



#### **N-CHANNEL ENHANCEMENT MODE MOSFET**

### **Product Summary**

| V <sub>(BR)DSS</sub> | RDS(ON) Max                   | I <sub>D</sub><br>T <sub>A</sub> = +25°C |
|----------------------|-------------------------------|--|
| 20V                  | $24m\Omega$ @ $V_{GS} = 4.5V$ | 6.2A                                     |
| 200                  | $32mΩ @ V_{GS} = 2.5V$        | 0.2A                                     |

### **Description and Applications**

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- DC-DC Converters
- Power Management Functions
- Backlighting

### **Features and Benefits**

- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

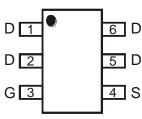
#### **Mechanical Data**

- Case: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound.
  UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish Tin Finish Annealed over Copper Leadframe.
  Solderable per MIL-STD-202, Method 208 (§3)
- Weight: 0.013 grams (Approximate)

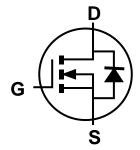
#### TSOT26



Top View



Top View Pin Configuration



**Equivalent Circuit** 

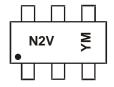
#### **Ordering Information** (Note 4)

| Part Number   | Case   | Packaging          |
|---------------|--------|--------------------|
| DMN2028UVT-7  | TSOT26 | 3,000/Tape & Reel  |
| DMN2028UVT-13 | TSOT26 | 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**



N2V = Product Type Marking Code YM = Date Code Marking Y = Year (ex: C = 2015) M = Month (ex: 9 = September)

Date Code Key

| Year  | 201 | 4   | 2015 |     | 2016 | 20  | 17  | 2018 |     | 2019 | 2   | 2020 |
|-------|-----|-----|------|-----|------|-----|-----|------|-----|------|-----|------|
| Code  | В   |     | С    |     | D    |     | E   |      |     | G    |     | Н    |
| Month | Jan | Feb | Mar  | Apr | May  | Jun | Jul | Aug  | Sep | Oct  | Nov | Dec  |
| Code  | 1   | 2   | 3    | 4   | 5    | 6   | 7   | 8    | 9   | 0    | N   | D    |



# **Maximum Ratings** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

| Characteristic   | Symbol          | Value | Unit |
|--|-----------------|-------|------|
| Drain-Source Voltage                                     | $V_{DSS}$       | 20    | V    |
| Gate-Source Voltage                                      | $V_{GSS}$       | ±8    | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | ΙD              | 6.2   | Α    |
| Maximum Body Diode Forward Current (Note 6)              | Is              | 1.5   | Α    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)       | I <sub>DM</sub> | 40    | Α    |

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

| Characteristic                                   |                        | Symbol                           | Value       | Unit |  |
|--|------------------------|----------------------------------|-------------|------|--|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                   | 1.2         | W    |  |
| Thermal Desistance Junction to Ambient (Note 5)  | Steady state           | Б.                               | 105         | °C/W |  |
| Thermal Resistance, Junction to Ambient (Note 5) | t<10s                  | $R_{\theta JA}$                  | 76          | C/VV |  |
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                   | 1.6         | W    |  |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state           | <u> </u>                         | 76          |      |  |
| Thermal Resistance, Junction to Ambient (Note 6) | t<10s                  | $R_{\theta JA}$                  | 50          | °C/W |  |
| Thermal Resistance, Junction to Case (Note 6)    | $R_{	heta JC}$         | 15                               |             |      |  |
| Operating and Storage Temperature Range          |                        | T <sub>J.</sub> T <sub>STG</sub> | -55 to +150 | °C   |  |

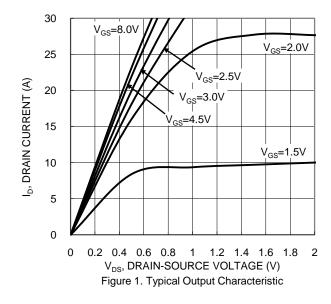
### Electrical Characteristics (@TA = +25°C, unless otherwise specified.)

