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## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
-20V	16mΩ @ V <sub>GS</sub> = -4.5V	-9.0A
	22mΩ @ V <sub>GS</sub> = -2.5V	-7.7A

## Description and Applications

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.

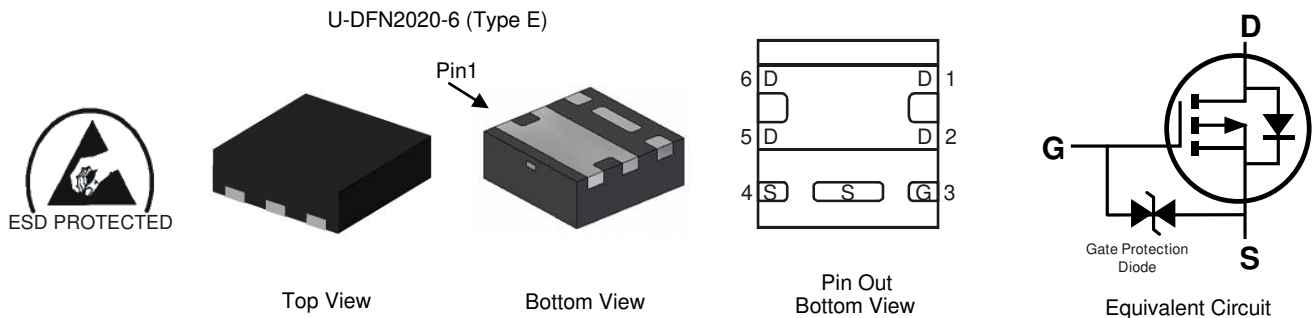
- Battery Management Application
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- Low Gate Threshold Voltage
- Low On-Resistance
- 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 E)
- 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)
- Weight: 0.007 grams (Approximate)



## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2021UFDE-7	U-DFN2020-6 (Type E)	3,000/Tape & Reel
DMP2021UFDE-13	U-DFN2020-6 (Type E)	10,000/Tape & Reel

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - 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.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



FP = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: D = 2016)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022
Code	D	E	F	G	H	I	J

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>	±10	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	Steady State	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-9.0 -7.2	A
	t < 10s	T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C	I <sub>D</sub>	-11.1 -8.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I <sub>DM</sub>	-60	A
Continuous Source-Drain Diode Current (Note 6)		T <sub>A</sub> = +25°C	I <sub>S</sub>	-2.4	A
Avalanche Current (Note 7) L = 0.1mH			I <sub>AS</sub>	-27	A
Avalanche Energy (Note 7) L = 0.1mH			E <sub>AS</sub>	38	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.76	W
	T <sub>A</sub> = +70°C		0.48	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	R <sub>θJA</sub>	165	°C/W
	t < 10s		116	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	1.90	W
	T <sub>A</sub> = +70°C		1.20	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R <sub>θJA</sub>	67	°C/W
	t < 10s		47	
Thermal Resistance, Junction to Case (Note 6)	Steady state	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	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 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.35	—	-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>	—	12	16	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -7.0A
			15	22		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -5.0A
			19	40		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -3.0A
			21	80		V <sub>GS</sub> = -1.5V, I <sub>D</sub> = -1.0A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.0A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	2,760	—	pF	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	262	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	220	—		
Gate Resistance	R <sub>g</sub>	—	16	—	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>	—	34	—	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.0A
Total Gate Charge (V <sub>GS</sub> = -8V)	Q <sub>g</sub>	—	59	—		
Gate-Source Charge	Q <sub>gs</sub>	—	3.5	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	8.3	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	7.5	—	ns	V <sub>DS</sub> = -15V, V <sub>GS</sub> = -4.5V, R <sub>G</sub> = 1Ω, I <sub>D</sub> = -4.0A
Turn-On Rise Time	t <sub>R</sub>	—	25	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	125	—		
Turn-Off Fall Time	t <sub>F</sub>	—	96	—		
Reverse Recovery Time	t <sub>RR</sub>	—	48	—	ns	I <sub>F</sub> = -1.0A, di/dt = 100A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	33	—	nC	I <sub>F</sub> = -1.0A, di/dt = 100A/µs

- 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.

