

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
-12V	15mΩ @ V <sub>GS</sub> = -4.5V	-20A
	20mΩ @ V <sub>GS</sub> = -3.7V	-18A
	30mΩ @ V <sub>GS</sub> = -2.5V	-16A
	40mΩ @ V <sub>GS</sub> = -1.8V	-11A

## Description

This new generation 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

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

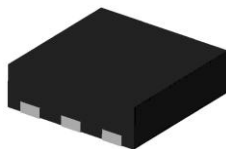
## Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

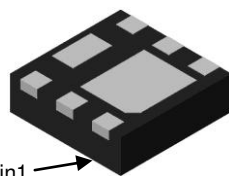
## Mechanical Data

- Case: U-DFN2020-6 (Type F)
- 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)

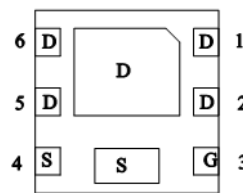
U-DFN2020-6 (Type F)



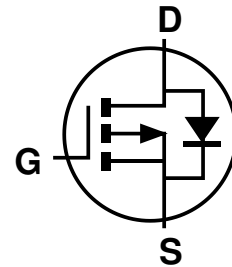
Top View



Bottom View



Pin Out  
Bottom View



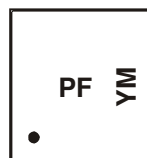
Internal Schematic

## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP1012UFDF-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMP1012UFDF-13	U-DFN2020-6 (Type F)	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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



PF = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025
Code	F	G	H	I	J	K	L	M

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>	-12	V		
Gate-Source Voltage	V <sub>GSS</sub>	±8	V		
Continuous Drain Current V <sub>GS</sub> = -4.5V (Note 10)	Steady State	T <sub>C</sub> = +25°C	-20	A	
		T <sub>C</sub> = +70°C	-16	A	
	t < 5s (Note 6)	T <sub>A</sub> = +25°C	I <sub>D</sub>	-12.6	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-55	A		
Maximum Body Diode Continuous Current (Note 6)	I <sub>S</sub>	-2.8	A		
Avalanche Current (Note 7), L = 0.1mH	I <sub>AS</sub>	-21	A		
Avalanche Energy (Note 7), L = 0.1mH	E <sub>AS</sub>	22	mJ		

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = +25°C	0.72	W
		T <sub>A</sub> = +70°C	0.46	
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	172	°C/W
		t < 5s	130	
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.11	W
		T <sub>A</sub> = +70°C	1.36	
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady State	59	°C/W
		t < 5s	44	
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	9.0		
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>	-12	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-1	µA	V <sub>DS</sub> = -10V, 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 8)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.3	-0.5	-0.9	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	11	15	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A
			12	20		
			15	30		
			20	40		
						V <sub>GS</sub> = -3.7V, I <sub>D</sub> = -5A
						V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4A
						V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -10A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1344	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	342	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	297	—		
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>	—	19.5	—	nC	V <sub>DS</sub> = -6V, I <sub>D</sub> = -10A
Total Gate Charge (V <sub>GS</sub> = -8V)	Q <sub>g</sub>	—	31	—		
Gate-Source Charge	Q <sub>gs</sub>	—	2.1	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	7.9	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	6.0	—	ns	V <sub>DS</sub> = -6V, V <sub>GS</sub> = -4.5V, R <sub>g</sub> = 1Ω, I <sub>D</sub> = -8A
Turn-On Rise Time	t <sub>R</sub>	—	32	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	71	—		
Turn-Off Fall Time	t <sub>F</sub>	—	85	—		
Reverse Recovery Time	t <sub>RR</sub>	—	46	—	ns	I <sub>F</sub> = -12A, di/dt = 500A/µs
Reverse Recovery Charge	Q <sub>RR</sub>	—	44	—	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.
  - Package limited.

