

## Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ max                 | $I_D$ max |
|---------------|----------------------------------|-----------|
| -20V          | 200m $\Omega$ @ $V_{GS} = -4.5V$ | -1.7 A    |
|               | 290m $\Omega$ @ $V_{GS} = -2.5V$ | -1.3 A    |
|               | 390m $\Omega$ @ $V_{GS} = -1.8V$ | -1.1 A    |
|               | 650m $\Omega$ @ $V_{GS} = -1.5V$ | -0.5 A    |

## Description

This device provides a high performance, low  $R_{DS(ON)}$  P-Channel MOSFET in the thermally and spatially efficient DFN1616-6 package. The low  $R_{DS(ON)}$  of this MOSFET ensures conduction losses are kept making it ideal for use in the following applications:

## Applications

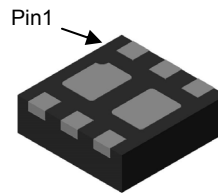
- Battery disconnect switch
- Load switch for power management functions

## Features

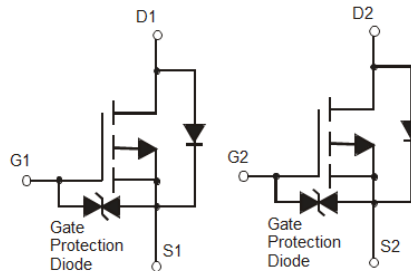
- Typical off board profile of 0.5mm - ideally suited for thin applications
- Low  $R_{DS(ON)}$  – minimizes conduction losses
- PCB footprint of 2.56mm<sup>2</sup>
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 standards for High Reliability**
- ESD Protected Gate**

## Mechanical Data

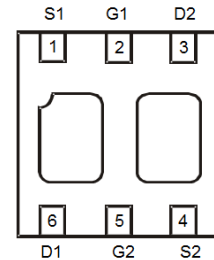
- Case: U-DFN1616-6 Type F
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Lead Free Plating (NiPdAu Finish over Copper leadframe).
- Terminals: Solderable per MIL-STD-202, Method 208 <sup>(4)</sup>
- Weight: 0.04 grams (approximate)



Bottom View



Device Symbol



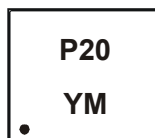
Pin Configuration Bottom View

## Ordering Information (Note 4)

| Product       | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| DMP2200UFCL-7 | 7                  | 8               | 3,000             |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



P20 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: B= 2014)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|
| Code | B    | C    | D    | E    | F    | G    | H    |

| 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                   | Units |
|-----------------------------------|------------------|-------------------------|-------|
| Drain-Source Voltage              | V <sub>DSS</sub> | -20                     | V     |
| Gate-Source Voltage               | V <sub>GSS</sub> | ±8                      | V     |
| Continuous Drain Current (Note 6) | I <sub>D</sub>   | @T <sub>A</sub> = +25°C | -1.7  |
|                                   |                  | @T <sub>A</sub> = +85°C | -1.2  |

