

Product Summary

| BV_{DSS} | $R_{DS(ON)}$ Max | I_D Max $T_A = 25^\circ C$ |
|------------|--------------------------------|---------------------------------|
| 30V | 12m Ω @ $V_{GS} = 10V$ | 10A |
| | 16m Ω @ $V_{GS} = 4.5V$ | 8.5A |

Description and Applications

This 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.

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

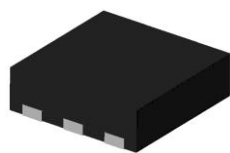
Features and Benefits

- 0.6mm profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- Low On-Resistance
- **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**

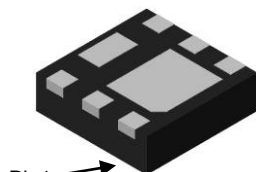
Mechanical Data

- 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 (a4)
- Weight: 0.0065 grams (Approximate)

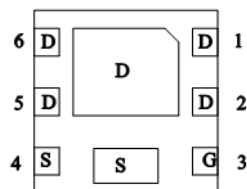
U-DFN2020-6 (Type F)



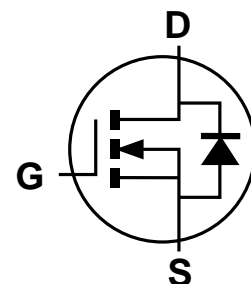
Top View



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:
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



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

Date Code Key

| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|------|------|------|------|------|------|------|------|------|
| Code | D | E | F | G | H | I | J | K |

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

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

| Characteristic | | Symbol | Value | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| 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} | 174 | °C/W |
| | t < 10s | | 121 | |
| Total Power Dissipation (Note 6) | T _A = +25°C | P _D | 2.02 | W |
| | T _A = +70°C | | 1.30 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | R _{θJA} | 66 | °C/W |
| | t < 10s | | 42 | |
| Thermal Resistance, Junction to Case (Note 6) | Steady State | R _{θJC} | 11.6 | °C |
| 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 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 30 | - | - | V | V _{GS} = 0V, I _D = 250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | - | - | 1 | µA | V _{DS} = 30V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | - | - | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1.4 | - | 2.0 | V | V _{DS} = V _{GS} , I _D = 250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | - | 8 | 12 | mΩ | V _{GS} = 10V, I _D = 11A |
| | | - | 12 | 16 | | V _{GS} = 4.5V, I _D = 9A |
| Diode Forward Voltage | V _{SD} | - | 0.70 | 1.0 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | - | 1415 | - | pF | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | - | 119 | - | | |
| Reverse Transfer Capacitance | C _{rss} | - | 82 | - | | |
| Gate Resistance | R _g | - | 2.6 | - | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | - | 11.3 | - | nC | V _{DS} = 15V, I _D = 12A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | - | 25.1 | - | | |
| Gate-Source Charge | Q _{gs} | - | 3.5 | - | | |
| Gate-Drain Charge | Q _{gd} | - | 3.6 | - | | |
| Turn-On Delay Time | t _{D(ON)} | - | 4.8 | - | ns | V _{DD} = 15V, V _{GS} = 10V, R _L = 1.25Ω, R _g = 3Ω |
| Turn-On Rise Time | t _R | - | 16.5 | - | | |
| Turn-Off Delay Time | t _{D(OFF)} | - | 26.1 | - | | |
| Turn-Off Fall Time | t _F | - | 5.6 | - | | |
| Reverse Recovery Time | t _{RR} | - | 12.3 | - | ns | I _F = 12A, di/dt = 500A/µs |
| Reverse Recovery Charge | Q _{RR} | - | 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_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

