

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON) \max}$               | $I_D \max$<br>$T_A = +25^\circ C$ |
|---------------|---------------------------------|-----------------------------------|
| 100V          | 160m $\Omega$ @ $V_{GS} = 10V$  | 2.9A                              |
|               | 200m $\Omega$ @ $V_{GS} = 4.5V$ | 2.6A                              |

## Description

This new generation 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.

## Applications

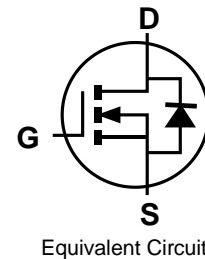
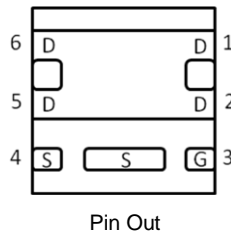
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.

## Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. “Green” Device (Note 3)**

## 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 <sup>e4</sup>
- Weight: 0.0065 grams (Approximate)



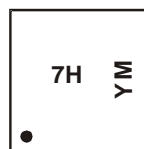
## Ordering Information (Note 4)

| Part Number      | Compliance | Case        | Quantity per reel |
|------------------|------------|-------------|-------------------|
| DMN10H170SFDE-7  | Standard   | U-DFN2020-6 | 3,000             |
| DMN10H170SFDE-13 | Standard   | U-DFN2020-6 | 10,000            |

- 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](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

U-DFN2020-6



7H = 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 | 2020 |     |     |     |     |
|-------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
| Code  | B    | 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<sub>A</sub> = +25°C unless otherwise specified.)

| Characteristic  |              |  | Symbol           | Value      | Units |
|---|--------------|--|------------------|------------|-------|
| Drain-Source Voltage                                    |              |  | V <sub>DSS</sub> | 100        | 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<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 2.9<br>2.3 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 3.4<br>2.7 | A     |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)      |              |  | I <sub>DM</sub>  | 10         | A     |
| Maximum Body Diode Continuous Current                   |              |  | I <sub>S</sub>   | 2.5        | A     |
| Avalanche Current (Note 7)                              |              |  | I <sub>AS</sub>  | 4.7        | A     |
| Avalanche Energy (Note 7)                               |              |  | E <sub>AS</sub>  | 16         | mJ    |

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

| Characteristic                                   |                        | Symbol                            | Value       | Units |
|--|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 0.66        | W     |
|  | T <sub>A</sub> = +70°C |                                   | 0.42        |       |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state           | R <sub>θJA</sub>                  | 189         | °C/W  |
|  | t < 10s                |                                   | 132         |       |
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 2.03        | W     |
|  | T <sub>A</sub> = +70°C |                                   | 1.31        |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state           | R <sub>θJA</sub>                  | 61          | °C/W  |
|  | t < 10s                |                                   | 43          |       |
| Thermal Resistance, Junction to Case (Note 6)    |                        | R <sub>θJC</sub>                  | 9.3         |       |
| 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>   | 100 | -    | -    | 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> = 100V, 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> | 1.0 | 2.0  | 3.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                                   |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | -   | 116  | 160  | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.0A   |
|  |                     |     | 126  | 200  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.0A  |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | -   | 0.9  | 1.0  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 10A   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |     |      |      |      |  |
| Input Capacitance                                      | C <sub>iSS</sub>    | -   | 1167 | -    | pF   | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                   |
| Output Capacitance                                     | C <sub>oss</sub>    | -   | 36   | -    | pF   |  |
| Reverse Transfer Capacitance                           | C <sub>rSS</sub>    | -   | 25   | -    | pF   |  |
| 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>      | -   | 4.9  | -    | nC   | V <sub>DS</sub> = 80V, I <sub>D</sub> = 12.8A  |
| Total Gate Charge (V <sub>GS</sub> = 10V)              | Q <sub>g</sub>      | -   | 9.7  | -    | nC   |  |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | -   | 2.0  | -    | nC   |  |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | -   | 2.0  | -    | nC   |  |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | -   | 10.5 | -    | ns   | V <sub>DS</sub> = 50V, I <sub>D</sub> = 12.8A<br>V <sub>GS</sub> = 10V, R <sub>G</sub> = 25Ω |
| Turn-On Rise Time                                      | t <sub>r</sub>      | -   | 11.1 | -    | ns   |  |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | -   | 42.6 | -    | ns   |  |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | -   | 12.8 | -    | ns   |  |
| Reverse Recovery Time                                  | T <sub>rr</sub>     | -   | 30.3 | -    | ns   | I <sub>F</sub> = 12.8A, di/dt = 100A/µs  |
| Reverse Recovery Charge                                | Q <sub>rr</sub>     | -   | 35.2 | -    | 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.
  - .UIS in production with L = 1.43mH, T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

