

## Product Summary

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max        | I <sub>D</sub> Max<br>T <sub>C</sub> = +25°C |
|-------------------|--------------------------------|----------------------------------------------|
| 30V               | 19mΩ @ V <sub>GS</sub> = 4.5V  | 15A                                          |
|                   | 25mΩ @ V <sub>GS</sub> = 2.5V  | 14A                                          |
|                   | 40mΩ @ V <sub>GS</sub> = 1.8V  | 10A                                          |
|                   | 120mΩ @ V <sub>GS</sub> = 1.5V | 6A                                           |

## Description

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

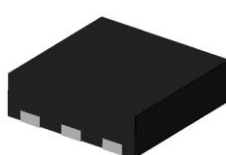
## Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low Gate Threshold Voltage
- 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**

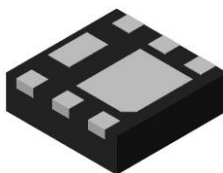
## Mechanical Data

- Case: U-DFN2020-6 (Type F)
- 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 ④
- Weight: 0.007 Grams (Approximate)

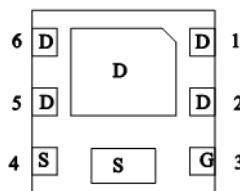
U-DFN2020-6 (Type F)



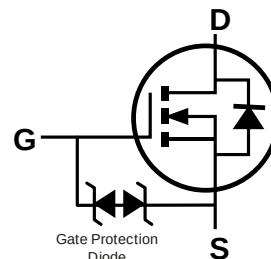
Top View



Bottom View



Pin Out  
Bottom View



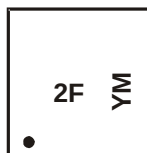
Internal Schematic

## Ordering Information (Note 4)

| Part Number    | Case                 | Packaging          |
|----------------|----------------------|--------------------|
| DMN3020UFDF-7  | U-DFN2020-6 (Type F) | 3,000/Tape & Reel  |
| DMN3020UFDF-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) 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



2F = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: D = 2016)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|------|------|------|------|------|------|------|------|------|
| Code | C    | D    | E    | F    | G    | H    | I    | J    |

| 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> | 30          | V    |
| Gate-Source Voltage                                      |              |                                                  | V <sub>GSS</sub> | ±12         | V    |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | Steady State | T <sub>C</sub> = +25°C<br>T <sub>C</sub> = +70°C | I <sub>D</sub>   | 15<br>13    | A    |
|                                                          | t < 5s       | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 10.4<br>8.3 | A    |
| Pulsed Drain Current (380µs Pulse, Duty Cycle = 1%)      |              |                                                  | I <sub>DM</sub>  | 40          | A    |
| Continuous Source-Drain Diode Current (Note 6)           |              | T <sub>A</sub> = +25°C                           | I <sub>S</sub>   | 2.2         | A    |
| Avalanche Current (Note 7) L = 0.1mH                     |              |                                                  | I <sub>AS</sub>  | 17          | A    |
| Avalanche Energy (Note 7) L = 0.1mH                      |              |                                                  | E <sub>AS</sub>  | 15          | mJ   |

