

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = +25^\circ C$ |
|---------------|-----------------------|------------------------------|
| 50V | 2.0Ω @ $V_{GS} = 10V$ | 360mA |
| | 3.0Ω @ $V_{GS} = 5V$ | 250mA |

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

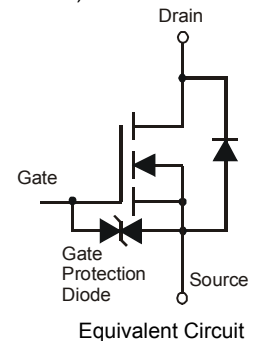
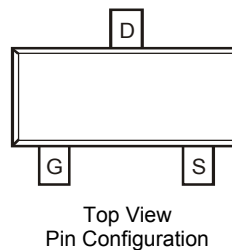
- DC-DC Converters
- Power management functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc

Features

- N-Channel MOSFET
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- 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: SOT323
- 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 ^{Ⓔ3}
- Terminal Connections: See Diagram
- Weight: 0.006 grams (approximate)

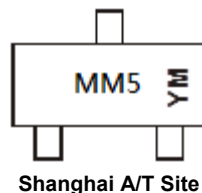


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|--------------|--------|--------------------|
| DMN53D0LW-7 | SOT323 | 3,000/Tape & Reel |
| DMN53D0LW-13 | SOT323 | 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



MM5 = Product Type Marking Code
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)
 Y = Year (ex: A = 2013)
 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} | 50 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 6) V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 360 | mA |
| | | T _A = +70°C | | 250 | |
| Continuous Drain Current (Note 6) V _{GS} = 5V | Steady State | T _A = +25°C | I _D | 250 | mA |
| | | T _A = +70°C | | 200 | |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%) | | | I _{DM} | 700 | mA |

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

| Characteristic | | Symbol | Value | Units |
|---|----------|-----------------------------------|------------|-------|
| Total Power Dissipation | (Note 5) | P _D | 320 | mW |
| | (Note 6) | | 420 | |
| Thermal Resistance, Junction to Ambient | (Note 5) | R _{θJA} | 395 | °C/W |
| | (Note 6) | | 301 | |
| 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} | 50 | — | — | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1.0 | µA | V _{DS} = 50V, V _{GS} = 0V |
| Gate-Body Leakage | I _{GSS} | — | — | ±10 | µA | V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.8 | — | 1.5 | V | V _{DS} = V _{GS} , I _D = 100µA |
| Gate Threshold Voltage Temperature Coefficient (Note 8) | $\frac{\Delta V_{GS(TH)}}{\Delta T_J}$ | — | -3.4 | — | mV/°C | — |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | — | 2.0 | Ω | V _{GS} = 10V, I _D = 270mA |
| | | — | — | 3.0 | | V _{GS} = 5V, I _D = 200mA |
| Forward Transconductance | g _{FS} | 80 | — | — | mS | V _{DS} = 10V, I _D = 200mA |
| Diode Forward Voltage | V _{SD} | — | 0.75 | 1.2 | V | V _{GS} = 0V, I _S = 115mA |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 45.8 | — | pF | V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 5.3 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 3.9 | — | | |
| Total Gate Charge V _{GS} = 10V | Q _g | — | 1.2 | — | nC | V _{GS} = 10V, V _{DS} = 10V, I _D = 250mA |
| Total Gate Charge V _{GS} = 4.5V | Q _g | — | 0.6 | — | | |
| Gate-Source Charge | Q _{gs} | — | 0.2 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 0.1 | — | | |
| Turn-On Delay Time | t _{D(on)} | — | 2.7 | — | nS | V _{DD} = 30V, V _{GS} = 10V, R _G = 25Ω, I _D = 200mA |
| Turn-On Rise Time | t _r | — | 2.5 | — | | |
| Turn-Off Delay Time | t _{D(off)} | — | 18.9 | — | | |
| Turn-Off Fall Time | t _f | — | 11.0 | — | | |

- 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.

