

DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| BV _{DSS} | R _{DS(ON)} Max | I _D MAX T _A = +25°C |
|-------------------|---------------------------------|--|
| -20V | 90mΩ @ V _{GS} = -4.5V | -3.2A |
| | 137mΩ @ V _{GS} = -2.5V | -2.6A |

Description

This MOSFET is designed to minimize on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

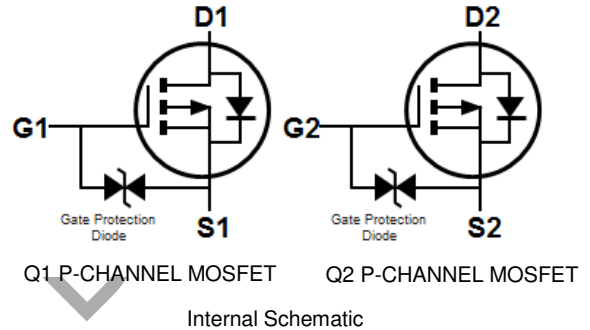
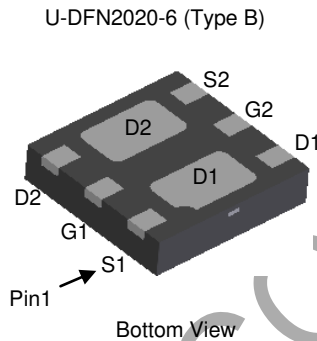
- Load Switch
- Power Management Functions
- Portable Power Adaptors

Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: U-DFN2020-6 (Type B)
- 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 e4
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)



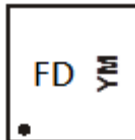
Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-----------------|----------------------|--------------------|
| DMP2060UFDB -7 | U-DFN2020-6 (Type B) | 3,000/Tape & Reel |
| DMP2060UFDB -13 | U-DFN2020-6 (Type B) | 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

U-DFN2020-6 (Type B)



FD = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: E = 2017)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|
| Code | B | C | D | E | F | G | H |

| 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} | -20 | V |
| Gate-Source Voltage | V _{GSS} | ±12 | V |
| Continuous Drain Current (Note 5) V _{GS} = -4.5V | I _D | -3.2 -2.5 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | I _S | -1.5 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | I _{DM} | -18 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|--------------|------|
| Total Power Dissipation (Note 5) | P _D | Steady State | 1.4 |
| | | t < 5s | 2.2 |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | Steady State | 92 |
| | | t < 5s | 55 |
| Thermal Resistance, Junction to Case (Note 5) | R _{θJC} | 30 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-------|-------|------|------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -20 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -20V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±10 | μA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.35 | — | -1.4 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 59 | 90 | mΩ | V _{GS} = -4.5V, I _D = -2.9A |
| | | — | 76 | 137 | | V _{GS} = -2.5V, I _D = -2.3A |
| Diode Forward Voltage | V _{SD} | — | -0.65 | -1.2 | V | V _{GS} = 0V, I _S = -3.0A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iss} | — | 881 | — | pF | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 84 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 67 | — | pF | |
| Gate Resistance | R _g | — | 14.3 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 11 | — | nC | V _{DS} = -10V, I _D = -3.7A |
| Total Gate Charge (V _{GS} = -8V) | | — | 18 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 1.5 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 2.3 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.0 | — | ns | |
| Turn-On Rise Time | t _r | — | 9.5 | — | ns | V _{DD} = -10V, V _{GS} = -4.5V, R _L = 3.3Ω, R _g = 1Ω |
| Turn-Off Delay Time | t _{D(OFF)} | — | 29.7 | — | ns | |
| Turn-Off Fall Time | t _f | — | 20.4 | — | ns | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 23.6 | — | ns | I _S = -3.0A, dI/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 11.4 | — | nC | I _S = -3.0A, dI/dt = 100A/μs |

- Notes:
- Device mounted on on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
 - Short duration pulse test used to minimize self-heating effect
 - Guaranteed by design. Not subject to product testing.

