

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max       | I <sub>D</sub> Max<br>T <sub>A</sub> = +25°C |
|-------------------|-------------------------------|----------------------------------------------|
| 30V               | 12mΩ @ V <sub>GS</sub> = 10V  | 10A                                          |
|                   | 16mΩ @ V <sub>GS</sub> = 4.5V | 8.5A                                         |

## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Battery Management Application
- Power Management Functions
- DC-DC Converters

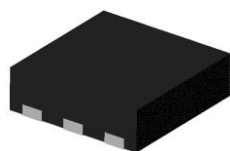
## Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low Gate Threshold Voltage
- Low On-Resistance
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>

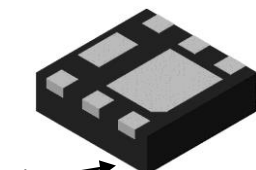
## Mechanical Data

- Case: U-DFN2020-6
- 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)
- Weight: 0.0065 grams (Approximate)

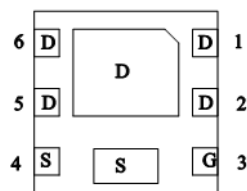
U-DFN2020-6 (Type F)



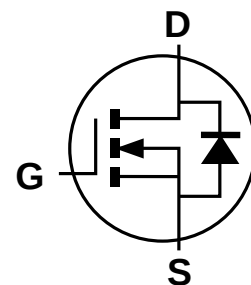
Top View



Bottom View



Pin Out  
Bottom View



Equivalent Circuit

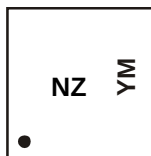
## Ordering Information (Note 4)

| Part Number    | Case                 | Packaging          |
|----------------|----------------------|--------------------|
| DMN3016LFDF-7  | U-DFN2020-6 (Type F) | 3,000/Tape & Reel  |
| DMN3016LFDF-13 | U-DFN2020-6 (Type F) | 10,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  - See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

Site 1



NZ = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: G = 2019)  
 M = Month (ex: 9 = September)

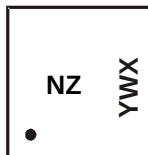
Date Code Key

| 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   |

Site 2



NZ = Product Type Marking Code  
 YWX = Date Code Marking  
 Y = Year (ex: 9 = 2019)  
 W = Week (ex: a = Week 27; z Represents Week 52 and 53)  
 X = Internal Code (ex: U = Monday)

Date Code Key

| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|------|------|------|------|------|------|
| Code | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    |

| Week | 1-26 | 27-52 | 53 |
|------|------|-------|----|
| Code | A-Z  | a-z   | z  |

| Internal Code | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---------------|-----|-----|-----|-----|-----|-----|-----|
| Code          | T   | U   | V   | W   | X   | Y   | Z   |

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

| Characteristic                                          |              |                        | Symbol           | Value | Unit |
|---------------------------------------------------------|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage                                    |              |                        | V <sub>DSS</sub> | 30    | V    |
| Gate-Source Voltage                                     |              |                        | V <sub>GSS</sub> | ±20   | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 10    | A    |
|                                                         |              | T <sub>A</sub> = +70°C |                  | 8     |      |
|                                                         | t<10s        | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 12    | A    |
|                                                         |              | T <sub>A</sub> = +70°C |                  | 9     |      |
| Maximum Continuous Body Diode Forward Current (Note 6)  |              |                        | I <sub>S</sub>   | 2.5   | A    |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)      |              |                        | I <sub>DM</sub>  | 50    | A    |
| Avalanche Current (Note 7) L = 0.1mH                    |              |                        | I <sub>AR</sub>  | 22    | A    |
| Avalanche Energy (Note 7) L = 0.1mH                     |              |                        | E <sub>AR</sub>  | 24    | mJ   |

