

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ max | I_D max $T_A = +25^\circ\text{C}$ |
|---------------|--|--|
| -12V | 14.8m Ω @ $V_{GS} = -4.5\text{V}$ | -9.5A |
| | 19m Ω @ $V_{GS} = -2.5\text{V}$ | -8.5A |
| | 26m Ω @ $V_{GS} = -1.8\text{V}$ | -7.2A |
| | 32m Ω @ $V_{GS} = -1.5\text{V}$ | -6.6A |

Description

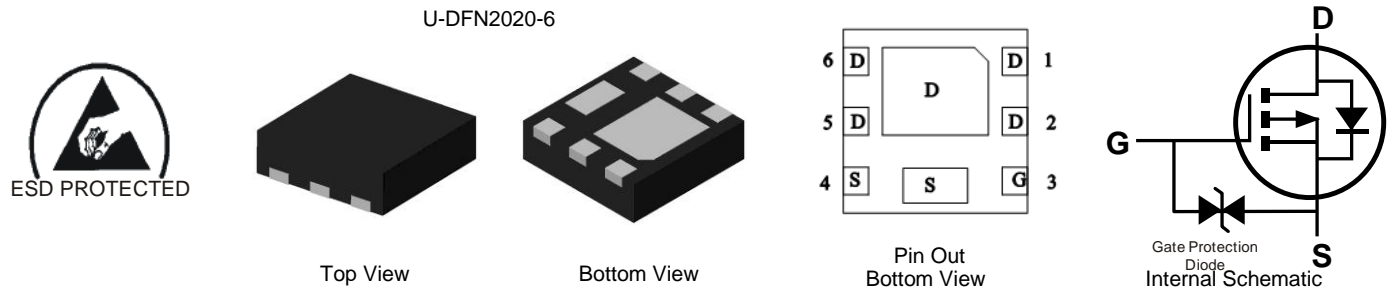
This MOSFET is designed specifically for use in battery management applications.

Features

- 0.6mm profile – ideal for low profile applications
- PCB footprint of 4mm²
- 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
- 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)

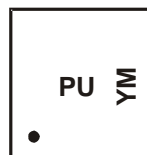


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|----------------|-------------|--------------------|
| DMP1022UFDF-7 | U-DFN2020-6 | 3,000/Tape & Reel |
| DMP1022UFDF-13 | U-DFN2020-6 | 10,000/Tape & Reel |

- 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.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



PU = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|
| Code | Y | Z | A | B | C | D | E |

| 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_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Units |
|---|--------------|--|------------------|---------------|-------|
| Drain-Source Voltage | | | V _{DSS} | -12 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | V |
| Continuous Drain Current (Note 6) V _{GS} = -4.5V | Steady State | T _A = +25°C T _A = +70°C | I _D | -9.5 -7.6 | A |
| | t < 5s | T _A = +25°C T _A = +70°C | I _D | -11.0 -8.8 | A |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%) | | | I _{DM} | -90 | A |
| Continuous Source-Drain Diode Current | | T _A = +25°C T _C = +25°C | I _S | -2.5 -7.1 | A |
| Pulsed Source-Drain Diode Current (10μs pulse, duty cycle = 1%) | | | I _{SM} | -50 | A |

Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|--|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 0.73 | W |
| | T _A = +70°C | | 0.47 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | R _{θJA} | 172 | °C/W |
| | t < 5s | | 128 | |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 2.1 | W |
| | T _A = +70°C | | 1.3 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | R _{θJA} | 59 | °C/W |
| | t < 5s | | 45 | |
| Thermal Resistance, Junction to Case (Note 6) | Steady state | R _{θJC} | 5.1 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-------|-------|------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -12 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -1 | μA | V _{DS} = -12V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±10 | μA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | -0.35 | — | -0.8 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(on)} | — | 12 | 14.8 | mΩ | V _{GS} = -4.5V, I _D = -4A |
| | | | 15 | 19 | | V _{GS} = -2.5V, I _D = -4A |
| | | | 20 | 26 | | V _{GS} = -1.8V, I _D = -4A |
| | | | 23 | 32 | | V _{GS} = -1.5V, I _D = -2A |
| Diode Forward Voltage | V _{SD} | — | -0.8 | -1.2 | V | V _{GS} = 0V, I _S = -8A |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C _{iss} | — | 2,712 | — | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 514 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 467 | — | | |
| Gate Resistance | R _g | — | 8.6 | 18 | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge | Q _g | — | 48.3 | — | nC | V _{GS} = -8V, V _{DS} = -6V, I _D = -10A |
| Total Gate Charge | Q _g | — | 28.6 | — | | |
| Gate-Source Charge | Q _{gs} | — | 4.2 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 7.0 | — | | |
| Turn-On Delay Time | t _{D(on)} | — | 25.1 | — | ns | V _{DS} = -6V, V _{GS} = -4.5V, R _G = 1Ω, I _D = -8A |
| Turn-On Rise Time | t _r | — | 39.8 | — | | |
| Turn-Off Delay Time | t _{D(off)} | — | 141 | — | | |
| Turn-Off Fall Time | t _f | — | 147 | — | | |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