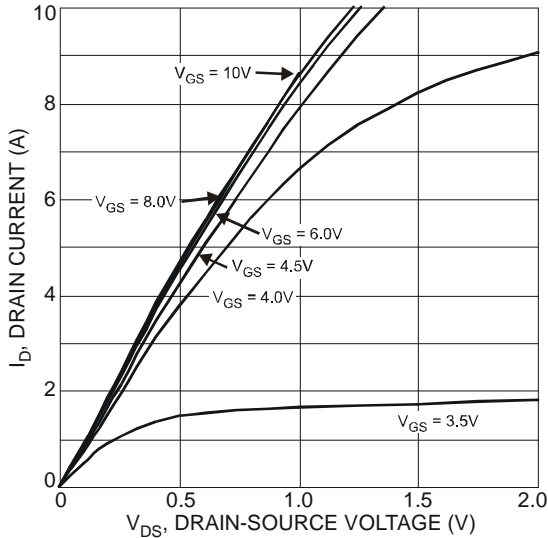


Fig. 1 Typical Output Characteristic

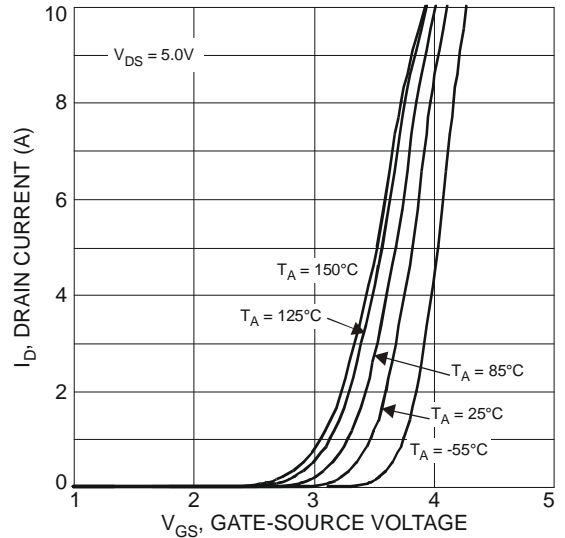


Fig. 2 Typical Transfer Characteristics

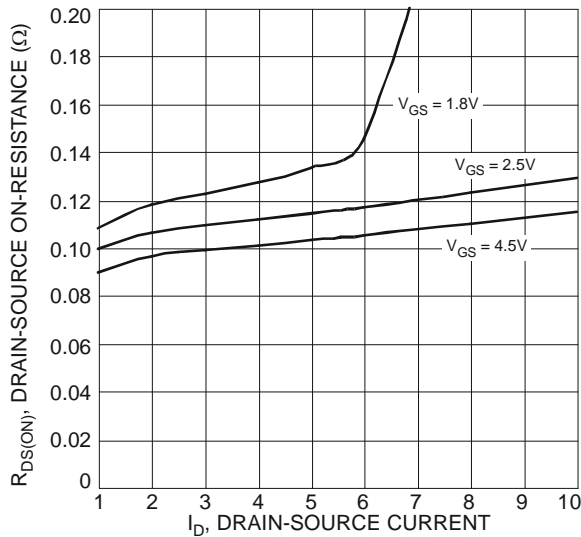


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

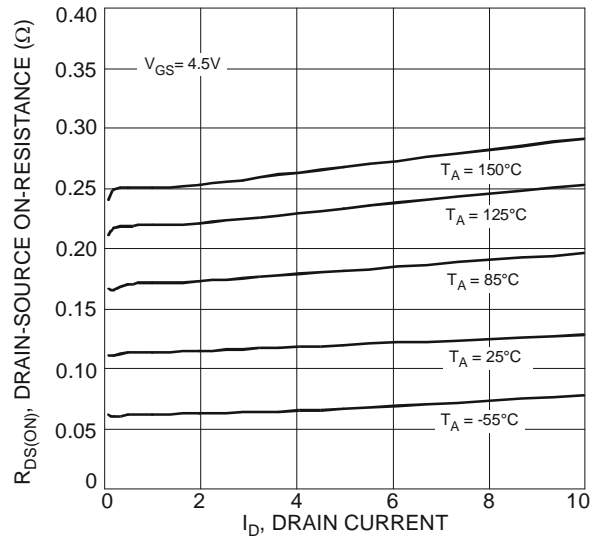


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

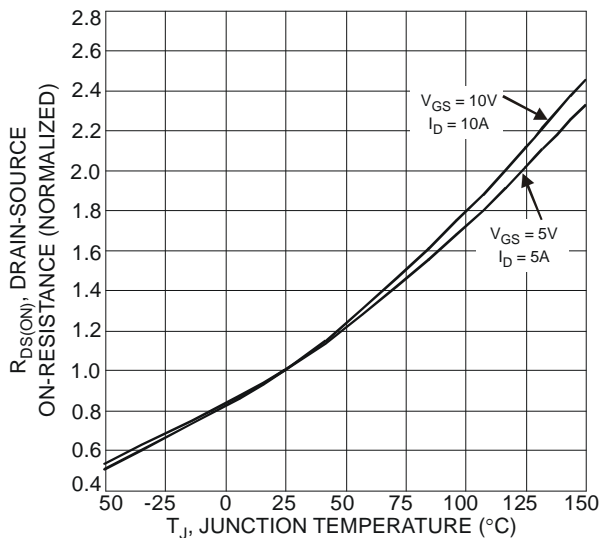


Fig. 5 On-Resistance Variation with Temperature

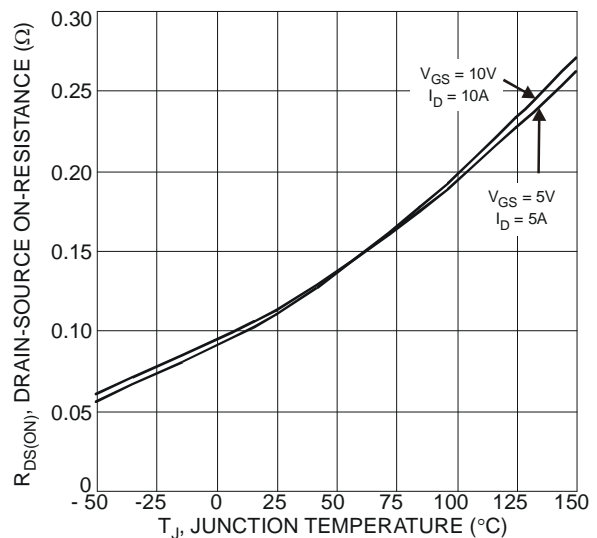


Fig. 6 On-Resistance Variation with Temperature

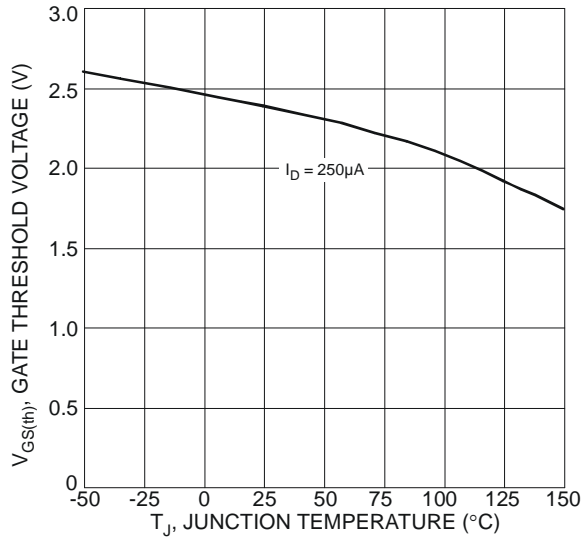


