

## DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

### Product Summary

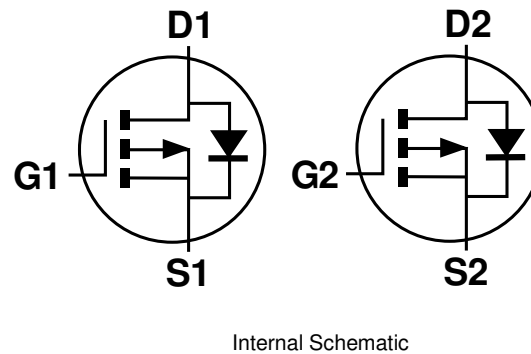
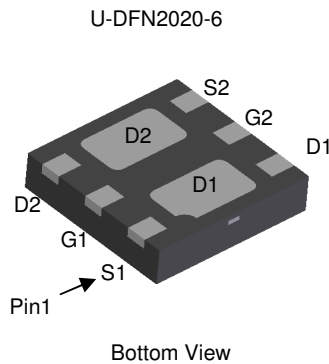
Device	$V_{(BR)DSS}$	$R_{DS(ON) max}$	$I_D MAX$ $T_A = +25^\circ C$
P-Channel	-12V	61m $\Omega$ @ $V_{GS} = -4.5V$	-3.8A
		81m $\Omega$ @ $V_{GS} = -2.5V$	-3.3A
		115m $\Omega$ @ $V_{GS} = -1.8V$	-2.8A

### Description

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.

### Applications

- Load Switch
- Power Management Functions
- Portable Power Adaptors



### Features

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

### Mechanical Data

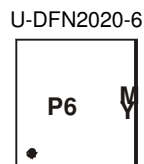
- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @4
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)

### Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1046UFDB -7	U-DFN2020-6	3,000/Tape & Reel
DMP1046UFDB -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> 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>.

### Marking Information



P6 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

#### Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021
Code	C	D	E	F	G	H	I

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>	-12	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-3.8 -3.0	A
	t < 5s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-5.0 -4.0	A
Maximum Continuous Body Diode Forward Current (Note 5)			I <sub>S</sub>	-1	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I <sub>DM</sub>	-15	A
Avalanche Current (L = 0.1mH)			I <sub>AS</sub>	-12	A
Avalanche Energy (L = 0.1mH)			E <sub>AS</sub>	8	mJ

**Thermal Characteristics**

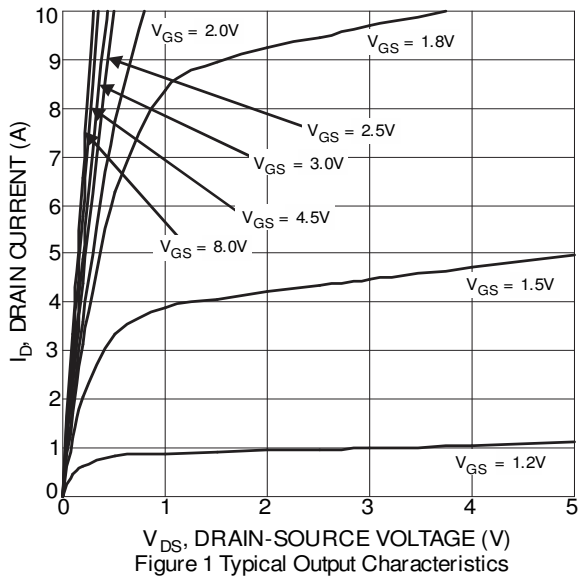
Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	Steady State	P <sub>D</sub>	1.4	W
	t < 5s		2.2	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	92	°C/W
	t < 5s		55	
Thermal Resistance, Junction to Case (Note 5)		R <sub>θJC</sub>	20	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

Notes: 5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.