**Thermal Characteristics**

| 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>                  | 171         | °C/W |
|                                                  | t < 5s                 |                                   | 112         |      |
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.03        | W    |
|                                                  | T <sub>A</sub> = +70°C |                                   | 1.30        |      |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 63          | °C/W |
|                                                  | t < 5s                 |                                   | 40          |      |
| Thermal Resistance, Junction to Case             | Steady State           | R <sub>θJC</sub>                  | 18          |      |
| 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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —   | —    | 1   | µA   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V                                               |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | —   | —    | ±10 | µA   | V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V                                              |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |     |      |     |      |                                                                                           |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | 0.4 | 0.6  | 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> | —   | 16   | 19  | mΩ   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.5A                                             |
|                                                        |                     |     | 19   | 25  |      | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.5A                                             |
|                                                        |                     |     | 26   | 40  |      | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 2.0A                                             |
|                                                        |                     |     | 32   | 120 |      | V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 1.0A                                             |
|                                                        |                     |     | —    | —   |      | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.0A                                               |
| 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 9)</b>                |                     |     |      |     |      |                                                                                           |
| Input Capacitance                                      | C <sub>iss</sub>    | —   | 1304 | —   | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz                                   |
| Output Capacitance                                     | C <sub>oss</sub>    | —   | 87   | —   |      |                                                                                           |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | —   | 80   | —   |      |                                                                                           |
| Gate Resistance                                        | R <sub>g</sub>      | —   | 1.3  | —   | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                      |
| Total Gate Charge (V <sub>GS</sub> = 4.5V)             | Q <sub>g</sub>      | —   | 15   | —   | nC   | V <sub>DS</sub> = 15V, I <sub>D</sub> = 4.5A                                              |
| Total Gate Charge (V <sub>GS</sub> = 8V)               | Q <sub>g</sub>      | —   | 27   | —   |      |                                                                                           |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | —   | 2.0  | —   |      |                                                                                           |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | —   | 2.1  | —   |      |                                                                                           |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | —   | 4.1  | —   | ns   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 1Ω, I <sub>D</sub> = 4.5A |
| Turn-On Rise Time                                      | t <sub>r</sub>      | —   | 4.8  | —   |      |                                                                                           |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | —   | 20.5 | —   |      |                                                                                           |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | —   | 3.2  | —   |      |                                                                                           |
| Reverse Recovery Time                                  | t <sub>RR</sub>     | —   | 7.1  | —   | ns   | I <sub>F</sub> = 1.0A, di/dt = 100A/µs                                                    |
| Reverse Recovery Charge                                | Q <sub>RR</sub>     | —   | 1.7  | —   | nC   |                                                                                           |

- 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. 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.  
8. Short duration pulse test used to minimize self-heating effect.  
9. Guaranteed by design. Not subject to product testing.