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

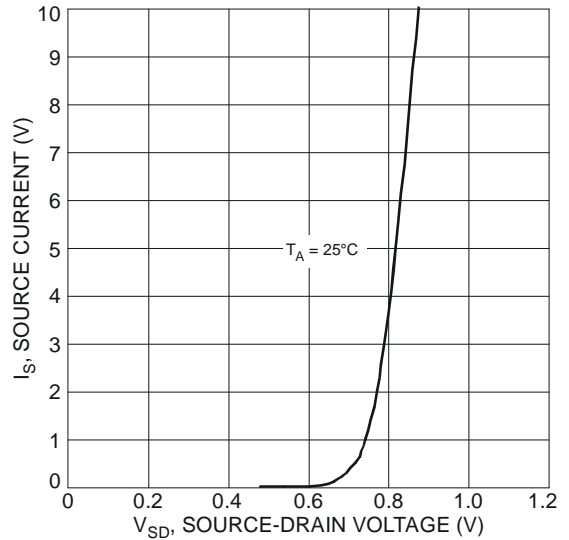


Fig. 8 Diode Forward Voltage vs. Current

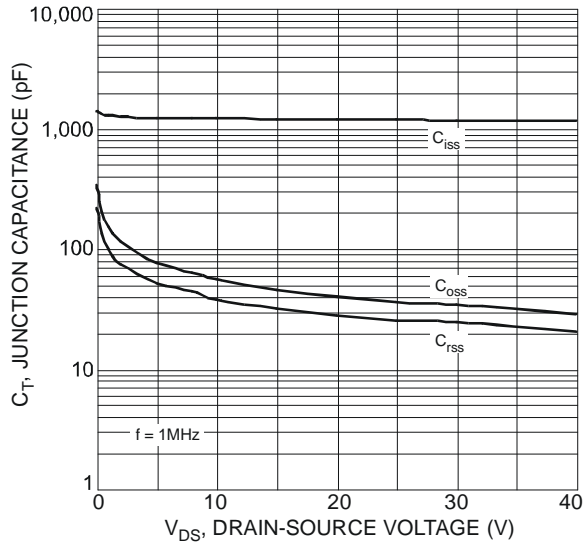


Fig. 9 Typical Junction Capacitance

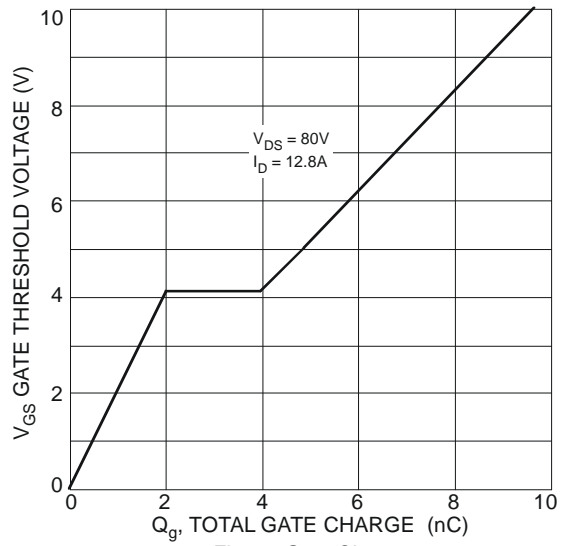


Fig. 10 Gate Charge

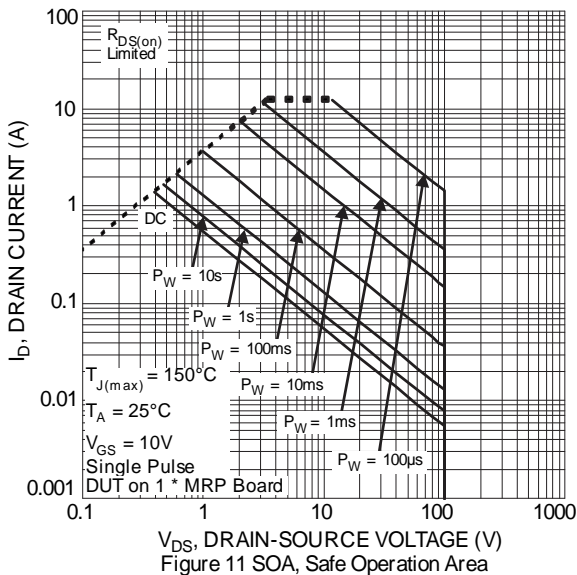
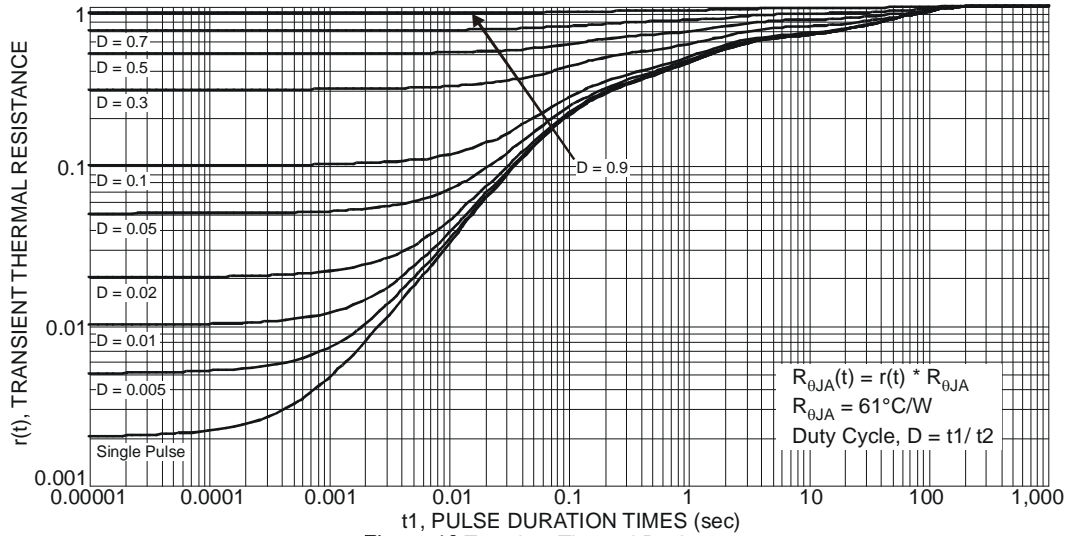
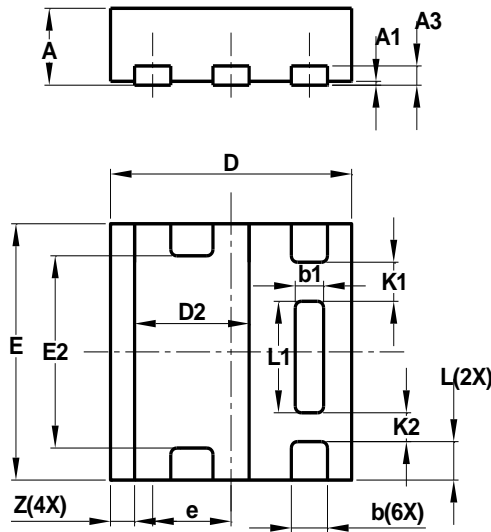


Figure 11 SOA, Safe Operation Area



**Package Outline Dimensions**

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

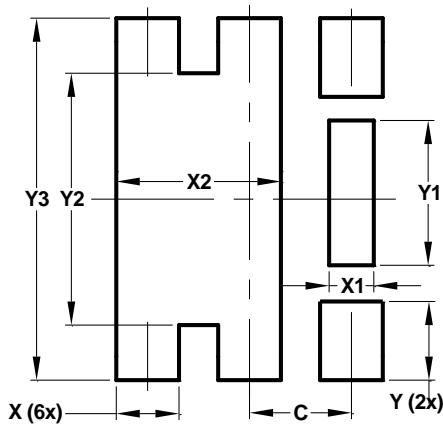


| U-DFN2020-6<br>Type E |       |       |       |
