

**DUAL P-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> MAX T <sub>A</sub> = +25°C
-20V	90mΩ @ V <sub>GS</sub> = -4.5V	-3.2A
	137mΩ @ V <sub>GS</sub> = -2.5V	-2.6A

**Description**

This MOSFET is designed to minimize on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

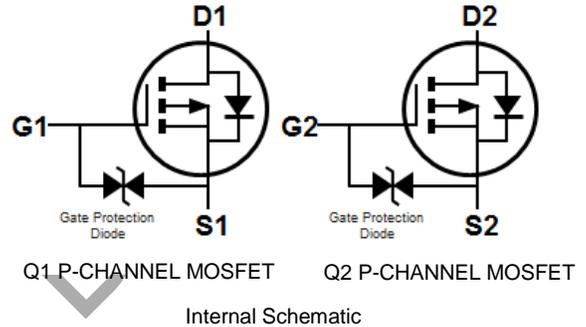
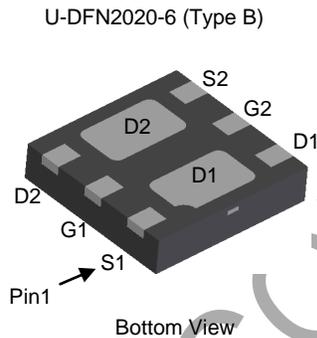
- Load Switch
- Power Management Functions
- Portable Power Adaptors

**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 <sup>e4</sup>
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)



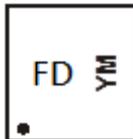
**Ordering Information** (Note 4)

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](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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-20	V
Gate-Source Voltage	V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	-3.2 -2.5	A
Maximum Continuous Body Diode Forward Current (Note 5)	I <sub>S</sub>	-1.5	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-18	A