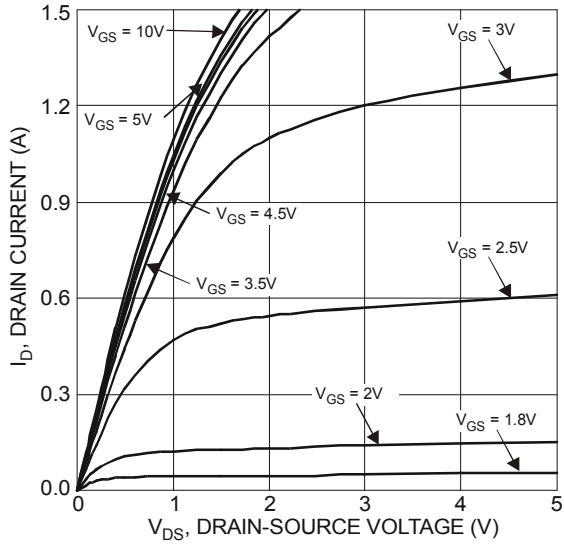


Figure 1 Typical Output Characteristics

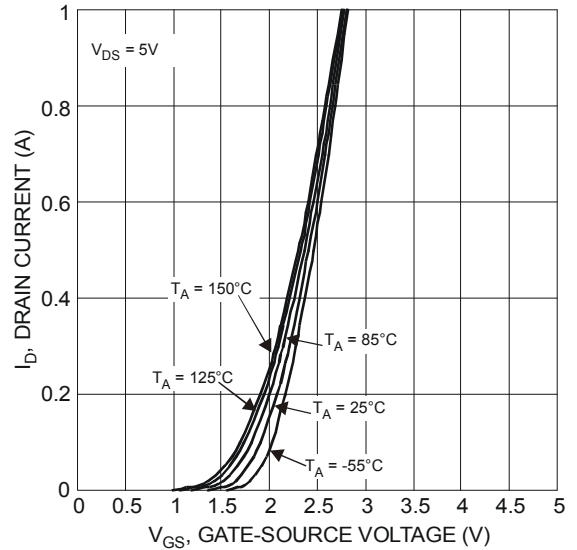


Figure 2 Typical Transfer Characteristics

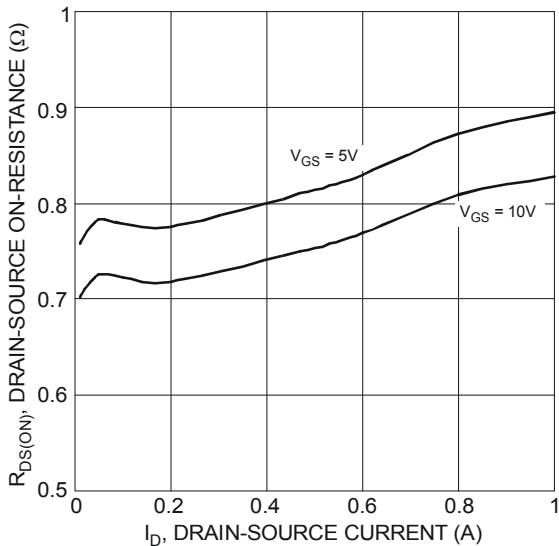


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

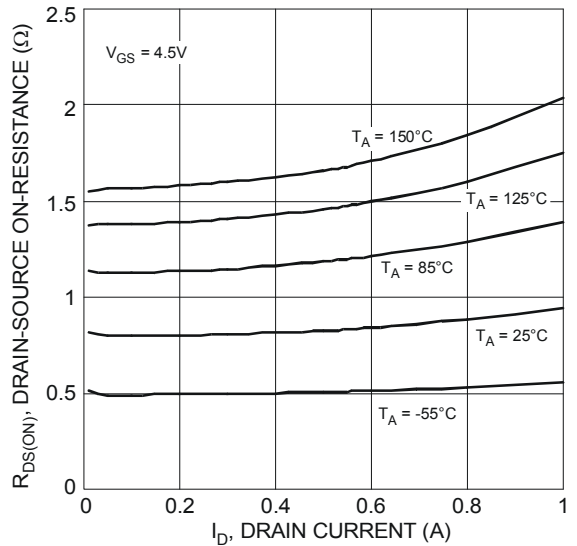


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

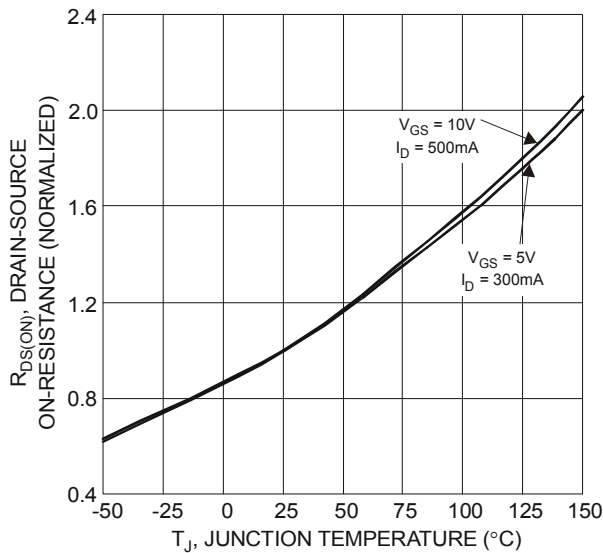


Figure 5 On-Resistance Variation with Temperature

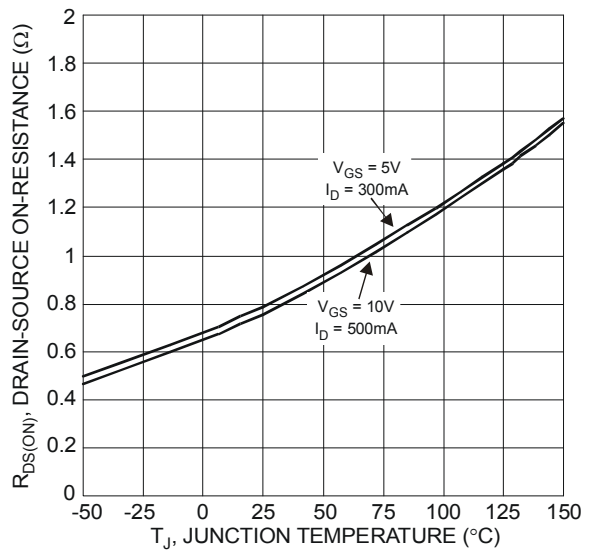