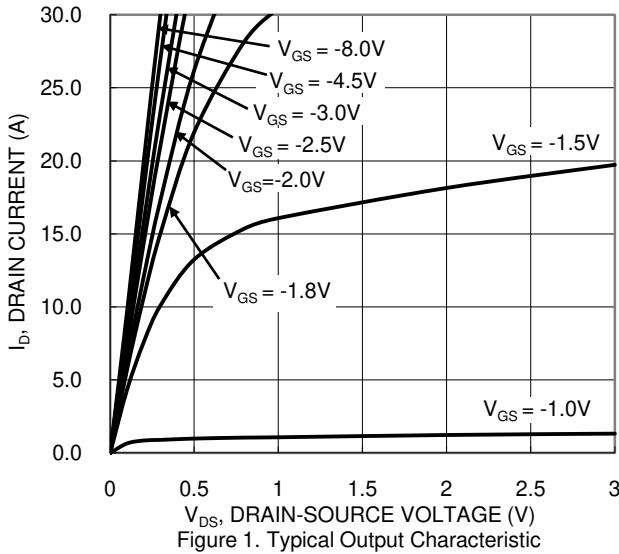


Figure 1. Typical Output Characteristic

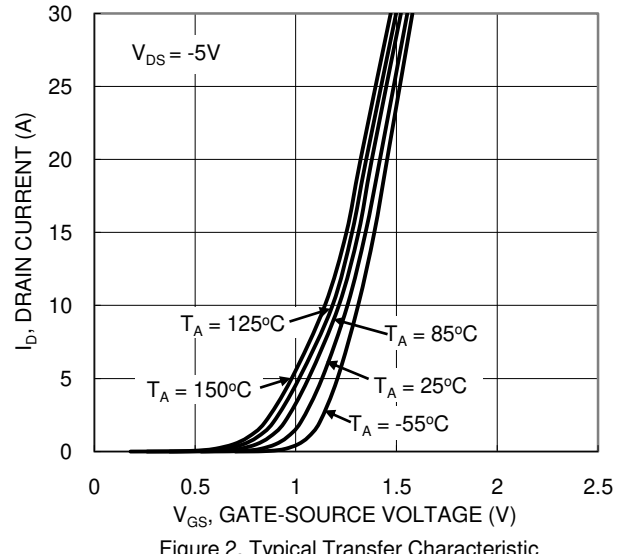


Figure 2. Typical Transfer Characteristic

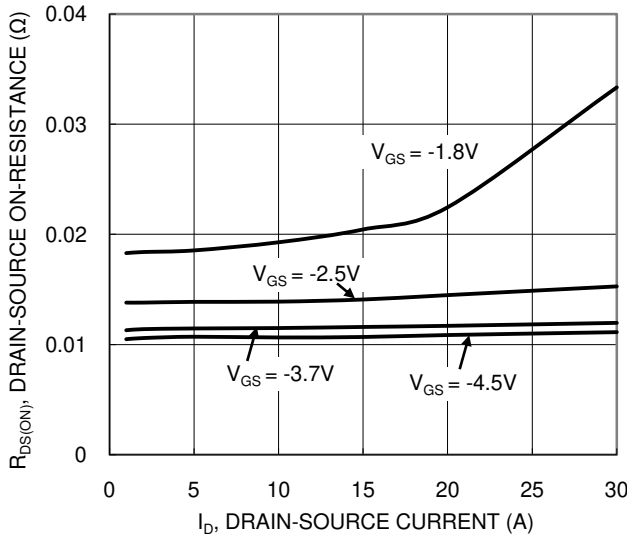


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

