

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ\text{C}$
-20V	16m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-9.0A
	22m $\Omega$ @ $V_{GS} = -2.5\text{V}$	-7.7A

## Description and Applications

This MOSFET is designed to minimize on-state resistance ( $R_{DS(ON)}$ ) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

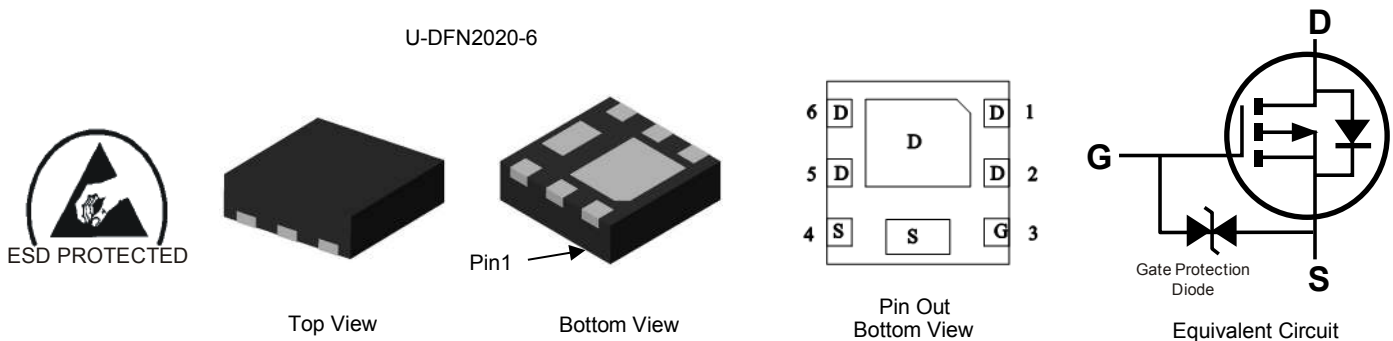
- Battery Management Application
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- 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)**
- **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 refer to the related automotive grade (Q-suffix) part. A listing can be found at**  
<https://www.diodes.com/products/automotive/automotive-products/>.
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**  
<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: 0.007 grams (Approximate)



## Ordering Information (Note 4)

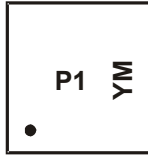
Part Number	Case	Packaging
DMP2021UFDF-7	U-DFN2020-6	3000/Tape & Reel
DMP2021UFDF-13	U-DFN2020-6	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 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 <http://www.diodes.com/products/packages.html>.

## Marking Information

Site 1

U-DFN2020-6



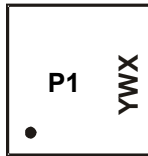
P1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: H = 2020)  
 M = Month (ex: 9 = September)

Date Code Key

<b>Year</b>	<b>2014</b>	<b>2015</b>	...	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
<b>Code</b>	B	C	...	H	I	J	K

<b>Month</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Code</b>	1	2	3	4	5	6	7	8	9	O	N	D

Site 2



P1 = 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>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>
<b>Code</b>	9	0	1	2	3	4	5	6

<b>Week</b>	<b>1-26</b>	<b>27-52</b>	<b>53</b>
<b>Code</b>	A-Z	a-z	z

<b>Internal Code</b>	<b>Sun</b>	<b>Mon</b>	<b>Tue</b>	<b>Wed</b>	<b>Thu</b>	<b>Fri</b>	<b>Sat</b>
<b>Code</b>	T	U	V	W	X	Y	Z

**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>	±8	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	Units
Total Power Dissipation (Note 5)	T <sub>A</sub> = +25°C	P <sub>D</sub>	0.73	W
	T <sub>A</sub> = +70°C		0.47	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R <sub>θJA</sub>	172	°C/W
	t < 10s		121	
Total Power Dissipation (Note 6)	T <sub>A</sub> = +25°C	P <sub>D</sub>	2.02	W
	T <sub>A</sub> = +70°C		1.30	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R <sub>θJA</sub>	63	°C/W
	t < 10s		42	
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	30	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 1-inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> rating 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.