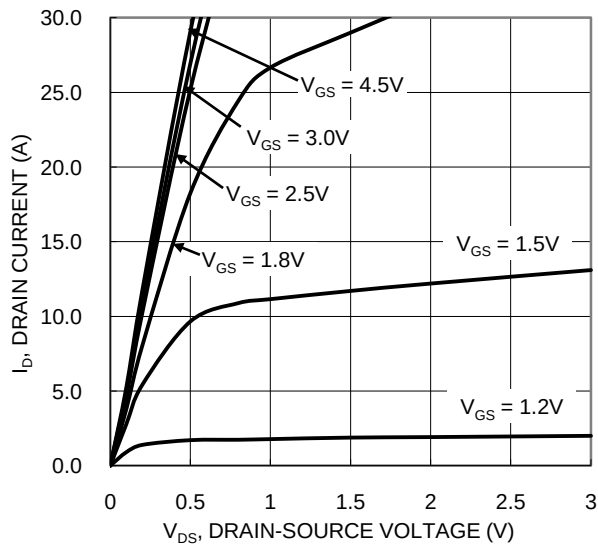


Figure 1. Typical Output Characteristic

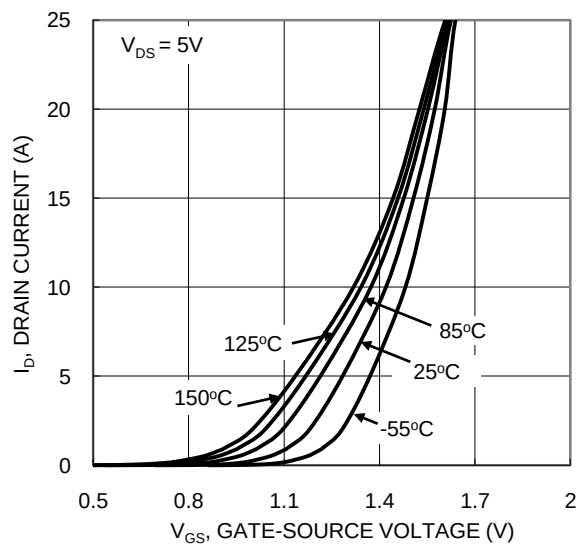


Figure 2. Typical Transfer Characteristic

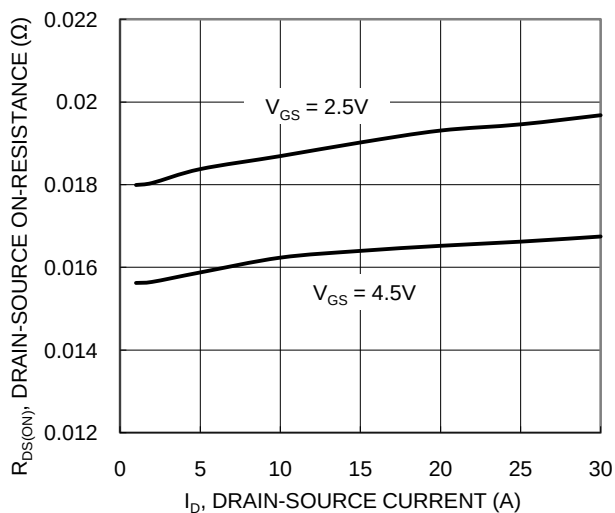


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

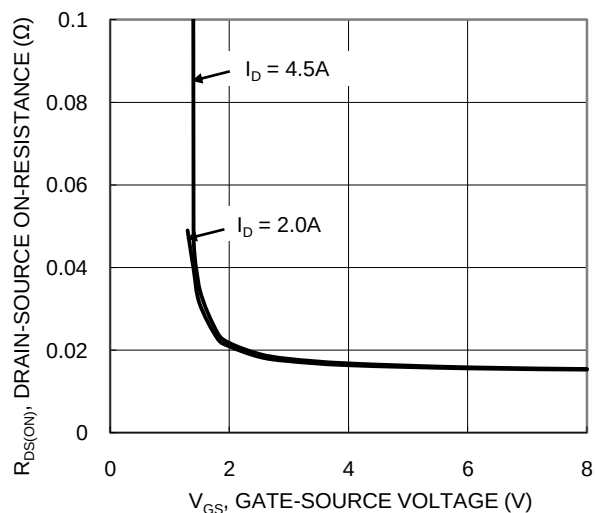


Figure 4. Typical Transfer Characteristic

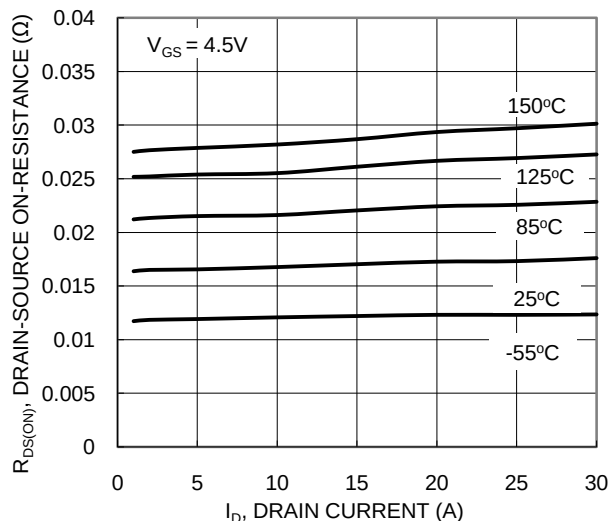


