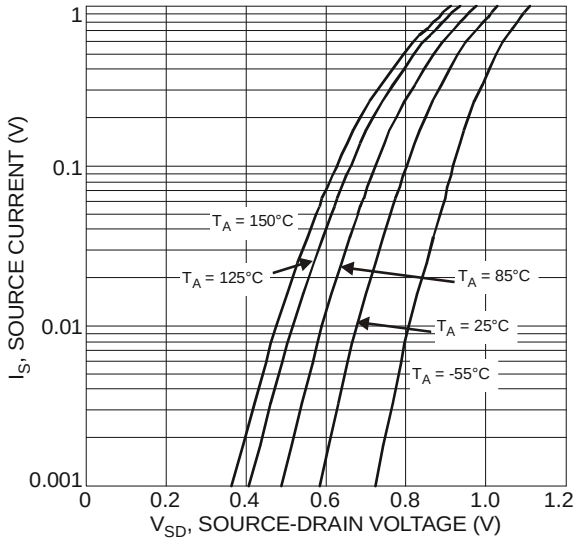



Figure 7. Diode Forward Voltage vs. Current

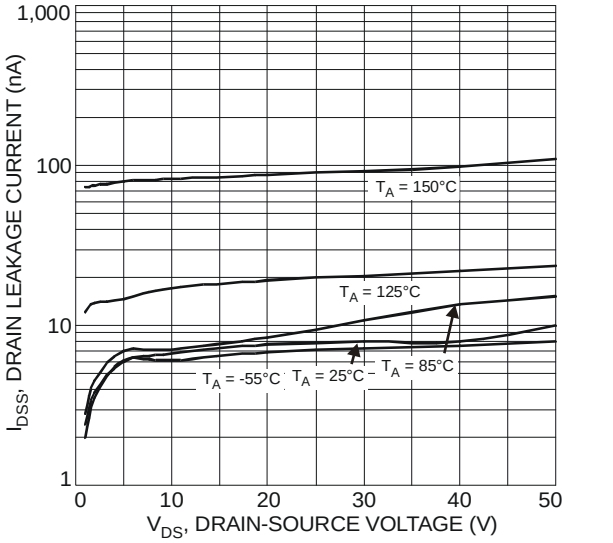



Figure 8. Typical Drain-Source Leakage Current vs. Voltage

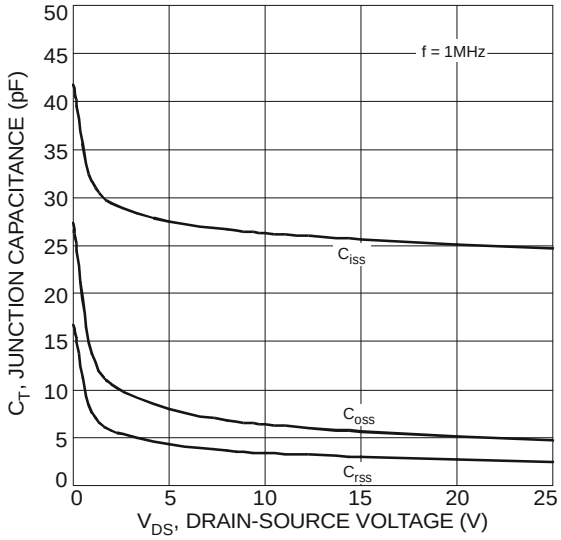
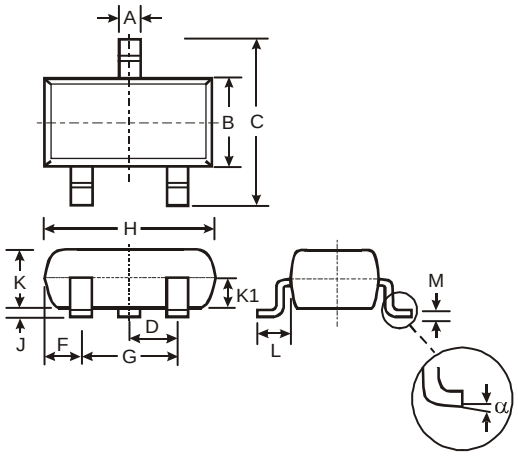


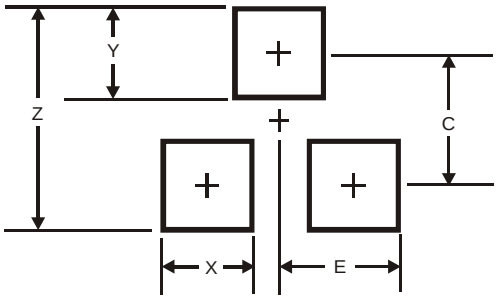

Figure 9. Typical Junction Capacitance

## Package Outline Dimensions




| 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 |
| **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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