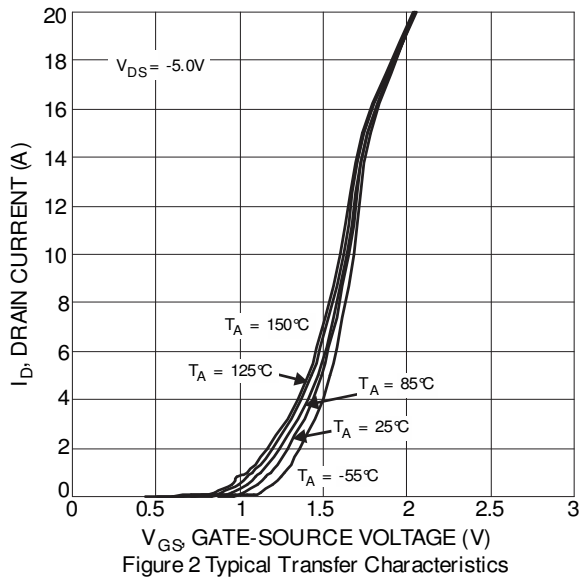
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-12	-	-	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> = -12V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4	-	-1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	37	61	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.6A
		-	47	81		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.2A
		-	63	115		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1.0A
Diode Forward Voltage	V <sub>SD</sub>	-	-0.65	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -4.5A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	-	915	-	pF	V <sub>DS</sub> = -6V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	225	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	183	-	pF	
Gate Resistance	R <sub>g</sub>	-	56.9	-	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>	-	10.7	-	nC	V <sub>DS</sub> = -6V, I <sub>D</sub> = -4.3A
Total Gate Charge (V <sub>GS</sub> = -8V)		-	17.9	-	nC	
Gate-Source Charge	Q <sub>gs</sub>	-	1.7	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	3.0	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	5.7	-	ns	
Turn-On Rise Time	t <sub>r</sub>	-	11.5	-	ns	V <sub>DD</sub> = -6V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 1.6Ω, R <sub>G</sub> = 1Ω
Turn-Off Delay Time	t <sub>D(off)</sub>	-	27.8	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	26.4	-	ns	

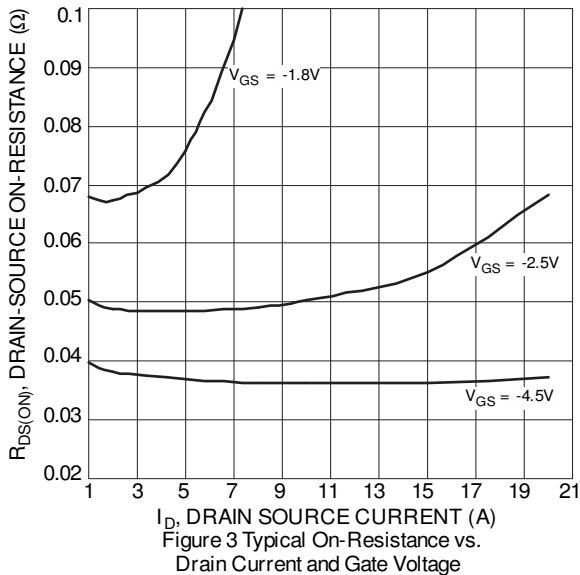
Notes: 6. Short duration pulse test used to minimize self-heating effect.  
7. Guaranteed by design. Not subject to product testing.



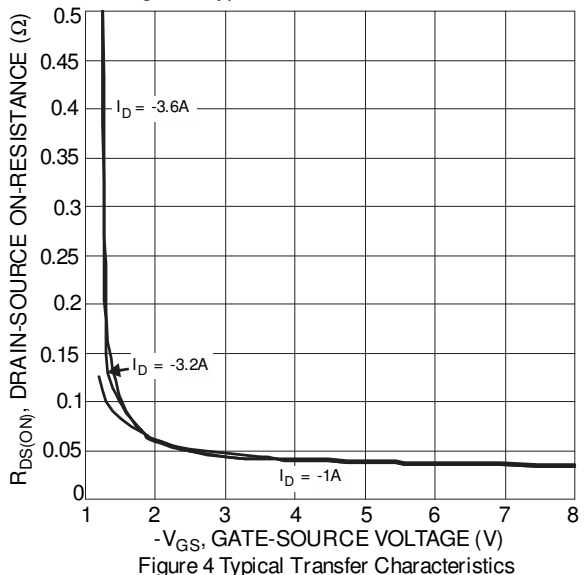
$V_{DS}$ , DRAIN-SOURCE VOLTAGE (V)  
Figure 1 Typical Output Characteristics