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

| Characteristic                          | Symbol                            | Value       | Units |
|---|-----------------------------------|-------------|-------|
| Total Power Dissipation                 | P <sub>D</sub>                    | (Note 5)    | 0.66  |
|   |                                   | (Note 6)    | 1.58  |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | (Note 5)    | 193   |
|   |                                   | (Note 6)    | 80    |
| 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   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V   |
| Gate-Body Leakage                         | I <sub>GSS</sub>    | —    | —    | ±10  | μA   | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 7)</b>        |                     |      |      |      |      |  |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | -0.4 | —    | -1.2 | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA  |
| Static Drain-Source On-Resistance         | R <sub>DS(ON)</sub> | —    | 153  | 200  | mΩ   | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.0A<br>V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1.2A<br>V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -0.24A<br>V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -0.18A |
|   |                     |      | 220  | 290  |      |  |
|   |                     |      | 260  | 390  |      |  |
|   |                     |      | 360  | 650  |      |  |
| Diode Forward Voltage (Note 7)            | V <sub>SD</sub>     | —    | —    | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -0.6A   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>   |                     |      |      |      |      |  |
| Input Capacitance                         | C <sub>iss</sub>    | —    | 184  | —    | pF   | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz   |
| Output Capacitance                        | C <sub>oss</sub>    | —    | 25.8 | —    | pF   |  |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    | —    | 18.6 | —    | pF   |  |
| Total Gate Charge                         | Q <sub>g</sub>      | —    | 2.2  | —    | nC   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V,<br>I <sub>D</sub> = -1.7A   |
| Gate-Source Charge                        | Q <sub>gs</sub>     | —    | 0.4  | —    | nC   |  |
| Gate-Drain Charge                         | Q <sub>gd</sub>     | —    | 0.5  | —    | nC   |  |
| <b>SWITCHING CHARACTERISTICS (Note 8)</b> |                     |      |      |      |      |  |
| Turn-On Delay Time                        | t <sub>D(ON)</sub>  | —    | 9.8  | —    | ns   | V <sub>DD</sub> = -10V, I <sub>D</sub> = -1.5A,<br>V <sub>GS</sub> = -4.5V, R <sub>GEN</sub> = 1Ω  |
| Turn-Off Delay Time                       | t <sub>D(OFF)</sub> | —    | 23   | —    | ns   |  |
| Turn-On Rise Time                         | t <sub>r</sub>      | —    | 87   | —    | ns   |  |
| Turn-Off Fall Time                        | t <sub>f</sub>      | —    | 41   | —    | ns   |  |

- 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.