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

| Characteristic                                   |                        | Symbol                            | Value       | Unit |
|--------------------------------------------------|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 0.73        | W    |
|                                                  | T <sub>A</sub> = +70°C |                                   | 0.47        |      |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State           | R <sub>θJA</sub>                  | 174         | °C/W |
|                                                  | t < 10s                |                                   | 121         |      |
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.02        | W    |
|                                                  | T <sub>A</sub> = +70°C |                                   | 1.30        |      |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 66          | °C/W |
|                                                  | t < 10s                |                                   | 42          |      |
| Thermal Resistance, Junction to Case (Note 6)    | Steady State           | R <sub>θJC</sub>                  | 11.6        |      |
| 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 8)</b>        |                     |     |      |      |      |                                                                                           |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 30  | —    | —    | 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> = 30V, V <sub>GS</sub> = 0V                                               |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                              |
| <b>ON CHARACTERISTICS (Note 8)</b>         |                     |     |      |      |      |                                                                                           |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1.4 | —    | 2.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 8    | 12   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 11A                                               |
|                                            |                     | —   | 12   | 16   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 9A                                               |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.70 | 1.0  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A                                                 |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>    |                     |     |      |      |      |                                                                                           |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 1415 | —    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz                                   |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 119  | —    |      |                                                                                           |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 82   | —    |      |                                                                                           |
| Gate Resistance                            | R <sub>g</sub>      | —   | 2.6  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                    |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 11.3 | —    | nC   | V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A                                               |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 25.1 | —    |      |                                                                                           |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 3.5  | —    |      |                                                                                           |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 3.6  | —    |      |                                                                                           |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 4.8  | —    | ns   | V <sub>DD</sub> = 15V, V <sub>GS</sub> = 10V, R <sub>L</sub> = 1.25Ω, R <sub>g</sub> = 3Ω |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 16.5 | —    |      |                                                                                           |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 26.1 | —    |      |                                                                                           |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 5.6  | —    |      |                                                                                           |
| Reverse Recovery Time                      | t <sub>RR</sub>     | —   | 12.3 | —    | ns   | I <sub>F</sub> = 12A, di/dt = 500A/μs                                                     |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     | —   | 10.4 | —    | nC   |                                                                                           |

- 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.
  - I<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