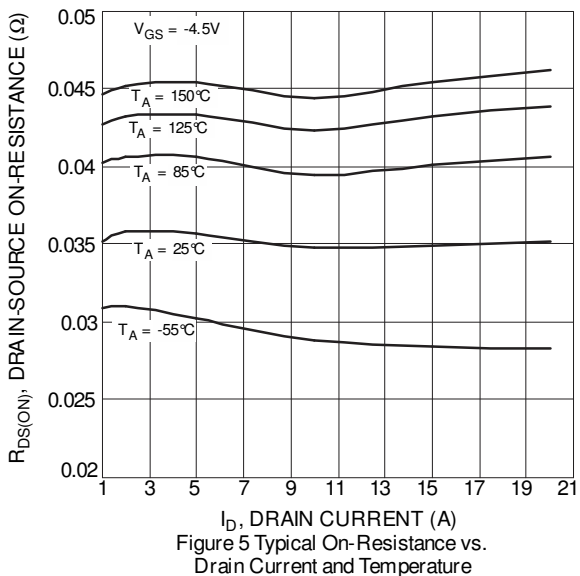
$V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 2 Typical Transfer Characteristics



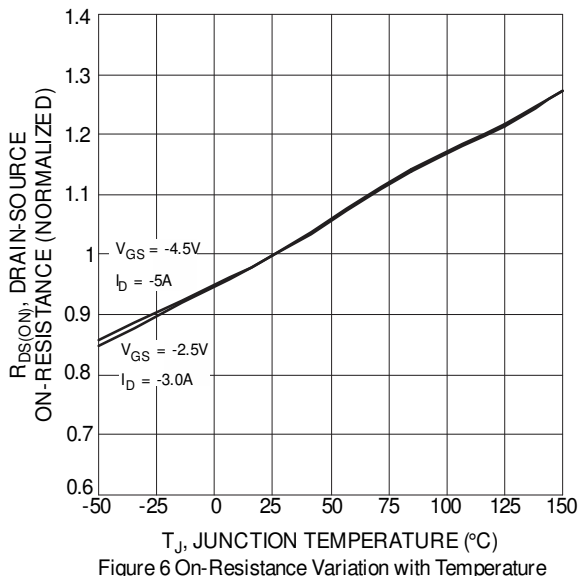
$I_D$ , DRAIN SOURCE CURRENT (A)  
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage



$-V_{GS}$ , GATE-SOURCE VOLTAGE (V)  
Figure 4 Typical Transfer Characteristics



$I_D$ , DRAIN CURRENT (A)  
Figure 5 Typical On-Resistance vs. Drain Current and Temperature



$T_J$ , JUNCTION TEMPERATURE ( $^{\circ}C$ )  
Figure 6 On-Resistance Variation with Temperature

