

**DUAL N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

Device	V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> MAX T <sub>A</sub> = +25°C
N-Channel	20V	40mΩ @ V <sub>GS</sub> = 4.5V	4.7A
		65mΩ @ V <sub>GS</sub> = 2.5V	3.7A

**Description**

This 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**

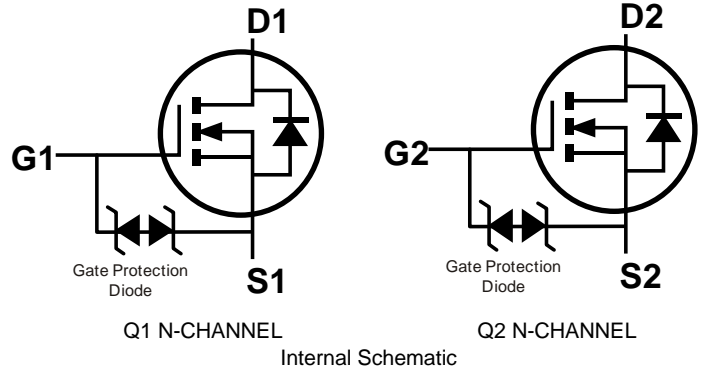
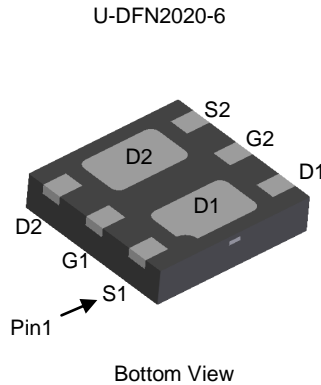
- Load Switch
- Power Management Functions
- Portable Power Adaptors

**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
- 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)
- Terminal Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)



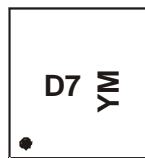
**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2041UFDB -7	U-DFN2020-6	3,000/Tape & Reel
DMN2041UFDB -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](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**

U-DFN2020-6



D7 = 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
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	Units	
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	Steady State	I <sub>D</sub>	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	4.7 3.8	A
	t < 5s		T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	6.1 4.9	A
Maximum Continuous Body Diode Forward Current (Note 5)		I <sub>S</sub>	2	A	
Pulsed Drain Current (10μs pulse, duty cycle = 1%)		I <sub>DM</sub>	20	A	

**Thermal Characteristics**

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

**Electrical Characteristics Q1 N-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>	—	23	40	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.2A
		—	26	65		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.3A
Diode Forward Voltage	V <sub>SD</sub>	—	0.75	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 4.4A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	713	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	80	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	68	—	pF	
Gate Resistance	R <sub>g</sub>	—	15	—	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>	—	8	—	nC	V <sub>DS</sub> = 10V, I <sub>D</sub> = 5.5A
Total Gate Charge (V <sub>GS</sub> = 8V)		—	15	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	1.0	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.1	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	3.6	—	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 2.3Ω, R <sub>G</sub> = 1Ω
Turn-On Rise Time	t <sub>r</sub>	—	15.9	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	16.0	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	2.6	—	ns	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	6.6	—	nS	I <sub>S</sub> = 4.4A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	1.2	—	nC	I <sub>S</sub> = 4.4A, dI/dt = 100A/μs

- Notes:
- Device mounted 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.

