



#### 30V N-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

| V <sub>(BR)DSS</sub> | R <sub>DS(ON) max</sub>       | I <sub>D max</sub><br>T <sub>A</sub> = +25°C |
|----------------------|-------------------------------|--|
| 30V                  | 10mΩ @ V <sub>GS</sub> = 10V  | 12.0A  |
| 30 V                 | 16mΩ @ V <sub>GS</sub> = 4.5V | 10.4A  |

## **Description**

This new generation 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.

# **Applications**

- General Purpose Interfacing Switch
- Power Management Functions

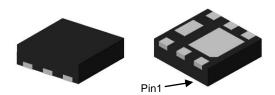
## **Features**

- 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)

## **Mechanical Data**

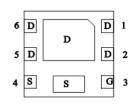
- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (4)
- Weight: 0.0065 grams (Approximate)

#### U-DFN2020-6

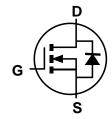


Top View

Bottom View



Pin Out Bottom View



**Equivalent Circuit** 

# **Ordering Information** (Note 4)

| Part Number    | Marking | Reel size (inches) | Quantity per reel |
|----------------|---------|--------------------|-------------------|
| DMT3008LFDF-7  | T3      | 7                  | 3,000             |
| DMT3008LFDF-13 | T3      | 13                 | 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 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.
- ${\it 4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.}\\$

# **Marking Information**

#### U-DFN2020-6



T3 = 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 |     | 2021 |
|-------|------|-----|------|------|-----|------|------|----|-------|------|-----|------|
| Code  | В    |     | С    | D    |     | Е    | F    |    | G     | Н    |     | I    |
| Month | Jan  | Feb | Mar  | Apr  | May | Jun  | Jul  | Au | g Sep | Oct  | Nov | Dec  |
| Code  | 1    | 2   | 3    | 4    | 5   | 6    | 7    | 8  | 9     | 0    | N   | D    |



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

| Characteristic   | Symbol           | Value  | Units          |              |   |
|--|------------------|--|----------------|--------------|---|
| Drain-Source Voltage                                     | $V_{DSS}$        | 30   | V              |              |   |
| Gate-Source Voltage                                      | V <sub>GSS</sub> | ±20  | V              |              |   |
| Continuous Dusin Courset (Nata CVV 40.0)/                | I <sub>D</sub>   | 12.0<br>9.5                                  | А              |              |   |
| Continuous Drain Current (Note 6) V <sub>GS</sub> =10.0V | t<10s            | $T_A = +25^{\circ}C$<br>$T_A = +70^{\circ}C$ | I <sub>D</sub> | 13.6<br>11.0 | А |
| Continuous Dusin Courset (Note CVV)                      | Steady<br>State  | $T_A = +25^{\circ}C$<br>$T_A = +70^{\circ}C$ | I <sub>D</sub> | 10.4<br>8.4  | А |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V | t<10s            | $T_A = +25$ °C<br>$T_A = +70$ °C             | I <sub>D</sub> | 11.9<br>9.6  | А |
| Pulsed Drain Current (10µs pulse, duty cycle = 1%)       | I <sub>DM</sub>  | 70   | Α              |              |   |
| Maximum Body Diode Continuous Current                    | I <sub>S</sub>   | 2  | Α              |              |   |
| Avalanche Current (Note 7) L = 0.1mH                     | I <sub>AS</sub>  | 8  | Α              |              |   |
| Avalanche Energy (Note 7) L = 0.1mH                      | E <sub>AS</sub>  | 3.2  | mJ             |              |   |

