## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | $I_D$ max $T_A$ = 25°C |
|---|---|---|
| 20V | 18.5mΩ @ $V_{GS}$ = 10V | 5.4 A |
| | 21mΩ @ $V_{GS}$ = 4.5V | 5.0 A |
| | 24mΩ @ $V_{GS}$ = 2.5V | 4.6 A |
| | 31mΩ @ $V_{GS}$ = 1.8V | 3.5 A |

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **ESD Protected up to 2KV**
- **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**

## 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.

## Mechanical Data

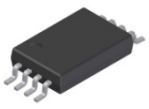
- Case: TSSOP-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.039 grams (approximate)

## Applications

- Power management functions
- Load Switch

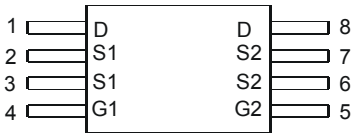
ESD PROTECTED TO 2kV

TSSOP-8

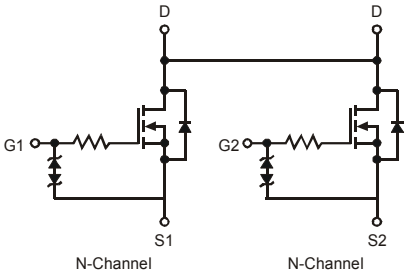


Top View

Bottom View




Top View
Pin Configuration



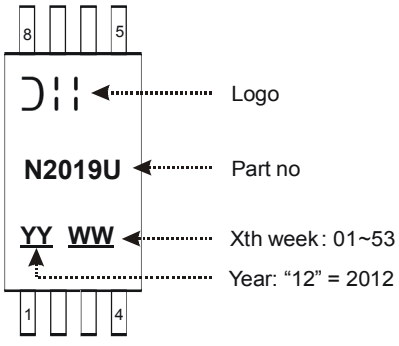

Internal Schematic

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMN2019UTS-13 | TSSOP-8 | 2500/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




Top View

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

| Characteristic | | | | Symbol | Value | Units |
|---|---|---|---|---|---|---|
| Drain-Source Voltage | | | | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage | | | | $V_{GSS}$ | ±12 | V |
| Continuous Drain Current (Note 5) | $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 5.4<br>4.3 | A |
| Continuous Drain Current (Note 5) | $V_{GS}$ = 2.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 4.6<br>3.7 | A |
| Continuous Body Diode Forward Current (Note 5) | | Steady Stat | $T_A$ = +25°C | $I_S$ | 0.9 | A |
| Pulsed Drain Current (Note 5) 10µs pulse, duty cycle = 1% | | | | $I_{DM}$ | 30 | A |

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

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 0.78 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 161 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | $R_{\theta JC}$ | 26 | °C/W |
| 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 6)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | - | - | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | - | - | 1.0 | µA | $V_{DS}$ = 20V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | - | - | 10 | µA | $V_{GS}$ = ±10V, $V_{DS}$ = 0V |
| Gate-Source Breakdown Voltage | $BV_{SGS}$ | ±12 | - | - | V | $V_{DS}$ = 0V, $I_G$ = ±250µA |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.35 | - | 0.95 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | - | 15.5 | 18.5 | mΩ | $V_{GS}$ = 10V, $I_D$ = 7A |
| | | - | 16.5 | 21 | | $V_{GS}$ = 4.5V, $I_D$ = 7A |
| | | - | 17 | 21.5 | | $V_{GS}$ = 4.0V, $I_D$ = 7A |
| | | - | 17.5 | 22.5 | | $V_{GS}$ = 3.6V, $I_D$ = 6.5A |
| | | - | 18 | 23 | | $V_{GS}$ = 3.1V, $I_D$ = 6.5A |
| | | - | 19 | 24 | | $V_{GS}$ = 2.5V, $I_D$ = 5.5A |
| | | - | 24 | 31 | | $V_{GS}$ = 1.8V, $I_D$ = 3.5A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | - | 13 | - | S | $V_{DS}$ = 5V, $I_D$ = 5A |
| Diode Forward Voltage | $V_{SD}$ | - | 0.7 | 1.0 | V | $V_{GS}$ = 0V, $I_S$ = 1A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 143 | - | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 74 | - | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 29 | - | pF | |
| Gate Resistance | $R_g$ | - | 202 | - | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_g$ | - | 8.8 | - | nC | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$ = 6.5A |
| Gate-Source Charge | $Q_{gs}$ | - | 1.4 | - | nC | |
| Gate-Drain Charge | $Q_{gd}$ | - | 3.0 | - | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 53 | - | ns | $V_{DD}$ = 10V, $V_{GS}$ = 4.5V, $R_L$ = 10Ω, $R_G$ = 6Ω |
| Turn-On Rise Time | $t_r$ | - | 78 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 562 | - | ns | |
| Turn-Off Fall Time | $t_f$ | - | 234 | - | ns | |