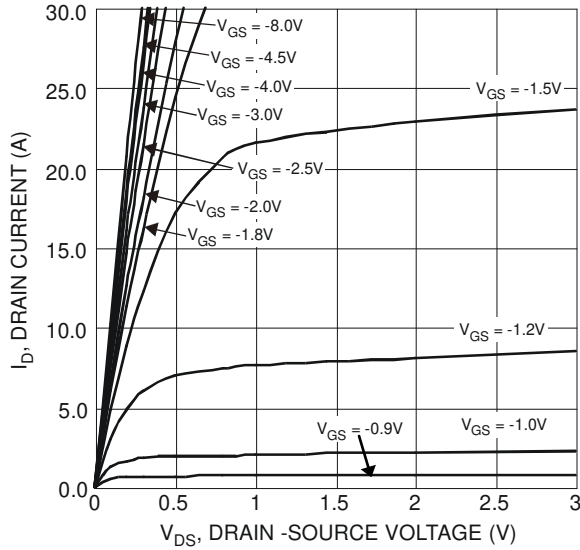


Figure 1 Typical Output Characteristics

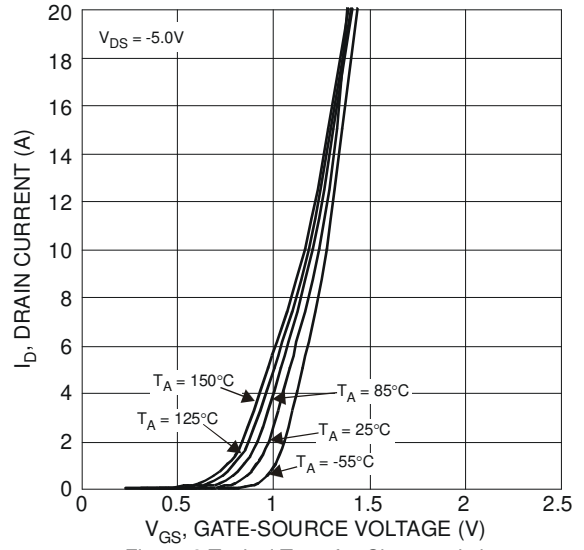


Figure 2 Typical Transfer Characteristics

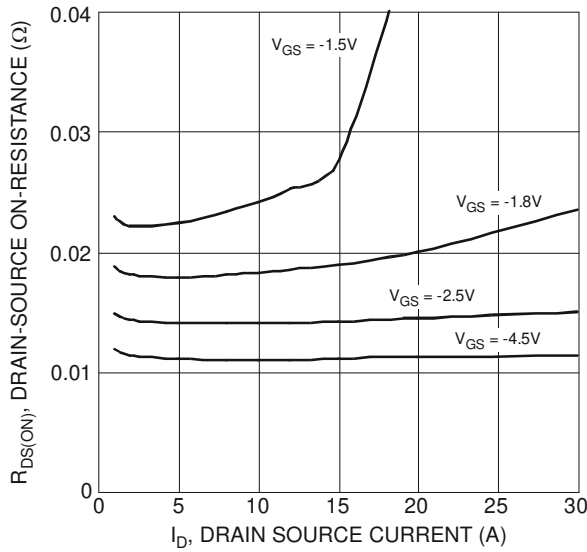


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

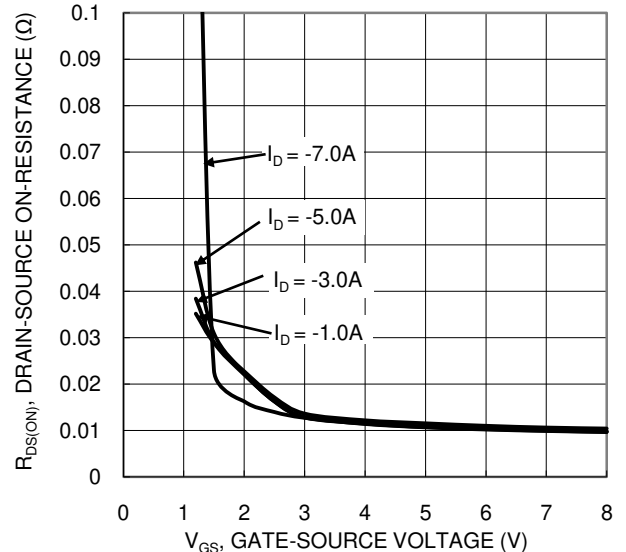


Figure 4 Typical Transfer Characteristic

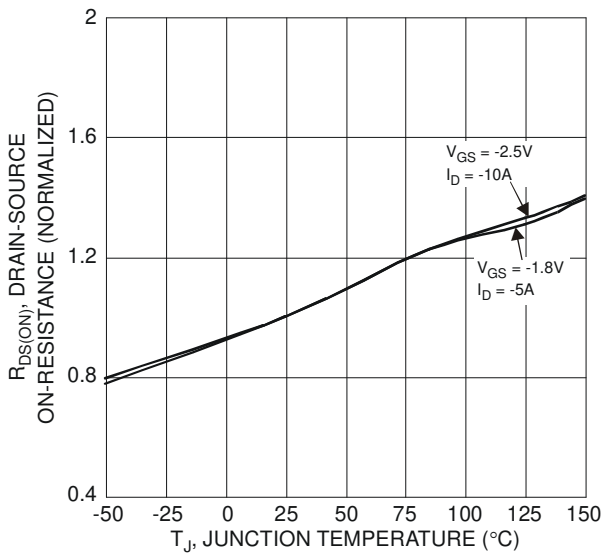


Figure 5 On-Resistance Variation with Temperature