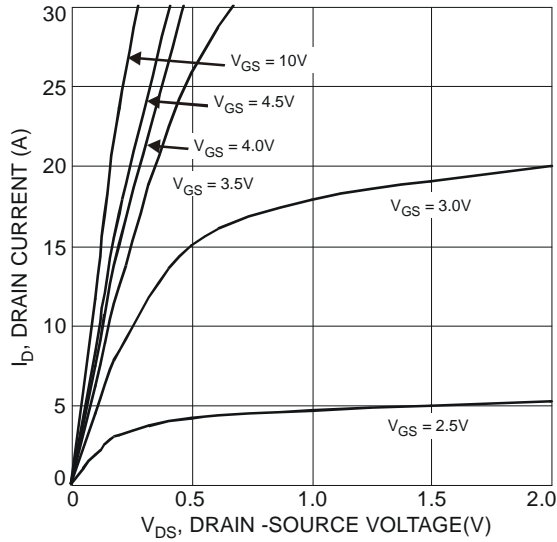


Fig. 1 Typical Output Characteristics

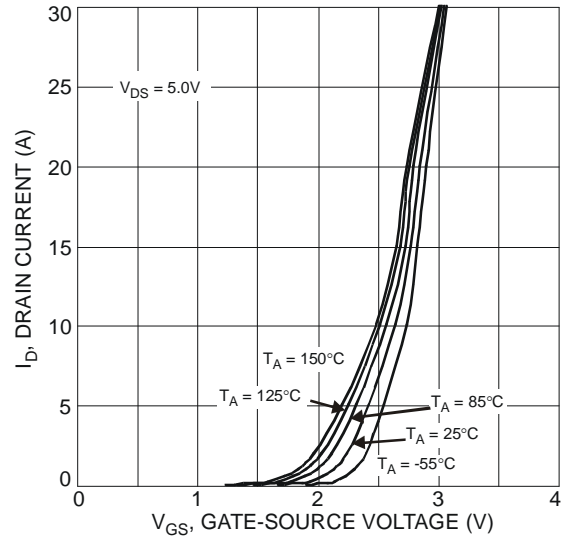


Fig. 2 Typical Transfer Characteristics

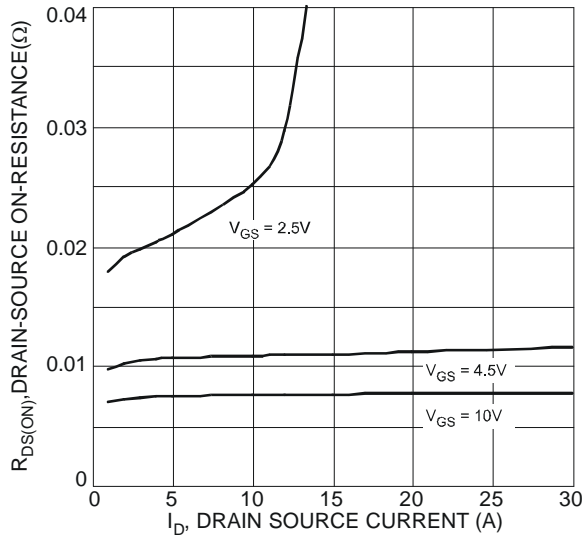


