

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
20V	45mΩ @ V <sub>GS</sub> = 4.5V	4.5A
	55mΩ @ V <sub>GS</sub> = 2.5V	4.1A

## Description

This MOSFET has been 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

- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

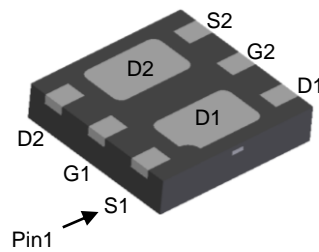
## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

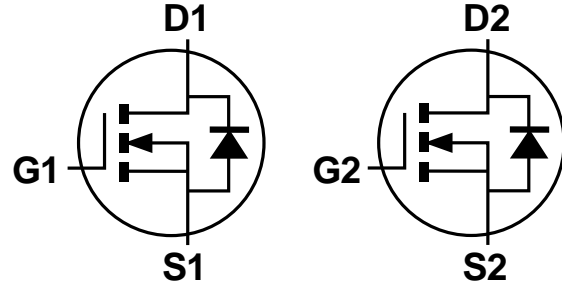
## Mechanical Data

- 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
- Weight: 0.0065 grams (Approximate)

U-DFN2020-6 (Type B)



Bottom View



Internal Schematic

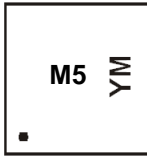
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2050LFDB -7	U-DFN2020-6 (Type B)	3,000/Tape & Reel
DMN2050LFDB -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) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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**

Site 1



M5 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: H = 2020)  
 M = Month (ex: 9 = September)

Date Code Key

<b>Year</b>	2013	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
<b>Code</b>	A	...	H	I	J	K	L	M	N	O	P	R
<b>Month</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Code</b>	1	2	3	4	5	6	7	8	9	O	N	D

Site 2



M5 = Product Type Marking Code  
 YWX = Date Code Marking  
 Y = Year (ex: 0 = 2020)  
 W = Week (ex: a = week 27; z represents week 52 and 53)  
 X = Internal Code (ex: U = Monday)

Date Code Key

<b>Year</b>	2013	...	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
<b>Code</b>	3	...	0	1	2	3	4	5	6	7	8	9
<b>Week</b>	1-26				27-52				53			
<b>Code</b>	A-Z				a-z				z			
<b>Internal Code</b>	Sun	Mon	Tue	Wed	Thu	Fri	Sat					
<b>Code</b>	T	U	V	W	X	Y	Z					

**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	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	3.3	A
		T <sub>A</sub> = +70°C		2.6	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	4.5	A
		T <sub>A</sub> = +70°C		3.6	
Maximum Continuous Body Diode Forward Current (Note 6)			I <sub>S</sub>	1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	25	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	9	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	4.5	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.73	W
	T <sub>A</sub> = +70°C		0.46	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	173	°C/W
	t < 10s		110	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.42	W
	T <sub>A</sub> = +70°C		0.90	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	89	°C/W
	t < 10s		57	
Thermal Resistance, Junction to Case (Note 6)		R <sub>θJC</sub>	18	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</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> = 16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	—	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	28	45	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.0A
		—	36	55		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4.2A
Forward Transfer Admittance	Y <sub>fs</sub>	—	9	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.75	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	389	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	72	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	63	—	pF	
Gate Resistance	R <sub>g</sub>	—	2.1	—	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>	—	5.7	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 5.8A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	12	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	0.7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.5	—	nC	
Turn-On Delay Time	t <sub>d(ON)</sub>	—	5	—	ns	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>G</sub> = 6Ω, I <sub>DS</sub> = 1A
Turn-On Rise Time	t <sub>R</sub>	—	8	—	ns	
Turn-Off Delay Time	t <sub>d(OFF)</sub>	—	25	—	ns	
Turn-Off Fall Time	t <sub>F</sub>	—	8	—	ns	
Reverse Recovery Time	t <sub>RR</sub>	—	8.5	—	ns	I <sub>F</sub> = 5A, di/dt = 100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	2.1	—	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<sub>AS</sub> and E<sub>AS</sub> ratings are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