NEW PRODUCT

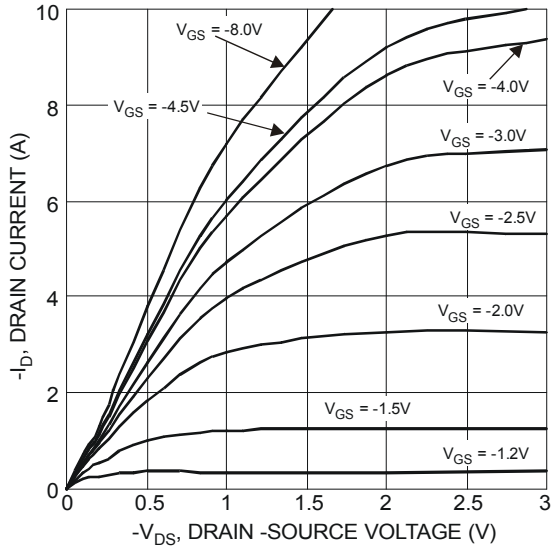


Figure 1 Typical Output Characteristics

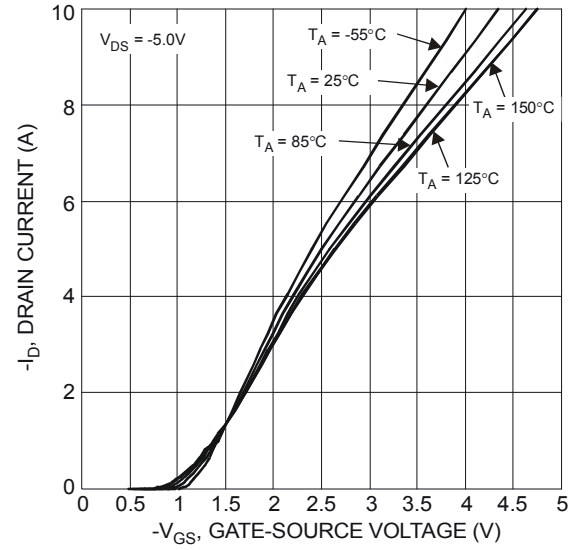


Figure 2 Typical Transfer Characteristics

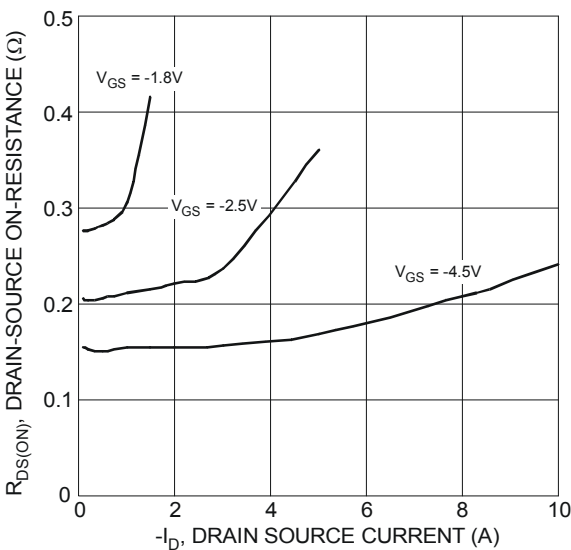


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

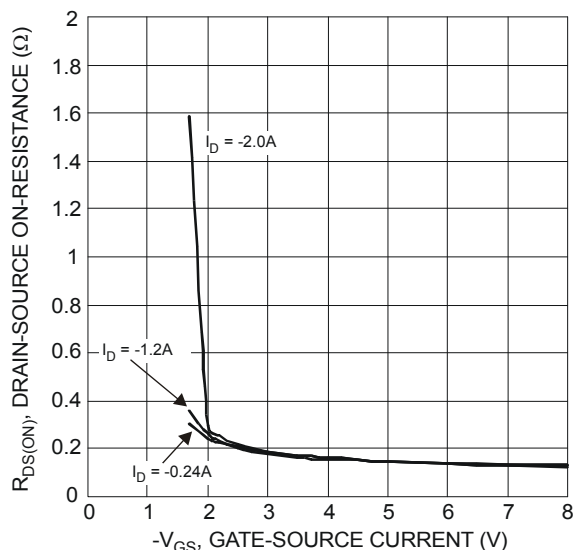