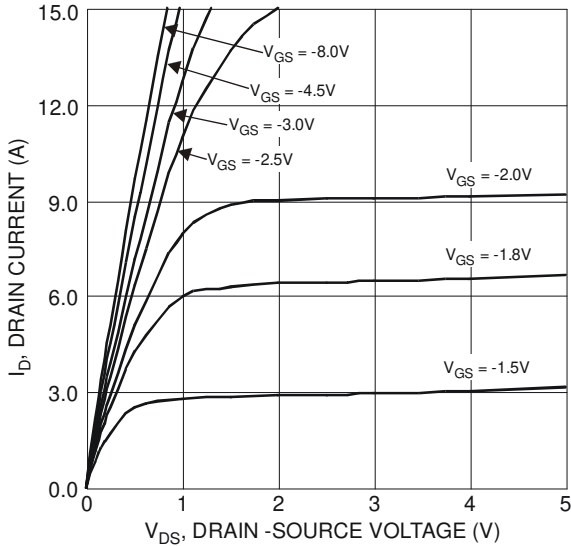


Figure 1 Typical Output Characteristics

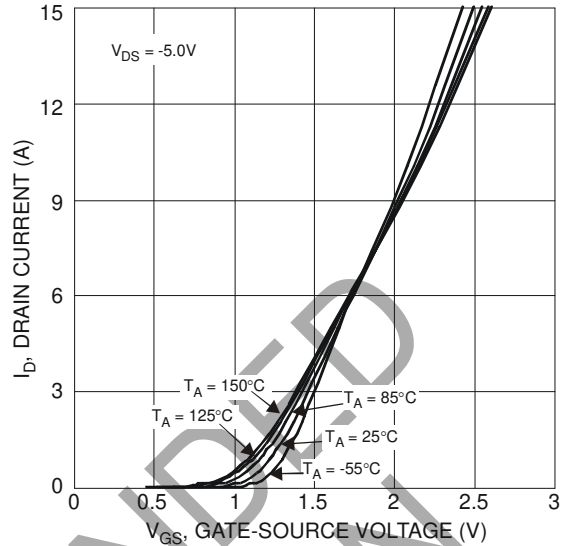


Figure 2 Typical Transfer Characteristics

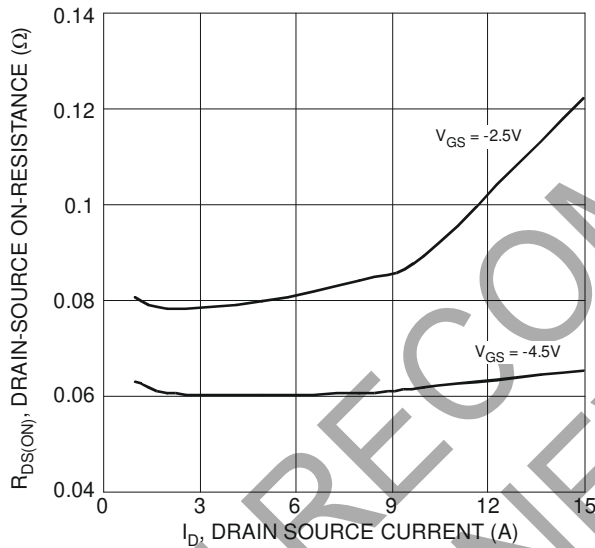


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

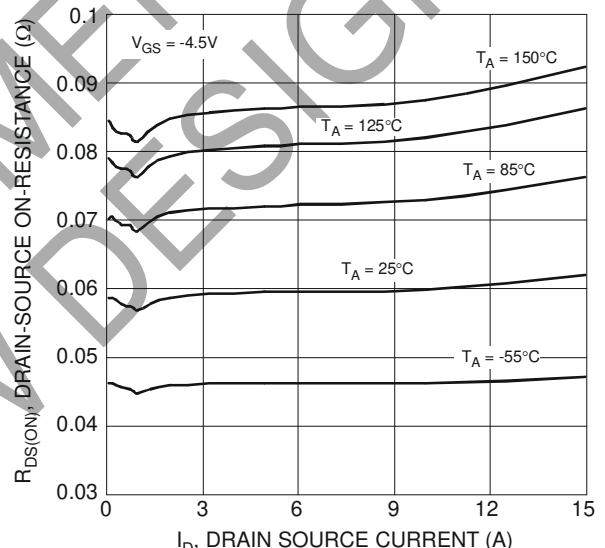