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

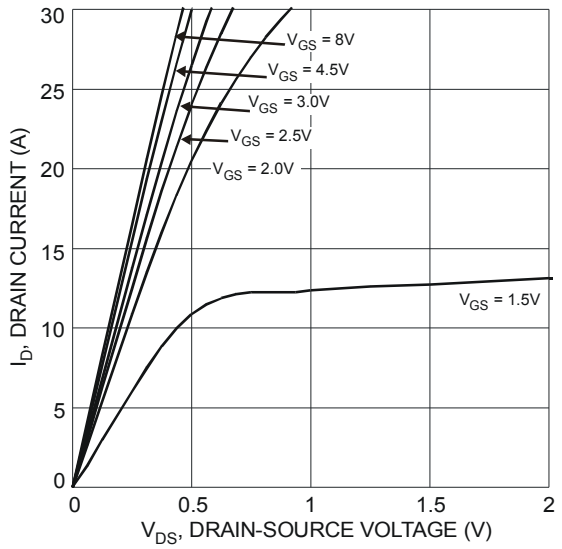



Fig. 1 Typical Output Characteristic

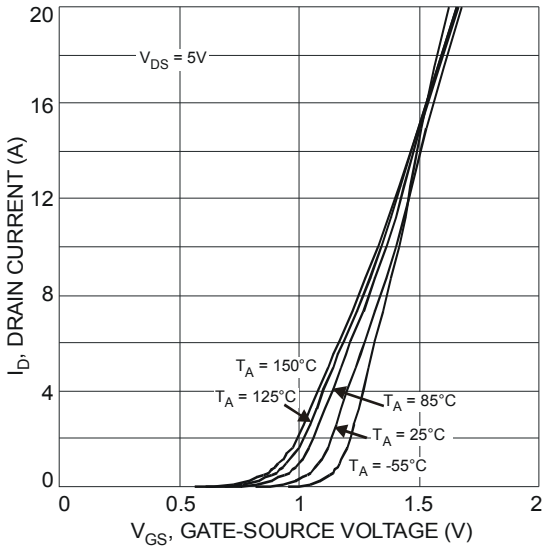



Fig. 2 Typical Transfer Characteristic

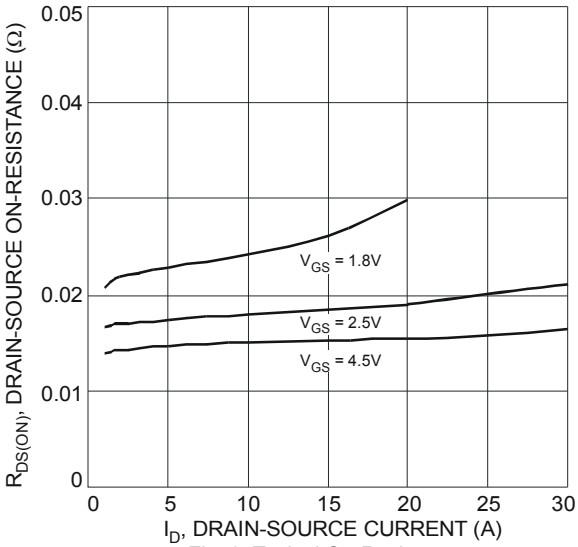



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

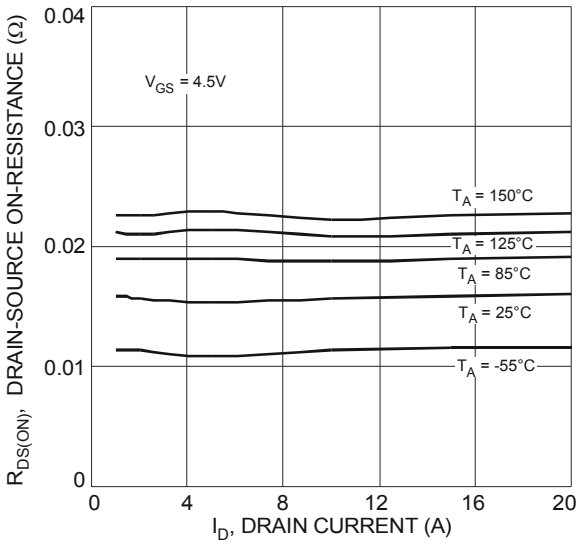



Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

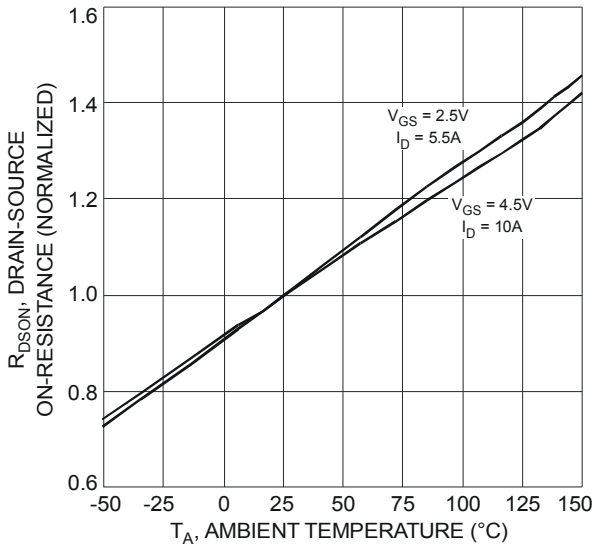



