

**DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

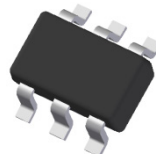
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ (MAX)                     | Package | $I_D$ (MAX)<br>$T_A = +25^\circ\text{C}$ |
|---------------|--|---------|--|
| 30V           | 190m $\Omega$ @ $V_{GS} = 10\text{V}$  | SOT363  | 1A                                       |
|               | 335m $\Omega$ @ $V_{GS} = 4.5\text{V}$ |         | 0.75A                                    |

**Description**

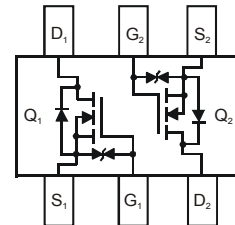
This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

- Motor Control
- Power Management Functions
- Load Switch



Top View


 Top View  
Internal Schematic

**Features and Benefits**

- 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**

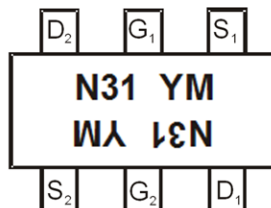
**Mechanical Data**

- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Alloy42 leadframe.  
Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.006 grams (approximate)

**Ordering Information** (Note 4)

| Part Number   | Case   | Packaging          |
|---------------|--------|--------------------|
| DMN3190LDW-7  | SOT363 | 3000K/Tape & Reel  |
| DMN3190LDW-13 | SOT363 | 10000K/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](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**


N31 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: Y = 2011)  
 M = Month (ex: 9 = September)

## Date Code Key

| Year Code | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------|------|------|------|------|------|------|------|
| Code      | Y    | Z    | A    | B    | C    | D    | E    |

| Month Code | 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic   | Symbol       | Value                     | Units |    |
|--|--------------|---------------------------|-------|----|
| Drain-Source Voltage   | $V_{DSS}$    | 30                        | V     |    |
| Gate-Source Voltage  | $V_{GSS}$    | $\pm 20$                  | V     |    |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$      | Steady State | $T_A = +25^\circ\text{C}$ | 1000  | mA |
|  |              | $T_A = +70^\circ\text{C}$ | 900   |    |
| Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$      | T < 5s       | $T_A = +25^\circ\text{C}$ | 1300  | mA |
|  |              | $T_A = +70^\circ\text{C}$ | 1000  |    |
| Maximum Continuous Body Diode Forward Current (Note 5)       | $I_S$        | 0.5                       | A     |    |
| Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle=1%) | $I_{DM}$     | 2.0                       | A     |    |

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   | Symbol          | Value                     | Units              |                    |
|--|-----------------|---------------------------|--------------------|--------------------|
| Total Power Dissipation (Note 5)                 | $P_D$           | $T_A = +25^\circ\text{C}$ | 0.32               | W                  |
|  |                 | $T_A = +70^\circ\text{C}$ | 0.19               |                    |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | Steady State              | 395                | $^\circ\text{C/W}$ |
|  |                 | T < 5s                    | 320                |                    |
| Total Power Dissipation (Note 6)                 | $P_D$           | $T_A = +25^\circ\text{C}$ | 0.4                | W                  |
|  |                 | $T_A = +70^\circ\text{C}$ | 0.25               |                    |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | Steady State              | 320                | $^\circ\text{C/W}$ |
|  |                 | T < 5s                    | 250                |                    |
| Thermal Resistance, Junction to Case             | $R_{\theta JC}$ | 143                       | $^\circ\text{C/W}$ |                    |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150               | $^\circ\text{C}$   |                    |

