

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ Max                       | $I_D$ Max<br>$T_A = +25^\circ\text{C}$ |
|------------|--|--|
| -20V       | 45m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -4.7A                                  |
|            | 90m $\Omega$ @ $V_{GS} = -1.8\text{V}$ | -3.3A                                  |

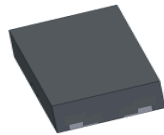
## Description and Applications

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.

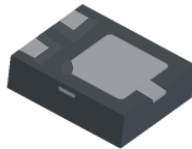
- Backlighting
- Power Management Functions
- DC-DC Converters



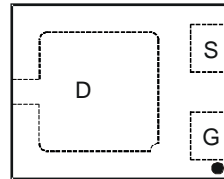
ESD protected Gate



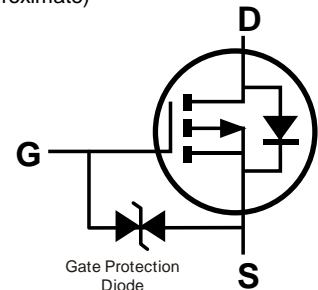
TOP VIEW



BOTTOM VIEW



Internal Schematic  
(Top View)



Equivalent Circuit

## Features and Benefits

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

## Mechanical Data

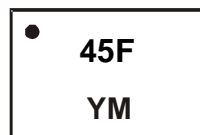
- Case: X2-DFN2015-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Terminals Connections: See Diagram Below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

## Ordering Information (Note 4)

| Part Number   | Case         | Packaging         |
|---------------|--------------|-------------------|
| DMP2045UFY4-7 | 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) & 2015/863/EU (RoHS 3) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free/](http://www.diodes.com/quality/lead_free/) 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



45F = Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------|------|------|------|------|------|------|------|------|------|
| Code | E    | F    | G    | H    | I    | J    | K    | L    | M    |

| 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                  | Unit |
|---|------------------|------------------------|------|
| Drain-Source Voltage                                      | V <sub>DSS</sub> | -20                    | V    |
| Gate-Source Voltage                                       | V <sub>GSS</sub> | ±8                     | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V | I <sub>D</sub>   | T <sub>A</sub> = +25°C | -4.7 |
|   |                  | T <sub>A</sub> = +70°C | -3.8 |
| Maximum Continuous Body Diode Forward Current (Note 6)    | I <sub>S</sub>   | -1                     | A    |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)        | I <sub>DM</sub>  | -25                    | A    |

**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value            | Unit |
|--|-----------------------------------|------------------|------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 0.67             | W    |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | Steady State     | 190  |
| Total Power Dissipation (Note 6)                 |                                   | P <sub>D</sub>   | 1.49 |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | Steady State     | 84   |
| Thermal Resistance, Junction to Case (Note 6)    |                                   | R <sub>θJC</sub> | 14.5 |
| 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   |
|---|---------------------|------|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>     |                     |      |      |      |      |  |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | -20  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA  |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | —    | —    | -1   | µA   | T <sub>J</sub> = +25°C, V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                     | I <sub>GSS</sub>    | —    | —    | ±10  | µA   | V <sub>GS</sub> = ±8.0V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 7)</b>      |                     |      |      |      |      |  |
| Gate Threshold Voltage                  | V <sub>GS(TH)</sub> | -0.3 | —    | -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> | —    | 34   | 45   | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A  |
|   |                     | —    | 44   | 58   |      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A  |
|   |                     | —    | 56   | 90   |      | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -0.1A  |
|   |                     | —    | 80   | 160  |      | V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -0.1A  |
| Diode Forward Voltage                   | V <sub>SD</sub>     | —    | -0.6 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.0A  |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b> |                     |      |      |      |      |  |
| Input Capacitance                       | C <sub>iss</sub>    | —    | 634  | —    | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz   |
| Output Capacitance                      | C <sub>oss</sub>    | —    | 81   | —    | pF   |  |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    | —    | 66   | —    | pF   |  |
| Gate Resistance                         | R <sub>g</sub>      | —    | 20   | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz   |
| Total Gate Charge                       | Q <sub>g</sub>      | —    | 6.8  | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V<br>I <sub>D</sub> = -4A  |
| Gate-Source Charge                      | Q <sub>gs</sub>     | —    | 0.7  | —    | nC   |  |
| Gate-Drain Charge                       | Q <sub>gd</sub>     | —    | 1.6  | —    | nC   |  |
| Turn-On Delay Time                      | t <sub>D(ON)</sub>  | —    | 4.2  | —    | ns   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V,<br>R <sub>D</sub> = 2.5Ω, R <sub>g</sub> = 3.0Ω, I <sub>D</sub> = -1A |
| Turn-On Rise Time                       | t <sub>R</sub>      | —    | 3.4  | —    | ns   |  |
| Turn-Off Delay Time                     | t <sub>D(OFF)</sub> | —    | 22.7 | —    | ns   |  |
| Turn-Off Fall Time                      | t <sub>F</sub>      | —    | 9.6  | —    | ns   |  |
| Reverse Recovery Time                   | t <sub>RR</sub>     | —    | 1.8  | —    | ns   | I <sub>F</sub> = -1.0A, di/dt = 100A/µs  |
| Reverse Recovery Charge                 | Q <sub>RR</sub>     | —    | 9.4  | —    | nC   | I <sub>F</sub> = -1.0A, di/dt = 100A/µs  |