Figure 6 On-Resistance Variation with Temperature

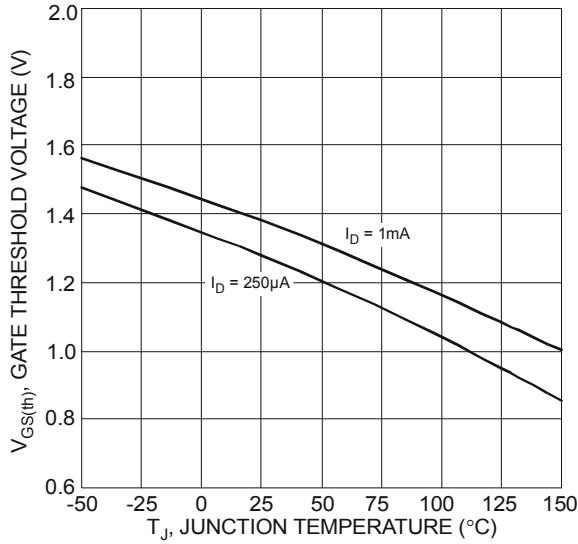


Figure 7 Gate Threshold Variation vs. Ambient Temperature

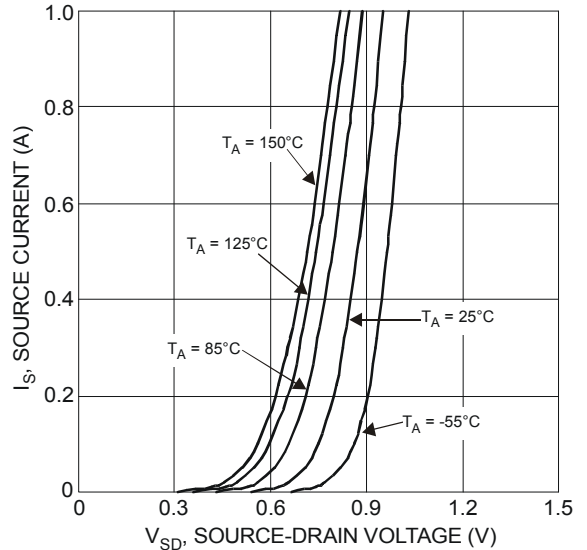


Figure 8 Diode Forward Voltage vs. Current

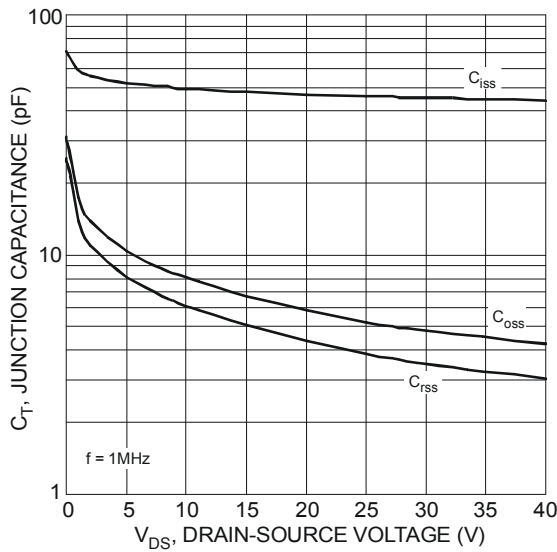


Figure 9 Typical Junction Capacitance

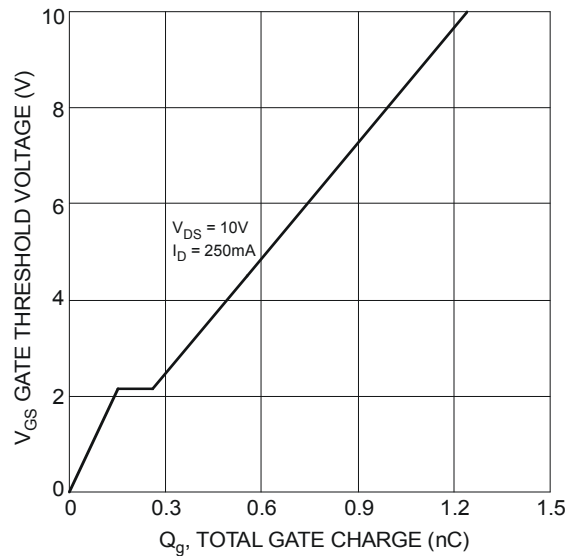
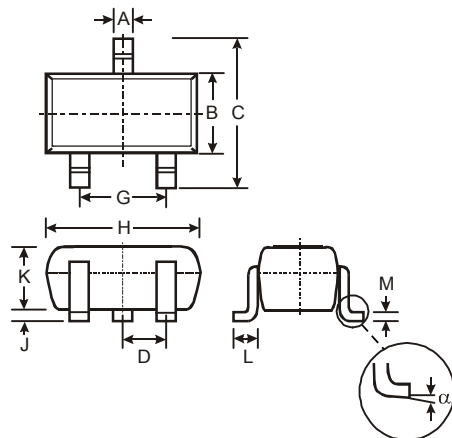


Figure 10 Gate Charge

Package Outline Dimensions

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

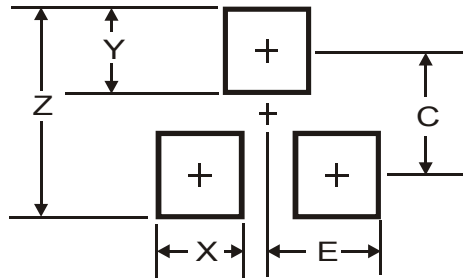


| SOT323 | | | |
|--------|------|------|------|
| Dim | Min | Max | Typ |
| A | 0.25 | 0.40 | 0.30 |
| B | 1.15 | 1.35 | 1.30 |
| C | 2.00 | 2.20 | 2.10 |
| D | - | - | 0.65 |
| G | 1.20 | 1.40 | 1.30 |
| H | 1.80 | 2.20 | 2.15 |
| J | 0.0 | 0.10 | 0.05 |
| K | 0.90 | 1.00 | 1.00 |
| L | 0.25 | 0.40 | 0.30 |
| M | 0.10 | 0.18 | 0.11 |
| 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 | 2.8 |
| X | 0.7 |
| Y | 0.9 |
| C | 1.9 |
| E | 1.0 |

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