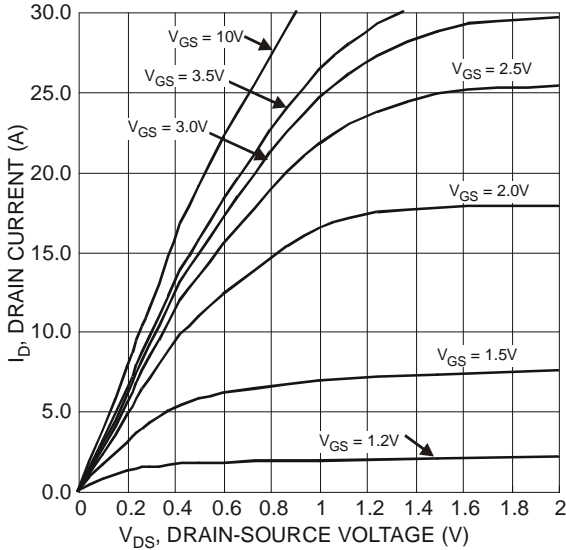


Figure 1 Typical Output Characteristics

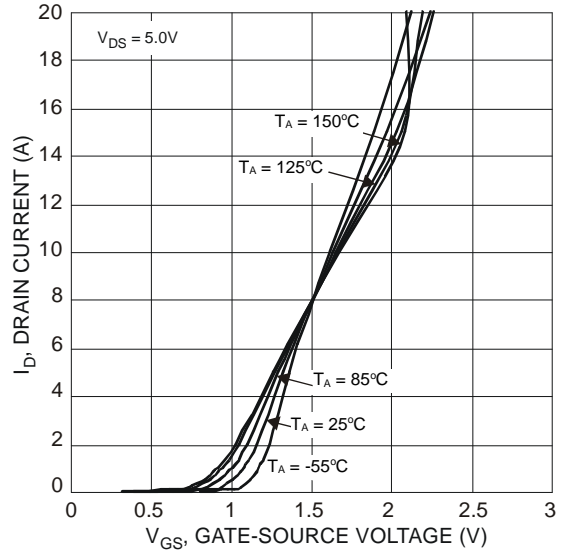


Figure 2 Typical Transfer Characteristics

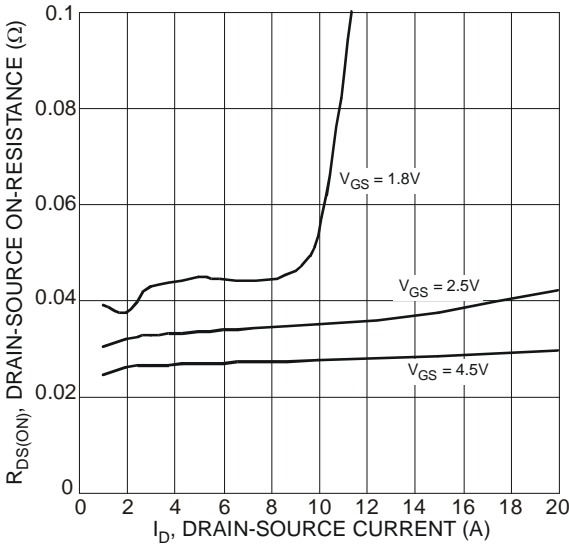


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

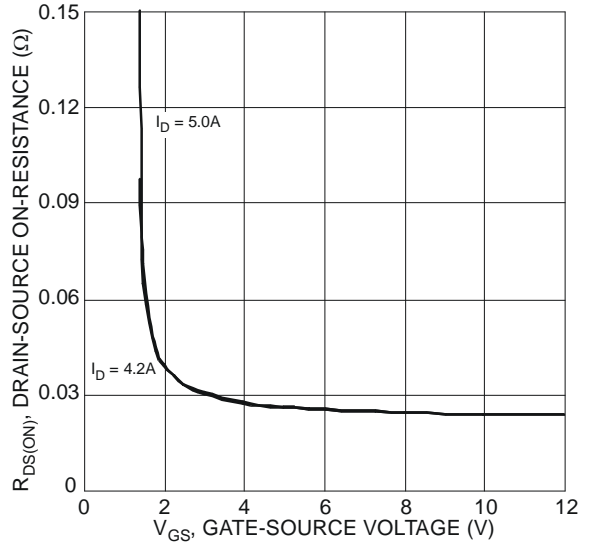


Figure 4 Typical Transfer Characteristics