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

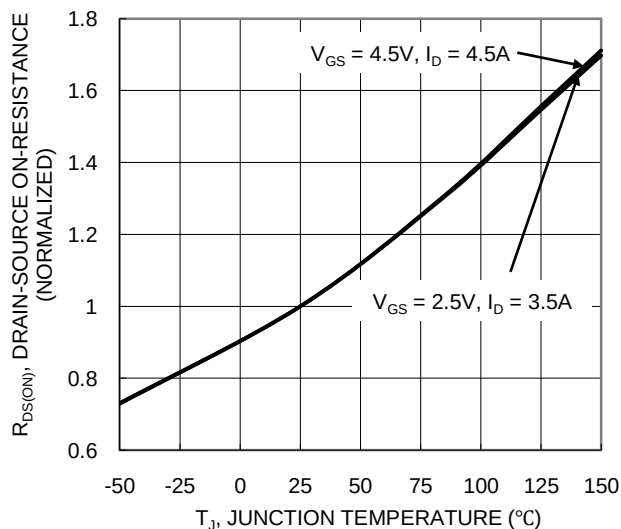


Figure 6. On-Resistance Variation with Temperature

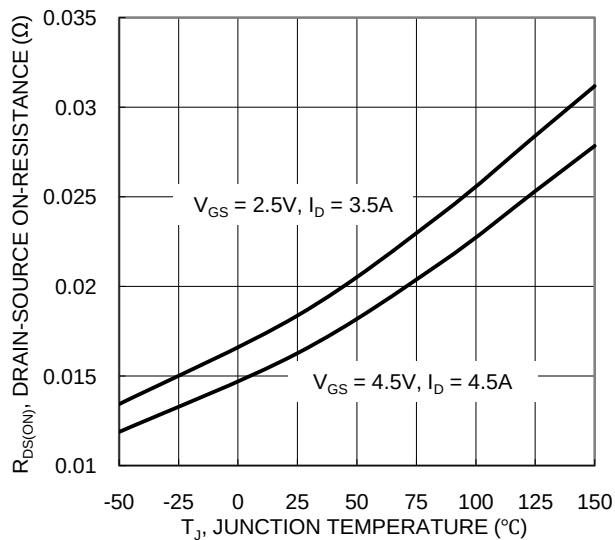


Figure 7. On-Resistance Variation with Temperature

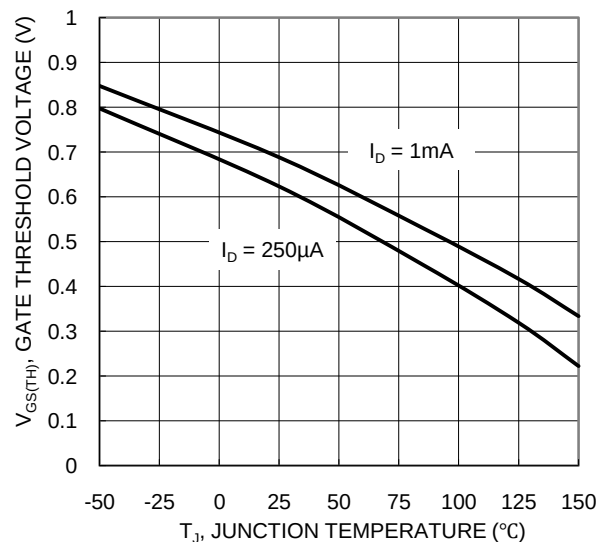


Figure 8. Gate Threshold Variation vs. Temperature

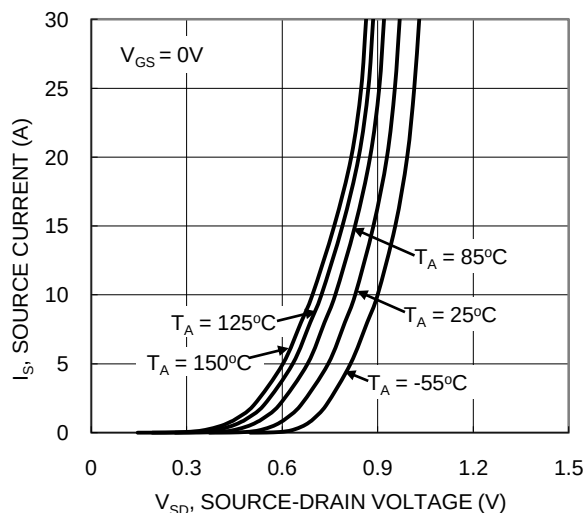