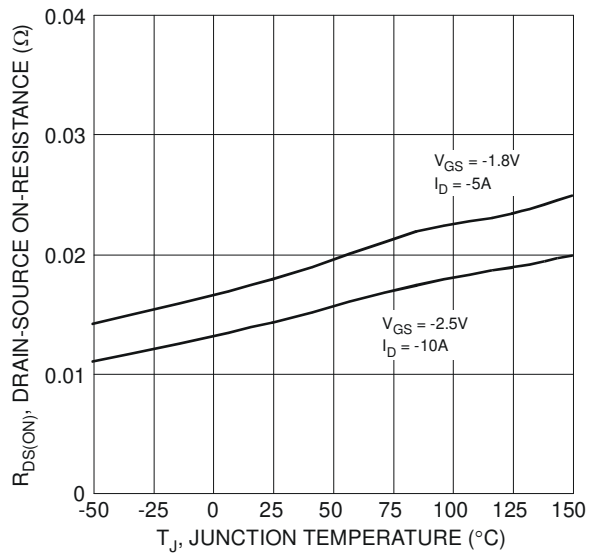


Figure 6 On-Resistance Variation with Temperature

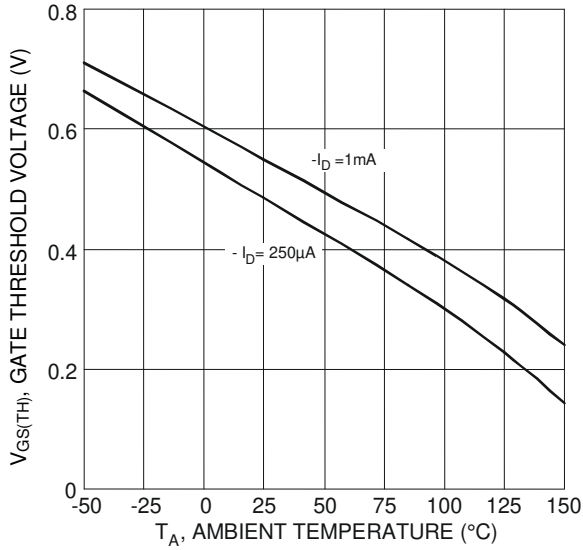


Figure 7 Gate Threshold Variation vs. Ambient Temperature

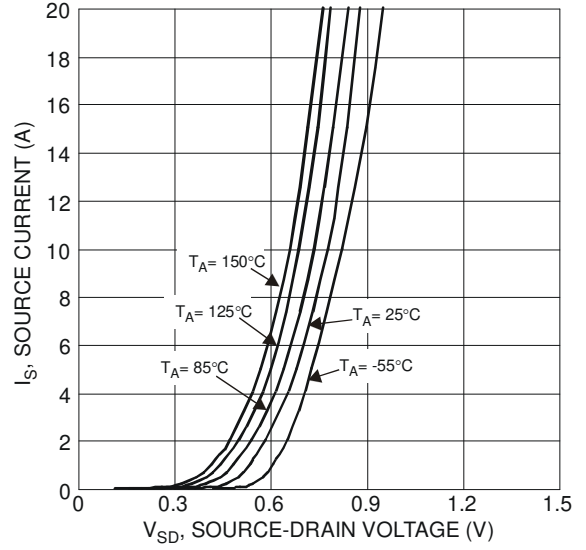


Figure 8 Diode Forward Voltage vs. Current

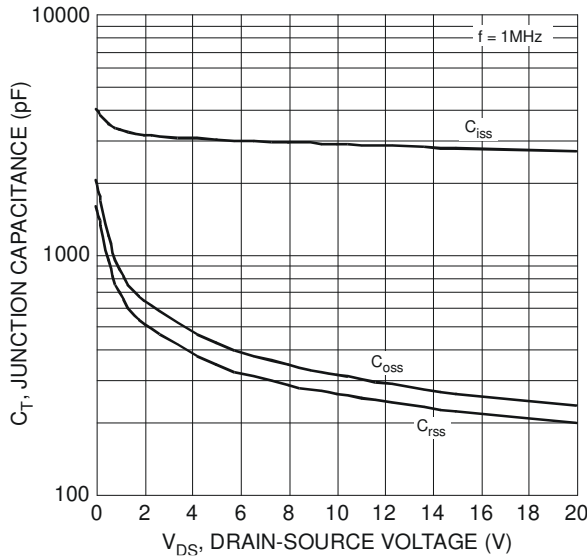


Figure 9 Typical Junction Capacitance

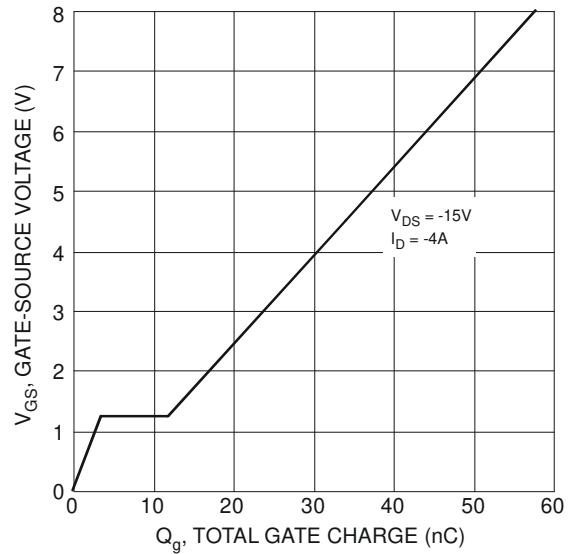


Figure 10 Gate-Charge Characteristics