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                               | Symbol       | Min | Typ  | Max      | Unit          | Test Condition   |
|--|--------------|-----|------|----------|---------------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>          |              |     |      |          |               |  |
| Drain-Source Breakdown Voltage               | $BV_{DSS}$   | 30  | —    | —        | V             | $V_{GS} = 0\text{V}, I_D = 1\text{mA}$   |
| Zero Gate Voltage Drain Current              | $I_{DSS}$    | —   | —    | 1        | $\mu\text{A}$ | @ $T_C = +25^\circ\text{C}$ , $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$        |
| Gate-Source Leakage                          | $I_{GSS}$    | —   | —    | $\pm 10$ | $\mu\text{A}$ | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$                                  |
| <b>ON CHARACTERISTICS (Note 7)</b>           |              |     |      |          |               |  |
| Gate Threshold Voltage                       | $V_{GS(th)}$ | 1.5 | —    | 2.8      | V             | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$  |
| Static Drain-Source On-Resistance            | $R_{DS(on)}$ | —   | 122  | 190      | m $\Omega$    | $V_{GS} = 10\text{V}, I_D = 1.3\text{A}$                                       |
|  |              | —   | 181  | 335      |               | $V_{GS} = 4.5\text{V}, I_D = 290\text{mA}$                                     |
| Forward Transfer Admittance                  | $ Y_{fs} $   | —   | 0.7  | —        | mS            | $V_{DS} = 10\text{V}, I_D = 250\text{mA}$                                      |
| Diode Forward Voltage                        | $V_{SD}$     | —   | —    | 1.2      | V             | $V_{GS} = 0\text{V}, I_S = 250\text{mA}$                                       |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>      |              |     |      |          |               |  |
| Input Capacitance                            | $C_{iss}$    | —   | 87   | —        | pF            | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$                   |
| Output Capacitance                           | $C_{oss}$    | —   | 17   | —        | pF            |  |
| Reverse Transfer Capacitance                 | $C_{rss}$    | —   | 12   | —        | pF            |  |
| Gate Resistance                              | $R_g$        | —   | 69.8 | —        | $\Omega$      | $f = 1\text{MHz}, V_{GS} = 0\text{V}, V_{DS} = 0\text{V}$                      |
| Total Gate Charge ( $V_{GS} = 4.5\text{V}$ ) | $Q_g$        | —   | 0.9  | —        | nC            | $V_{DS} = 10\text{V}, I_D = 250\text{mA}$                                      |
| Total Gate Charge ( $V_{GS} = 10\text{V}$ )  | $Q_g$        | —   | 2.0  | —        | nC            |  |
| Gate-Source Charge                           | $Q_{gs}$     | —   | 0.3  | —        | nC            |  |
| Gate-Drain Charge                            | $Q_{gd}$     | —   | 0.3  | —        | nC            |  |
| Turn-On Delay Time                           | $t_{D(on)}$  | —   | 4.5  | —        | ns            | $V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, R_g = 10\Omega, I_D = 100\text{mA}$ |
| Turn-On Rise Time                            | $t_r$        | —   | 8.9  | —        | ns            |  |
| Turn-Off Delay Time                          | $t_{D(off)}$ | —   | 30.3 | —        | ns            |  |
| Turn-Off Fall Time                           | $t_f$        | —   | 15.6 | —        | ns            |  |

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  - Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