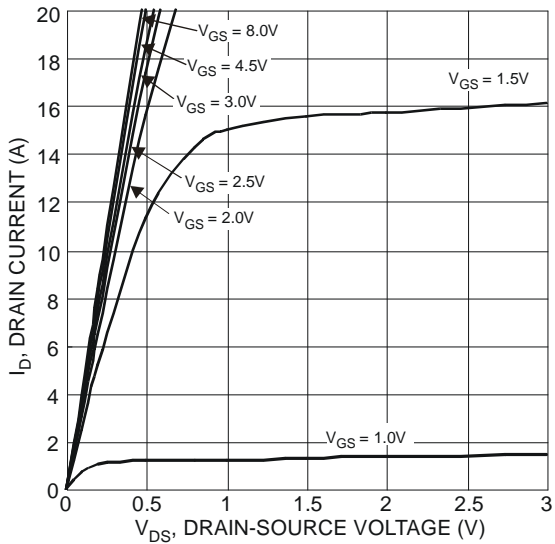


Figure 1 Typical Output Characteristics

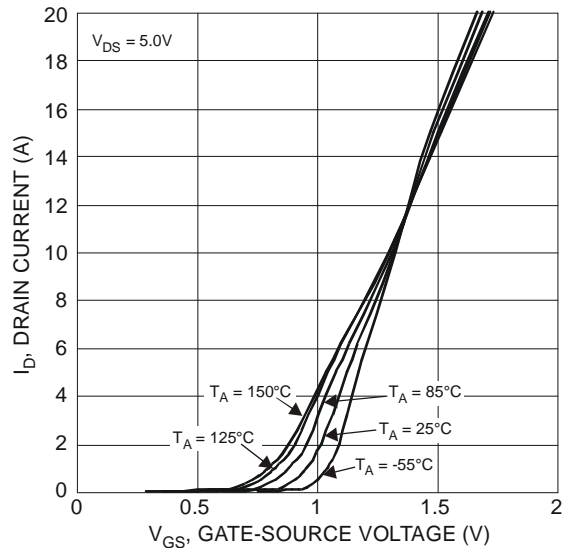


Figure 2 Typical Transfer Characteristics

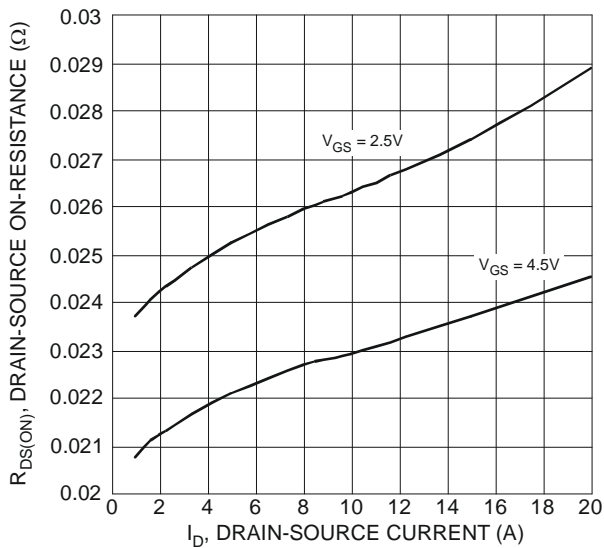


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

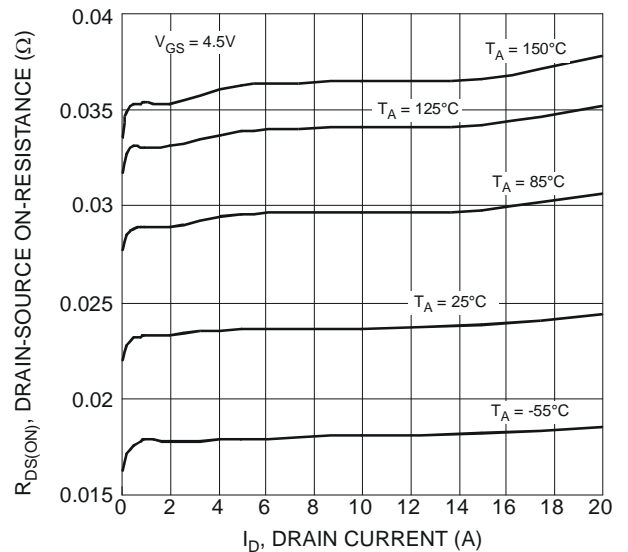


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

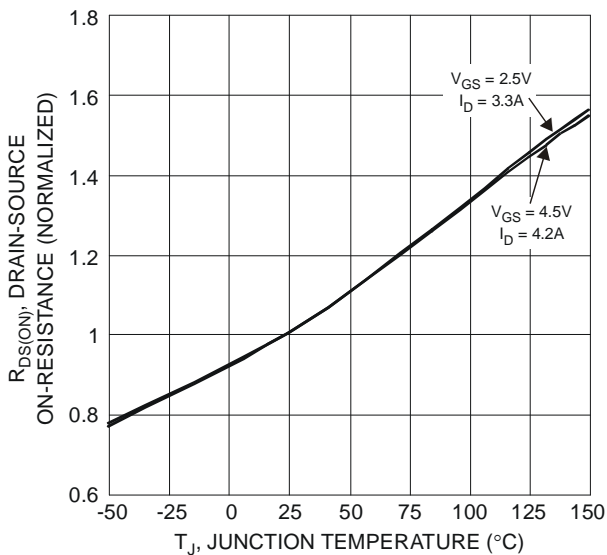