|-----------------------|-------|-------|-------|
| Dim                   | Min   | Max   | Typ   |
| A                     | 0.57  | 0.63  | 0.60  |
| A1                    | 0     | 0.05  | 0.03  |
| A3                    | —     | —     | 0.15  |
| b                     | 0.25  | 0.35  | 0.30  |
| b1                    | 0.185 | 0.285 | 0.235 |
| D                     | 1.95  | 2.05  | 2.00  |
| D2                    | 0.85  | 1.05  | 0.95  |
| E                     | 1.95  | 2.05  | 2.00  |
| E2                    | 1.40  | 1.60  | 1.50  |
| e                     | —     | —     | 0.65  |
| L                     | 0.25  | 0.35  | 0.30  |
| L1                    | 0.82  | 0.92  | 0.87  |
| K1                    | —     | —     | 0.305 |
| K2                    | —     | —     | 0.225 |
| Z                     | —     | —     | 0.20  |

All Dimensions in mm

## Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| <b>C</b>   | 0.650         |
| <b>X</b>   | 0.400         |
| <b>X1</b>  | 0.285         |
| <b>X2</b>  | 1.050         |
| <b>Y</b>   | 0.500         |
| <b>Y1</b>  | 0.920         |
| <b>Y2</b>  | 1.600         |
| <b>Y3</b>  | 2.300         |

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