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

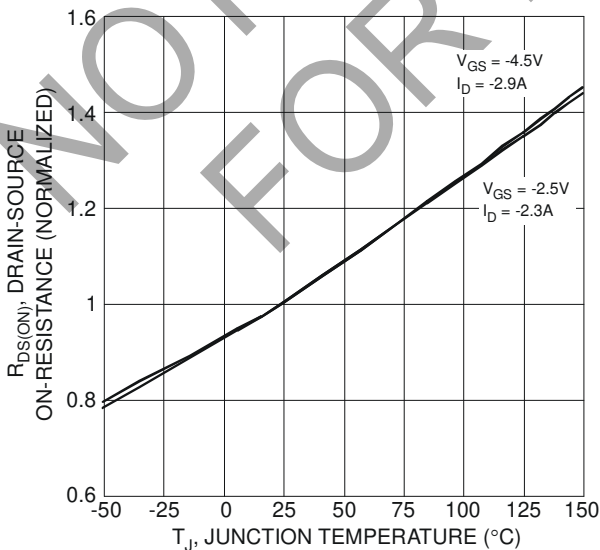


Figure 5 On-Resistance Variation with Temperature

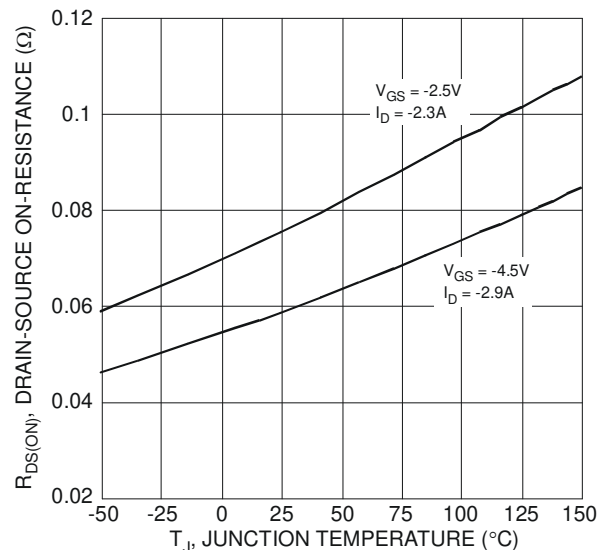


Figure 6 On-Resistance Variation with Temperature

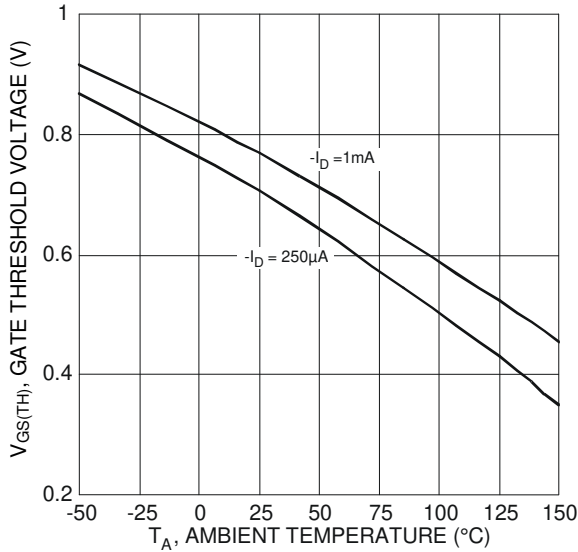


Figure 7 Gate Threshold Variation vs. Ambient Temperature