# **Thermal Characteristics**

| Characteristic                                   | Symbol                 | Value                            | Units       |      |
|--|------------------------|----------------------------------|-------------|------|
| Total Dawer Discipation (Note 5)                 | T <sub>A</sub> = +25°C | <b>D</b>                         | 0.8         | W    |
| Total Power Dissipation (Note 5)                 | $T_A = +70^{\circ}C$   | $P_{D}$                          | 0.5         |      |
| Thermal Peciatones Junction to Ambient (Note 5)  | Steady State           | D- · ·                           | 156         | °C/W |
| Thermal Resistance, Junction to Ambient (Note 5) | t<10s                  | $R_{\theta JA}$                  | 116         | C/VV |
| Total Bower Discipation (Note 6)                 | $T_A = +25^{\circ}C$   | Б                                | 2.1         | W    |
| Total Power Dissipation (Note 6)                 | $T_A = +70^{\circ}C$   | $P_{D}$                          | 1.3         |      |
| Thermal Peciatones Junction to Ambient (Note 6)  | Steady State           | D                                | 60.8        | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | t<10s                  | $R_{\theta JA}$                  | 45.0        |      |
| Thermal Resistance, Junction to Case (Note 6)    |                        | $R_{\theta JC}$                  | 13          |      |
| 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  | Тур  | Max  | Unit  | Test Condition  |  |
|--|---------------------|------|------|------|-------|---|--|
| OFF CHARACTERISTICS (Note 8)                           |                     |      |      |      |       |   |  |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | 30.0 | _    | _    | V     | $V_{GS} = 0V, I_D = 250\mu A$                         |  |
| Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | _    | _    | 1.0  | μΑ    | $V_{DS} = 24V, V_{GS} = 0V$                           |  |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | _    | _    | ±100 | nA    | $V_{GS} = \pm 20V, V_{DS} = 0V$                       |  |
| ON CHARACTERISTICS (Note 8)                            |                     |      |      |      |       |   |  |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | 1.0  | _    | 3.0  | V     | $V_{DS} = V_{GS}, I_{D} = 250 \mu A$                  |  |
| Static Drain-Source On-Resistance                      |                     |      | _    | 10.0 | mΩ    | $V_{GS} = 10V, I_D = 9.0A$                            |  |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | _    | _    | 16.0 | 11122 | $V_{GS} = 4.5V, I_D = 8.5A$                           |  |
| Diode Forward Voltage                                  | $V_{SD}$            | _    | _    | 1.2  | V     | $V_{GS} = 0V$ , $I_S = 2A$                            |  |
| DYNAMIC CHARACTERISTICS (Note 9)                       |                     |      |      | •    |       |   |  |
| Input Capacitance                                      | C <sub>iss</sub>    | _    | 886  | _    | pF    | 45)/ )/ 6)/   |  |
| Output Capacitance                                     | Coss                | _    | 531  | _    | pF    | $V_{DS} = 15V, V_{GS} = 0V,$<br>- f = 1.0MHz          |  |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | _    | 53   | _    | pF    | 1 = 1.0WH 12  |  |
| Gate Resistance  | Rg                  | _    | 1.6  | _    | Ω     | $V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$                |  |
| Total Gate Charge (V <sub>GS</sub> = 10V)              | Qg                  | _    | 14   | _    | nC    |   |  |
| Total Gate Charge (V <sub>GS</sub> = 4.5V)             | Qg                  | _    | 5.8  | _    | nC    | 101/ 1 201  |  |
| Gate-Source Charge                                     | Qgs                 | _    | 2.6  | _    | nC    | $V_{DD} = 10V, I_D = 30A$                             |  |
| Gate-Drain Charge                                      | $Q_{gd}$            | _    | 2.5  | _    | nC    | 1   |  |
| Turn-On Delay Time                                     | t <sub>D(ON)</sub>  | _    | 3.8  | _    | ns    |   |  |
| Turn-On Rise Time                                      | t <sub>R</sub>      | _    | 1.7  | _    | ns    | $V_{DD} = 10V, V_{GS} = 10V,$                         |  |
| Turn-Off Delay Time                                    | t <sub>D(OFF)</sub> | _    | 12.5 | _    | ns    | $R_L = 0.67\Omega$ , $R_G = 4.7\Omega$ , $I_D = -15A$ |  |
| Turn-Off Fall Time                                     | t <sub>F</sub>      | _    | 3.6  | _    | ns    |   |  |
| Reverse Recovery Time                                  | t <sub>RR</sub>     | _    | 18.4 | _    | ns    | 1 450 11/11 4000/                                     |  |
| Reverse Recovery Charge                                | Q <sub>rr</sub>     | _    | 7.6  | _    | nC    | $I_F = 15A$ , $dI/dt = 100A/\mu s$                    |  |