Figure 9. Diode Forward Voltage vs. Current

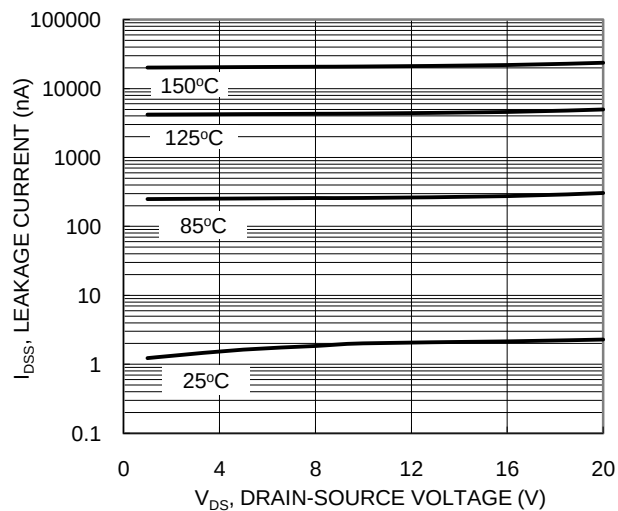


Figure 10. Typical Drain-Source Leakage Current vs. Voltage

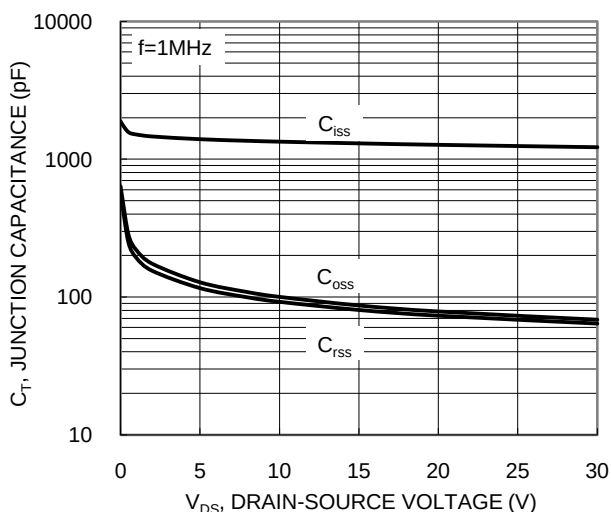


Figure 11. Typical Junction Capacitance

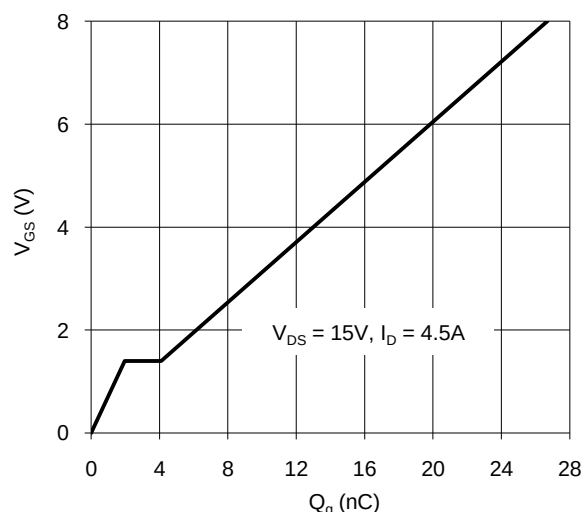
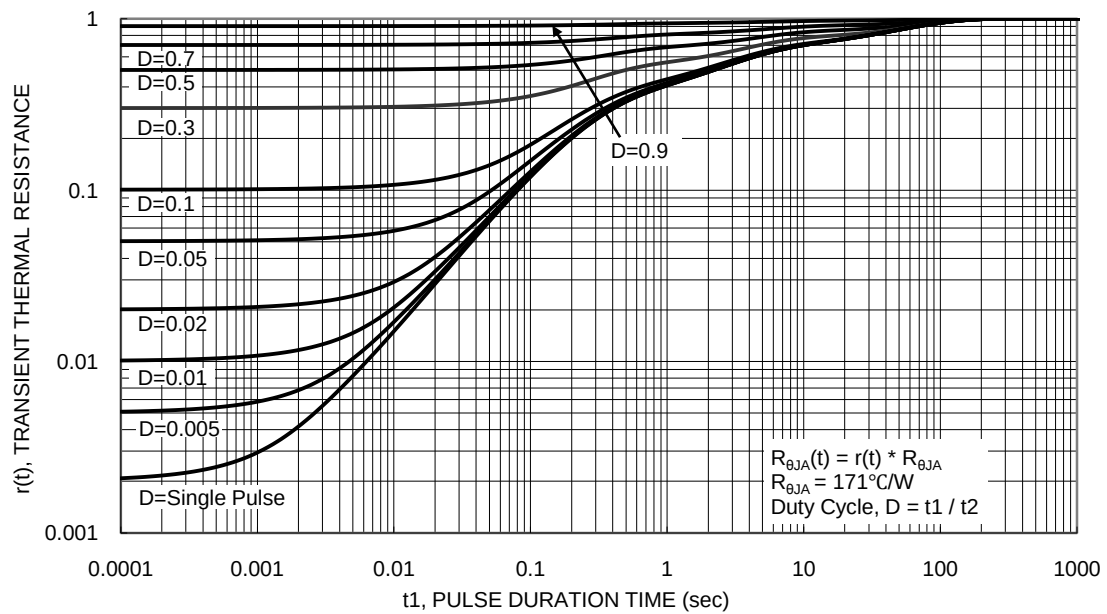
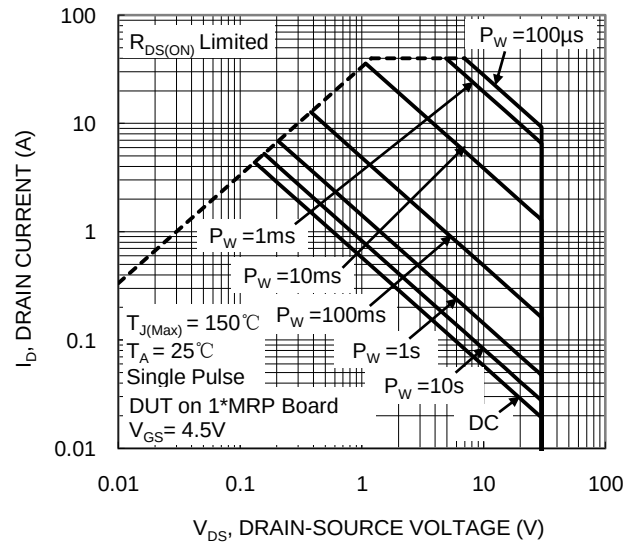


