

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **ESD Protected up to 2kV**
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 standards for High Reliability**

## Mechanical Data

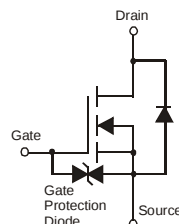
- Case: SOT-523
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.002 grams (approximate)



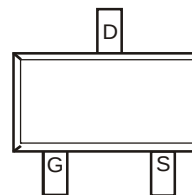
SOT-523



Top View



Equivalent Circuit



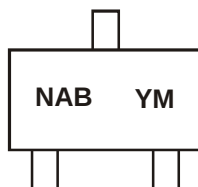
Top View

## Ordering Information (Note 3)

| Part Number | Case    | Packaging        |
|-------------|---------|------------------|
| DMN2004TK-7 | SOT-523 | 3000/Tape & Reel |

- Notes:
1. No purposefully added lead.
  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



NAB = Product Type Marking Code  
YM = Date Code Marking  
Y = Year (ex: T = 2006)  
M = Month (ex: 9 = September)

### Date Code Key

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|
| Code | T    | U    | V    | W    | X    | Y    | Z    |

| 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> | 20    | V     |
| Gate-Source Voltage           |              |                       | V <sub>GSS</sub> | ±8    | V     |
| Drain Current (Note 4)        | Steady State | T <sub>A</sub> = 25°C | I <sub>D</sub>   | 540   | mA    |
|                               |              | T <sub>A</sub> = 85°C |                  | 390   |       |
| Pulsed Drain Current (Note 5) |              |                       | I <sub>DM</sub>  | 1.5   | A     |

**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                          | Symbol                            | Value       | Units |
|-----------------------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 4)        | P <sub>D</sub>                    | 150         | mW    |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 833         | °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                                                                                                        |
|-----------------------------------|----------------------|-----|-----|------|------|-----------------------------------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 6)      |                      |     |     |      |      |                                                                                                                       |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>    | 20  | —   | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 10μA                                                                           |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>     | —   | 0.8 | 300  | nA   | V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V                                                                           |
|                                   |                      | —   | 0.9 | —    | nA   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V                                                                           |
| Gate-Source Leakage               | I <sub>GSS</sub>     | —   | —   | ±1   | μA   | V <sub>GS</sub> = ±4.5V, V <sub>DS</sub> = 0V                                                                         |
| ON CHARACTERISTICS (Note 6)       |                      |     |     |      |      |                                                                                                                       |
| Gate Threshold Voltage            | V <sub>GS(th)</sub>  | 0.5 | —   | 1.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                                            |
| Static Drain-Source On-Resistance | R <sub>DS (ON)</sub> | —   | 0.4 | 0.55 | Ω    | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 540mA                                                                        |
|                                   |                      |     | 0.5 | 0.70 |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 500mA                                                                        |
|                                   |                      |     | 0.7 | 0.9  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 350mA                                                                        |
| Forward Transfer Admittance       | Y <sub>fs</sub>      | 200 | —   | —    | ms   | V <sub>DS</sub> =10V, I <sub>D</sub> = 0.2A                                                                           |
| Diode Forward Voltage (Note 6)    | V <sub>SD</sub>      | 0.5 | —   | 1.4  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 115mA                                                                          |
| DYNAMIC CHARACTERISTICS           |                      |     |     |      |      |                                                                                                                       |
| Input Capacitance                 | C <sub>iss</sub>     | —   | —   | 150  | pF   | V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                                             |
| Output Capacitance                | C <sub>oss</sub>     | —   | —   | 25   | pF   |                                                                                                                       |
| Reverse Transfer Capacitance      | C <sub>rss</sub>     | —   | —   | 20   | pF   |                                                                                                                       |
| SWITCHING CHARACTERISTICS         |                      |     |     |      |      |                                                                                                                       |
| Turn-On Delay Time                | t <sub>d(on)</sub>   | —   | 8.5 | —    | ns   | V <sub>DD</sub> = 10V, R <sub>L</sub> = 47Ω, I <sub>D</sub> = 200mA,<br>V <sub>GEN</sub> = 4.5V, R <sub>G</sub> = 10Ω |
| Rise Time                         | t <sub>r</sub>       | —   | 9.1 | —    | ns   |                                                                                                                       |
| Turn-Off Delay Time               | t <sub>d(off)</sub>  | —   | 51  | —    | ns   |                                                                                                                       |
| Fall Time                         | t <sub>f</sub>       | —   | 28  | —    | ns   |                                                                                                                       |