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

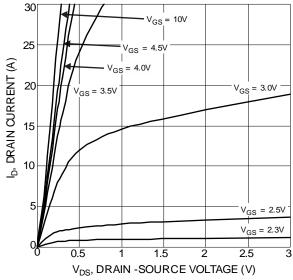
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

7. I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep  $T_J$  = +25°C.

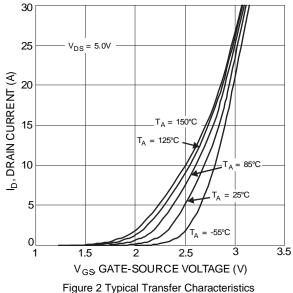
8. Short duration pulse test used to minimize self-heating effect.

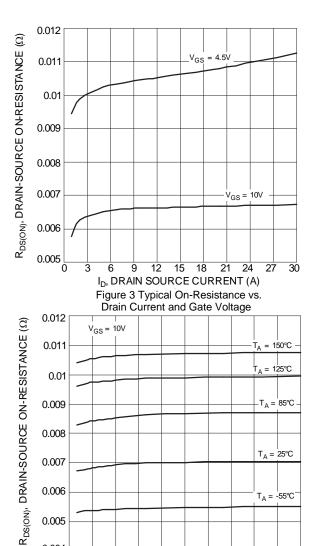
9. Guaranteed by design. Not subject to product testing.