Figure 5 On-Resistance Variation with Temperature

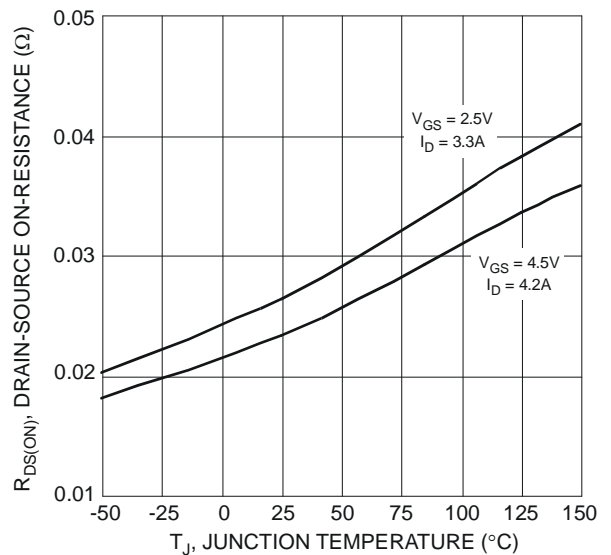


Figure 6 On-Resistance Variation with Temperature

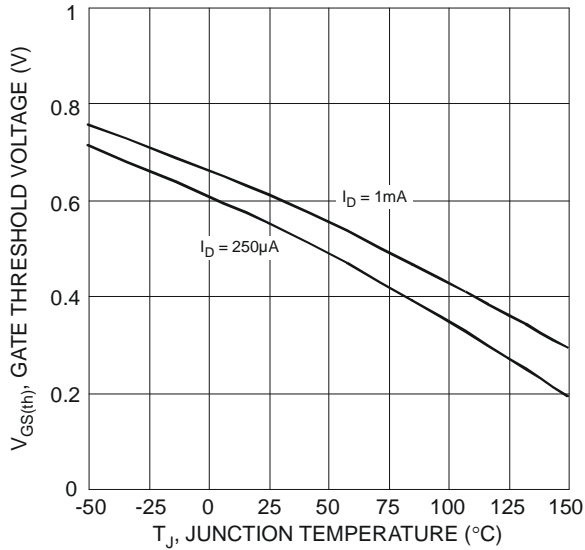


Figure 7 Gate Threshold Variation vs. Ambient Temperature

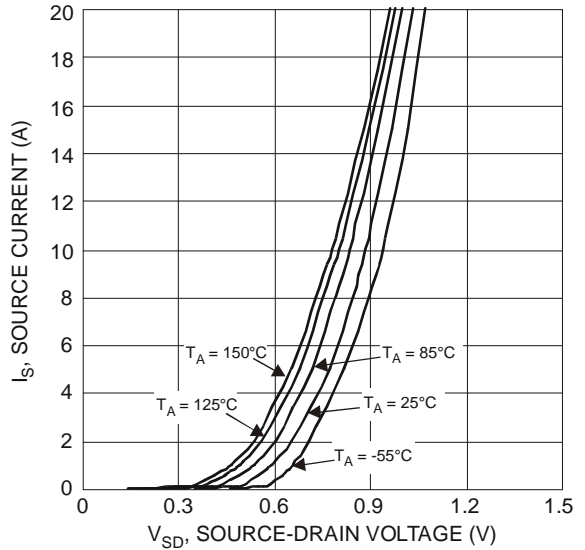


Figure 8 Diode Forward Voltage vs. Current

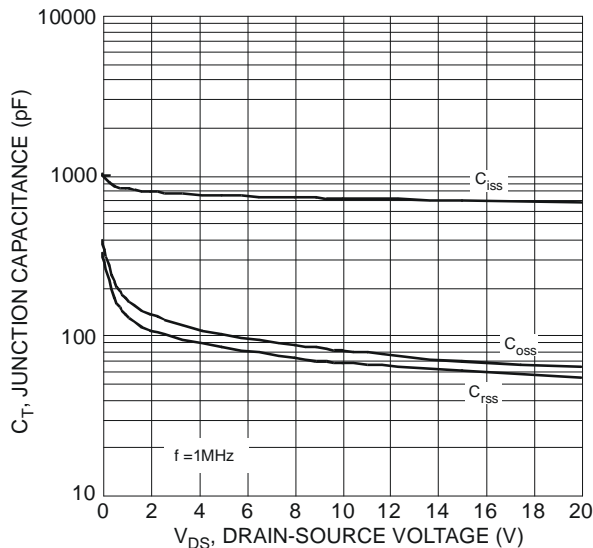


Figure 9 Typical Junction Capacitance