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

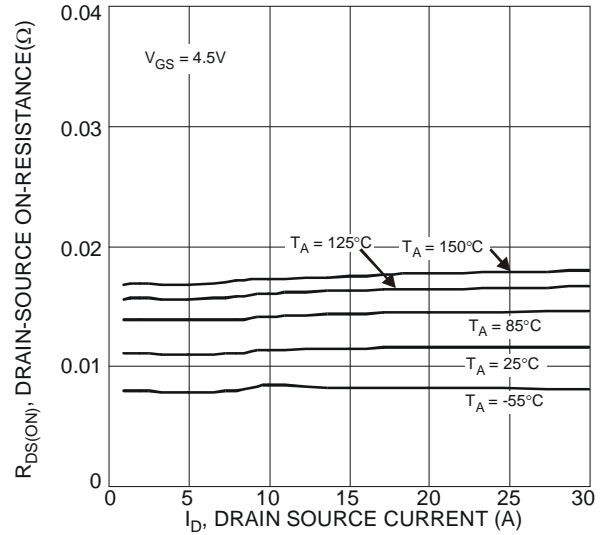


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

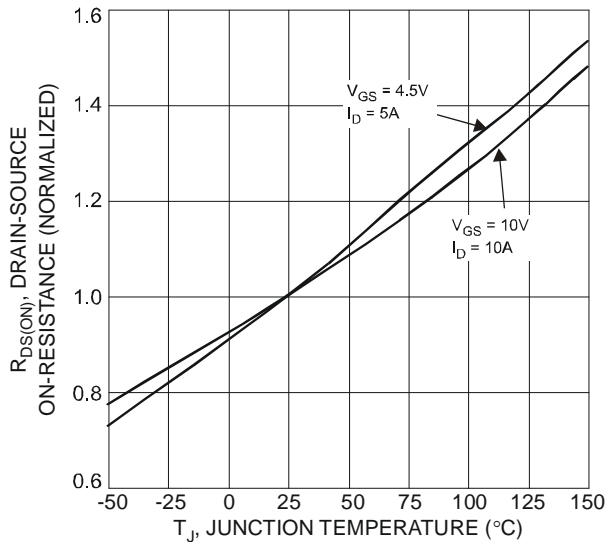


Fig. 5 On-Resistance Variation with Temperature