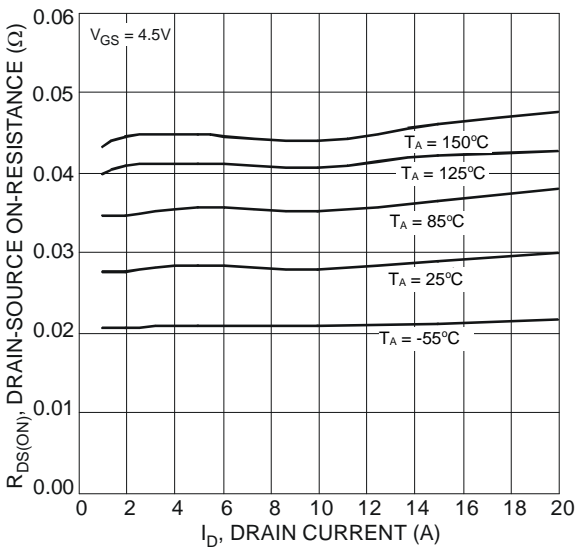


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

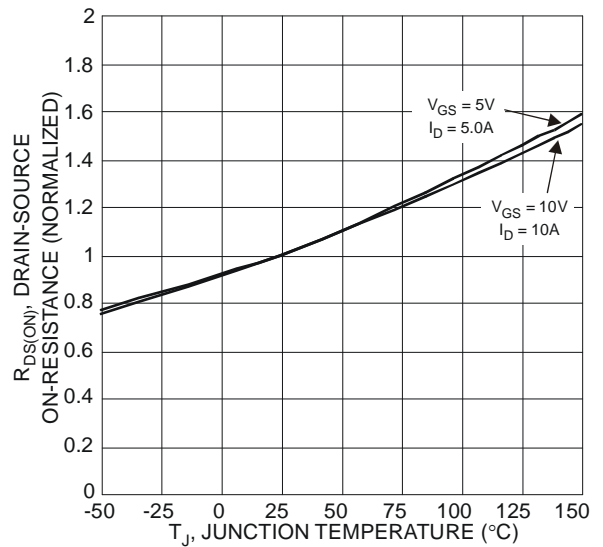


Figure 6 On-Resistance Variation with Temperature

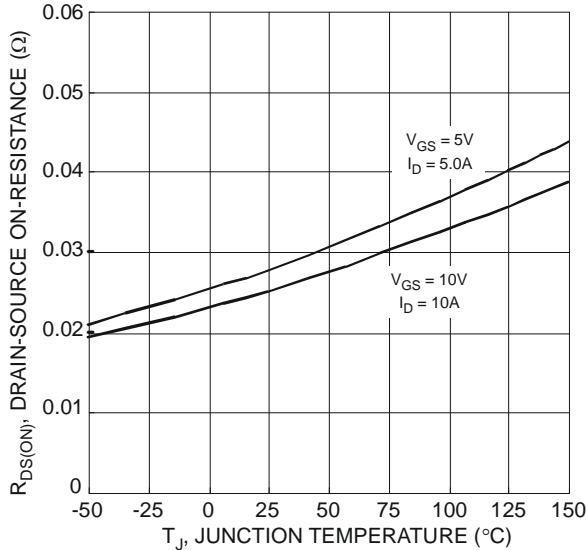


Figure 7 On-Resistance Variation with Temperature

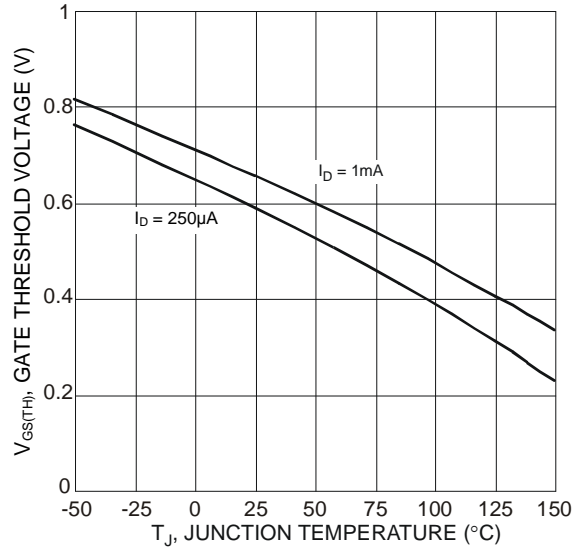