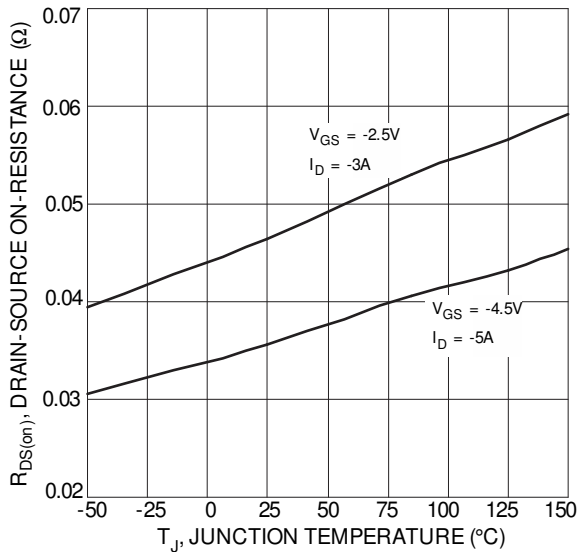


Figure 7 On-Resistance Variation with Temperature

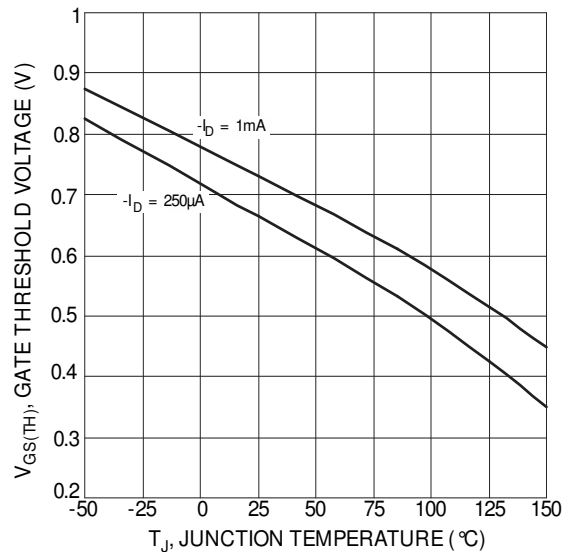


Figure 8 Gate Threshold Variation vs. Ambient Temperature

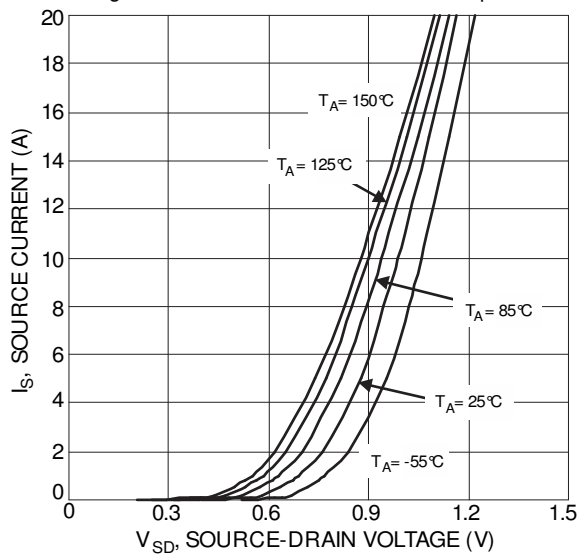


Figure 9 Diode Forward Voltage vs. Current

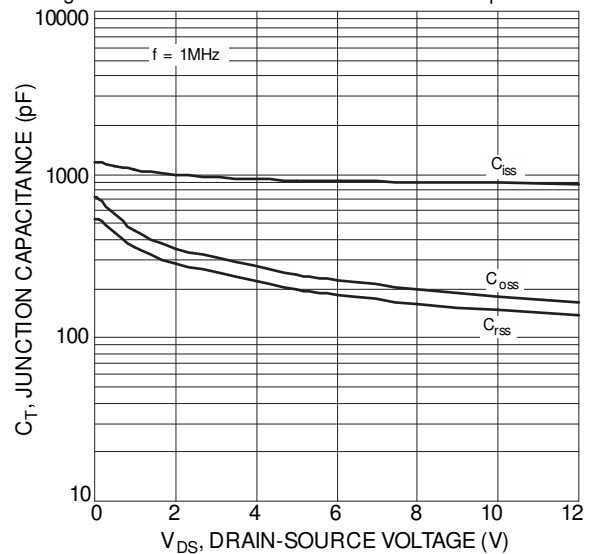


Figure 10 Typical Junction Capacitance

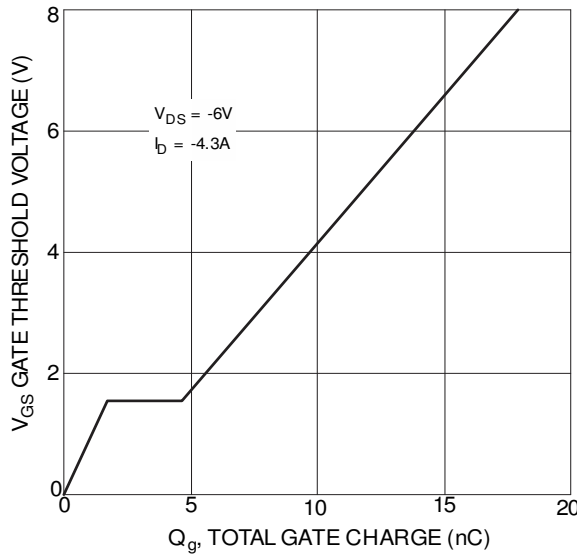


Figure 11 Gate Charge

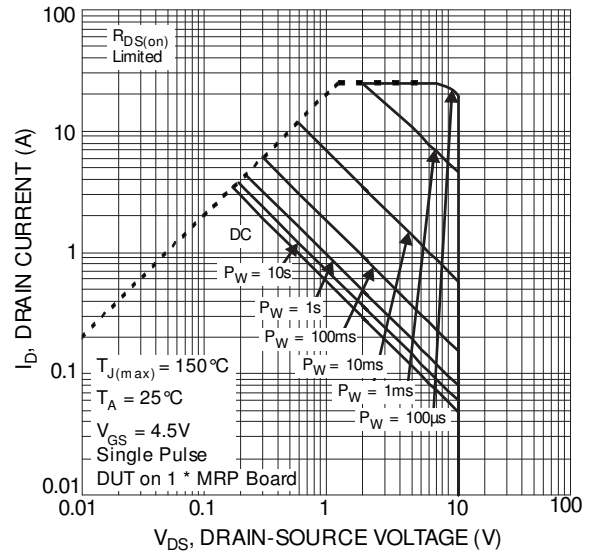