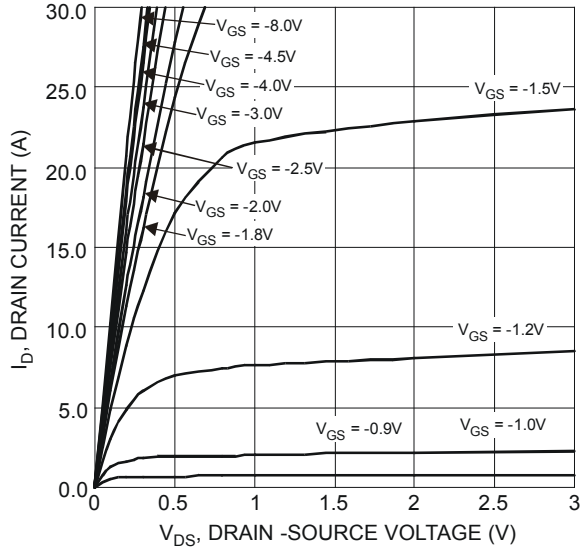


Figure 1 Typical Output Characteristics

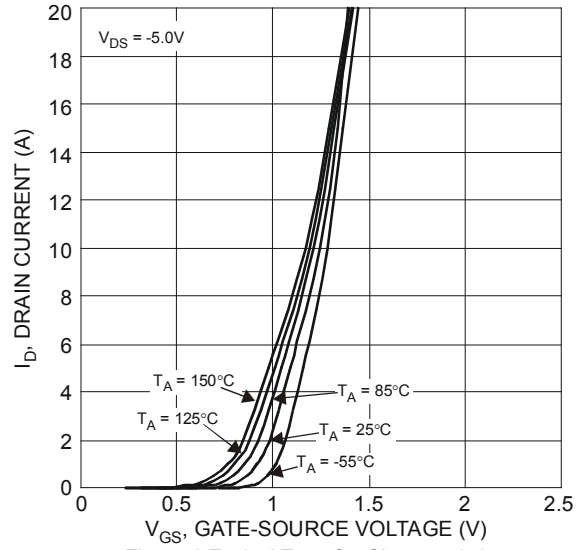


Figure 2 Typical Transfer Characteristics

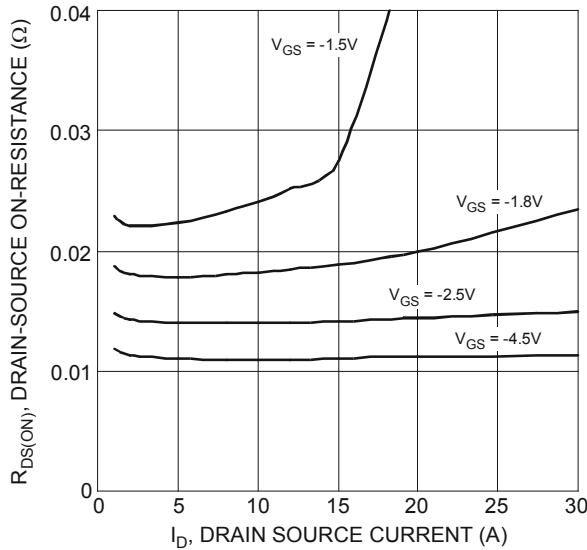


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

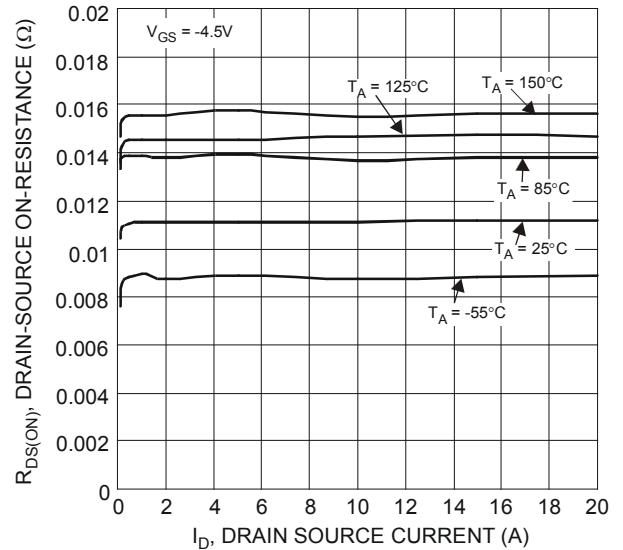