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

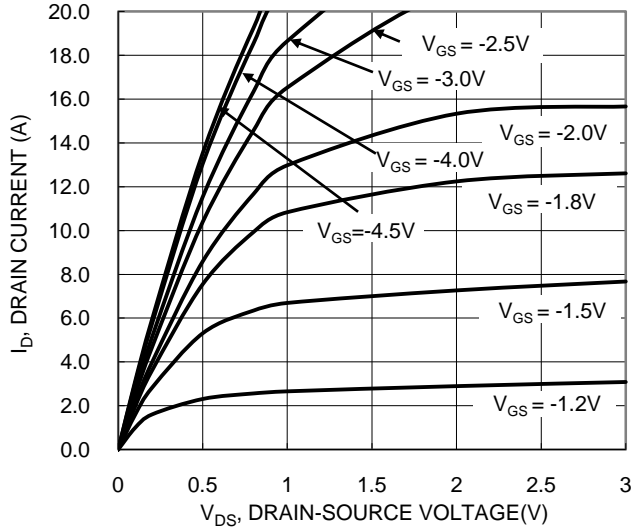


Figure 1. Typical Output Characteristic

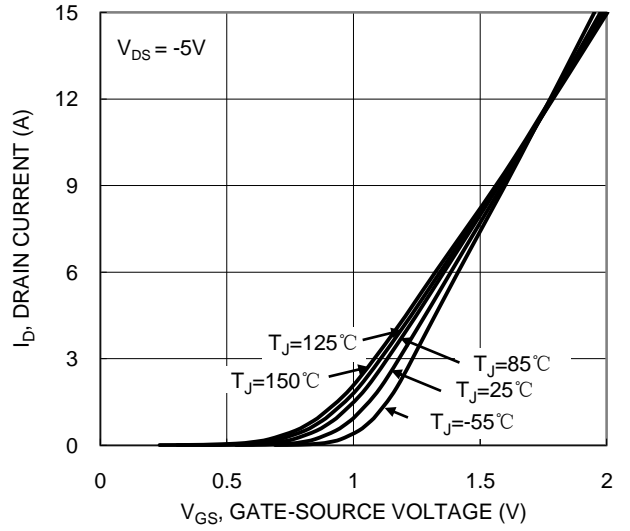


Figure 2. Typical Transfer Characteristic

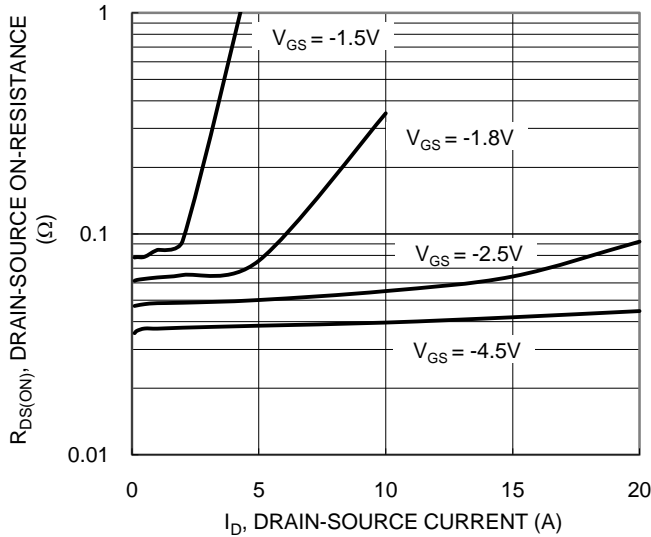


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

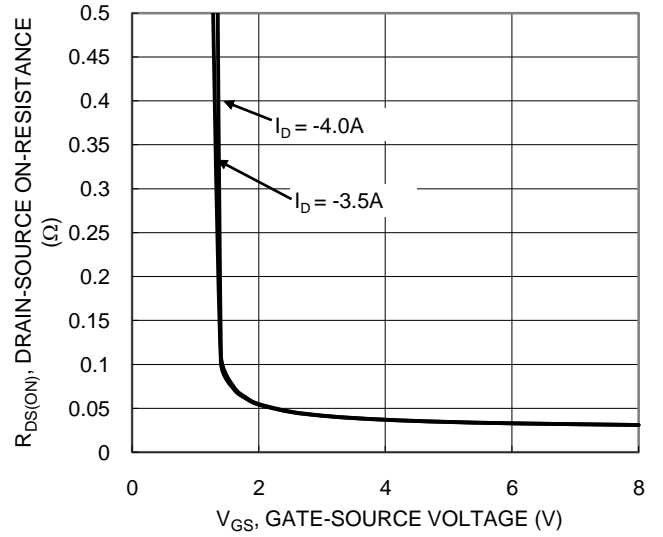


