

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$               | Package | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|---------------|----------------------------|---------|------------------------------------|
| 60V           | $8\Omega$ @ $V_{GS} = 5V$  | SOT363  | 170mA                              |
|               | $6\Omega$ @ $V_{GS} = 10V$ |         | 200mA                              |

## 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

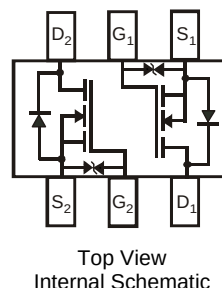
- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc

## Features

- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Small Surface Mount Package
- ESD Protected Gate, 1KV (HBM)
- **Lead-Free Finish; 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: Solderable per MIL-STD-202, Method 208③
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)

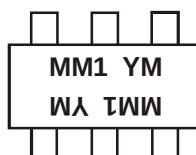


## Ordering Information (Note 4)

| Part Number  | Case   | Packaging        |
|--------------|--------|------------------|
| DMN65D8LDW-7 | SOT363 | 3000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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



MM1 = 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 | 2018 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code  | U    | V    | W    | X    | Y    | 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                     |                       |              |                                                  | Symbol           | Value      | Units |
|----------------------------------------------------|-----------------------|--------------|--------------------------------------------------|------------------|------------|-------|
| Drain-Source Voltage                               |                       |              |                                                  | V <sub>DSS</sub> | 60         | V     |
| Gate-Source Voltage                                |                       |              |                                                  | V <sub>GSS</sub> | ±20        | V     |
| Continuous Drain Current (Note 5)                  | V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 180<br>140 | mA    |
| Continuous Drain Current (Note 5)                  | V <sub>GS</sub> = 5V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 150<br>120 | mA    |
| Continuous Drain Current (Note 6)                  | V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 200<br>160 | mA    |
| Continuous Drain Current (Note 6)                  | V <sub>GS</sub> = 5V  | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 170<br>140 | mA    |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%) |                       |              |                                                  | I <sub>DM</sub>  | 800        | mA    |

**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value       | Units |
|--------------------------------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 300         | mW    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 435         | °C/W  |
| Total Power Dissipation (Note 6)                 | P <sub>D</sub>                    | 400         | mW    |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 330         | °C/W  |
| Thermal Resistance, Junction to Case (Note 6)    | R <sub>θJC</sub>                  | 139         | °C/W  |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                           | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                                 |
|------------------------------------------|---------------------|-----|------|------|------|------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>      |                     |     |      |      |      |                                                                                                |
| Drain-Source Breakdown Voltage           | BV <sub>DSS</sub>   | 60  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                   |
| Zero Gate Voltage Drain Current          | I <sub>DSS</sub>    | —   | —    | 1.0  | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                    |
| Gate-Body Leakage                        | I <sub>GSS</sub>    | —   | —    | ±5.0 | μA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                   |
| <b>ON CHARACTERISTICS (Note 7)</b>       |                     |     |      |      |      |                                                                                                |
| Gate Threshold Voltage                   | V <sub>GS(th)</sub> | 1.0 | —    | 2.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                     |
| Static Drain-Source On-Resistance        | R <sub>DS(on)</sub> | —   | —    | 8    | Ω    | V <sub>GS</sub> = 5.0V, I <sub>D</sub> = 0.115A                                                |
|                                          |                     | —   | —    | 6    | Ω    | V <sub>GS</sub> = 10.0V, I <sub>D</sub> = 0.115A                                               |
| Forward Transconductance                 | g <sub>FS</sub>     | 80  | —    | —    | mS   | V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.115A                                                 |
| Diode Forward Voltage                    | V <sub>SD</sub>     | -   | 0.8  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA                                                   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>  |                     |     |      |      |      |                                                                                                |
| Input Capacitance                        | C <sub>iss</sub>    | —   | 22.0 | —    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                        |
| Output Capacitance                       | C <sub>oss</sub>    | —   | 3.2  | —    |      |                                                                                                |
| Reverse Transfer Capacitance             | C <sub>rss</sub>    | —   | 2.0  | —    |      |                                                                                                |
| Gate Resistance                          | R <sub>G</sub>      | —   | 79.9 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                         |
| Total Gate Charge V <sub>GS</sub> = 10V  | Q <sub>g</sub>      | —   | 0.87 | —    | nC   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 30V, I <sub>D</sub> = 150mA                           |
| Total Gate Charge V <sub>GS</sub> = 4.5V | Q <sub>g</sub>      | —   | 0.43 | —    |      |                                                                                                |
| Gate-Source Charge                       | Q <sub>gs</sub>     | —   | 0.11 | —    |      |                                                                                                |
| Gate-Drain Charge                        | Q <sub>gd</sub>     | —   | 0.11 | —    | nS   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 0.115A, V <sub>GEN</sub> = 10V, R <sub>GEN</sub> = 25Ω |
| Turn-On Delay Time                       | t <sub>D(on)</sub>  | —   | 3.3  | —    |      |                                                                                                |
| Turn-On Rise Time                        | t <sub>r</sub>      | —   | 3.2  | —    |      |                                                                                                |
| Turn-Off Delay Time                      | t <sub>D(off)</sub> | —   | 12.0 | —    |      |                                                                                                |
| Turn-Off Fall Time                       | t <sub>f</sub>      | —   | 6.3  | —    |      |                                                                                                |