Fig. 5 On-Resistance Variation with Temperature

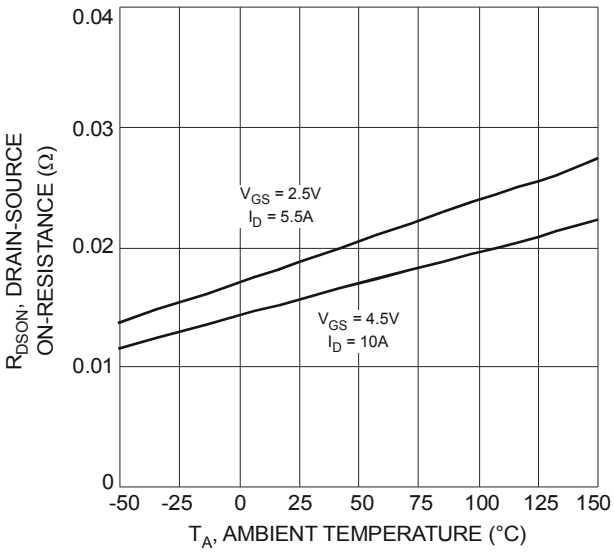



Fig. 6 On-Resistance Variation with Temperature

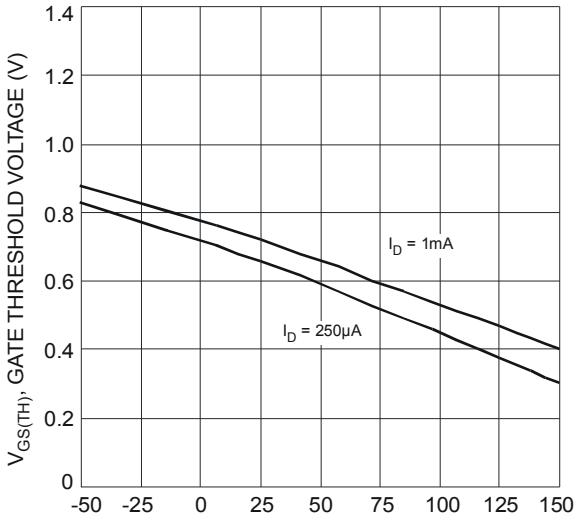



Fig. 7 Gate Threshold Variation vs. Ambient Temperature

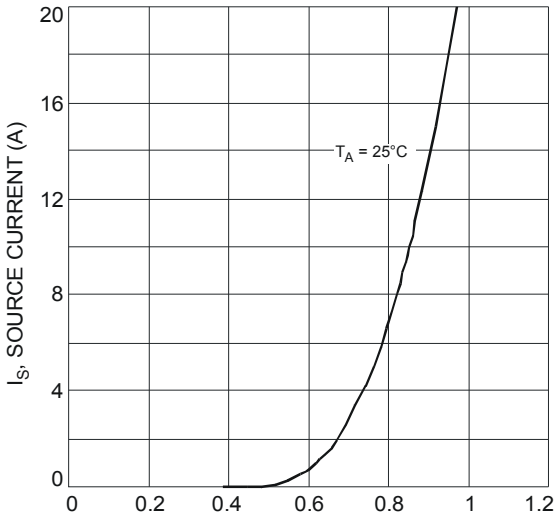



Fig. 8 Diode Forward Voltage vs. Current

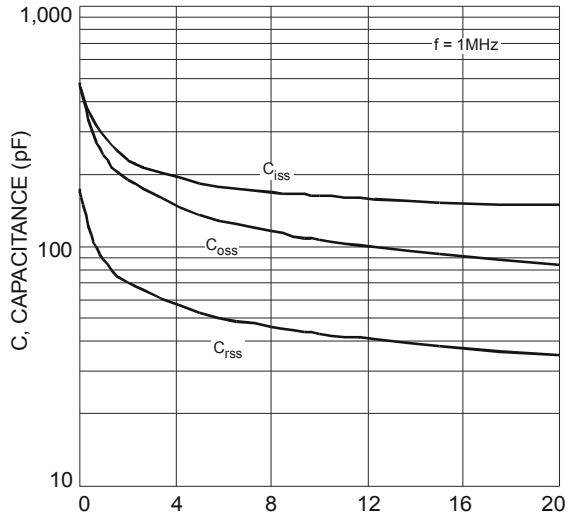



Fig. 9 Typical Total Capacitance

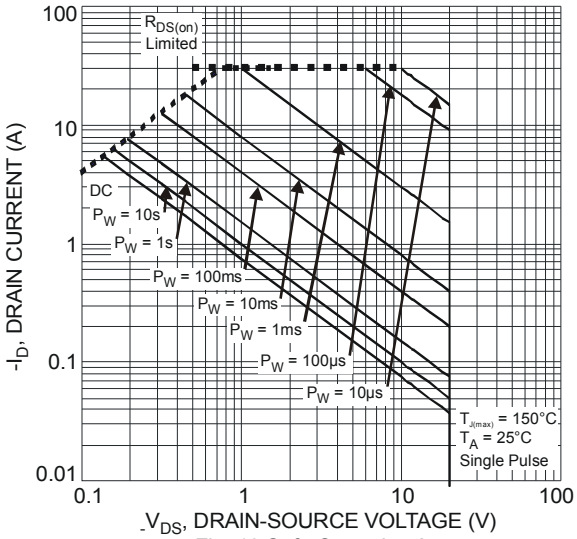