Figure 8 Gate Threshold Variation vs. Junction Temperature

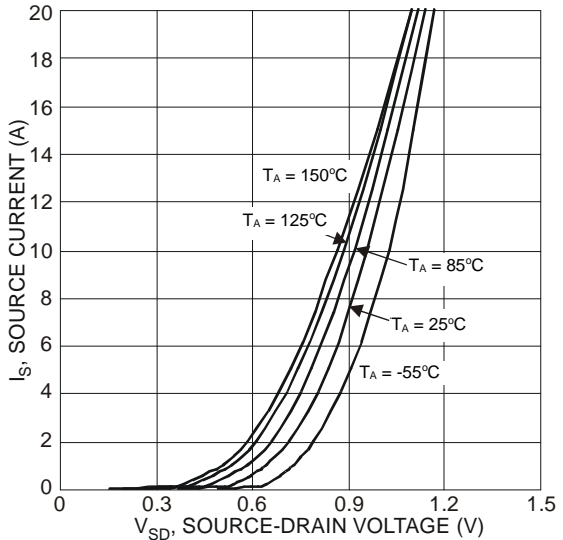


Figure 9 Diode Forward Voltage vs. Current

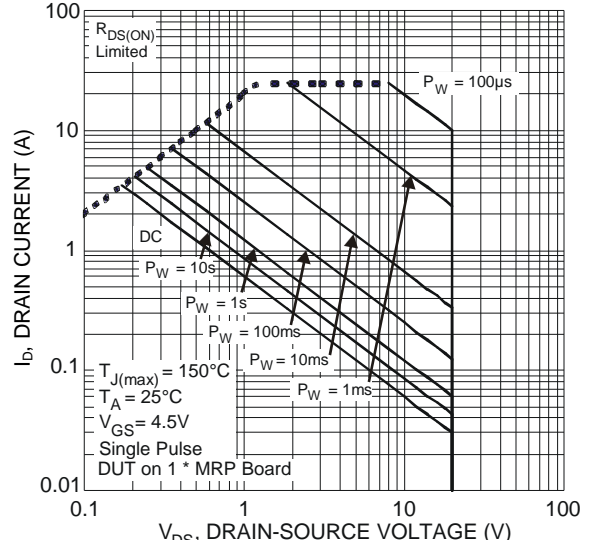


Figure 10 SOA, Safe Operation Area

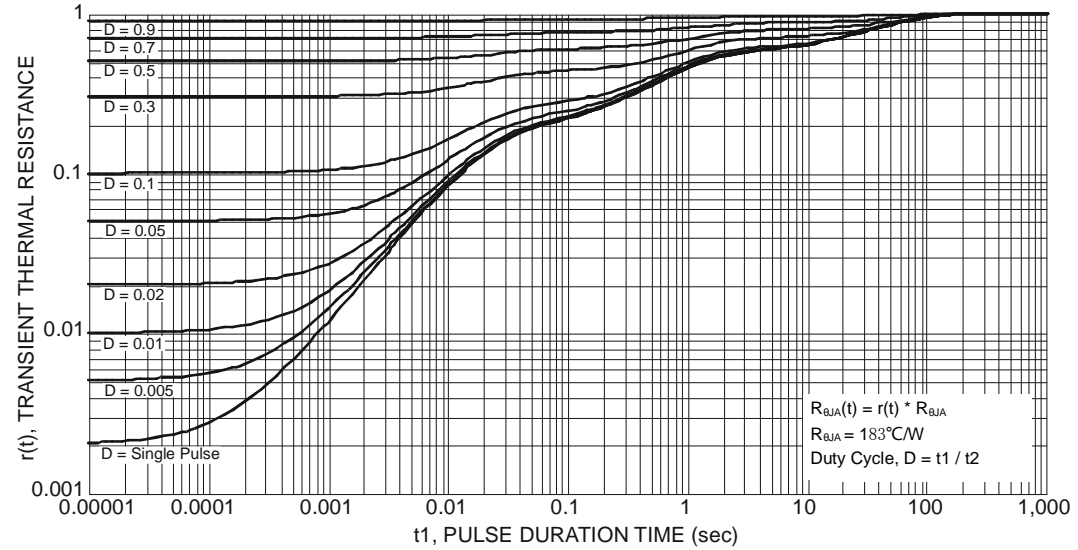
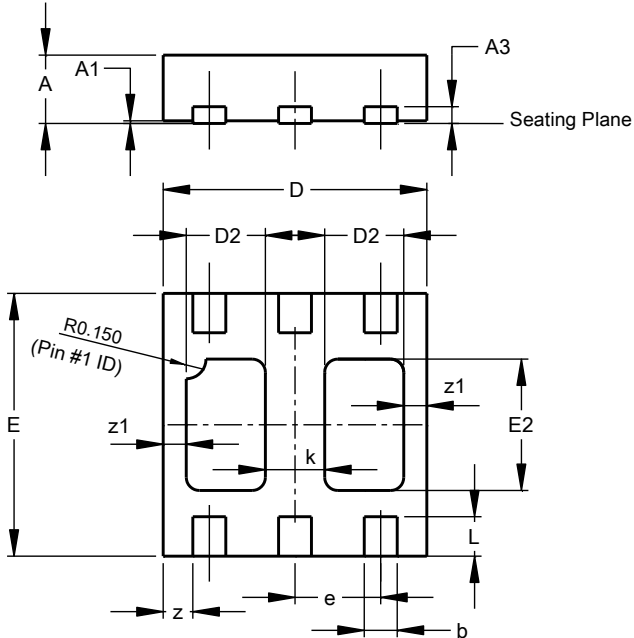


Figure 11 Transient Thermal Resistance

## Package Outline Dimensions

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

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

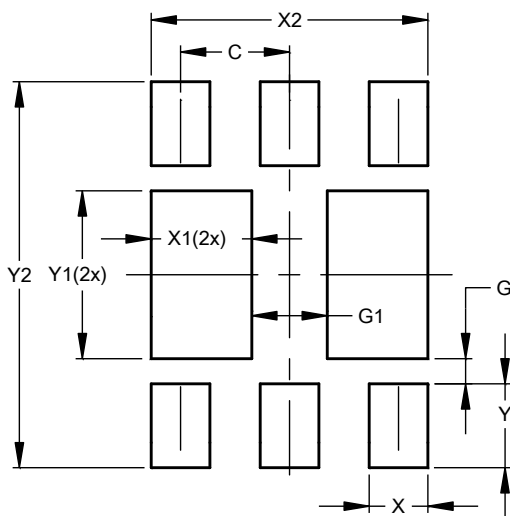


U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

## 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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