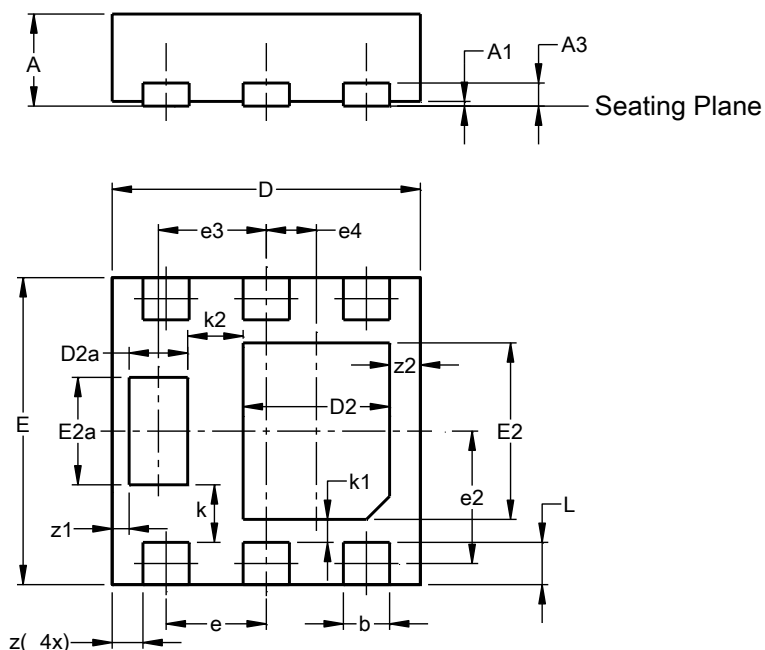
Figure 12. Gate Charge



## Package Outline Dimensions

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

**U-DFN2020-6 (Type F)**

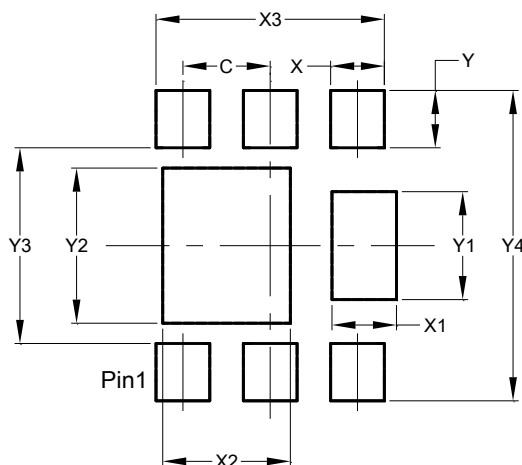


| U-DFN2020-6<br>(Type F) |           |       |       |
|-------------------------|-----------|-------|-------|
| Dim                     | Min       | Max   | Typ   |
| A                       | 0.57      | 0.63  | 0.60  |
| A1                      | 0.00      | 0.05  | 0.03  |
| A3                      | -         | -     | 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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- Защита от снятия компонента с производства.



#### Как с нами связаться

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