## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | $I_D$ max $T_A$ = +25°C |
|---|---|---|
| -16V | 39mΩ @ $V_{GS}$ = -4.5V | -2.5A |
| | 52mΩ @ $V_{GS}$ = -2.5V | -2.1A |
| | 65mΩ @ $V_{GS}$ = -1.8V | -1.8A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Up To 3kV
- **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 and Applications

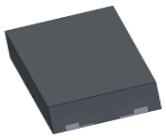
This MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

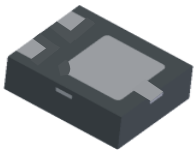
- Backlighting
- Power Management Functions
- DC-DC Converters

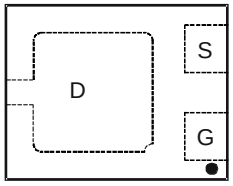
## Mechanical Data

- Case: X2-DFN2015-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e4
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)

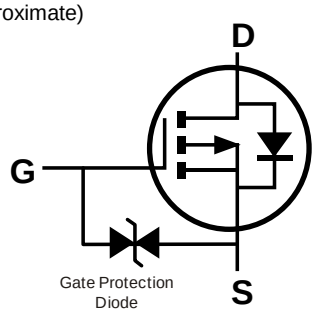

ESD PROTECTED TO 3kV


TOP VIEW


BOTTOM VIEW



Internal Schematic (Top View)



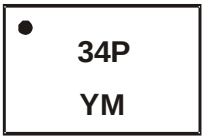
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMG3415UFY4-7 | X2-DFN2015-3 | 3,000/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




34P = Marking Code
YM = Date Code Marking
Y = Year (ex: C = 2015)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2009 | ~ | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|
| Code | W | ~ | C | D | E | F | G | H | I |

| 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 | | | $V_{DSS}$ | -16 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±8 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = -4.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -2.5<br>-2.2 | A |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | -12 | A |

## Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | | $P_D$ | 0.65 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 197 | °C/W |
| Total Power Dissipation (Note 6) | | $P_D$ | 1.35 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 95 | °C/W |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 22 | |
| 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 | $BV_{DSS}$ | -16 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current $T_J$ = +25°C | $I_{DSS}$ | — | — | -1.0 | µA | $V_{DS}$ = -16V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±10<br>±500 | µA<br>nA | $V_{GS}$ = ±8V, $V_{DS}$ = 0V<br>$V_{GS}$ = ±5V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -0.3 | -0.55 | -1.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | — | 31 | 39 | mΩ | $V_{GS}$ = -4.5V, $I_D$ = -4.0A |
| | | | 40 | 52 | | $V_{GS}$ = -2.5V, $I_D$ = -3.5A |
| | | | 51 | 65 | | $V_{GS}$ = -1.8V, $I_D$ = -2.0A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | — | 7.9 | — | S | $V_{DS}$ = -5V, $I_D$ = -2.5A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 282 | — | pF | $V_{DS}$ = -10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 152 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 38 | — | pF | |
| Gate Resistance | $R_g$ | — | 250 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge | $Q_g$ | — | 10 | — | nC | $V_{GS}$ = -4.5V, $V_{DS}$ = -10V, $I_D$ = -4A |
| Gate-Source Charge | $Q_{gs}$ | — | 1.5 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 2.4 | — | nC | |
| Turn-On Delay Time | $t_{D(on)}$ | — | 79 | — | ns | $V_{DS}$ = -10V, $V_{GS}$ = -4.5V,<br>$R_D$ = 2.5Ω, $R_G$ = 3.0Ω |
| Turn-On Rise Time | $t_r$ | — | 175 | — | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | — | 885 | — | ns | |
| Turn-Off Fall Time | $t_f$ | — | 568 | — | ns | |