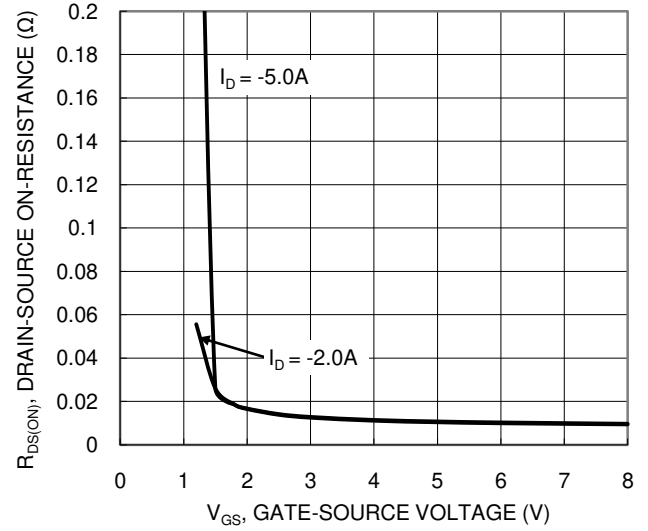


Figure 4. Typical Transfer Characteristic

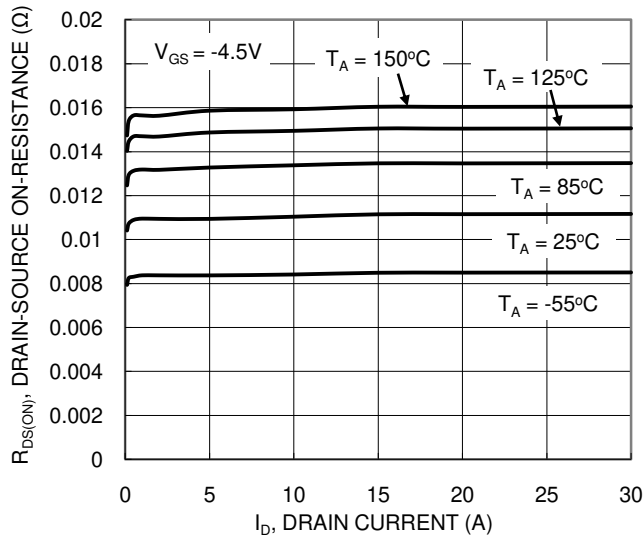


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

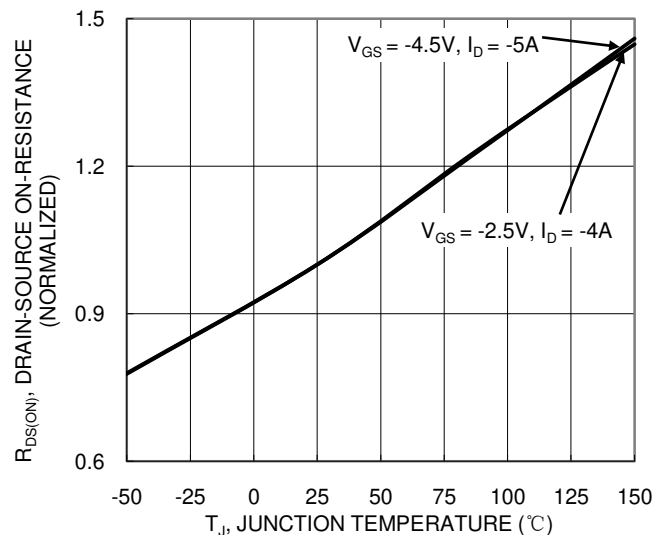
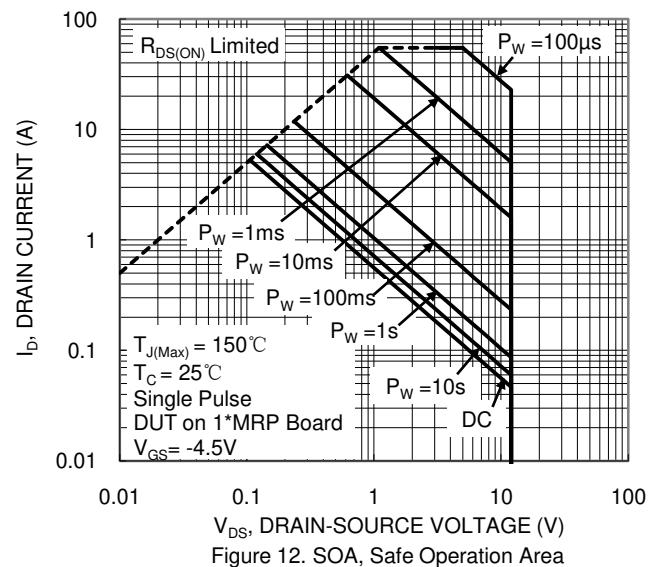