### Thermal Characteristics

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

### Electrical Characteristics P-CHANNEL (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

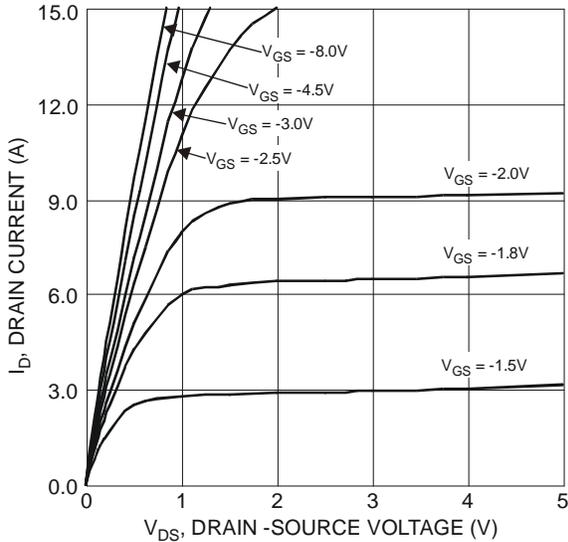


Figure 1 Typical Output Characteristics

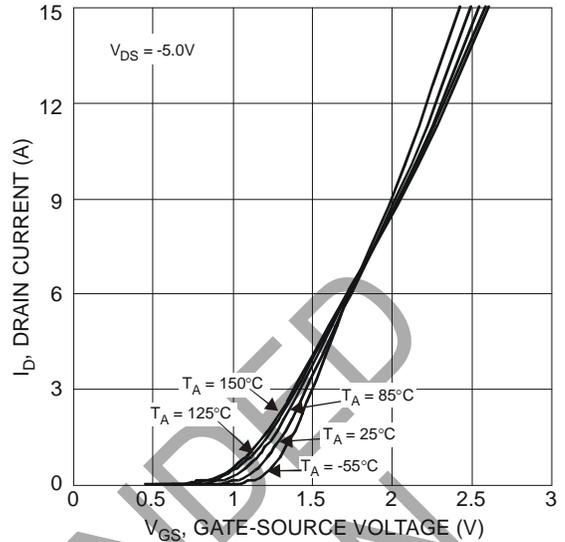


Figure 2 Typical Transfer Characteristics

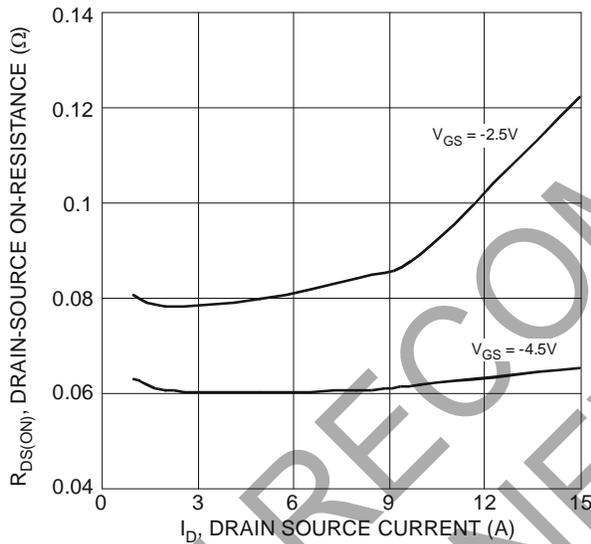


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

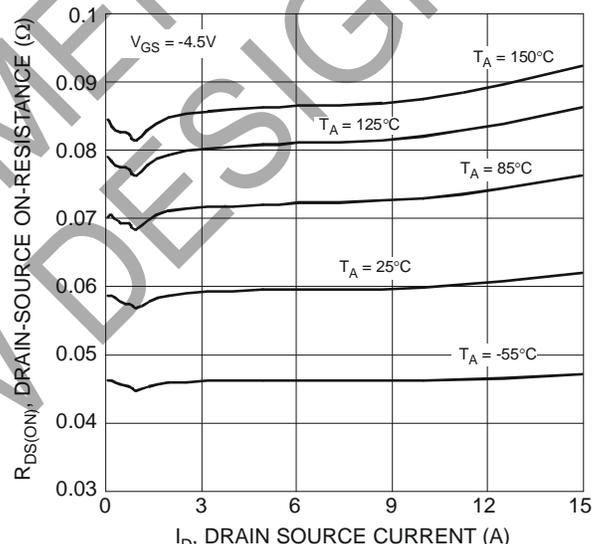


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