Figure 4. Typical Transfer Characteristic

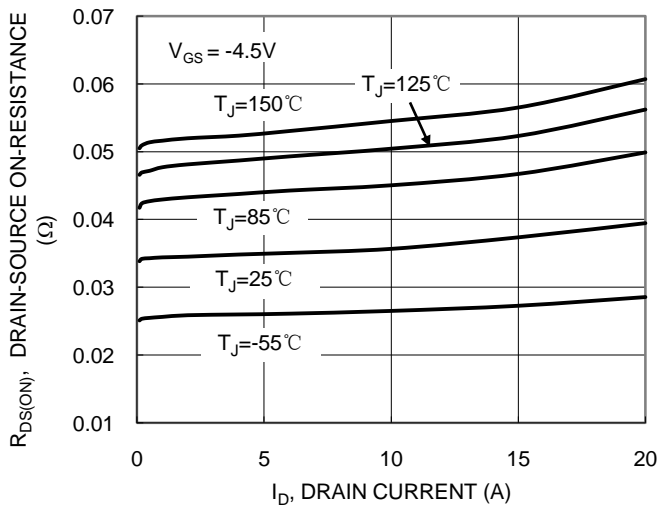


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

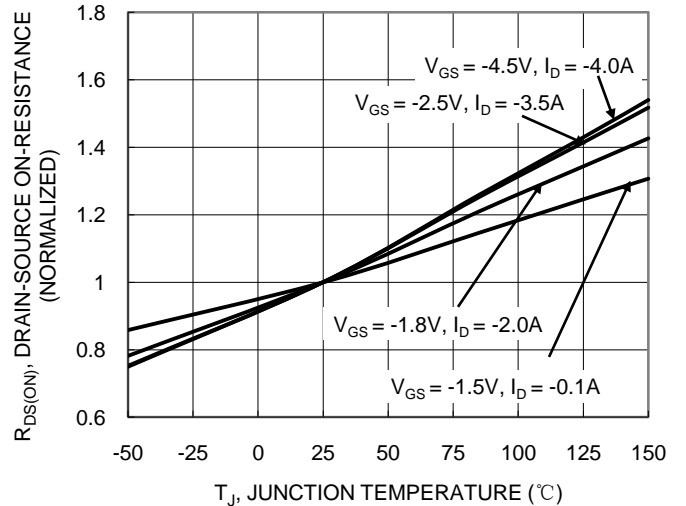


Fig.5 On-Resistance Variation with Junction Temperature

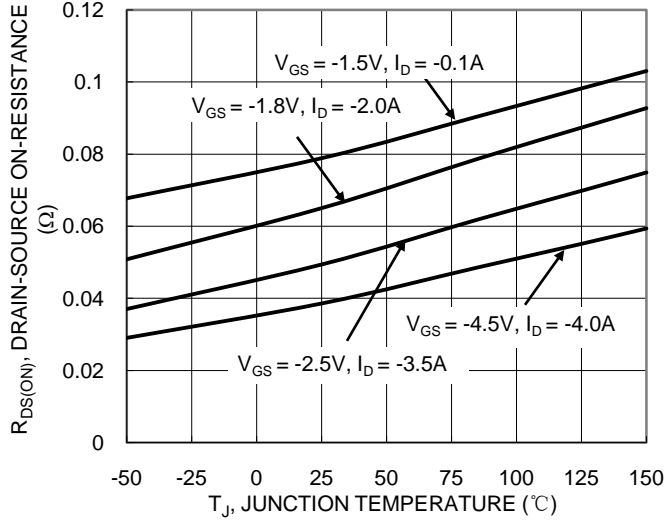


Figure 7. On-Resistance Variation with Junction Temperature

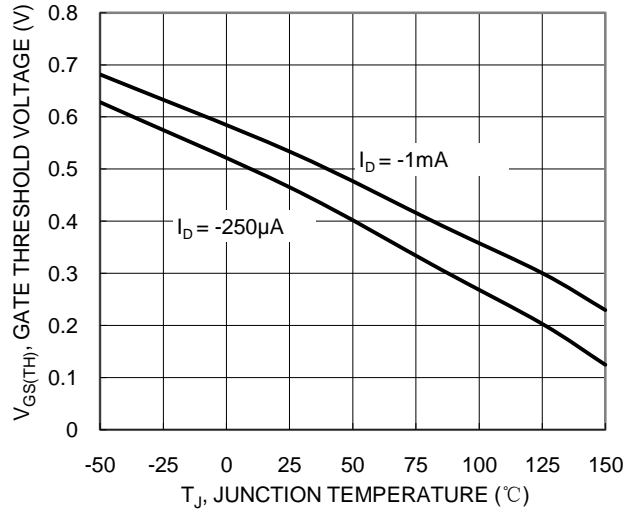