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

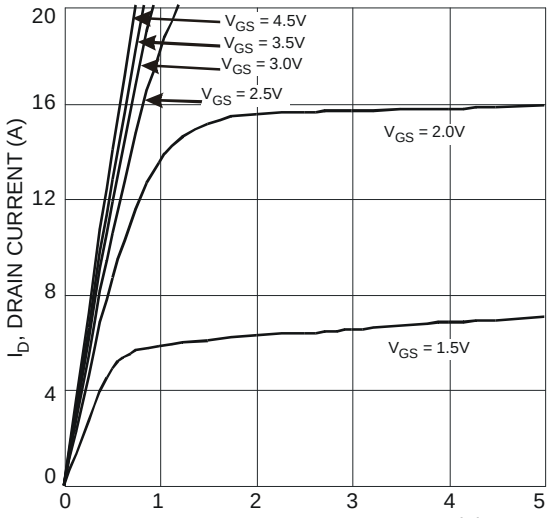



Fig. 1 Typical Output Characteristic

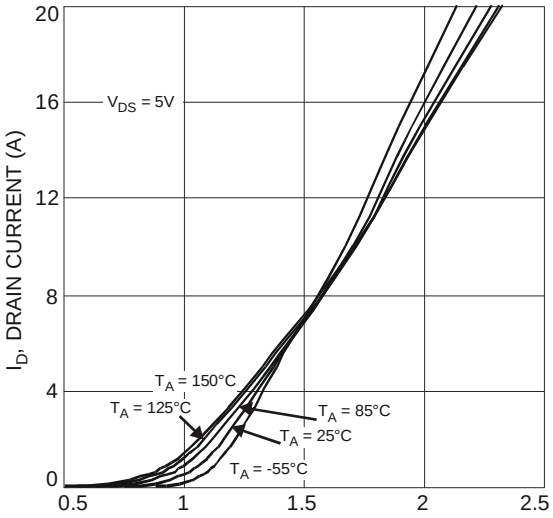



Fig. 2 Typical Transfer Characteristic

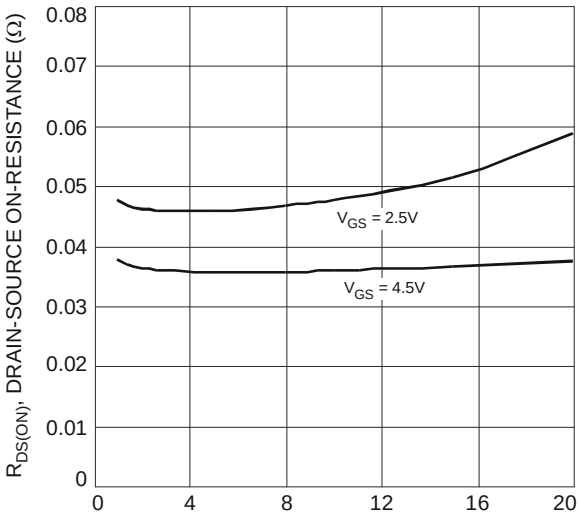



Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

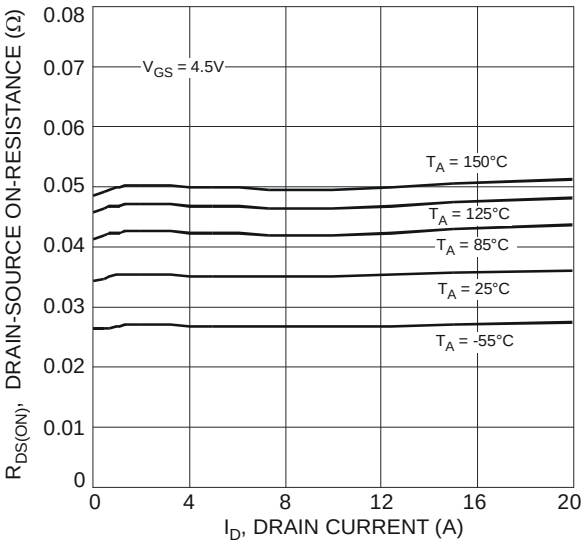



Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

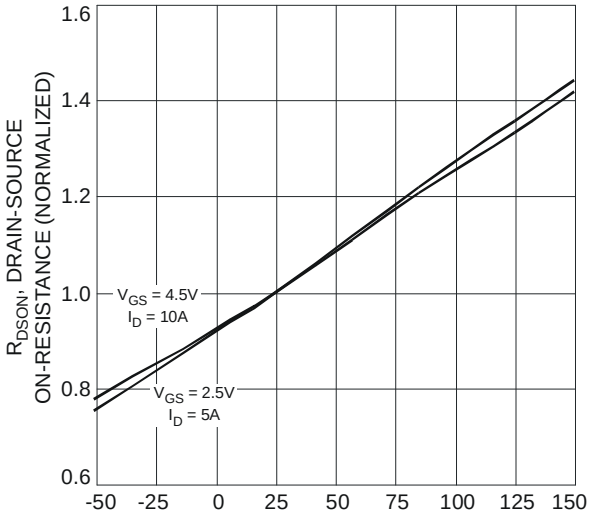



Fig. 5 On-Resistance Variation with Temperature

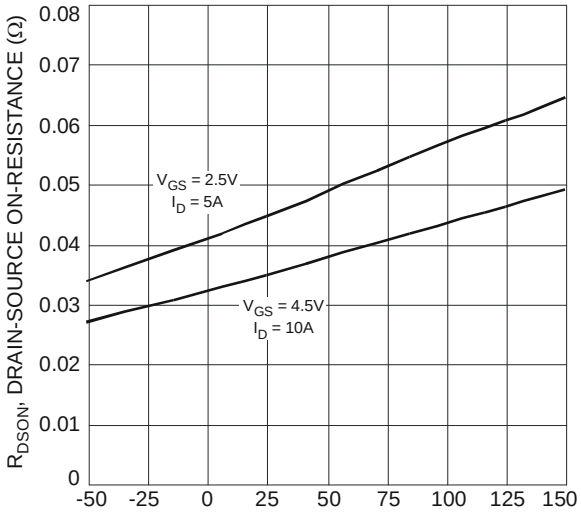



Fig. 6 On-Resistance Variation with Temperature

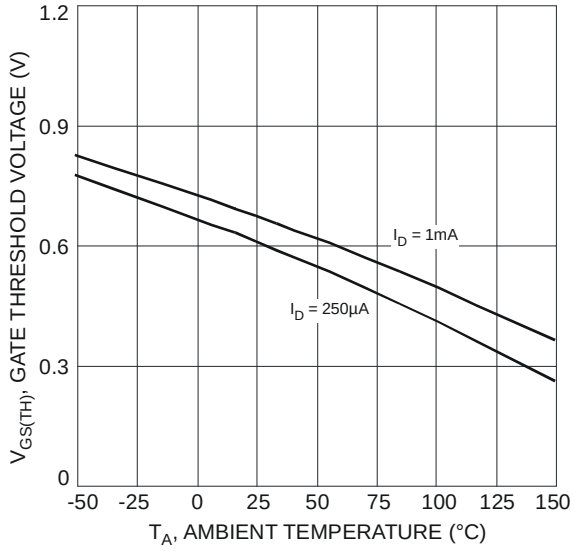