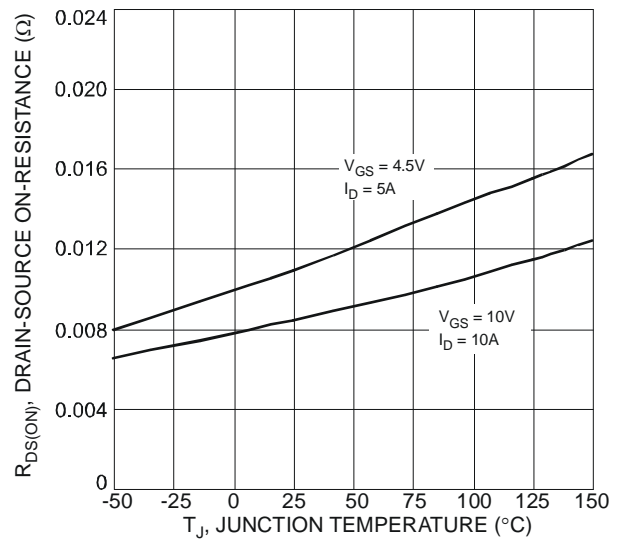
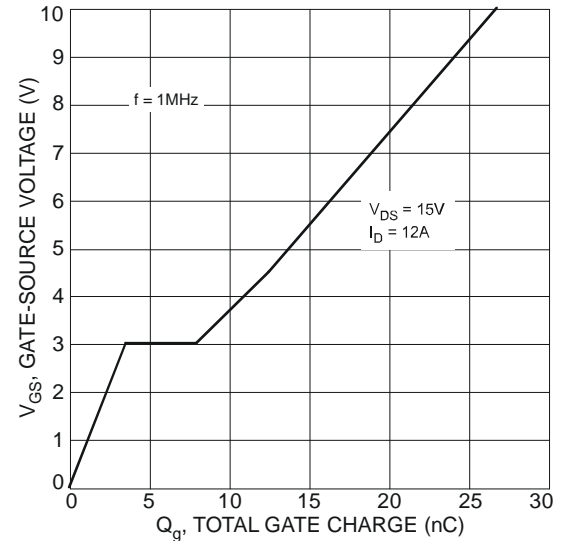
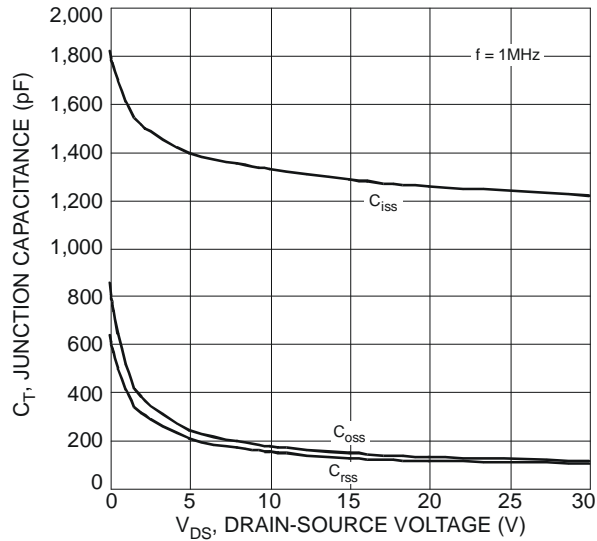
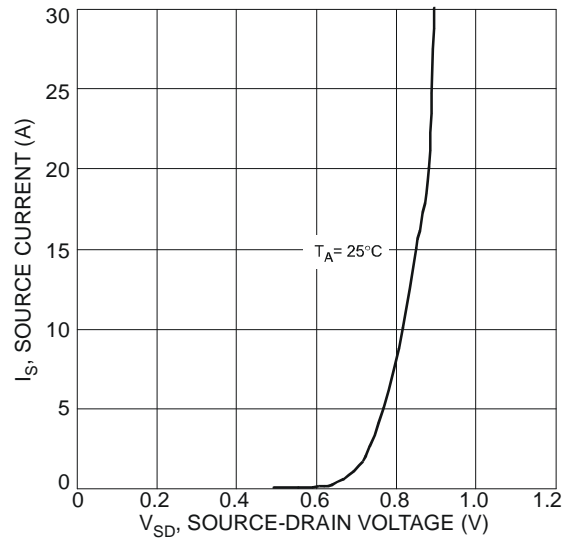
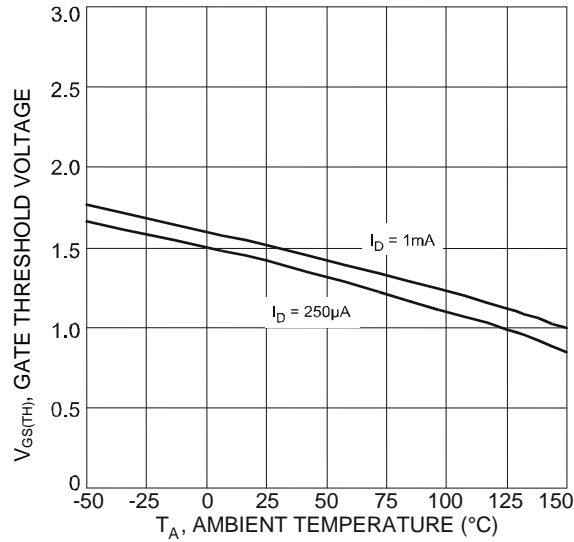