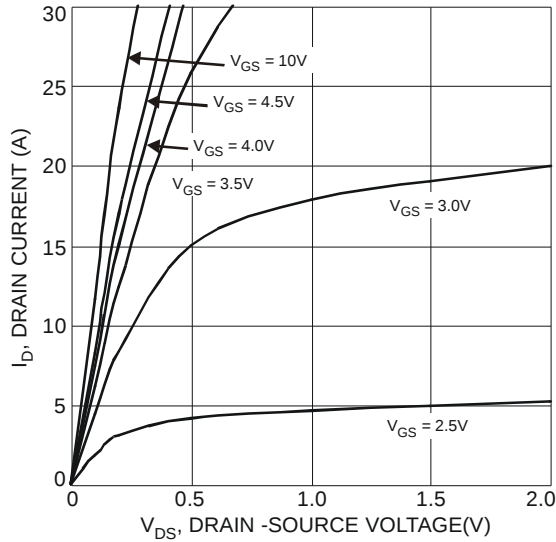


Fig. 1 Typical Output Characteristics

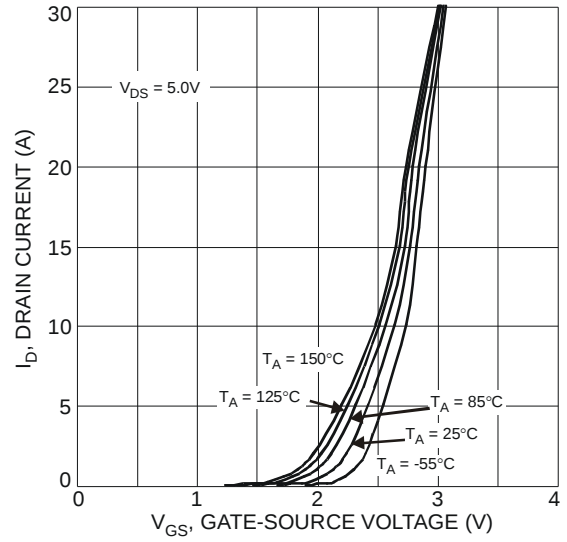


Fig. 2 Typical Transfer Characteristics

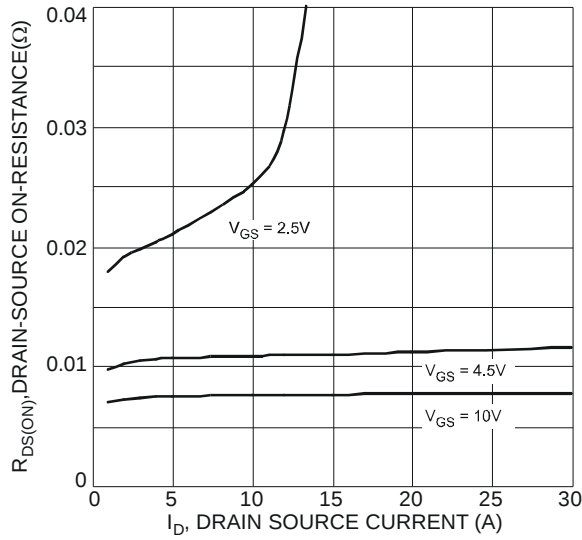


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

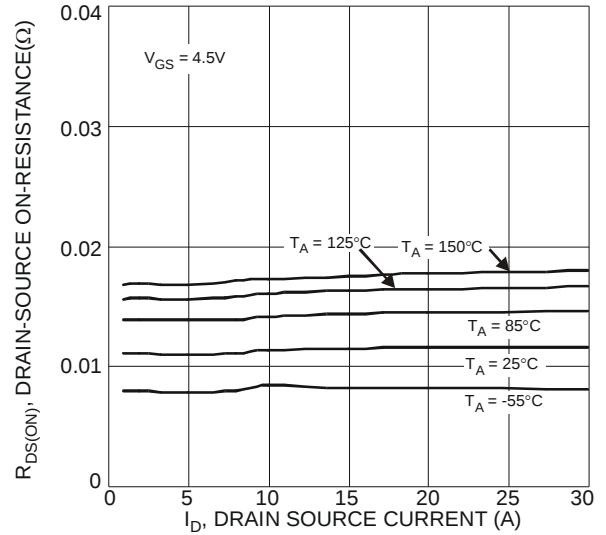