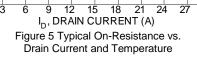






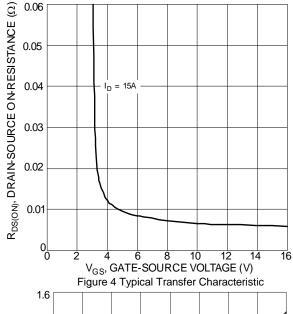






 $T_A = 25^{\circ}C$ 

 $T_A = -55^{\circ}C$ 



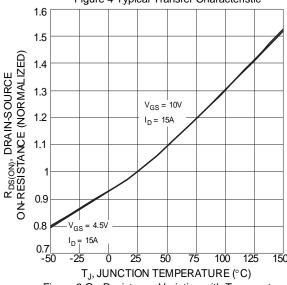


Figure 6 On-Resistance Variation with Temperature

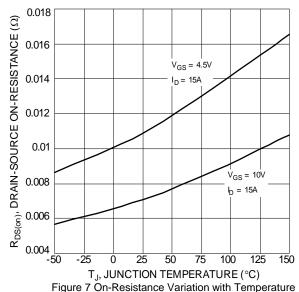
0.007

0.006

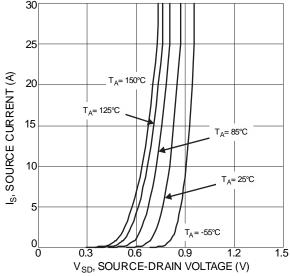
0.005

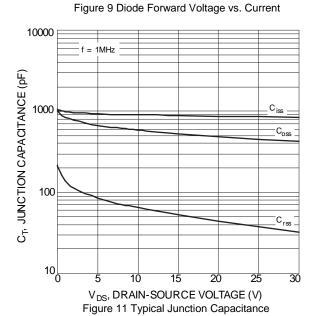
0.004











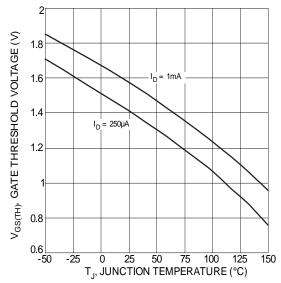


Figure 8 Gate Threshold Variation vs. Junction Temperature

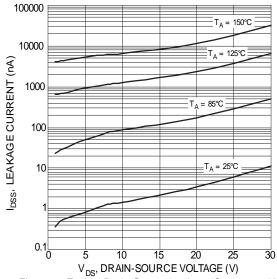
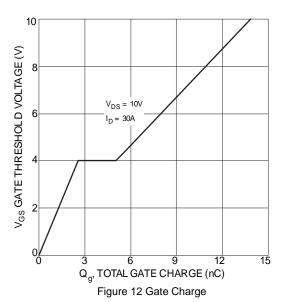
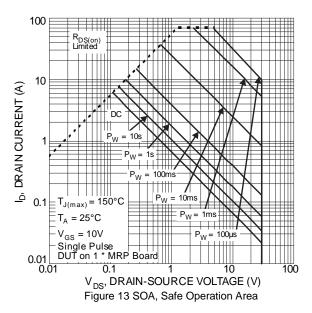


Figure 10 Typical Drain-Source Leakage Current vs. Voltage







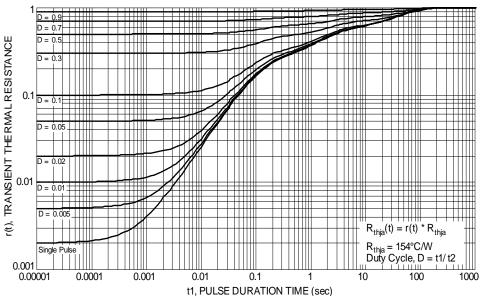


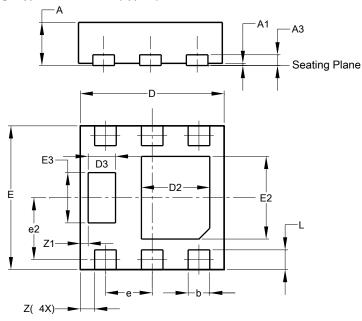
Figure 14 Transient Thermal Resistance



# **Package Outline Dimensions**

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

## (1) Package Type: U-DFN2020-6 (Type F)

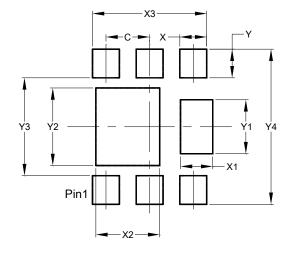


| U-DFN2020-6 |             |        |       |  |  |  |  |
|-------------|-------------|--------|-------|--|--|--|--|
| (Type F)    |             |        |       |  |  |  |  |
| Dim         | Min Max Typ |        |       |  |  |  |  |
| Α           | 0.57        | 0.63   | 0.60  |  |  |  |  |
| A1          | 0           | 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  |  |  |  |  |
| D3          | 0.33        | 0.43   | 0.38  |  |  |  |  |
| е           | 0.65 BSC    |        |       |  |  |  |  |
| e2          | 0           | .863 B | SC    |  |  |  |  |
| Ε           | 1.95        | 2.05   | 2.00  |  |  |  |  |
| E2          | 1.05        | 1.25   | 1.15  |  |  |  |  |
| E3          | 0.65        | 0.75   | 0.70  |  |  |  |  |
| L           | 0.225       | 0.325  | 0.275 |  |  |  |  |
| Ζ           | 0.20 BSC    |        |       |  |  |  |  |
| <b>Z</b> 1  | 0.110 BSC   |        |       |  |  |  |  |
| All D       | )imen       | sions  | in mm |  |  |  |  |

# **Suggested Pad Layout**

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

## (1) Package Type: U-DFN2020-6 (Type F)



| Dimensions | Value   |
|------------|---------|
|            | (in mm) |
| С          | 0.650   |
| X          | 0.400   |
| X1         | 0.480   |
| X2         | 0.950   |
| Х3         | 1.700   |
| Υ          | 0.425   |
| Y1         | 0.800   |
| Y2         | 1.150   |
| Y3         | 1.450   |
| Y4         | 2.300   |



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многоканальный

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