Fig. 6 On-Resistance Variation with Temperature



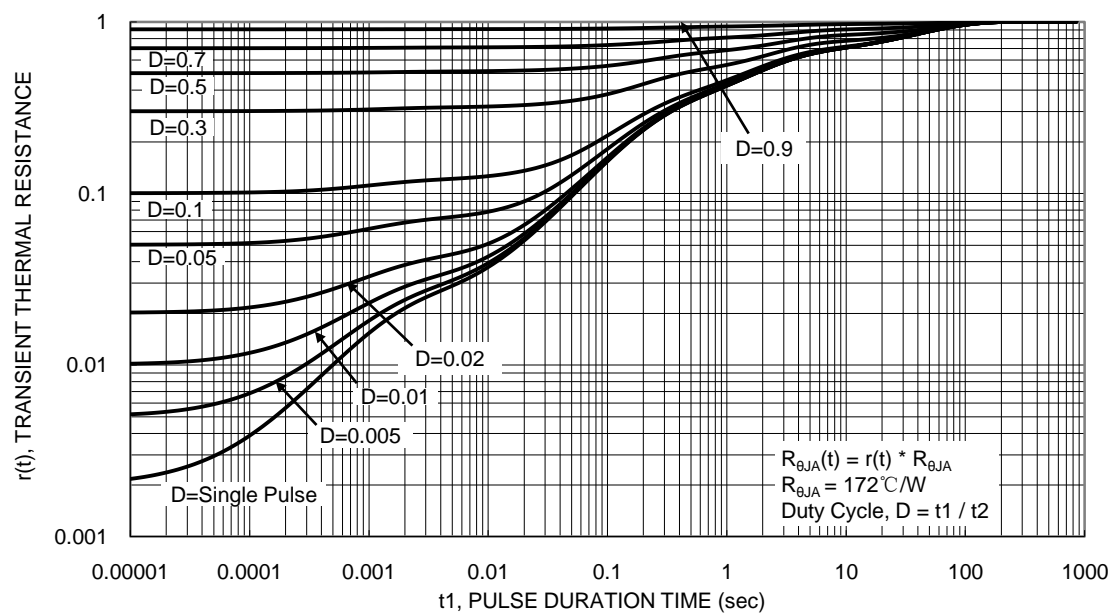
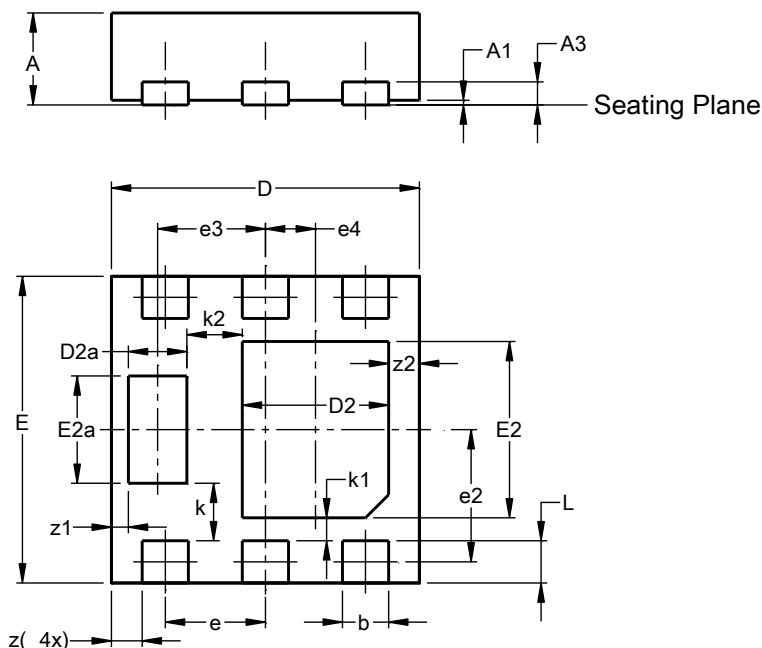


Figure 11. Transient Thermal Resistance

Package Outline Dimensions

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

U-DFN2020-6 (Type F)

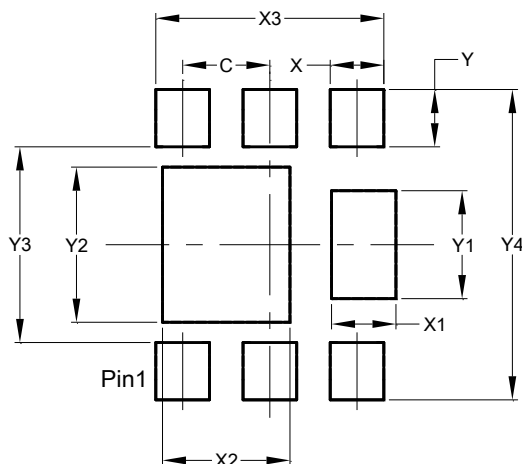


| U-DFN2020-6 (Type F) | | | |
|-------------------------|-----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.57 | 0.63 | 0.60 |
| A1 | 0.00 | 0.05 | 0.03 |
| A3 | - | - | 0.15 |
| b | 0.25 | 0.35 | 0.30 |
| D | 1.95 | 2.05 | 2.00 |
| D2 | 0.85 | 1.05 | 0.95 |
| D2a | 0.33 | 0.43 | 0.38 |
| 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 (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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