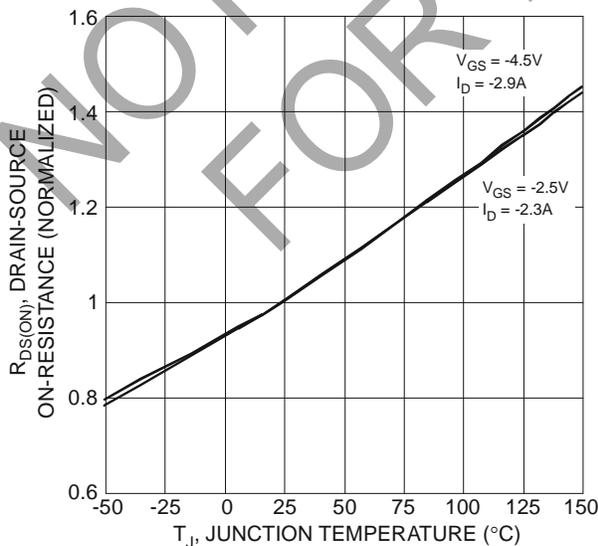


Figure 5 On-Resistance Variation with Temperature

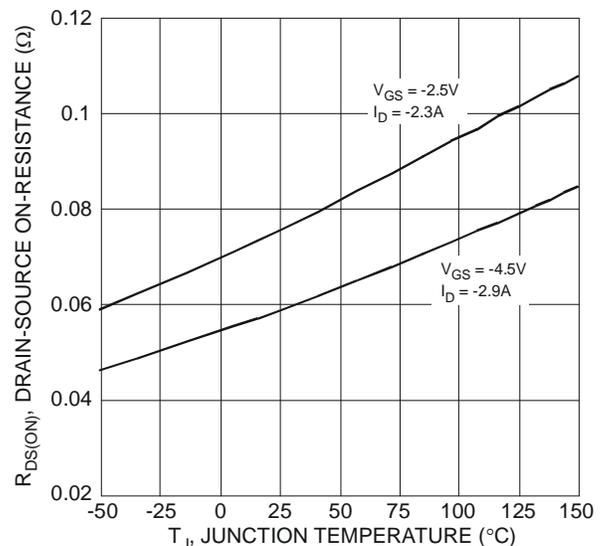


Figure 6 On-Resistance Variation with Temperature

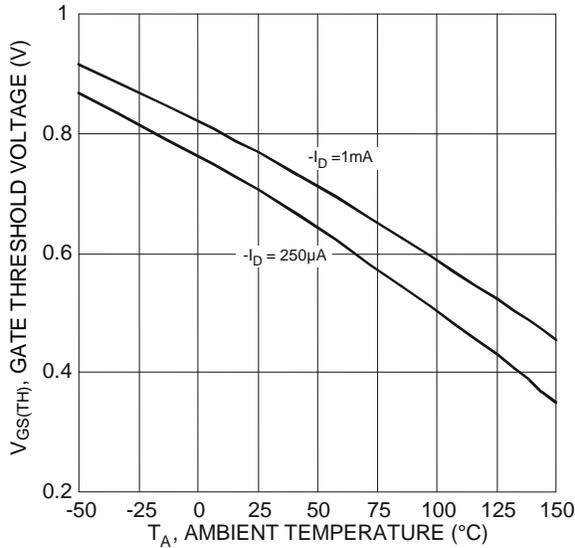


Figure 7 Gate Threshold Variation vs. Ambient Temperature

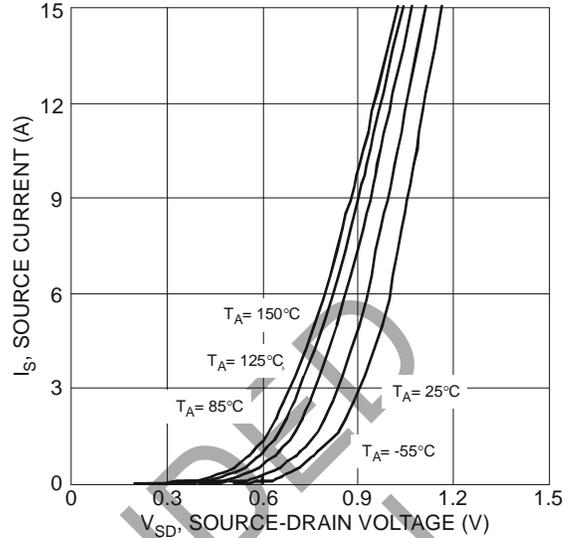


Figure 8 Diode Forward Voltage vs. Current

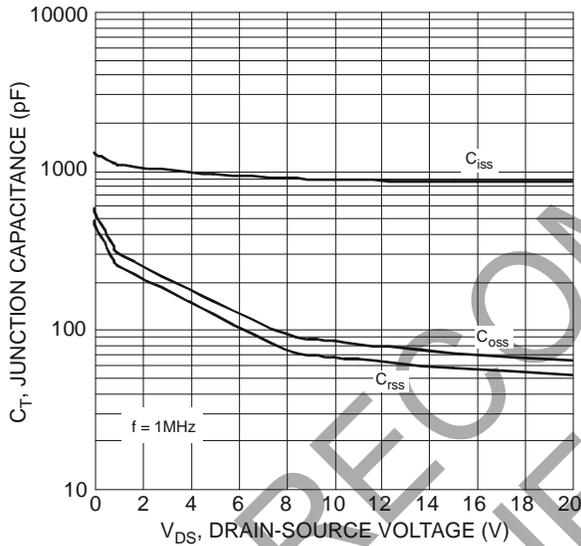


Figure 9 typical Junction Capacitance

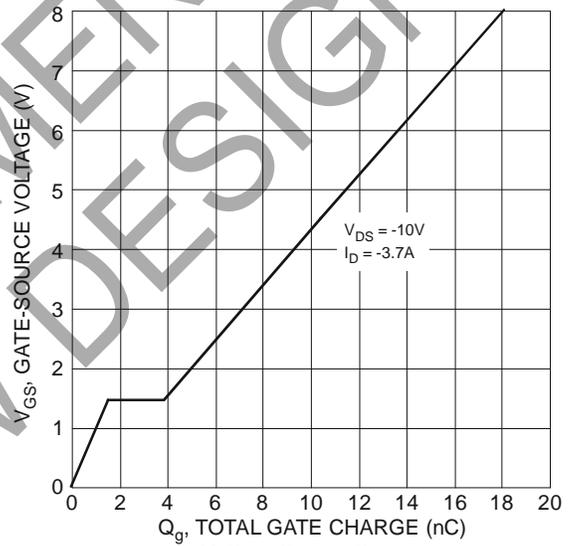


Figure 10 Gate-Charge Characteristics