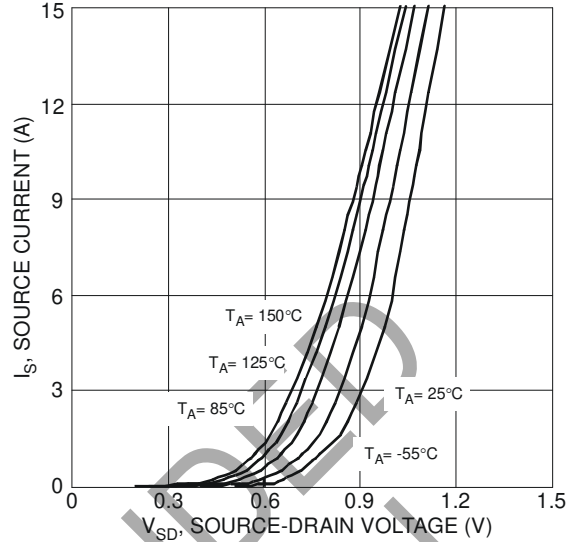


Figure 8 Diode Forward Voltage vs. Current

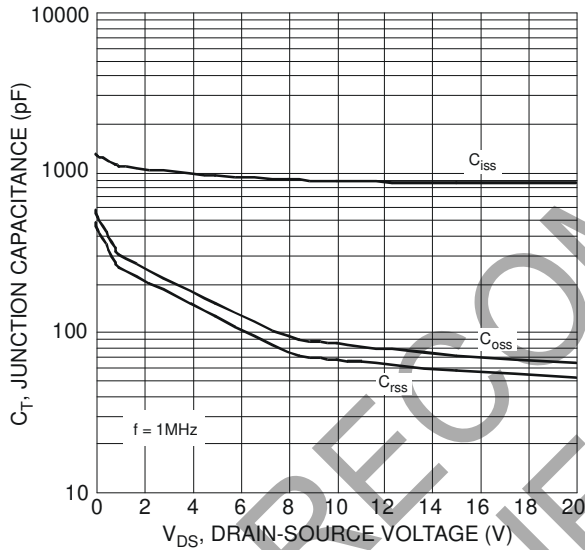


Figure 9 typical Junction Capacitance

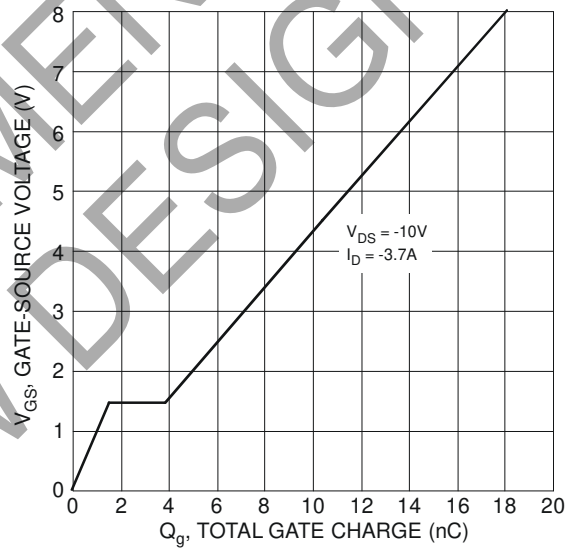


Figure 10 Gate-Charge Characteristics

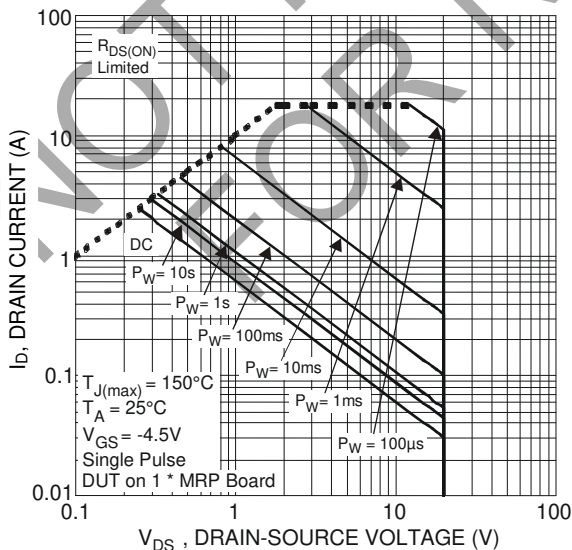
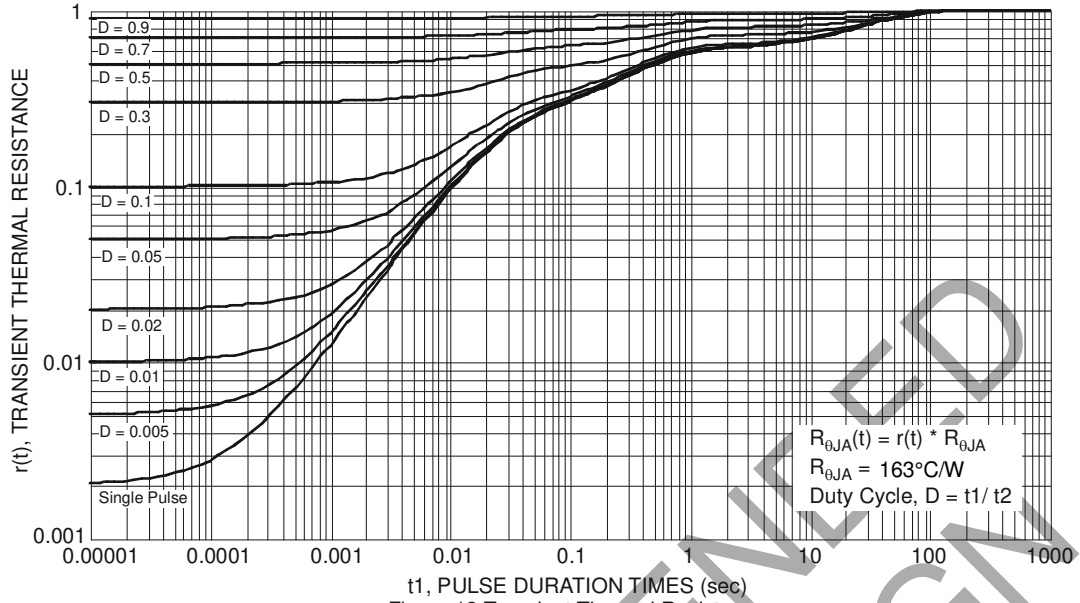