Figure 8. Gate Threshold Variation vs. Junction Temperature

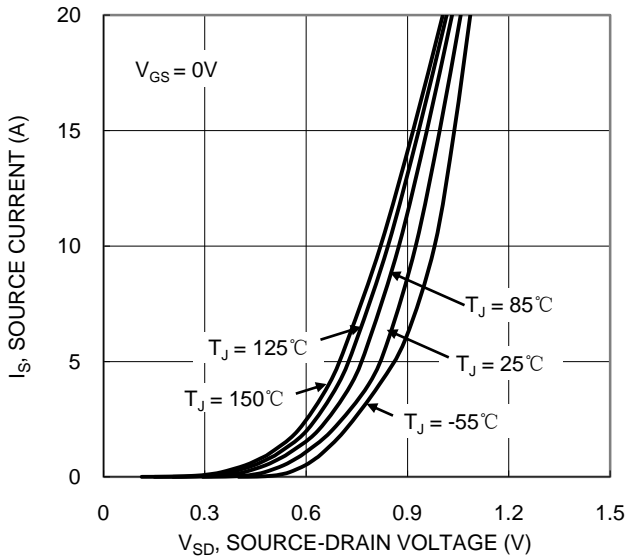


Figure 9. Diode Forward Voltage vs. Current

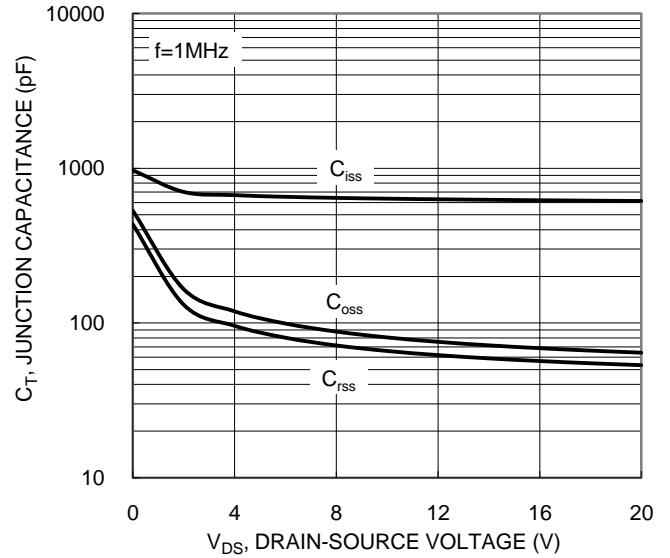


Figure 10. Typical Junction Capacitance

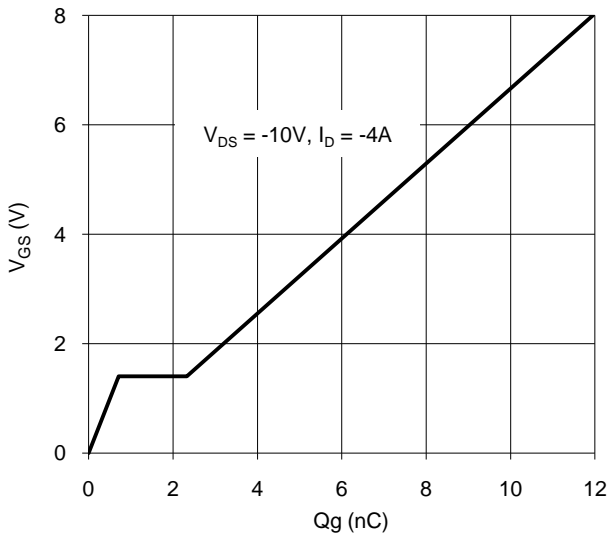


Figure 11. Gate Charge

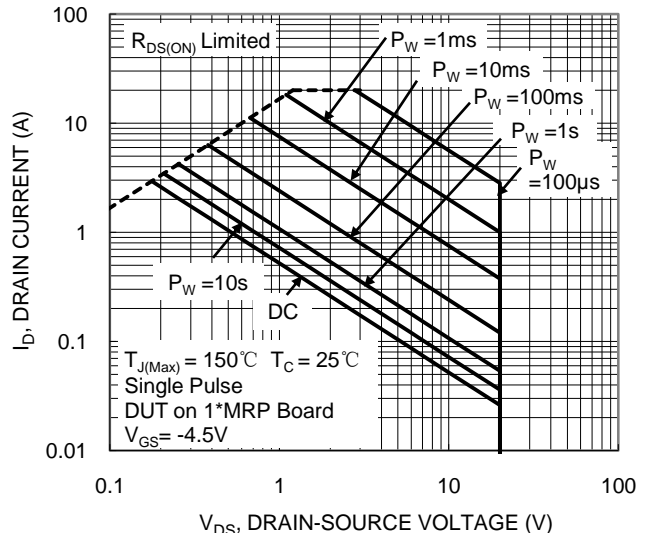


Figure 12. SOA, Safe Operation Area