Fig. 7 Gate Threshold Variation vs. Ambient Temperature

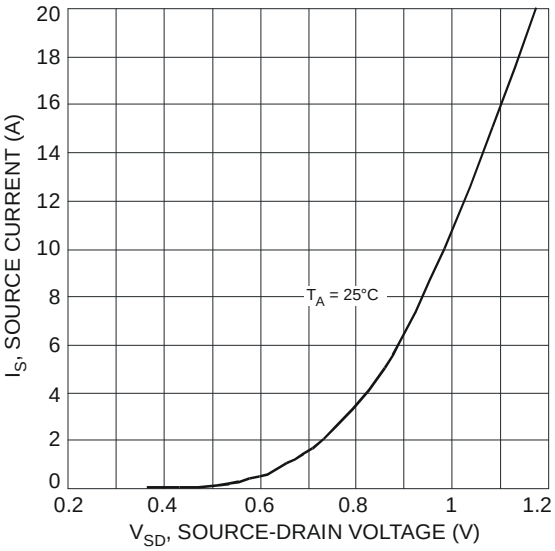



Fig. 8 Diode Forward Voltage vs. Current

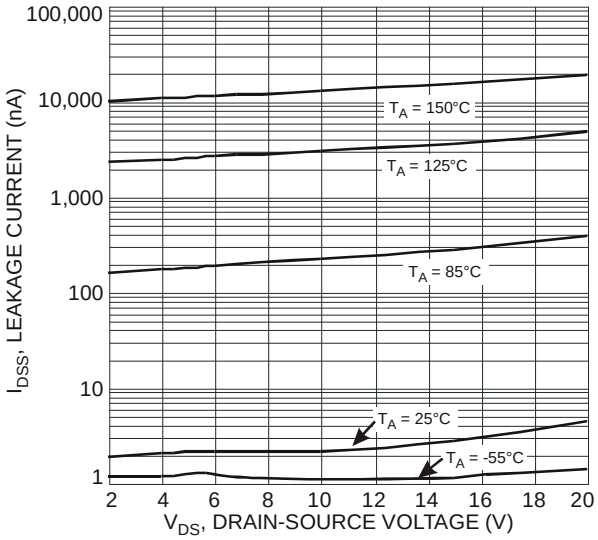



Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

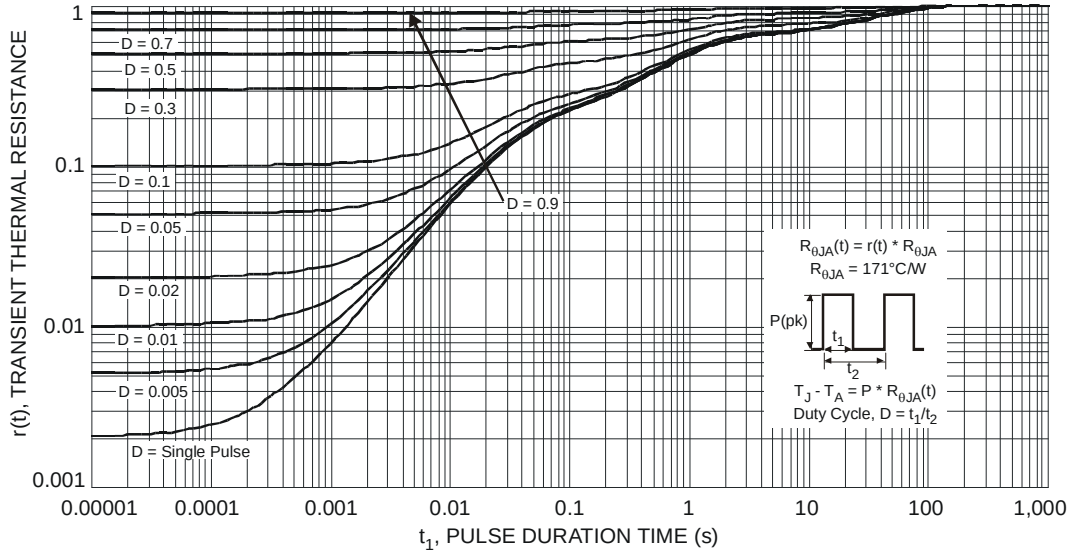
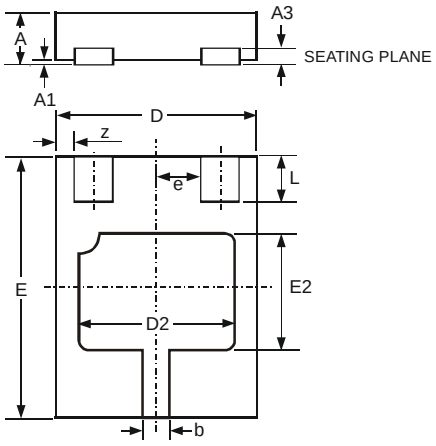



Fig. 10 Transient Thermal Response

## Package Outline Dimensions

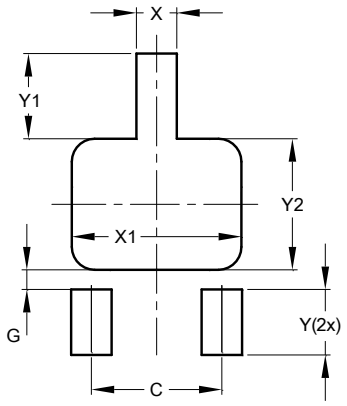
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.




| X2-DFN2015-3 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | - | 0.40 | - |
| **A1** | 0 | 0.05 | 0.02 |
| **A3** | - | - | 0.13 |
| **b** | 0.20 | 0.30 | 0.25 |
| **D** | 1.45 | 1.575 | 1.5 |
| **D2** | 1.00 | 1.20 | 1.10 |
| **e** | - | - | 0.50 |
| **E** | 1.95 | 2.075 | 2.00 |
| **E2** | 0.70 | 0.90 | 0.80 |
| **L** | 0.25 | 0.35 | 0.30 |
| **z** | - | - | 0.125 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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




| X2-DFN2015-3 | |
|---|---|
| **Dimensions** | **Value (in mm)** |
| **C** | 1.000 |
| **G** | 0.150 |
| **X** | 0.310 |
| **X1** | 1.300 |
| **Y** | 0.500 |
| **Y1** | 0.650 |
| **Y2** | 1.000 |

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