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

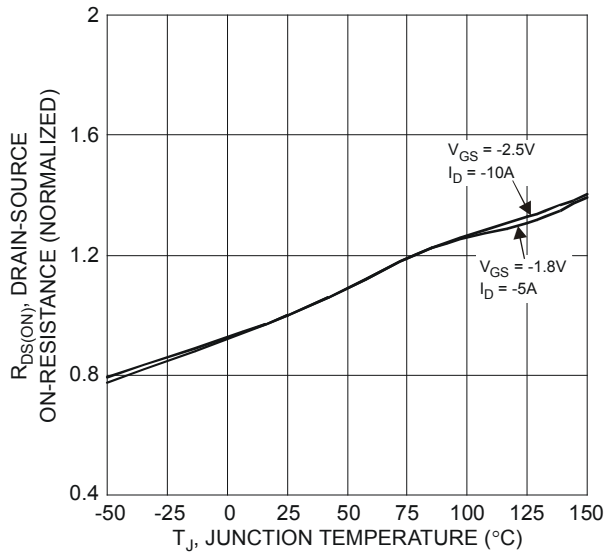


Figure 5 On-Resistance Variation with Temperature

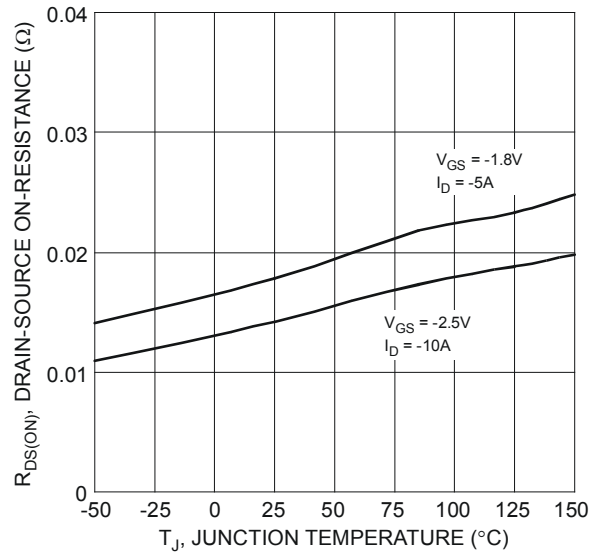


Figure 6 On-Resistance Variation with Temperature

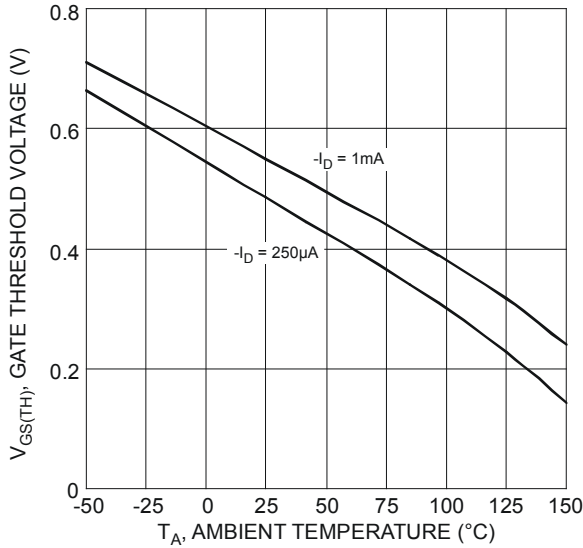


Figure 7 Gate Threshold Variation vs. Ambient Temperature