Figure 12 SOA, Safe Operation Area

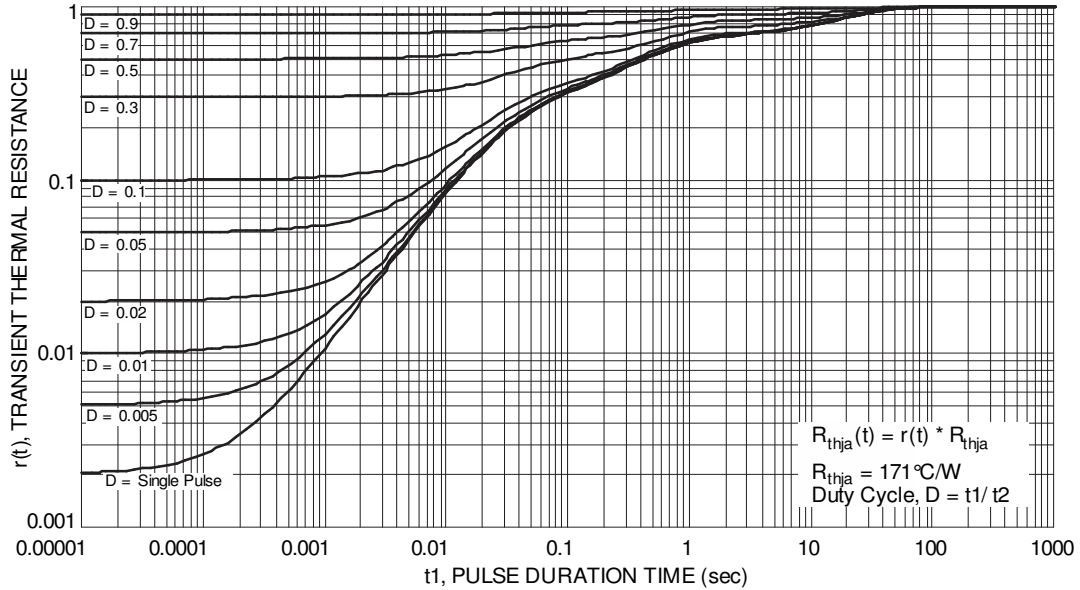
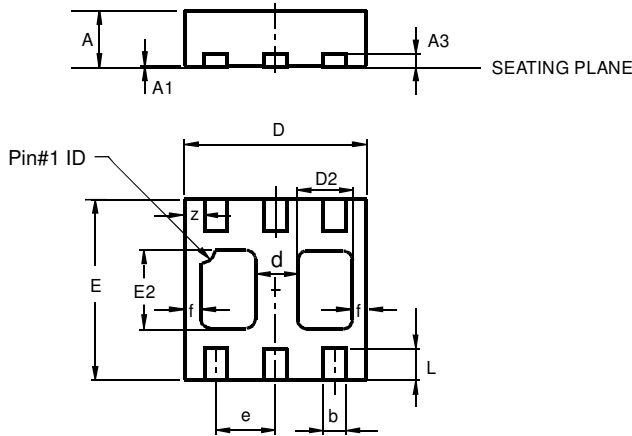


Figure 13 Transient Thermal Resistance

**Package Outline Dimensions**

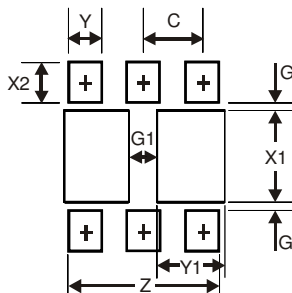
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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
All Dimensions in mm			

**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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