Figure 4 Typical Transfer Characteristics

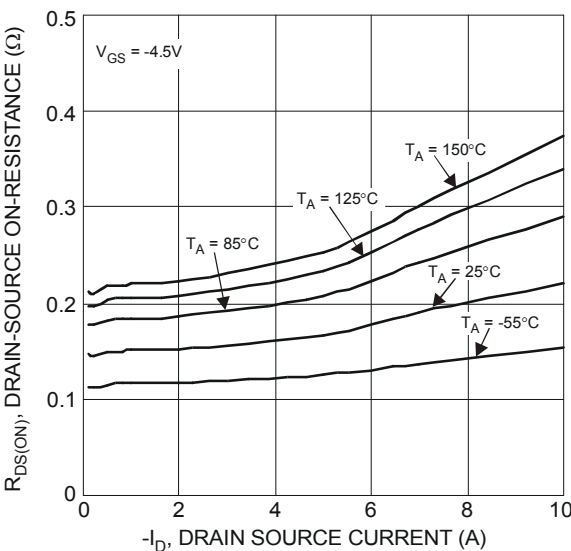


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

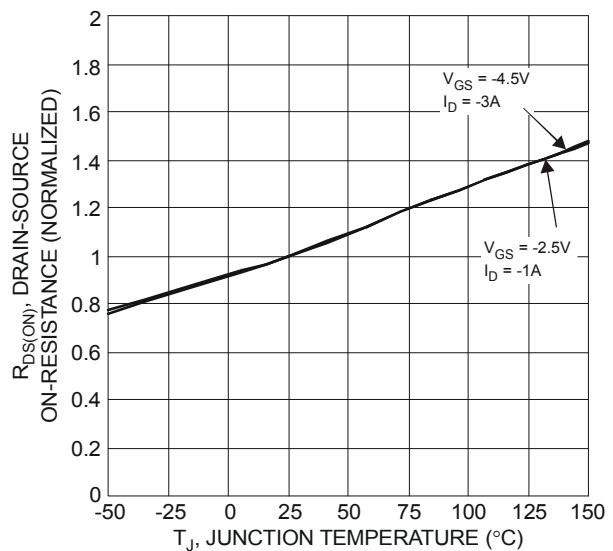


Figure 6 On-Resistance Variation with Temperature

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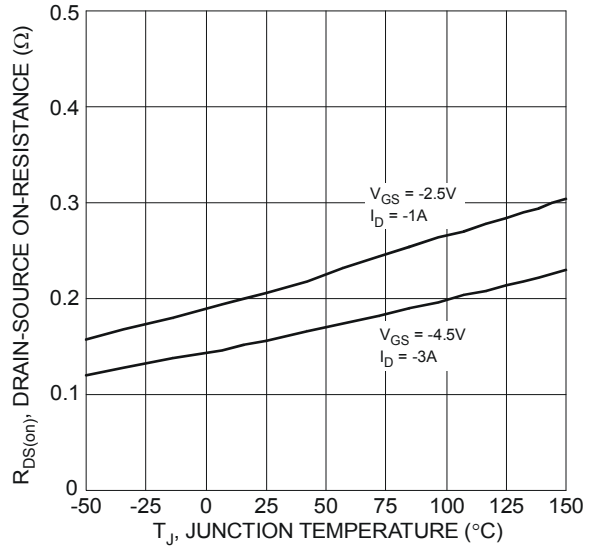