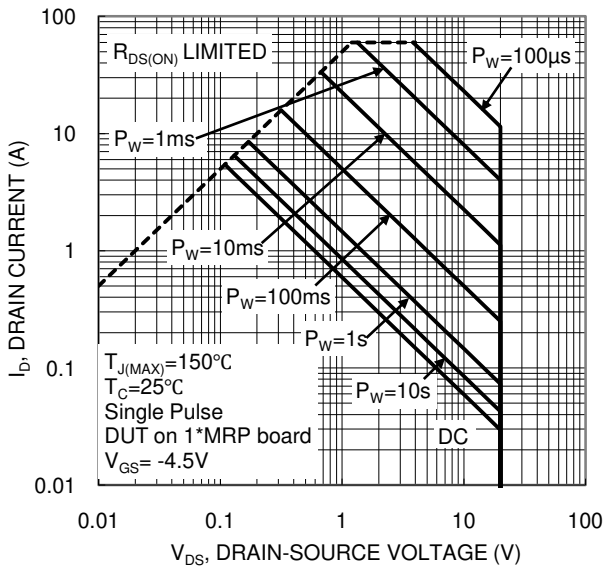


Figure 11 SOA, Safe Operation Area

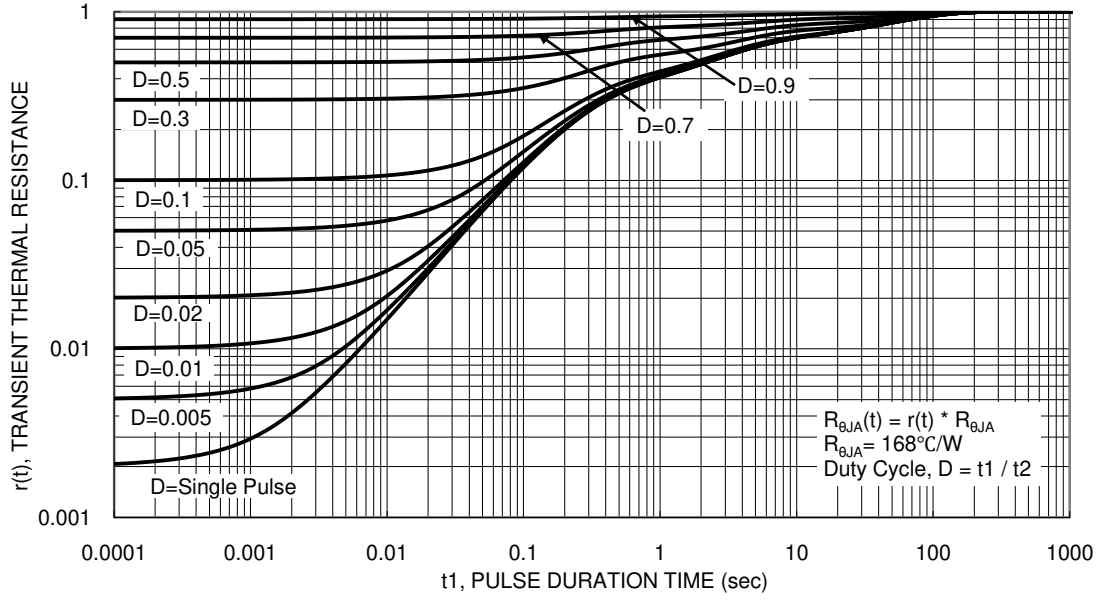
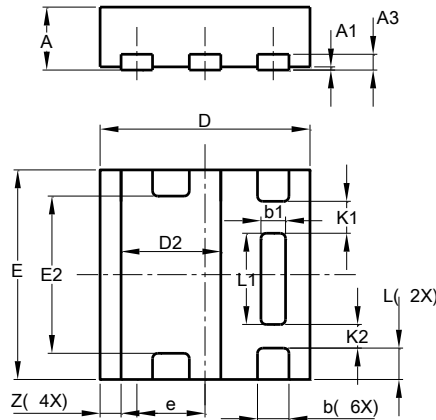


Figure 12 Transient Thermal Resistance

**Package Outline Dimensions**

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

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



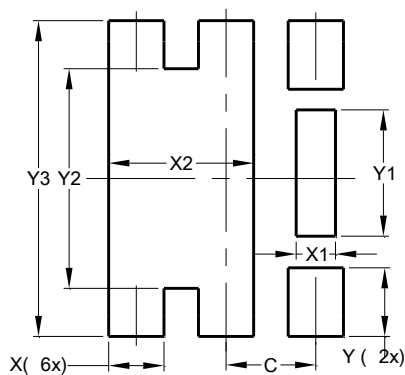
U-DFN2020-6 Type E			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	–	–	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	–	–	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
K1	–	–	0.305
K2	–	–	0.225
Z	–	–	0.20

**All Dimensions in mm**

**Suggested Pad Layout**

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

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



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.285
X2	1.050
Y	0.500
Y1	0.920
Y2	1.600
Y3	2.300

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