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

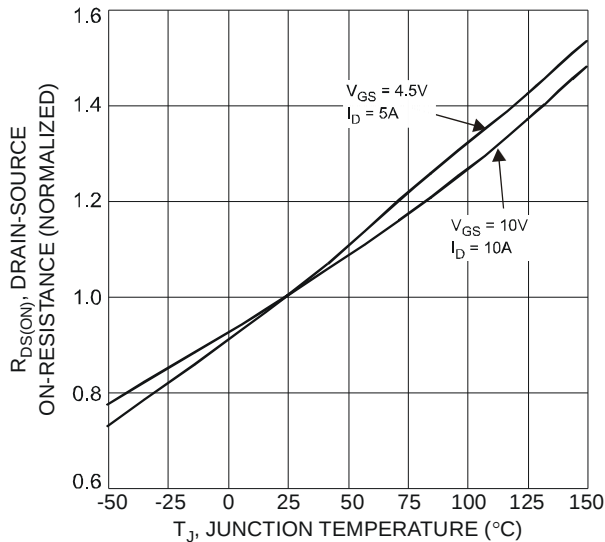


Fig. 5 On-Resistance Variation with Temperature

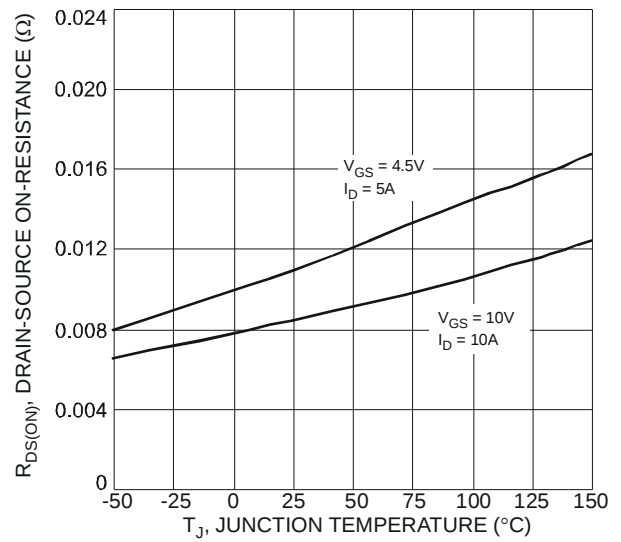


Fig. 6 On-Resistance Variation with Temperature

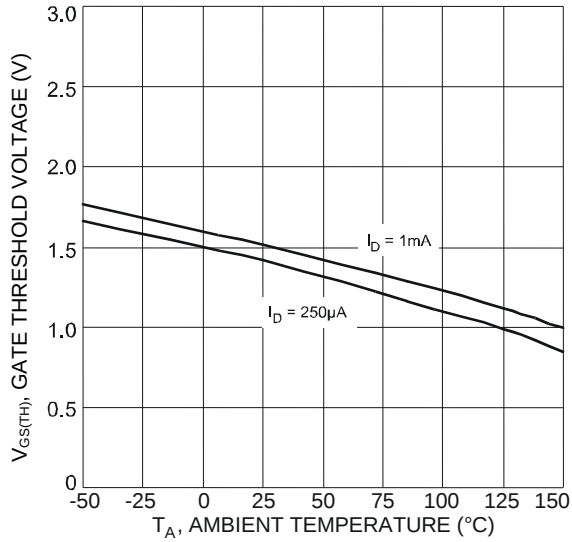


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