Figure 11 SOA, Safe Operation Area

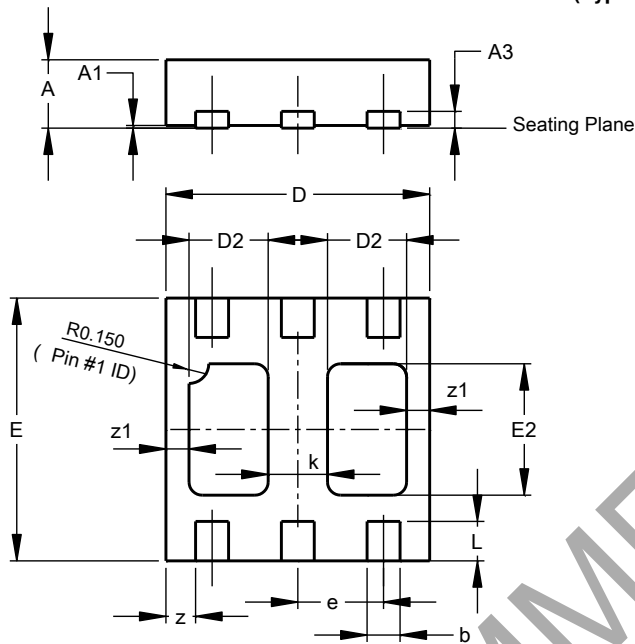


NOT RECOMMENDED FOR NEW DESIGN

Package Outline Dimensions

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

U-DFN2020-6 (Type B)

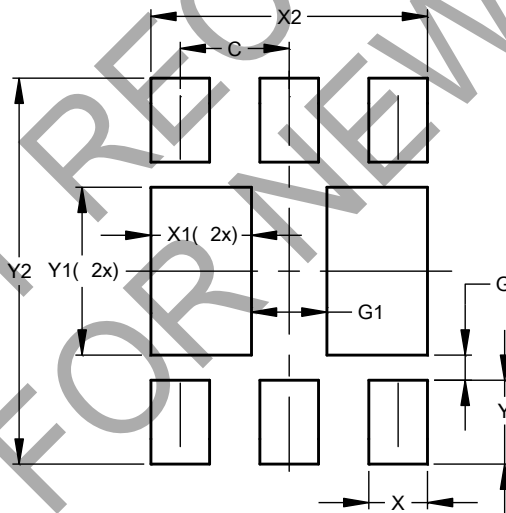


| U-DFN2020-6 (Type B) | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.545 | 0.605 | 0.575 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.13 |
| b | 0.20 | 0.30 | 0.25 |
| D | 1.95 | 2.075 | 2.00 |
| D2 | 0.50 | 0.70 | 0.60 |
| e | - | - | 0.65 |
| E | 1.95 | 2.075 | 2.00 |
| E2 | 0.90 | 1.10 | 1.00 |
| k | - | - | 0.45 |
| L | 0.25 | 0.35 | 0.30 |
| z | - | - | 0.225 |
| z1 | - | - | 0.175 |
| All Dimensions in mm | | | |

Suggested Pad Layout

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

U-DFN2020-6 (Type B)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 0.150 |
| G1 | 0.450 |
| X | 0.350 |
| X1 | 0.600 |
| X2 | 1.650 |
| Y | 0.500 |
| Y1 | 1.000 |
| Y2 | 2.300 |

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