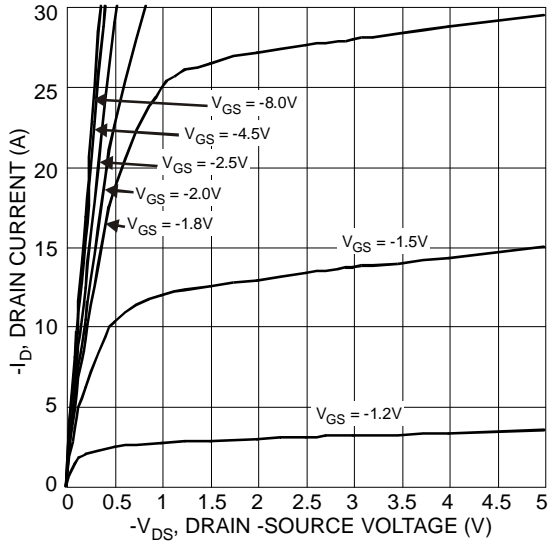


Figure 1 Typical Output Characteristics

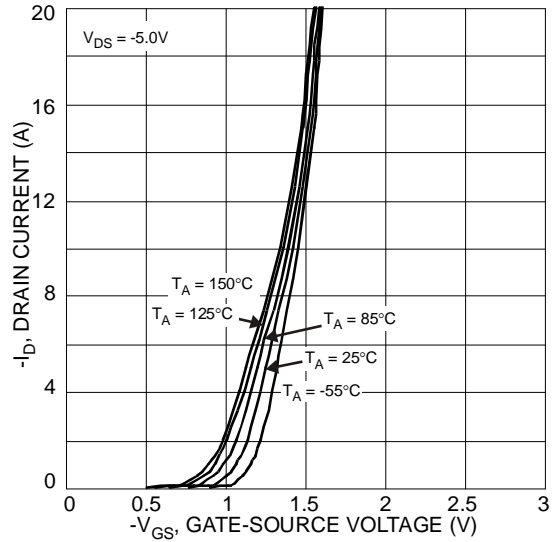


Figure 2 Typical Transfer Characteristics

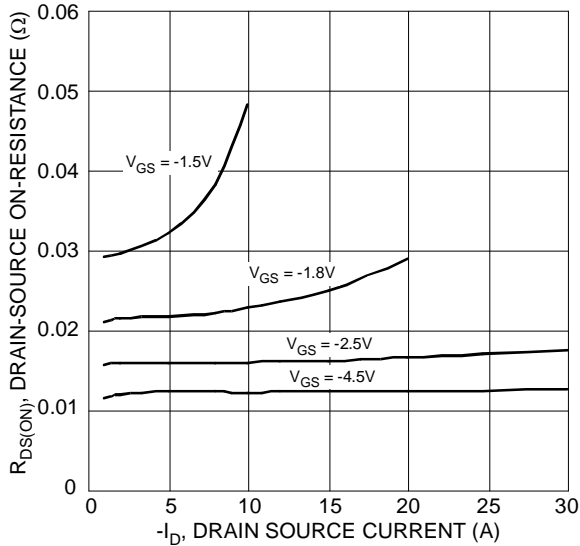


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

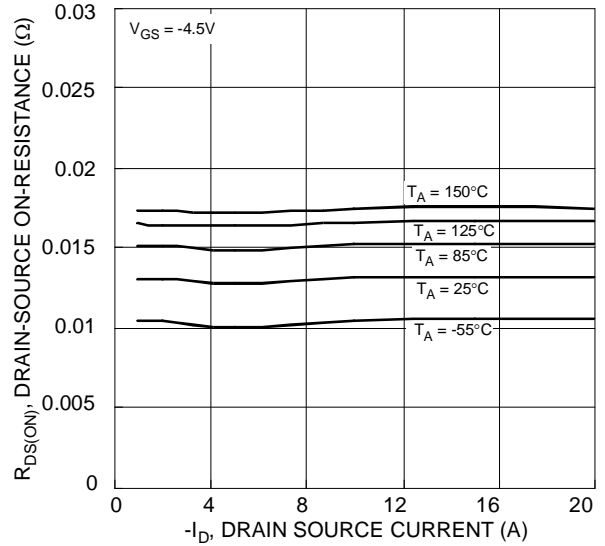


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

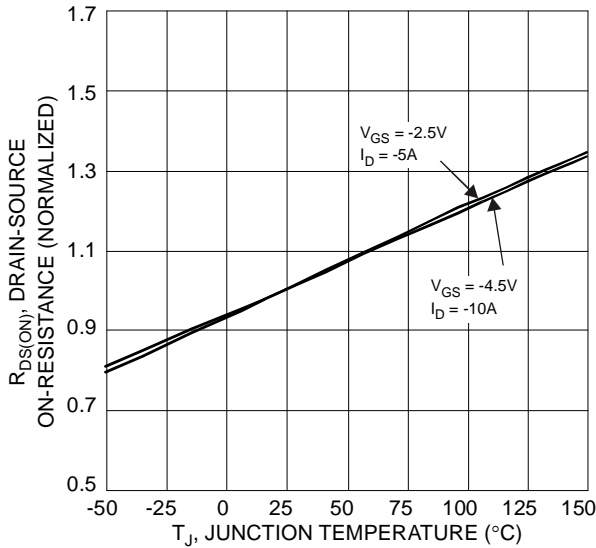


Figure 5 On-Resistance Variation with Temperature

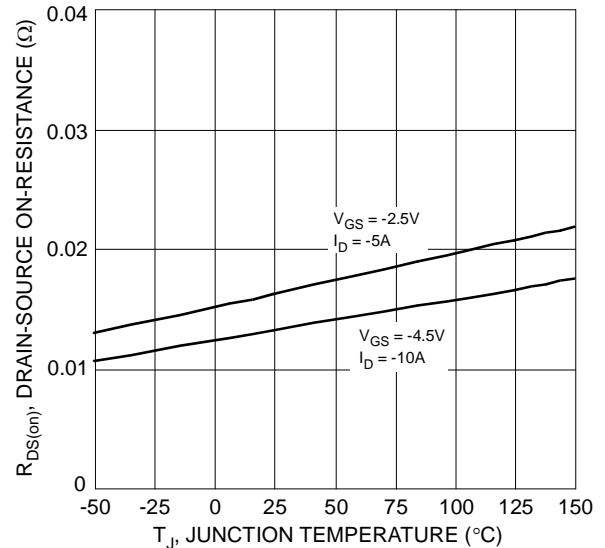