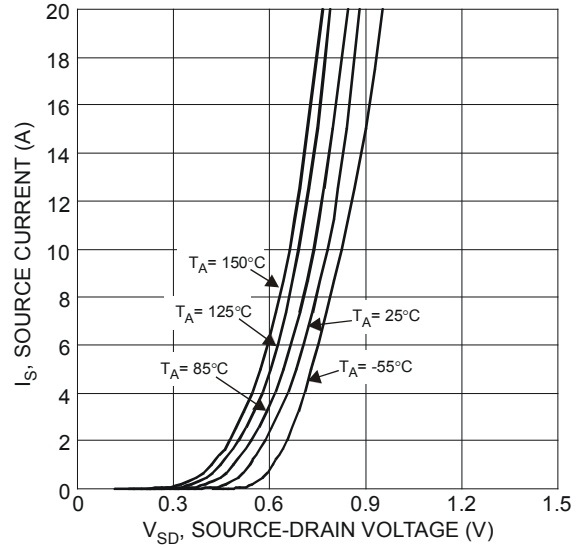


Figure 8 Diode Forward Voltage vs. Current

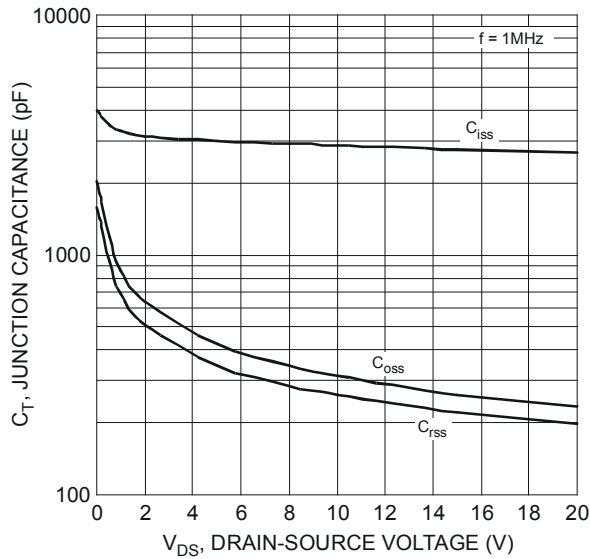


Figure 9 typical Junction Capacitance

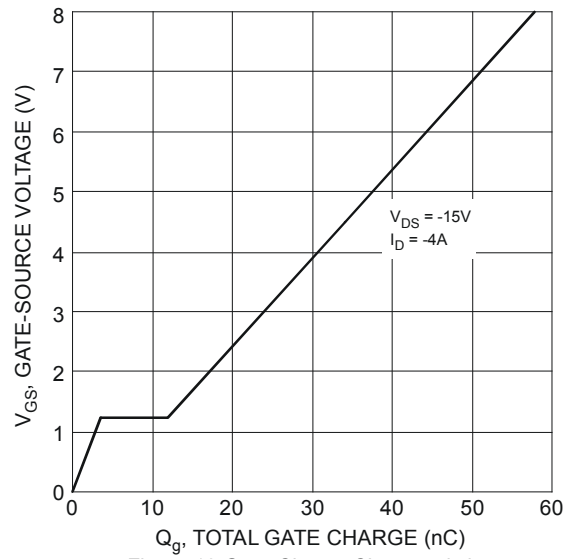


Figure 10 Gate-Charge Characteristics

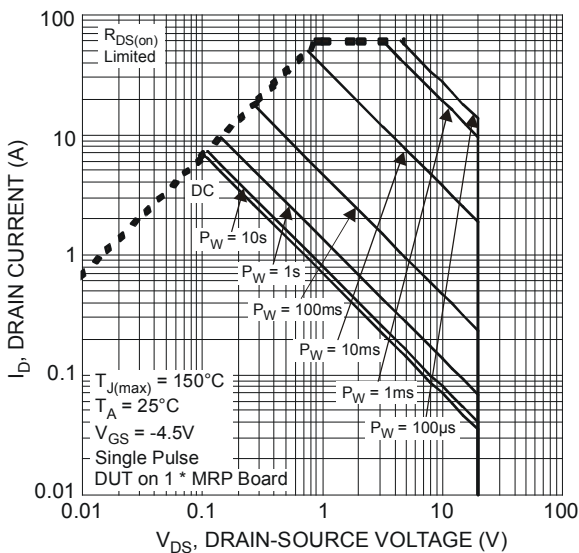
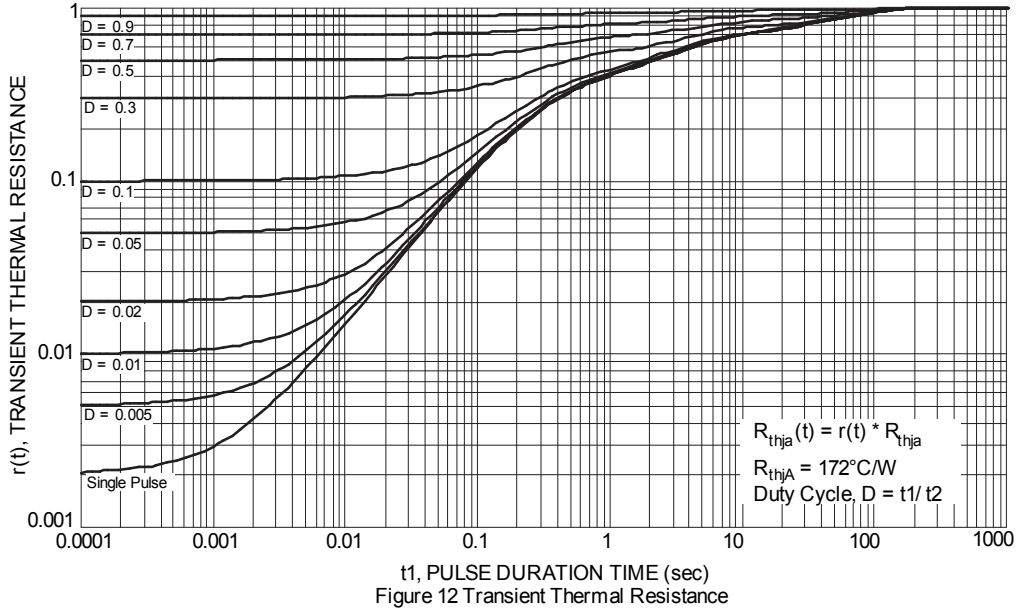