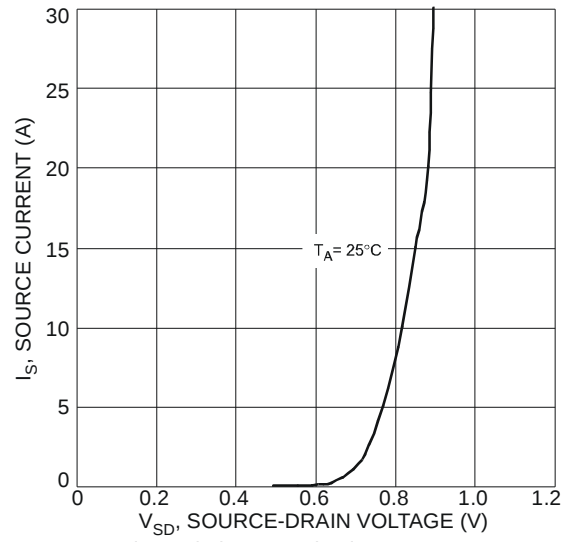


Fig. 8 Diode Forward Voltage vs. Current

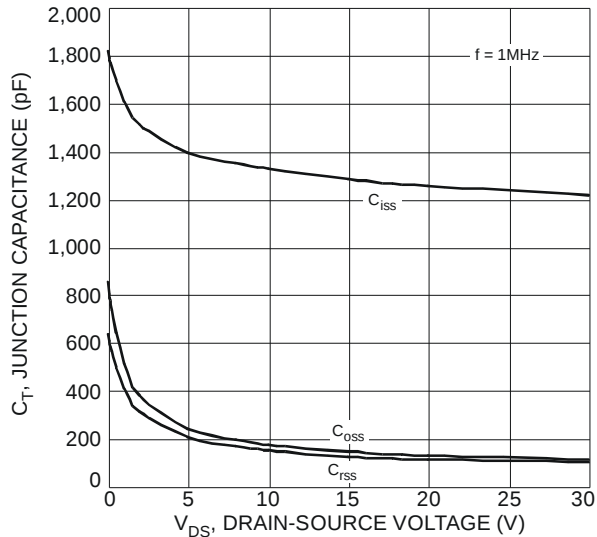


Fig. 9 Typical Junction Capacitance

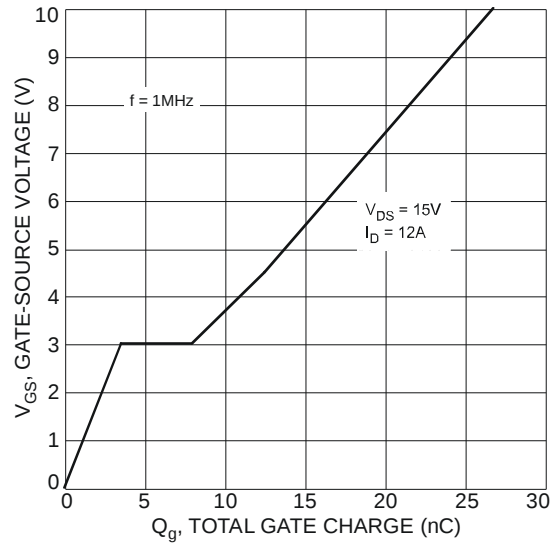


Fig. 10 Gate-Charge Characteristics

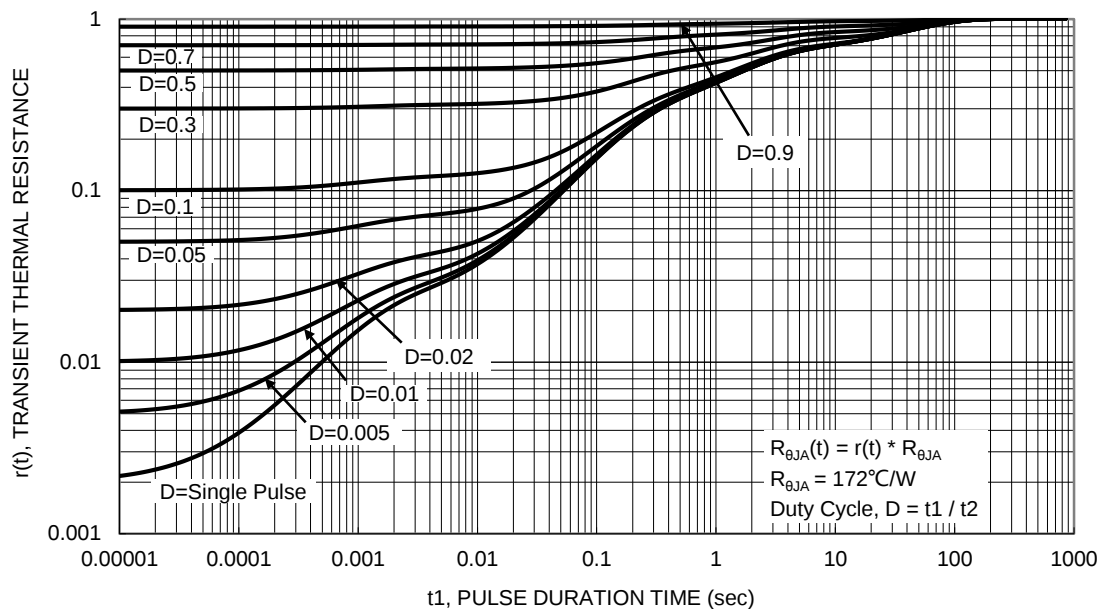
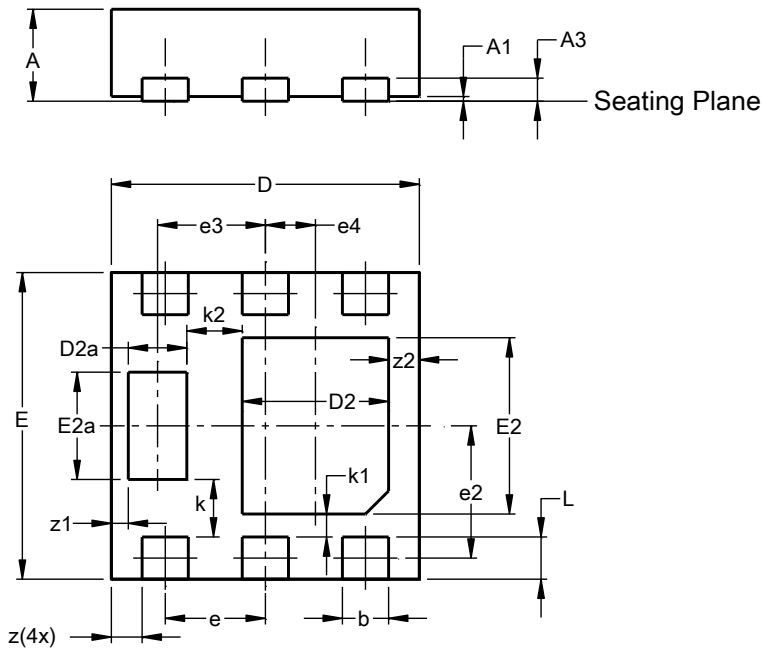