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

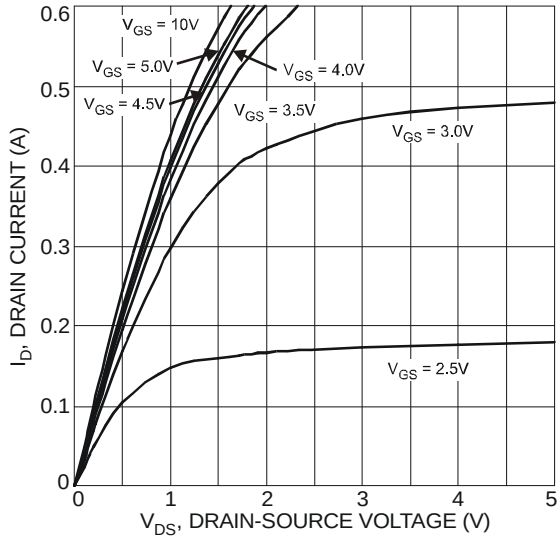


Fig.1 Typical Output Characteristic

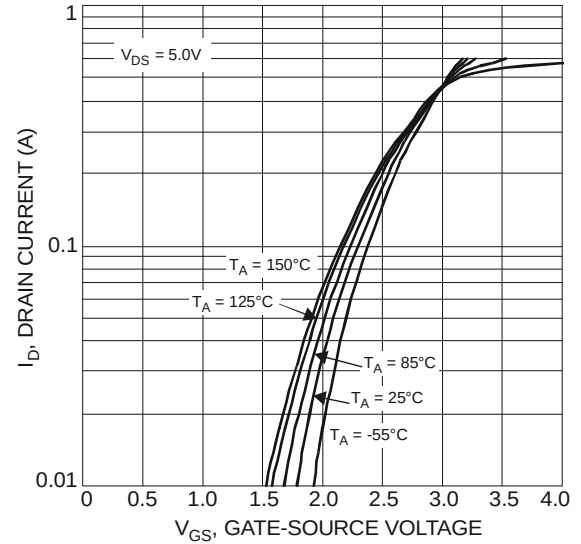


Fig.2 Typical Transfer Characteristics

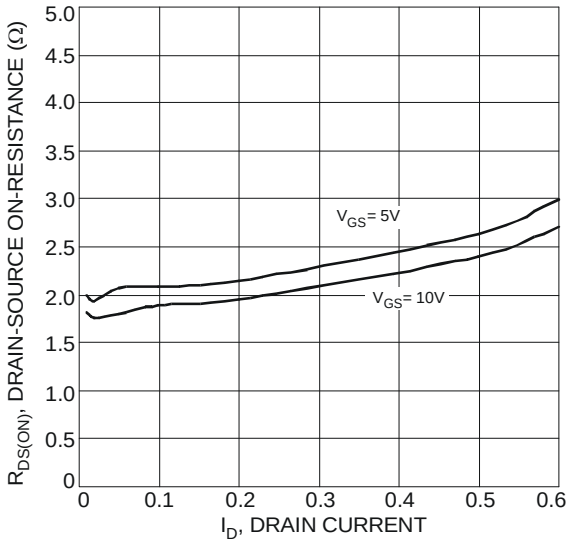


Fig.3 Typical On-Resistance vs. Drain Current and Temperature

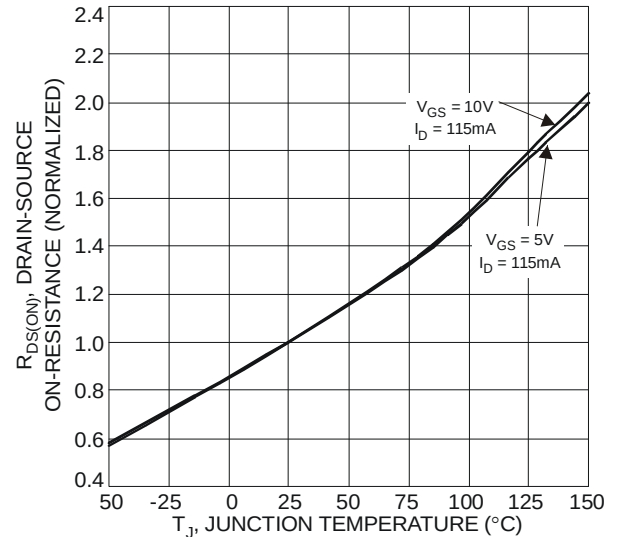


Fig.4 On-Resistance Variation with Temperature

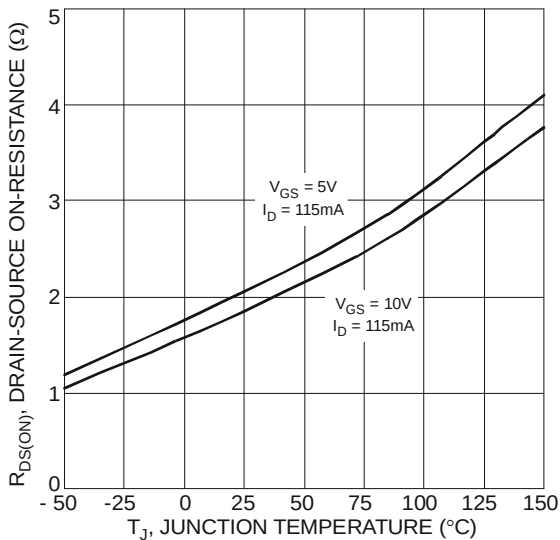


Fig.5 On-Resistance Variation with Temperature