Figure 6 On-Resistance Variation with Temperature

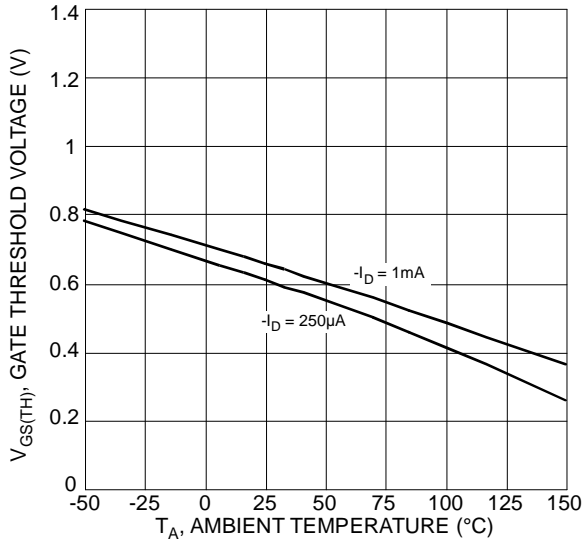


Figure 7 Gate Threshold Variation vs. Ambient Temperature

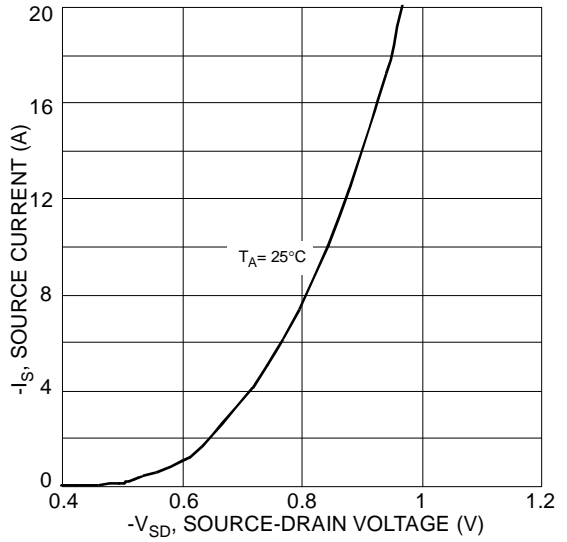


Figure 8 Diode Forward Voltage vs. Current

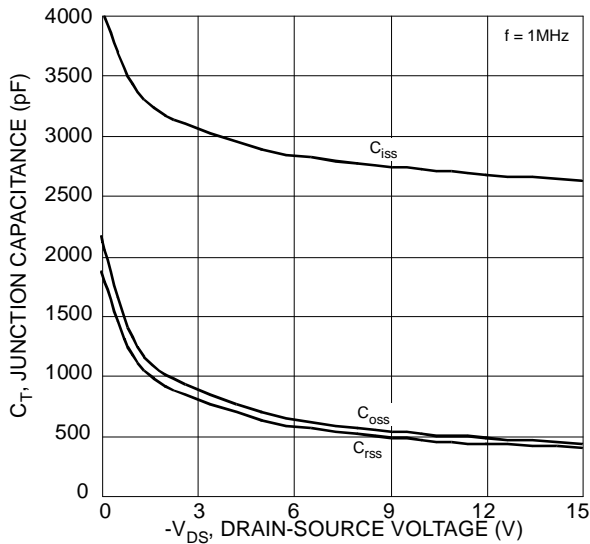


Figure 9 Typical Junction Capacitance

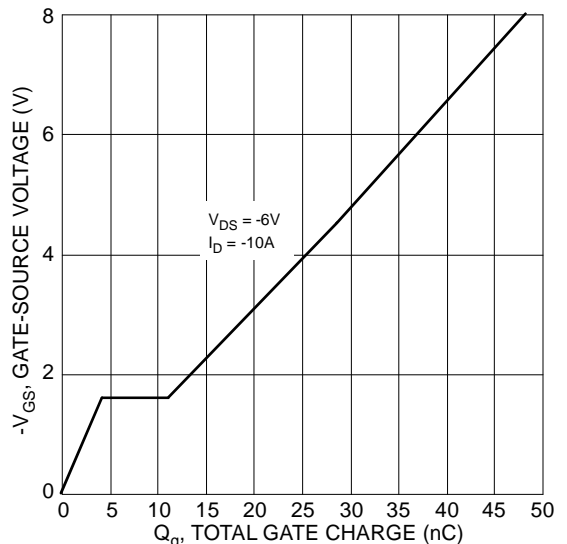


Figure 10 Gate-Charge Characteristics

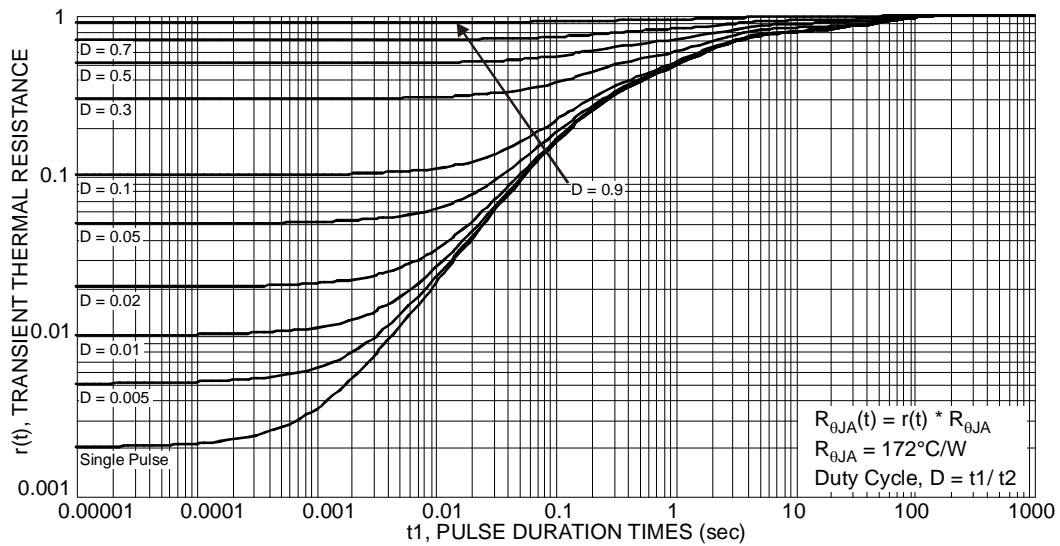