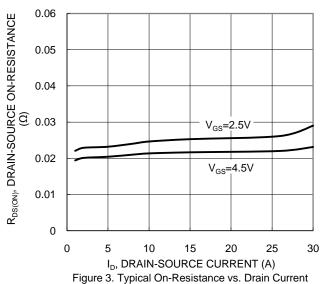
| Characteristic                    | Symbol              | Min | Тур  | Max  | Unit  | Test Condition                                  |
|-----------------------------------|---------------------|-----|------|------|-------|---|
| OFF CHARACTERISTICS (Note 7)      |                     |     |      | I.   |       |   |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | 20  | _    | _    | V     | $V_{GS} = 0V, I_D = 250\mu A$                   |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>    | _   | _    | 1    | μA    | $V_{DS} = 16V, V_{GS} = 0V$                     |
| Gate-Source Leakage               | I <sub>GSS</sub>    | _   |      | ±100 | nA    | $V_{GS} = \pm 8V, V_{DS} = 0V$                  |
| ON CHARACTERISTICS (Note 7)       |                     |     |      |      |       |   |
| Gate Threshold Voltage            | $V_{GS(TH)}$        | 0.4 |      | 1.5  | V     | $V_{DS} = V_{GS}, I_D = 250 \mu A$              |
| Static Drain-Source On-Resistance |                     | _   | 20   | 24   | mΩ    | $V_{GS} = 4.5V, I_D = 6.2A$                     |
| Static Diain-Source On-Nesistance | R <sub>DS(ON)</sub> | _   | 24   | 32   | 11122 | $V_{GS} = 2.5V, I_D = 5.2A$                     |
| Diode Forward Voltage             | $V_{SD}$            | _   |      | 1.2  | V     | $V_{GS} = 0V, I_{S} = 1.3A$                     |
| DYNAMIC CHARACTERISTICS (Note 8)  |                     |     |      |      |       |   |
| Input Capacitance                 | C <sub>iss</sub>    | _   | 856  | _    |       | 10111   |
| Output Capacitance                | Coss                | _   | 83   | _    | pF    | $V_{DS} = 10V, V_{GS} = 0V$<br>f = 1.0MHz       |
| Reverse Transfer Capacitance      | C <sub>rss</sub>    | _   | 78   | _    |       | 1 = 1.0W11Z                                     |
| Total Gate Charge                 | $Q_g$               | _   | 8.3  | _    |       |   |
| Gate-Source Charge                | $Q_{gs}$            | _   | 1.3  | _    | nC    | $V_{GS} = 4.5V$ , $V_{DS} = 10V$ , $I_D = 6.2A$ |
| Gate-Drain Charge                 | $Q_{gd}$            | _   | 3.1  | _    |       |   |
| Turn-On Delay Time                | t <sub>D(ON)</sub>  | _   | 13.2 | _    |       |   |
| Turn-On Rise Time                 | t <sub>R</sub>      | _   | 12.6 | _    | ns    | $V_{DD} = 10V, V_{GS} = 4.5V,$                  |
| Turn-Off Delay Time               | t <sub>D(OFF)</sub> | _   | 65   |      | 115   | $I_D = 1A$ , $R_G = 6\Omega$                    |
| Turn-Off Fall Time                | t <sub>F</sub>      | _   | 22   | _    |       |   |

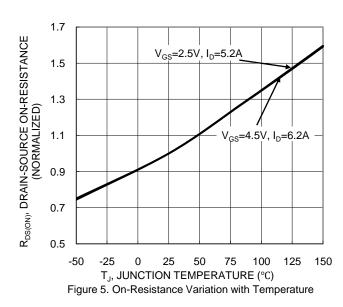
Notes:

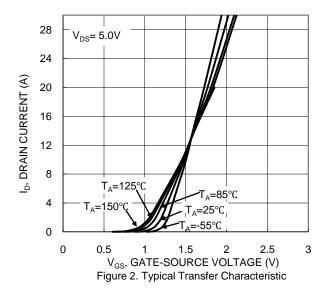
- 5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate.
- 7. Short duration pulse test used to minimize self-heating effect.
- 8. Guaranteed by design.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