- Notes: 4. Device mounted on FR-4 PCB.  
5. Pulse width ≤10μs, Duty Cycle ≤1%  
6. Short duration pulse test used to minimize self-heating effect.

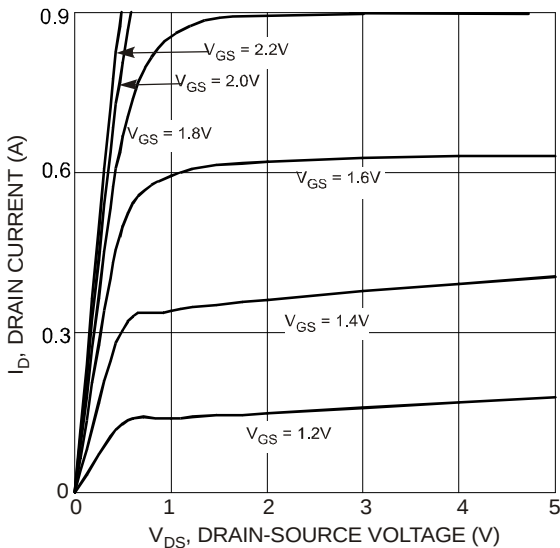


Fig. 1 Typical Output Characteristics

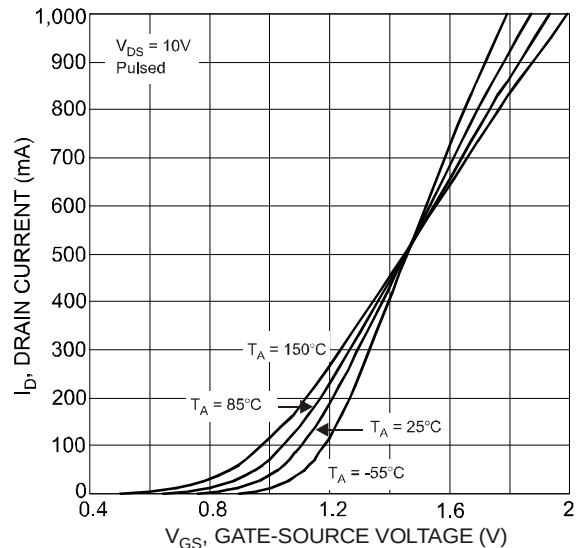


Fig. 2 Reverse Drain Current vs. Source-Drain Voltage

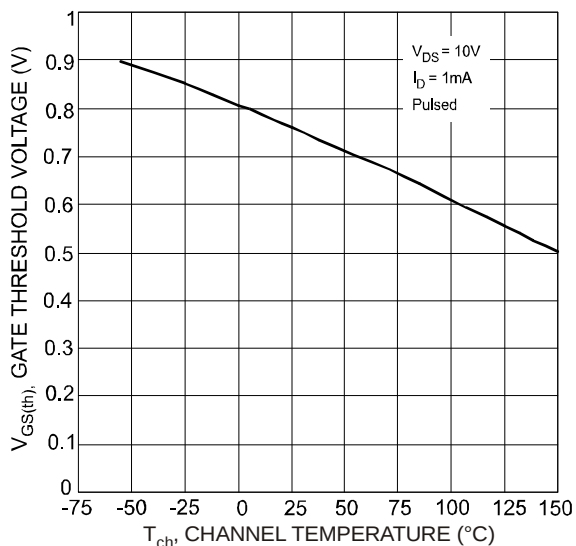


Fig. 3 Gate Threshold Voltage vs. Channel Temperature

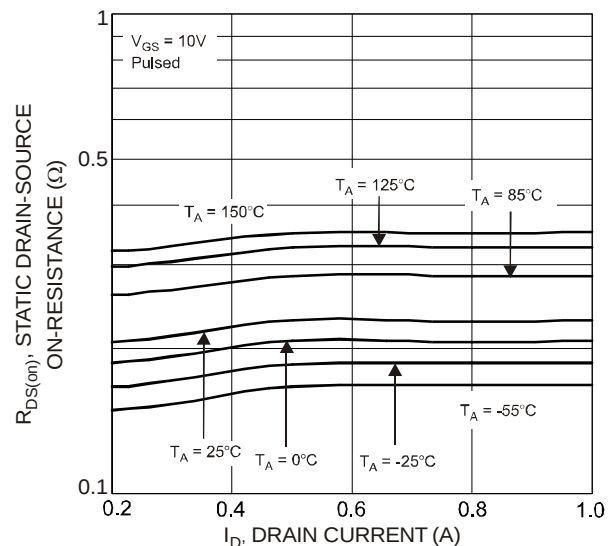


Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

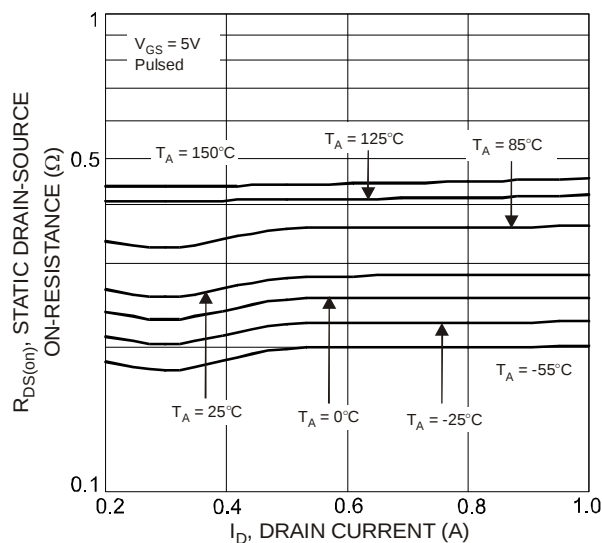