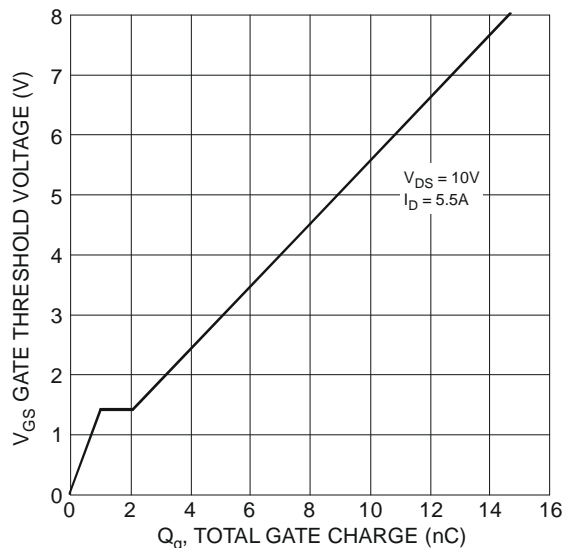


Figure 10 Gate Charge

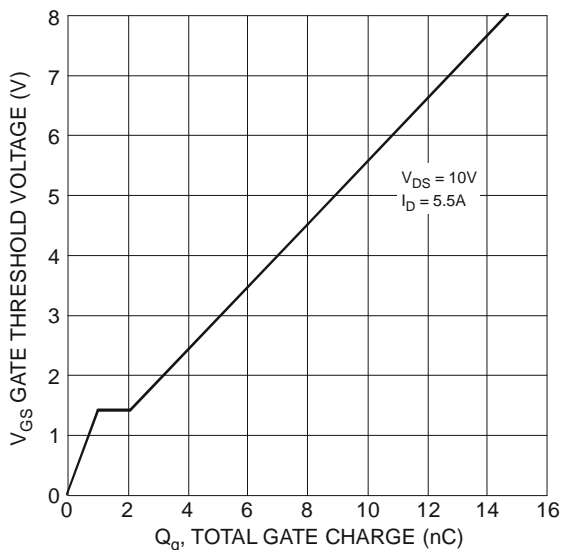


Figure 11 Gate Charge

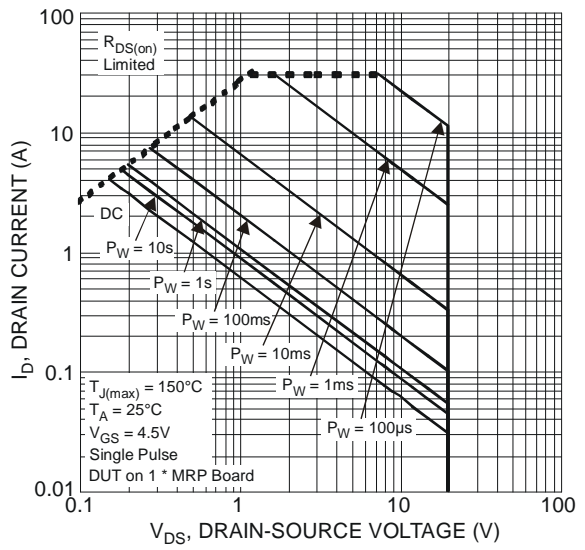
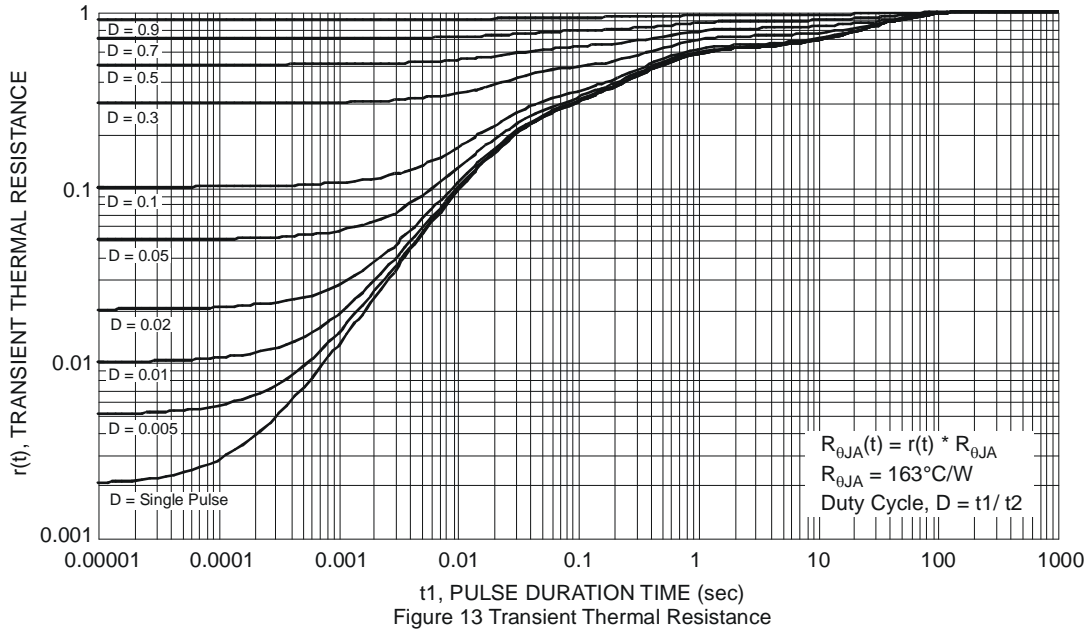
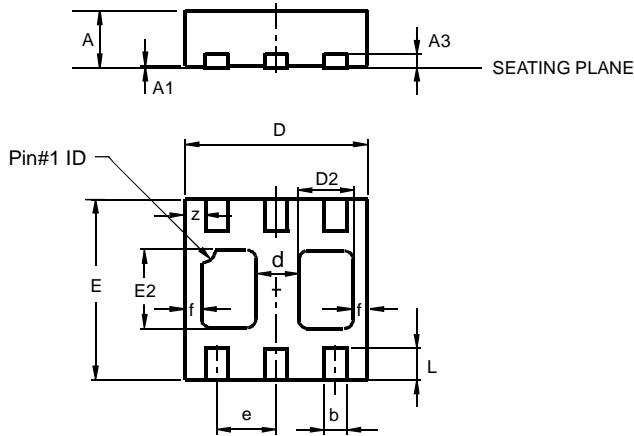


Figure 12 SOA, Safe Operation Area



**Package Outline Dimensions**

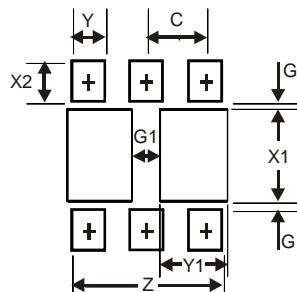
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
d	—	—	0.45
D2	0.50	0.70	0.60
e	—	—	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
f	—	—	0.15
L	0.25	0.35	0.30
z	—	—	0.225
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

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



Dimensions	Value (in mm)
Z	1.67
G	0.20
G1	0.40
X1	1.0
X2	0.45
Y	0.37
Y1	0.70
C	0.65

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.