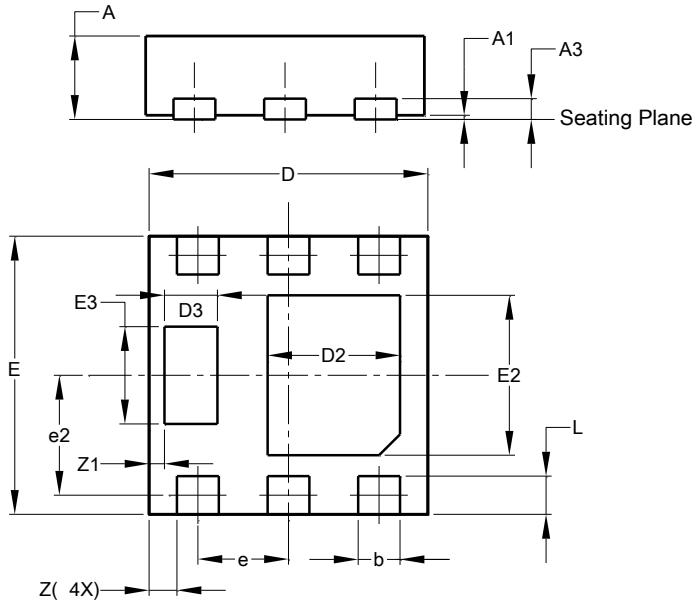
Figure 11 Transient Thermal Resistance

$R_{\theta JA}(t) = r(t) * R_{\theta JA}$
 $R_{\theta JA} = 172^{\circ}\text{C/W}$
 Duty Cycle, $D = t1 / t2$

Package Outline Dimensions

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

U-DFN2020-6 (Type F)

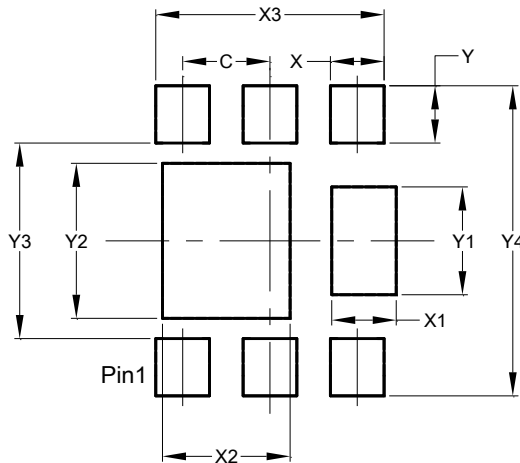


| U-DFN2020-6 (Type F) | | | |
|-------------------------|-----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.57 | 0.63 | 0.60 |
| A1 | 0 | 0.05 | 0.03 |
| A3 | - | - | 0.15 |
| b | 0.25 | 0.35 | 0.30 |
| D | 1.95 | 2.05 | 2.00 |
| D2 | 0.85 | 1.05 | 0.95 |
| D3 | 0.33 | 0.43 | 0.38 |
| e | 0.65 BSC | | |
| e2 | 0.863 BSC | | |
| E | 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 |
| Z | 0.20 BSC | | |
| Z1 | 0.110 BSC | | |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

U-DFN2020-6 (Type F)



| Dimensions | Value (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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