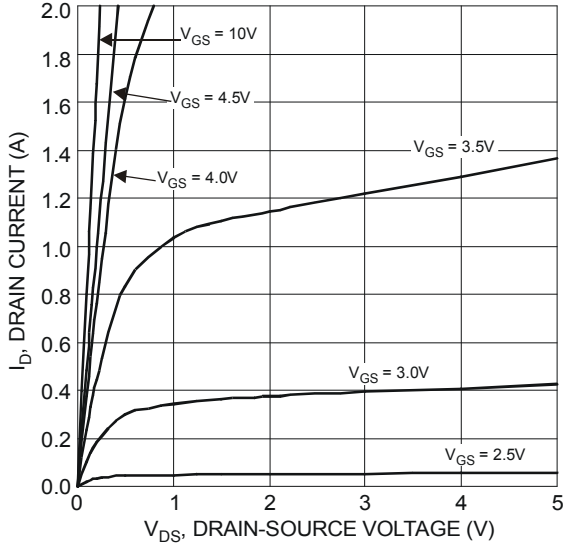


Figure 1 Typical Output Characteristic

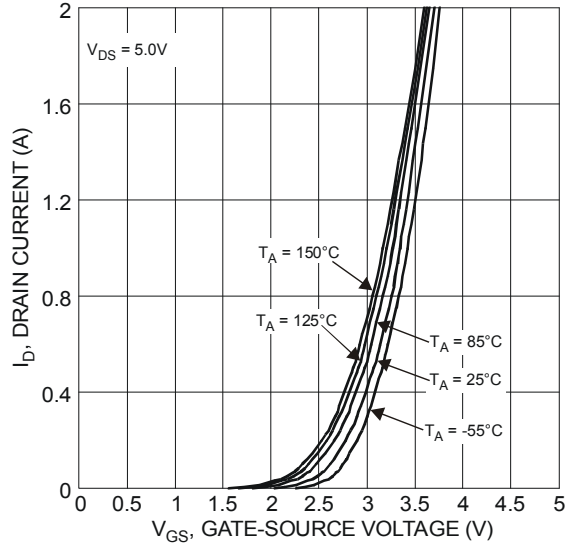


Figure 2 Typical Transfer Characteristics

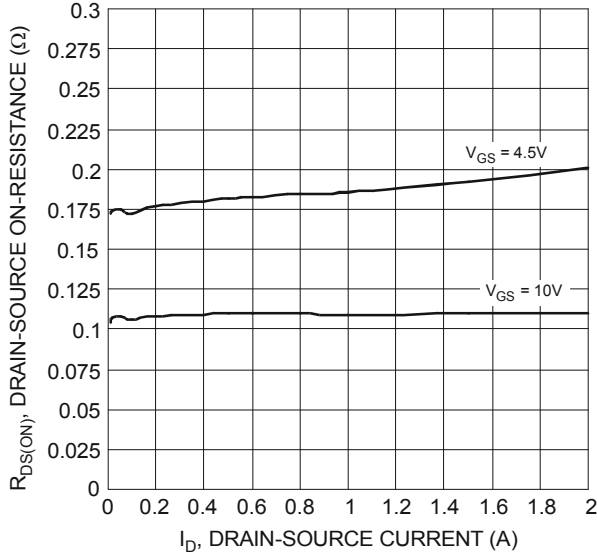


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

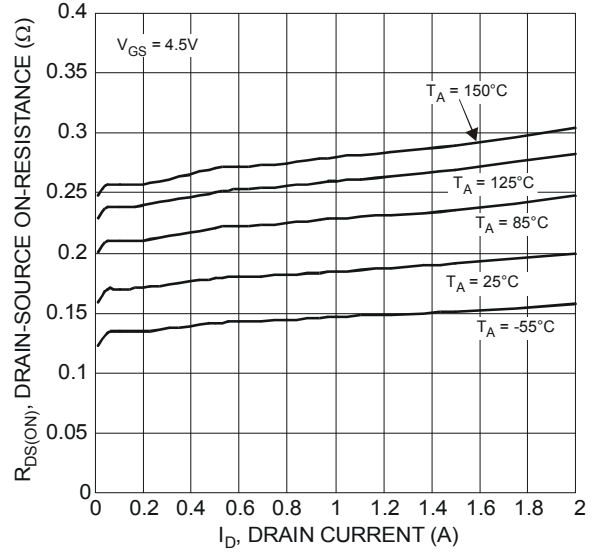


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

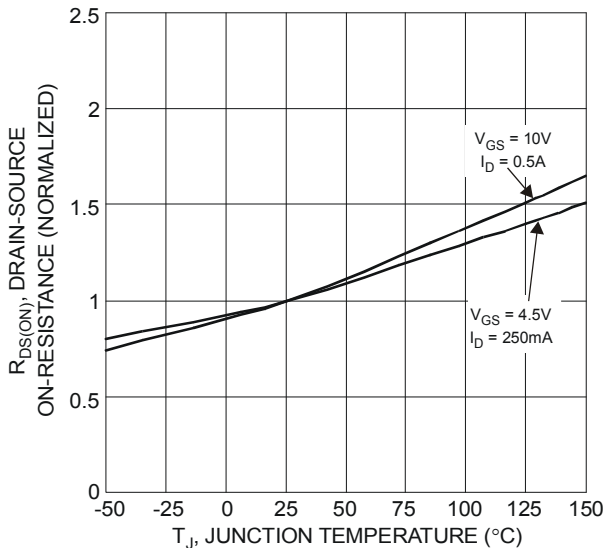


Figure 5 On-Resistance Variation with Temperature