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

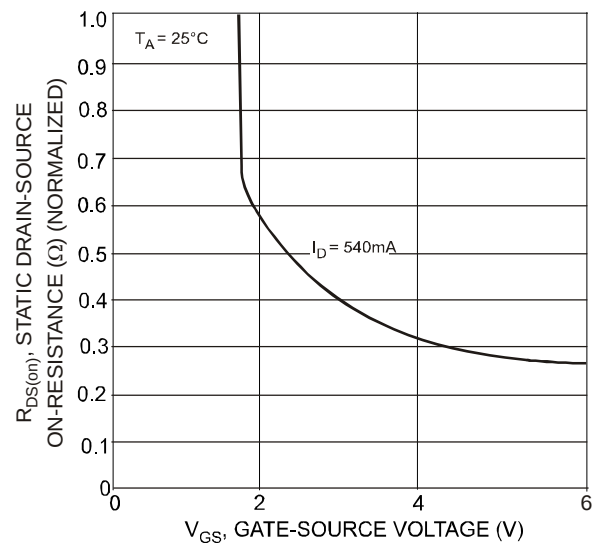


Fig. 6 Static Drain-Source, On-Resistance vs. Gate-Source Voltage

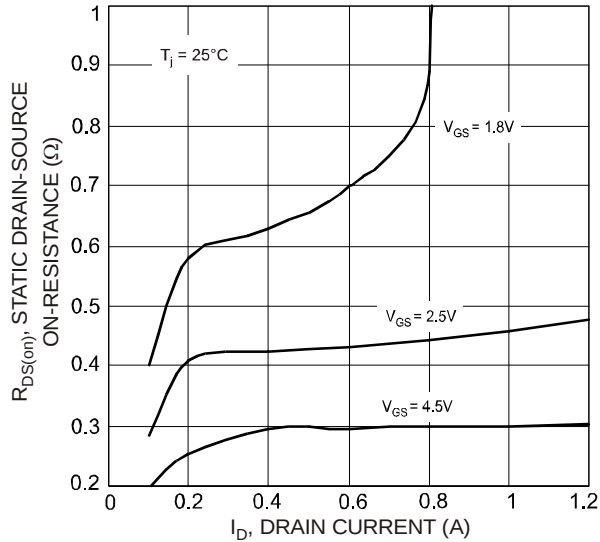


Fig. 7 On-Resistance vs. Drain Current and Gate Voltage

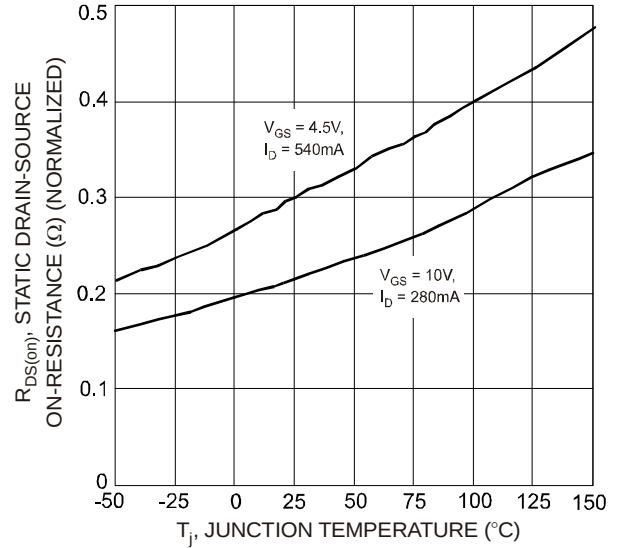


Fig. 8 Static Drain-Source, On-Resistance vs. Temperature

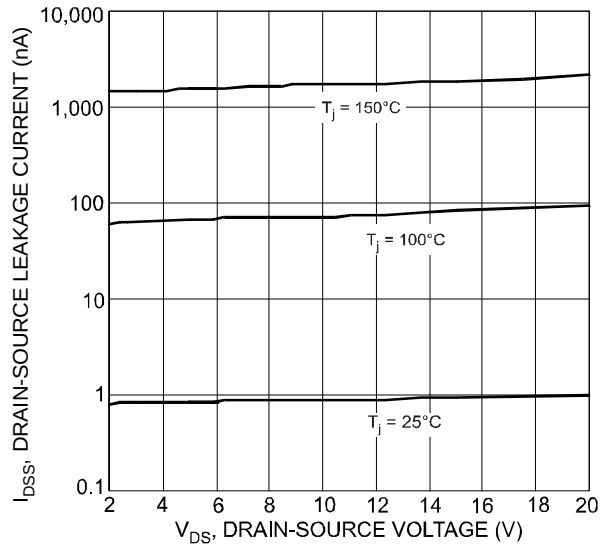


Fig. 9 Drain Source Leakage Current vs. Voltage

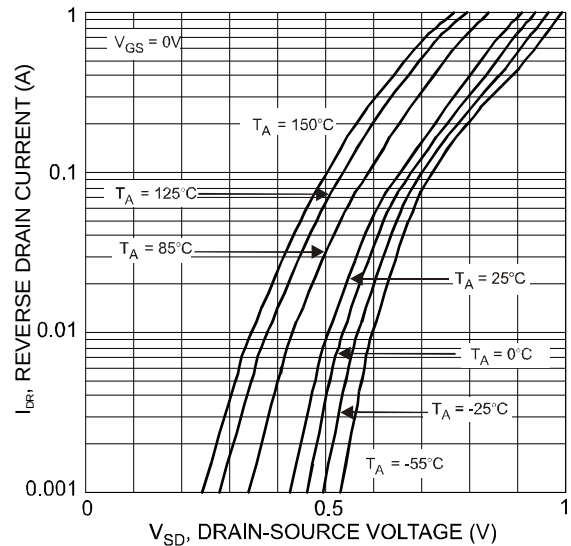


Fig. 10 Reverse Drain Current vs. Source-Drain Voltage