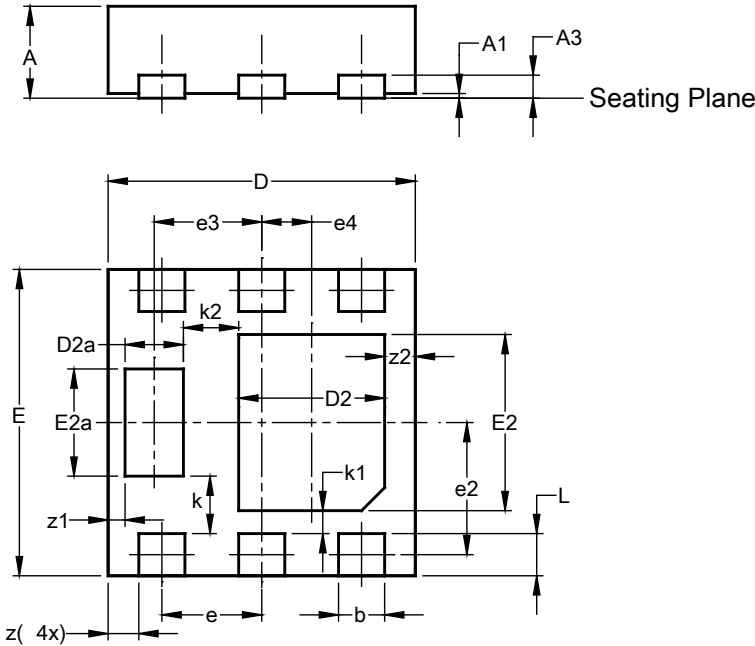
Figure 11 SOA, Safe Operation Area



## Package Outline Dimensions

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

U-DFN2020-6 (Type F)

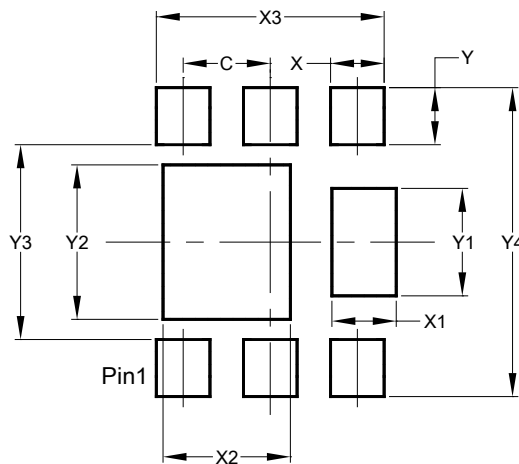


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36 BSC		
L	0.225	0.325	0.275
z	0.20 BSC		
z1	0.110 BSC		
z2	0.20 BSC		
All Dimensions in mm			

## Suggested Pad Layout

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

U-DFN2020-6 (Type F)



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.480
X2	0.950
X3	1.700
Y	0.425
Y1	0.800
Y2	1.150
Y3	1.450
Y4	2.300

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