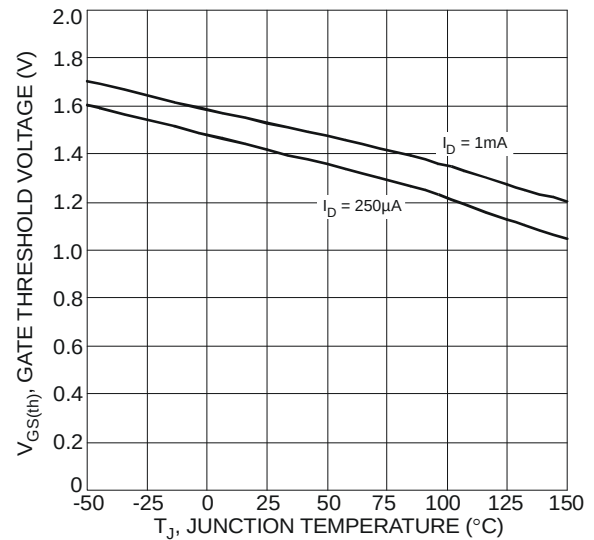


Fig.6 Gate Threshold Variation vs. Ambient Temperature

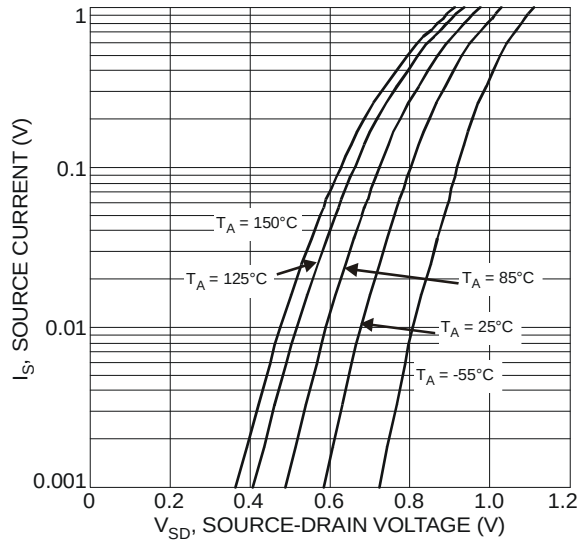


Fig. 7 Diode Forward Voltage vs. Current

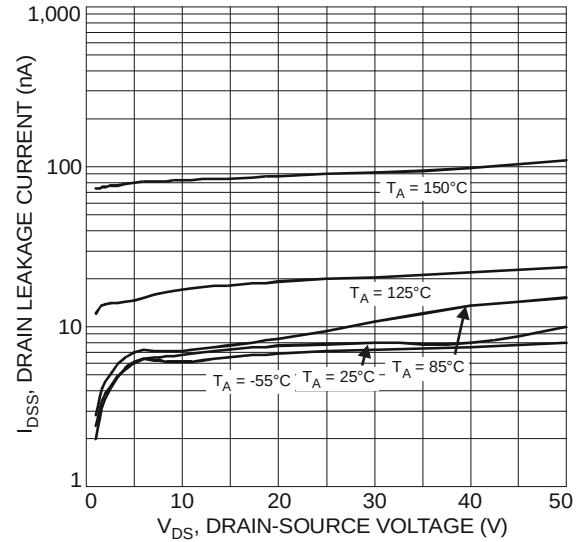


Fig. 8 Typical Drain-Source Leakage Current vs. Voltage

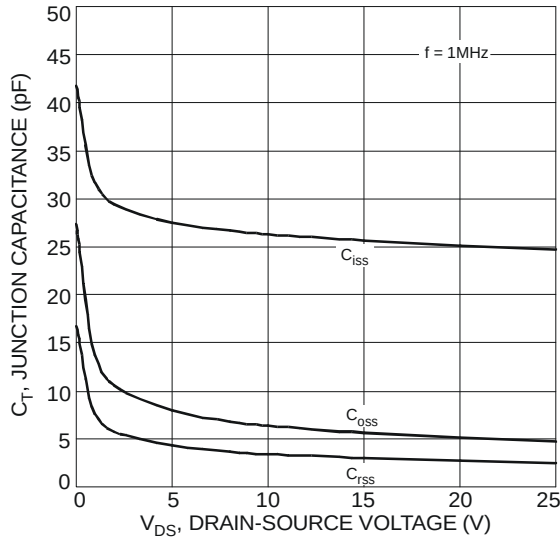


Fig. 9 Typical Junction Capacitance

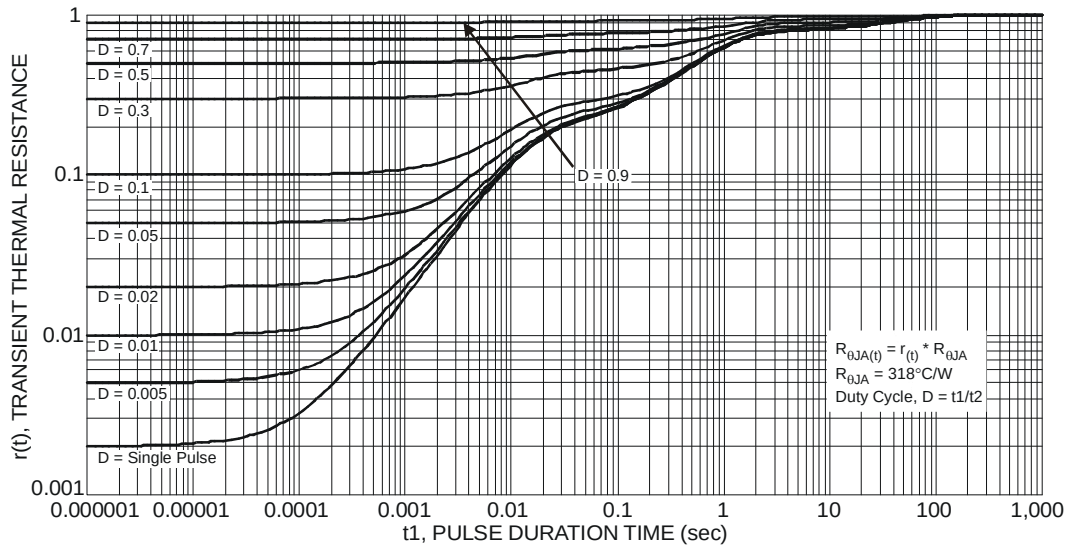
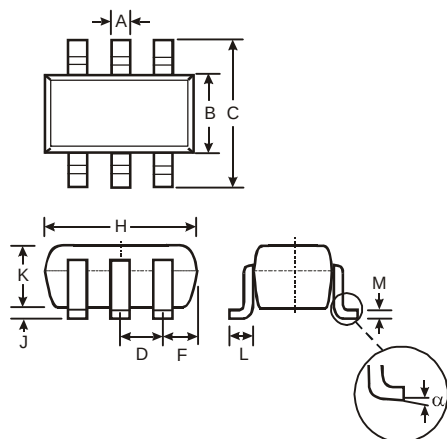


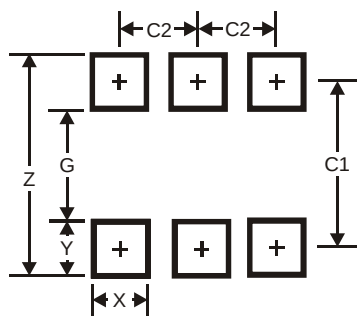
Fig. 10 Transient Thermal Resistance

## Package Outline Dimensions



| SOT363               |          |      |       |
|----------------------|----------|------|-------|
| Dim                  | Min      | Max  | Typ   |
| A                    | 0.10     | 0.30 | 0.25  |
| B                    | 1.15     | 1.35 | 1.30  |
| C                    | 2.00     | 2.20 | 2.10  |
| D                    | 0.65 Typ |      |       |
| F                    | 0.40     | 0.45 | 0.425 |
| H                    | 1.80     | 2.20 | 2.15  |
| J                    | 0        | 0.10 | 0.05  |
| K                    | 0.90     | 1.00 | 1.00  |
| L                    | 0.25     | 0.40 | 0.30  |
| M                    | 0.10     | 0.22 | 0.11  |
| α                    | 0°       | 8°   | -     |
| All Dimensions in mm |          |      |       |

## Suggested Pad Layout



| 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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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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