Figure 7 On-Resistance Variation with Temperature

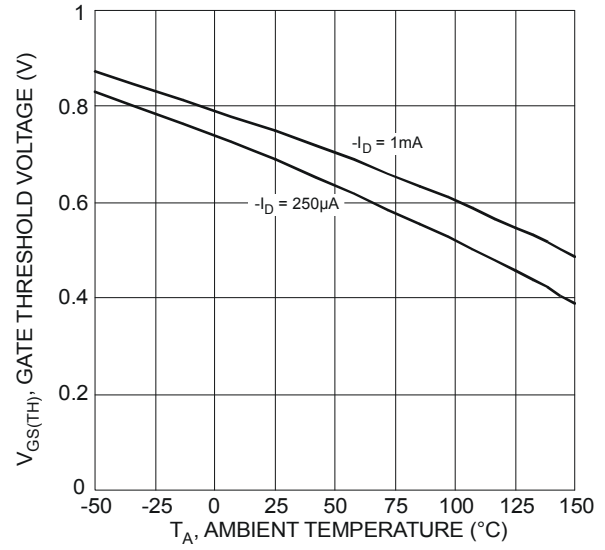


Figure 8 Gate Threshold Variation vs. Ambient Temperature

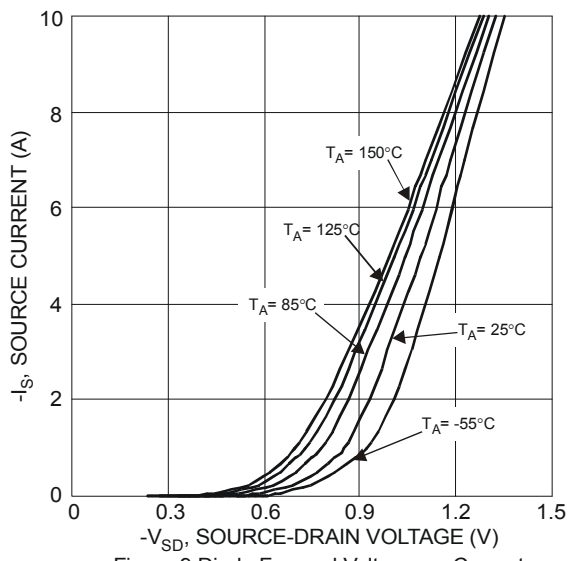


Figure 9 Diode Forward Voltage vs. Current

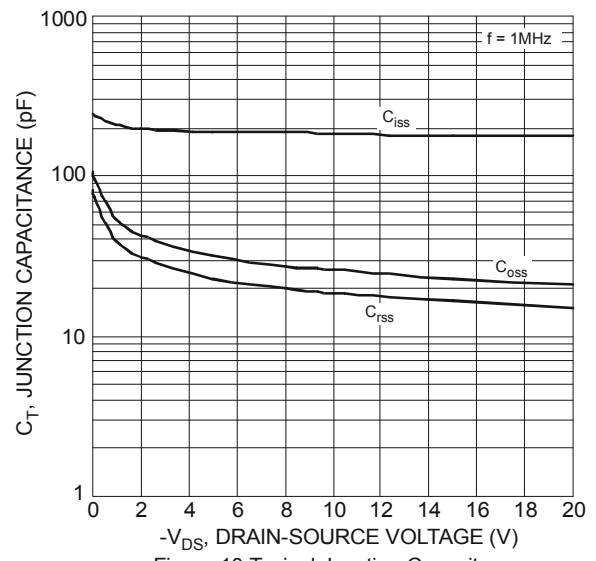


Figure 10 Typical Junction Capacitance

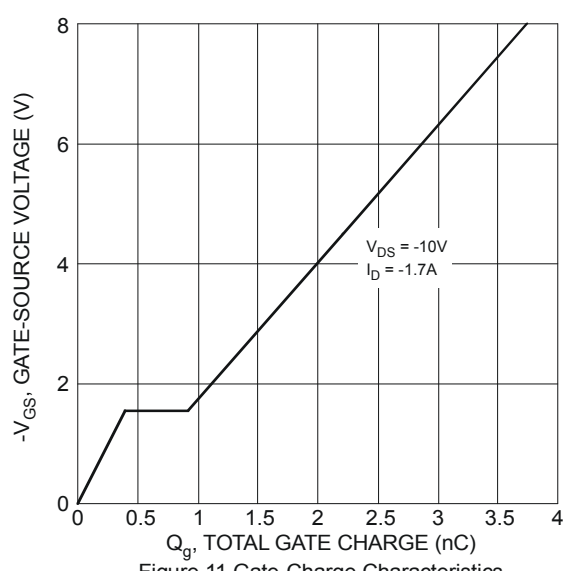


Figure 11 Gate-Charge Characteristics

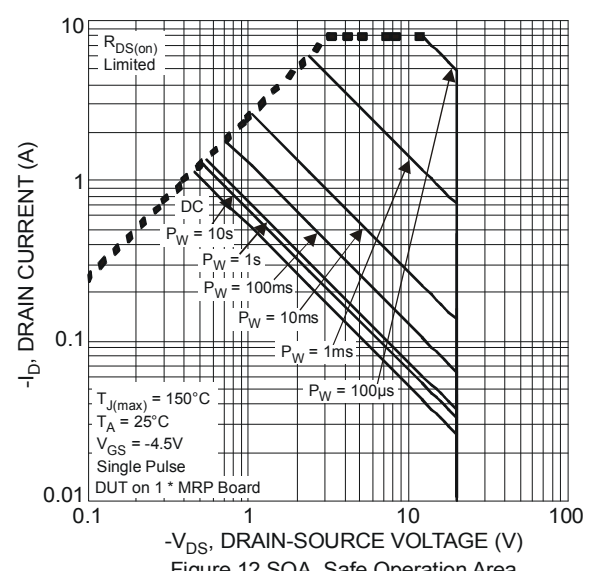


Figure 12 SOA, Safe Operation Area

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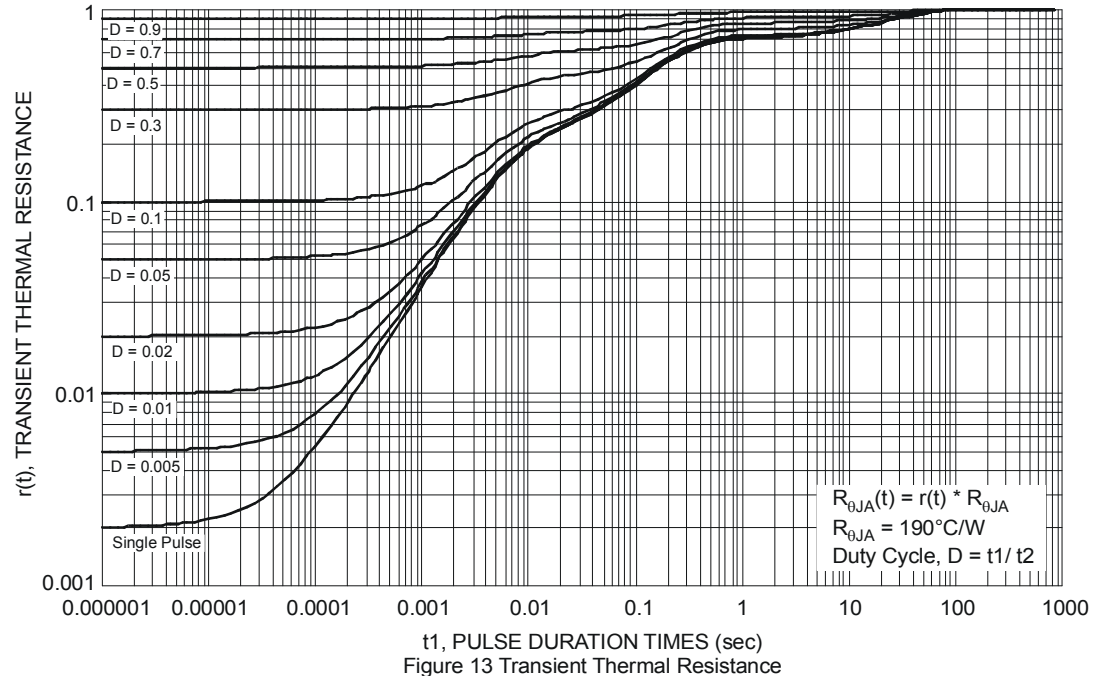
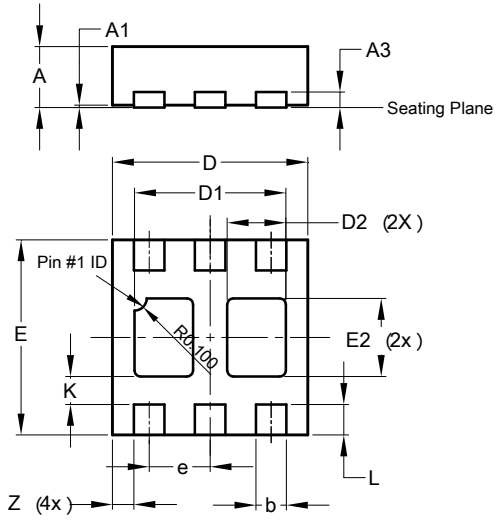


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

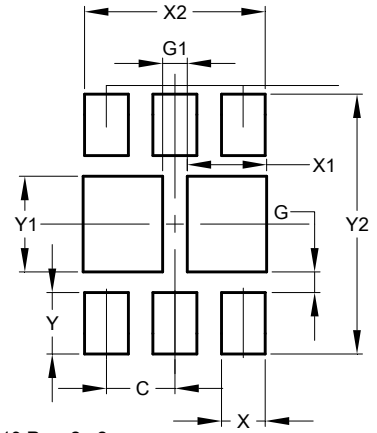
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| U-DFN1616-6<br>Type F |      |      |       |
|-----------------------|------|------|-------|
| Dim                   | Min  | Max  | Typ   |
| A                     | 0.45 | 0.55 | 0.50  |
| A1                    | 0    | 0.05 | 0.02  |
| A3                    | —    | —    | 0.127 |
| b                     | 0.20 | 0.30 | 0.25  |
| D                     | 1.55 | 1.65 | 1.60  |
| D1                    | 1.14 | 1.34 | 1.24  |
| D2                    | 0.38 | 0.58 | 0.48  |
| E                     | 1.55 | 1.65 | 1.60  |
| E2                    | 0.54 | 0.74 | 0.64  |
| e                     | —    | —    | 0.50  |
| K                     | —    | —    | 0.23  |
| L                     | 0.15 | 0.35 | 0.25  |
| Z                     | —    | —    | 0.175 |
| All Dimensions in mm  |      |      |       |

**Suggested Pad Layout**

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.500         |
| G          | 0.150         |
| G1         | 0.180         |
| X          | 0.320         |
| X1         | 0.580         |
| X2         | 1.320         |
| Y          | 0.450         |
| Y1         | 0.700         |
| Y          | 1.900         |

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