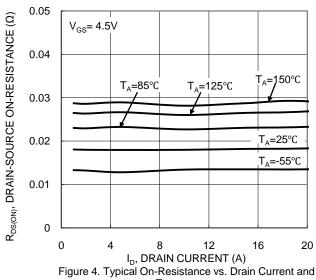












Temperature

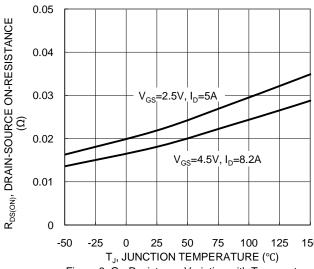


Figure 6. On-Resistance Variation with Temperature

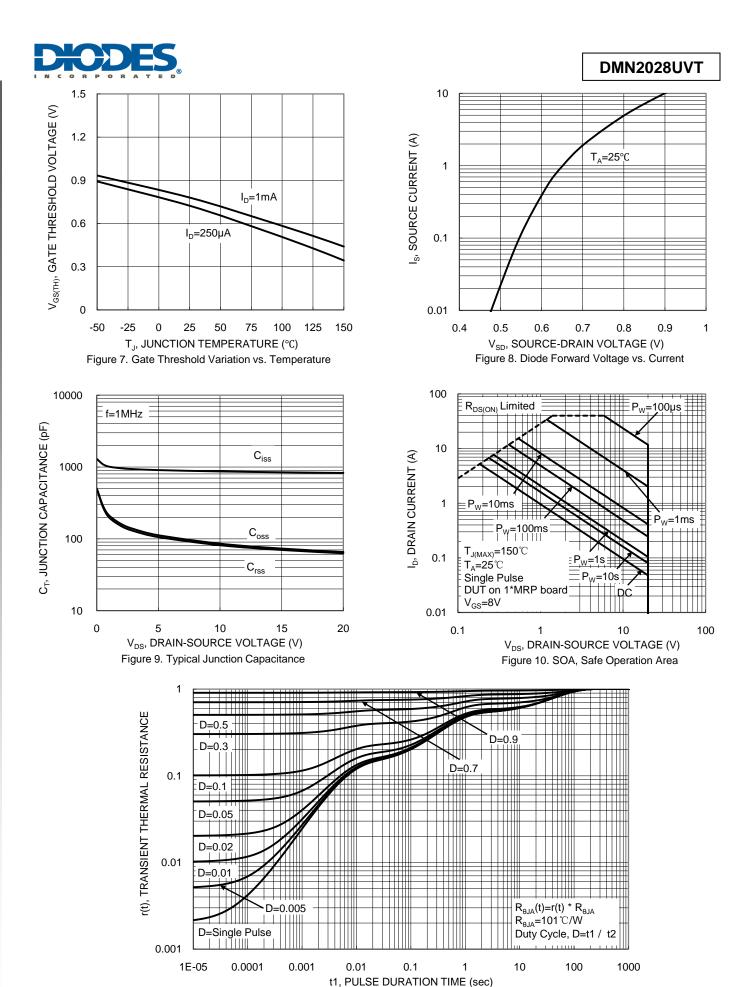
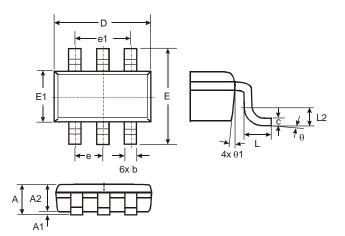


Figure 11. Transient Thermal Resistance



# **Package Outline Dimensions**

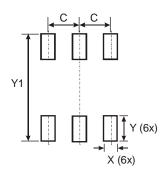
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



| TSOT26               |      |      |      |  |  |  |  |
|----------------------|------|------|------|--|--|--|--|
| Dim                  | Min  | Max  | Тур  |  |  |  |  |
| Α                    | _    | 1.00 | _    |  |  |  |  |
| A1                   | 0.01 | 0.10 |      |  |  |  |  |
| A2                   | 0.84 | 0.90 | _    |  |  |  |  |
| D                    | _    | _    | 2.90 |  |  |  |  |
| Е                    | _    | _    | 2.80 |  |  |  |  |
| E1                   | _    | _    | 1.60 |  |  |  |  |
| b                    | 0.30 | 0.45 |      |  |  |  |  |
| С                    | 0.12 | 0.20 |      |  |  |  |  |
| е                    | _    | _    | 0.95 |  |  |  |  |
| e1                   | _    | _    | 1.90 |  |  |  |  |
| L                    | 0.30 | 0.50 |      |  |  |  |  |
| L2                   | _    | _    | 0.25 |  |  |  |  |
| θ                    | 0°   | 8°   | 4°   |  |  |  |  |
| θ1                   | 4°   | 12°  |      |  |  |  |  |
| 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) |
|------------|---------------|
| С          | 0.950         |
| Х          | 0.700         |
| Y          | 1.000         |
| Y1         | 3.199         |



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