Figure 11. Transient Thermal Resistance

## Package Outline Dimensions

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

U-DFN2020-6 (Type F)

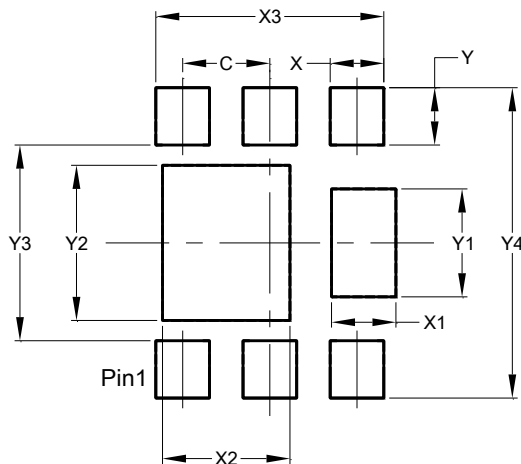


| U-DFN2020-6<br>(Type F) |           |       |       |
|-------------------------|-----------|-------|-------|
| Dim                     | Min       | Max   | Typ   |
| A                       | 0.57      | 0.63  | 0.60  |
| A1                      | 0.00      | 0.05  | 0.03  |
| A3                      | -         | -     | 0.15  |
| b                       | 0.25      | 0.35  | 0.30  |
| D                       | 1.95      | 2.05  | 2.00  |
| D2                      | 0.85      | 1.05  | 0.95  |
| D2a                     | 0.33      | 0.43  | 0.38  |
| E                       | 1.95      | 2.05  | 2.00  |
| E2                      | 1.05      | 1.25  | 1.15  |
| E2a                     | 0.65      | 0.75  | 0.70  |
| e                       | 0.65 BSC  |       |       |
| e2                      | 0.863 BSC |       |       |
| e3                      | 0.70 BSC  |       |       |
| e4                      | 0.325 BSC |       |       |
| k                       | 0.37 BSC  |       |       |
| k1                      | 0.15 BSC  |       |       |
| k2                      | 0.36 BSC  |       |       |
| L                       | 0.225     | 0.325 | 0.275 |
| z                       | 0.20 BSC  |       |       |
| z1                      | 0.110 BSC |       |       |
| z2                      | 0.20 BSC  |       |       |
| All Dimensions in mm    |           |       |       |

## Suggested Pad Layout

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

U-DFN2020-6 (Type F)



| Dimensions | Value<br>(in mm) |
|------------|------------------|
| C          | 0.650            |
| X          | 0.400            |
| X1         | 0.480            |
| X2         | 0.950            |
| X3         | 1.700            |
| Y          | 0.425            |
| Y1         | 0.800            |
| Y2         | 1.150            |
| Y3         | 1.450            |
| Y4         | 2.300            |

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