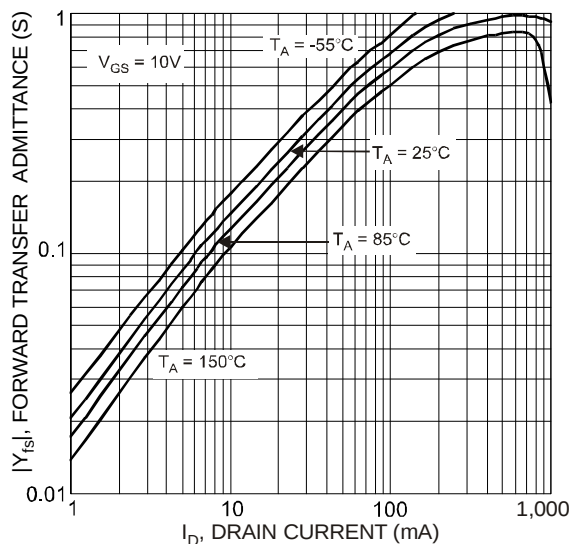


Fig. 11 Forward Transfer Admittance vs. Drain Current

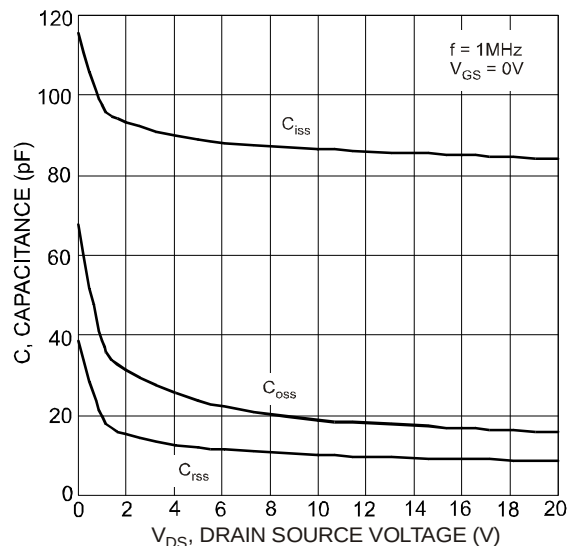
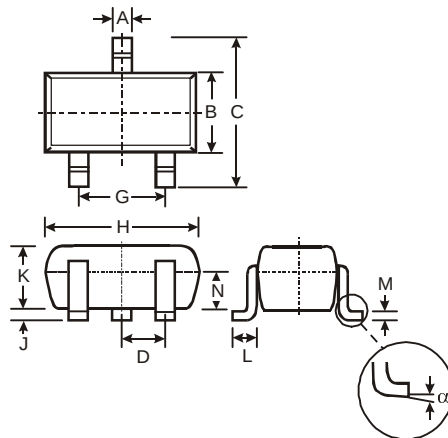


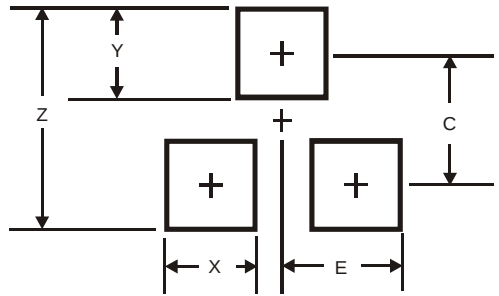
Fig. 12 Capacitance Variation

# Package Outline Dimensions



| SOT-523              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.22 |
| B                    | 0.75 | 0.85 | 0.80 |
| C                    | 1.45 | 1.75 | 1.60 |
| D                    | —    | —    | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| J                    | 0.00 | 0.10 | 0.05 |
| K                    | 0.60 | 0.80 | 0.75 |
| L                    | 0.10 | 0.30 | 0.22 |
| M                    | 0.10 | 0.20 | 0.12 |
| N                    | 0.45 | 0.65 | 0.50 |
| α                    | 0°   | 8°   | —    |
| All Dimensions in mm |      |      |      |

# Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 1.8           |
| X          | 0.4           |
| Y          | 0.51          |
| C          | 1.3           |
| E          | 0.7           |

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