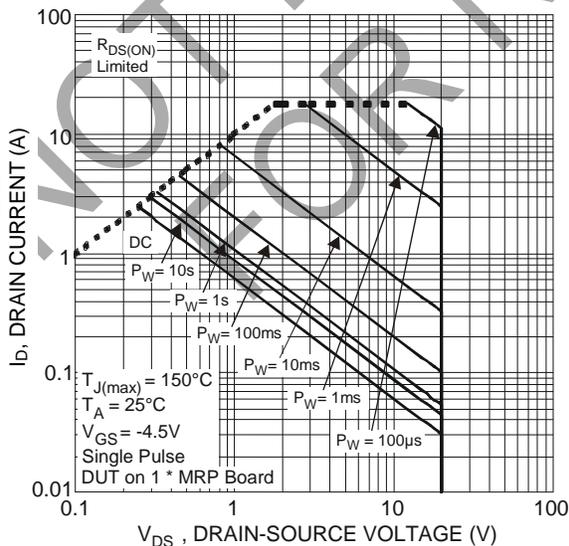
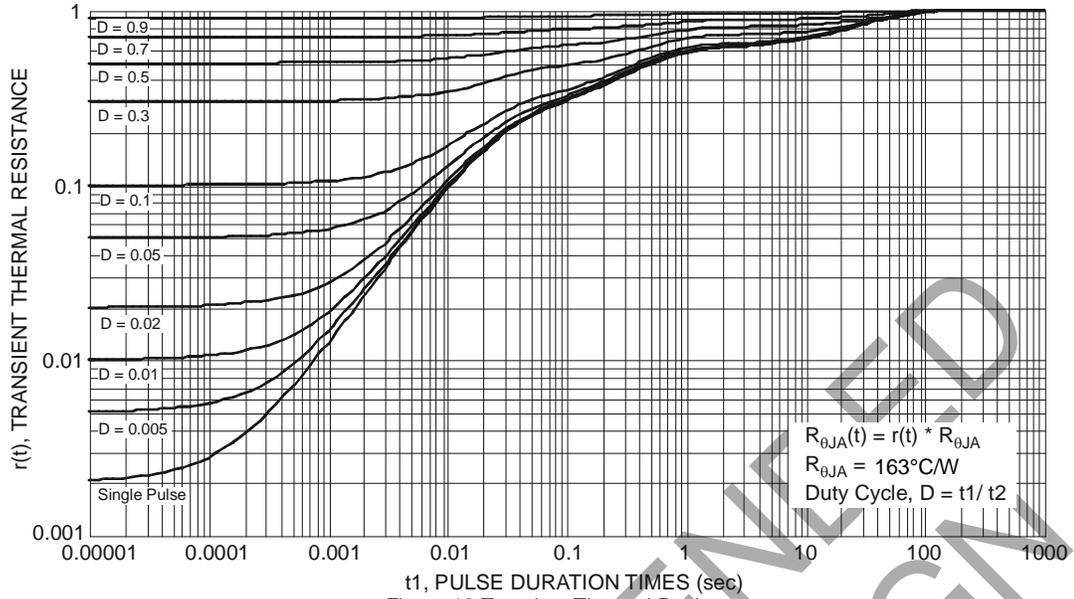


Figure 11 SOA, Safe Operation Area

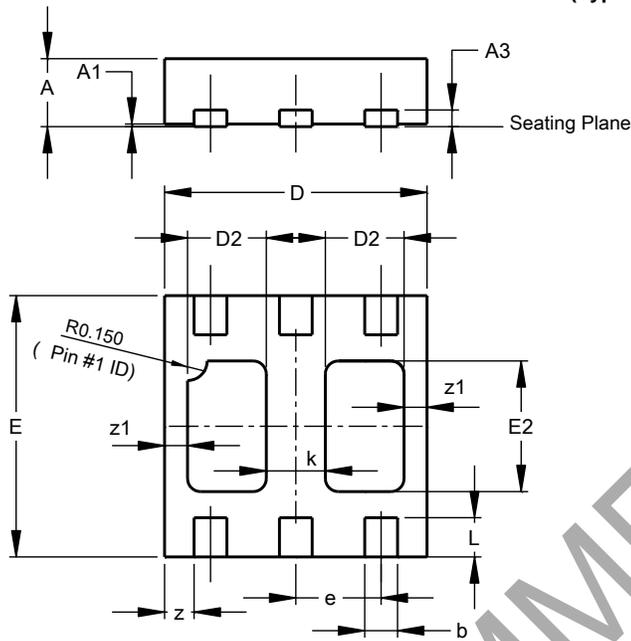


NOT RECOMMENDED FOR NEW DESIGN

**Package Outline Dimensions**

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

**U-DFN2020-6 (Type B)**

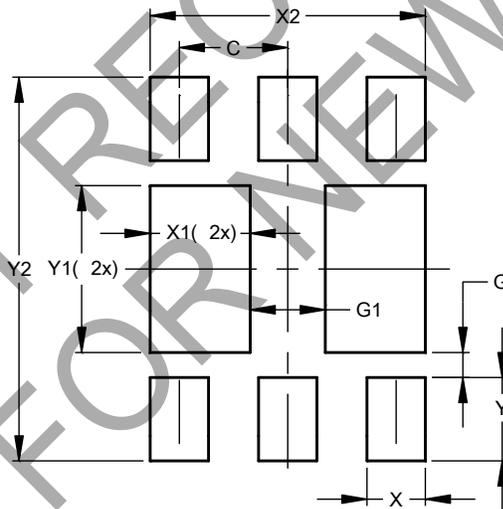


U-DFN2020-6 (Type B)			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

**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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