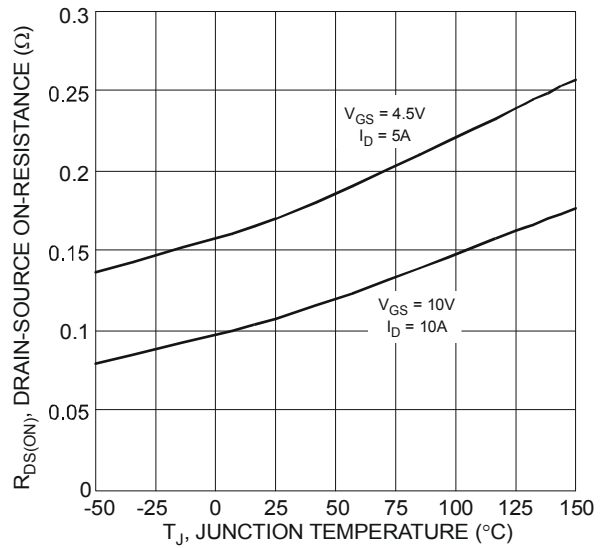


Figure 6 On-Resistance Variation with Temperature

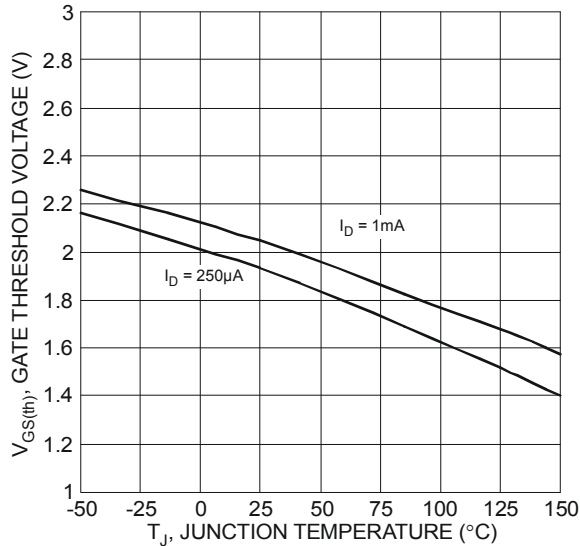


Figure 7 Gate Threshold Variation vs. Ambient Temperature

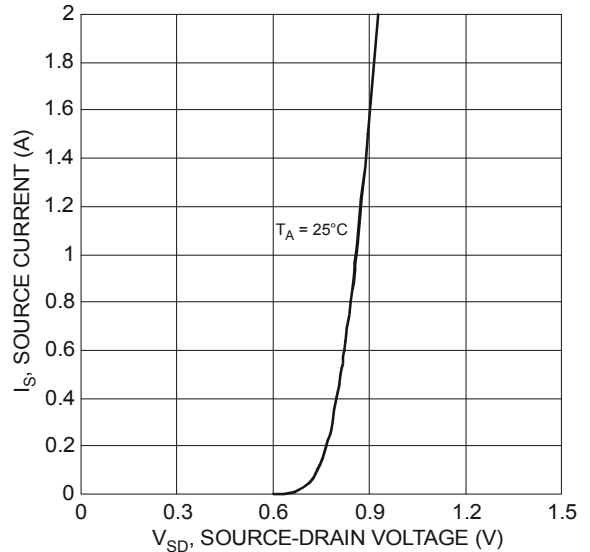


Figure 8 Diode Forward Voltage vs. Current

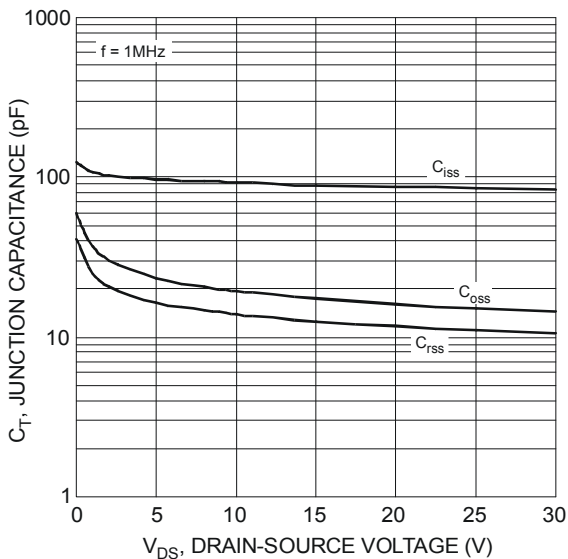


Figure 9 Typical Junction Capacitance

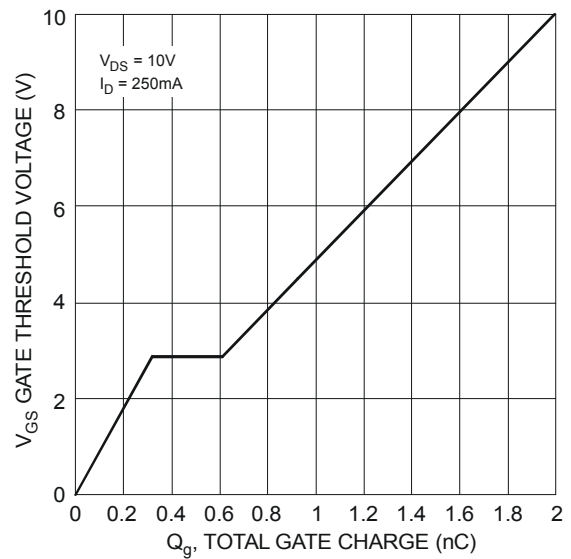
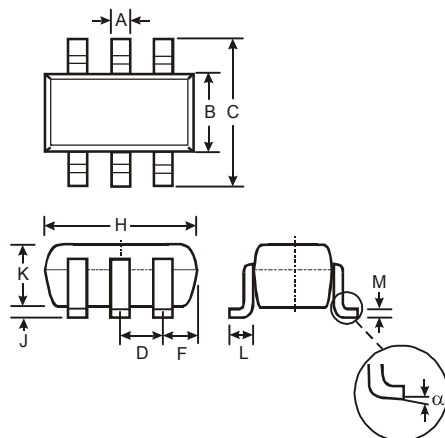


Figure 10 Gate Charge

## Package Outline Dimensions

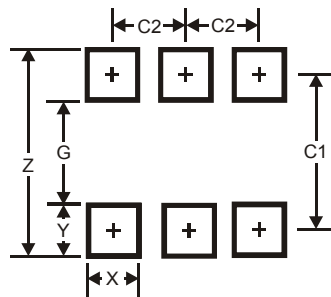
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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  |
| $\alpha$                    | 0°       | 8°   | -     |
| <b>All Dimensions in mm</b> |          |      |       |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| 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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