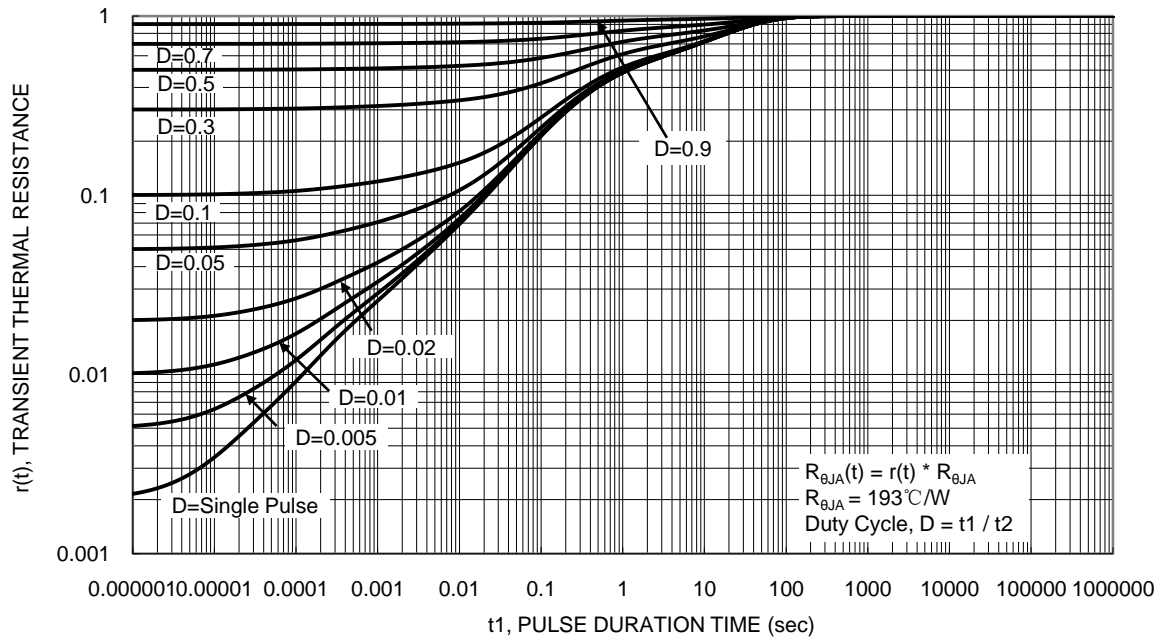
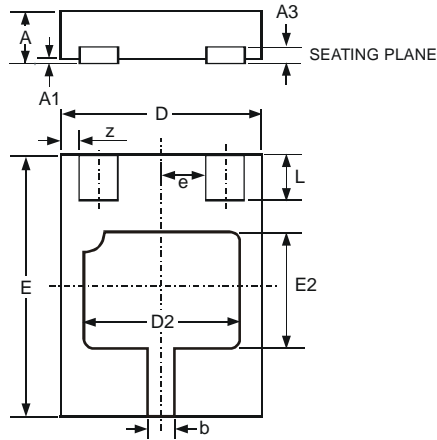


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN2015-3**

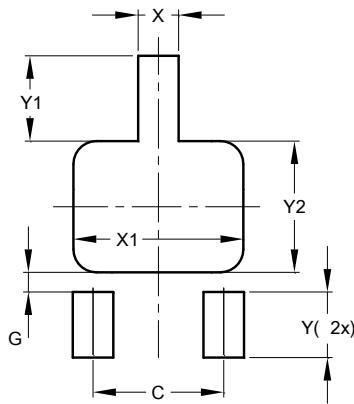


| X2-DFN2015-3         |      |       |       |
|----------------------|------|-------|-------|
| Dim                  | Min  | Max   | Typ   |
| A                    | -    | 0.40  | -     |
| A1                   | 0    | 0.05  | 0.02  |
| A3                   | -    | -     | 0.13  |
| b                    | 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 <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN2015-3**



| 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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