Fig. 10 Safe Operation Area

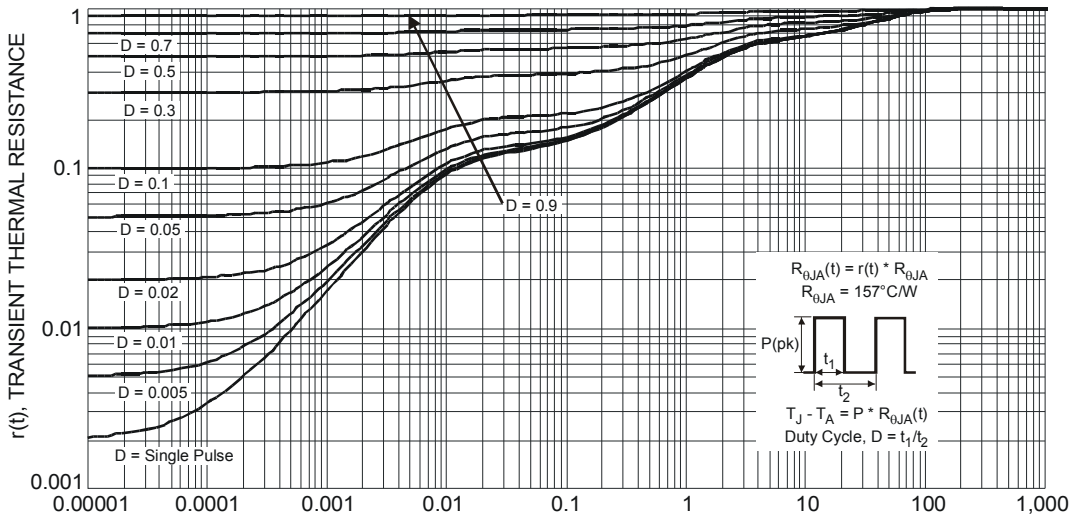
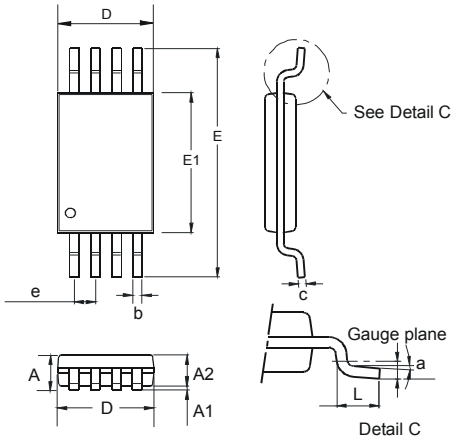



Fig. 11 Transient Thermal Response

## Package Outline Dimensions

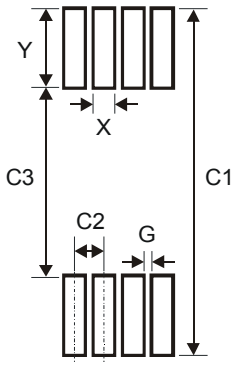
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| TSSOP-8 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **a** | 0.09 | – | – |
| **A** | – | 1.20 | – |
| **A1** | 0.05 | 0.15 | – |
| **A2** | 0.825 | 1.025 | 0.925 |
| **b** | 0.19 | 0.30 | – |
| **c** | 0.09 | 0.20 | – |
| **D** | 2.90 | 3.10 | 3.025 |
| **e** | — | — | 0.65 |
| **E** | — | — | 6.40 |
| **E1** | 4.30 | 4.50 | 4.425 |
| **L** | 0.45 | 0.75 | 0.60 |
| **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) |
|---|---|
| **X** | 0.45 |
| **Y** | 1.78 |
| **C1** | 7.72 |
| **C2** | 0.65 |
| **C3** | 4.16 |
| **G** | 0.20 |

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