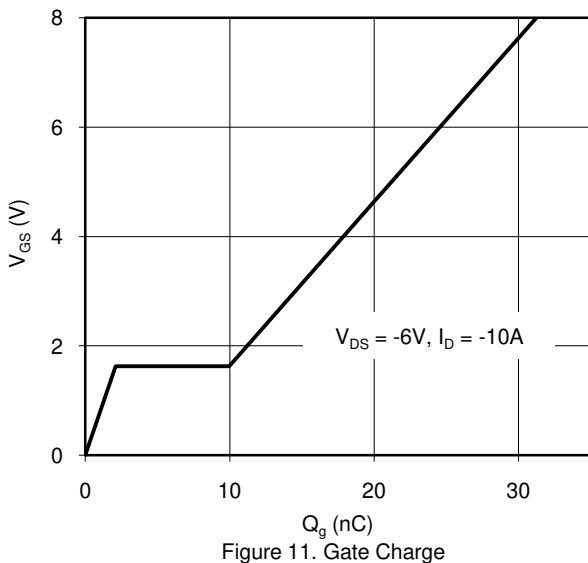
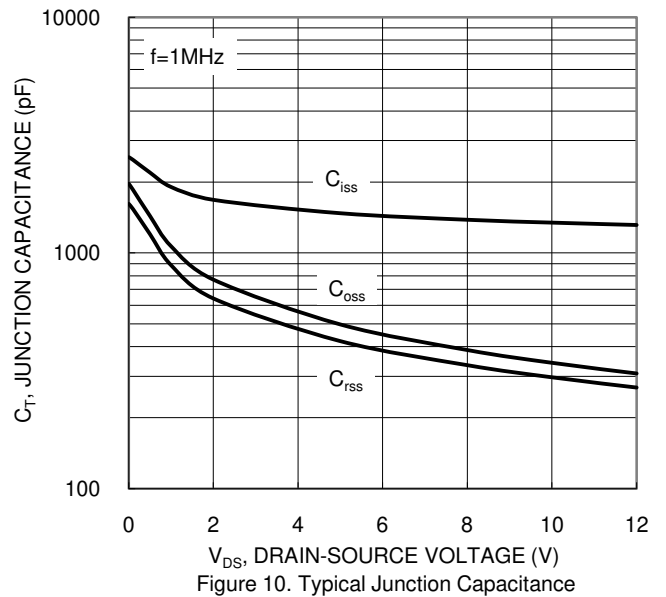
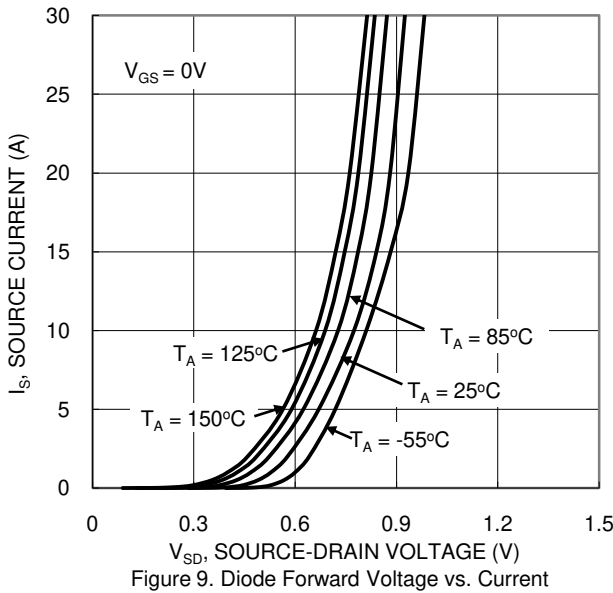
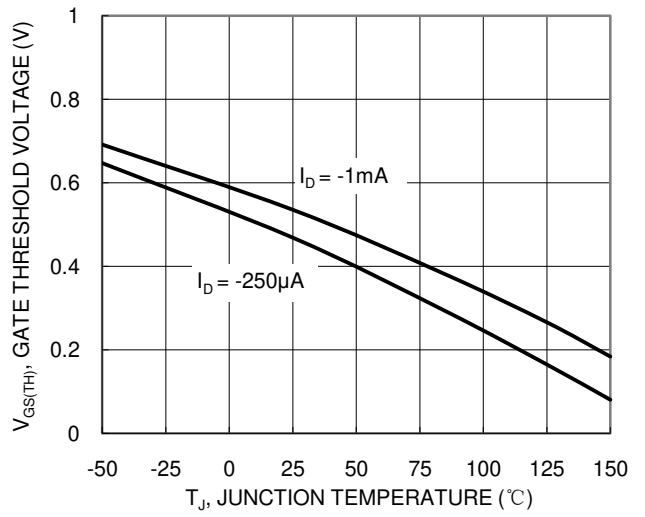
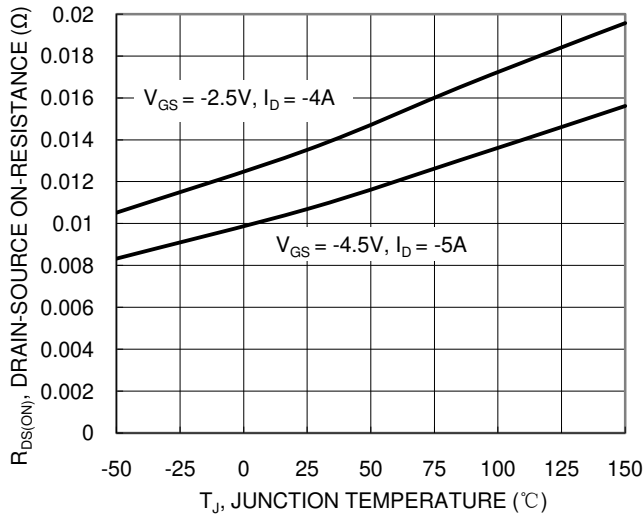


Figure 6. On-Resistance Variation with Temperature



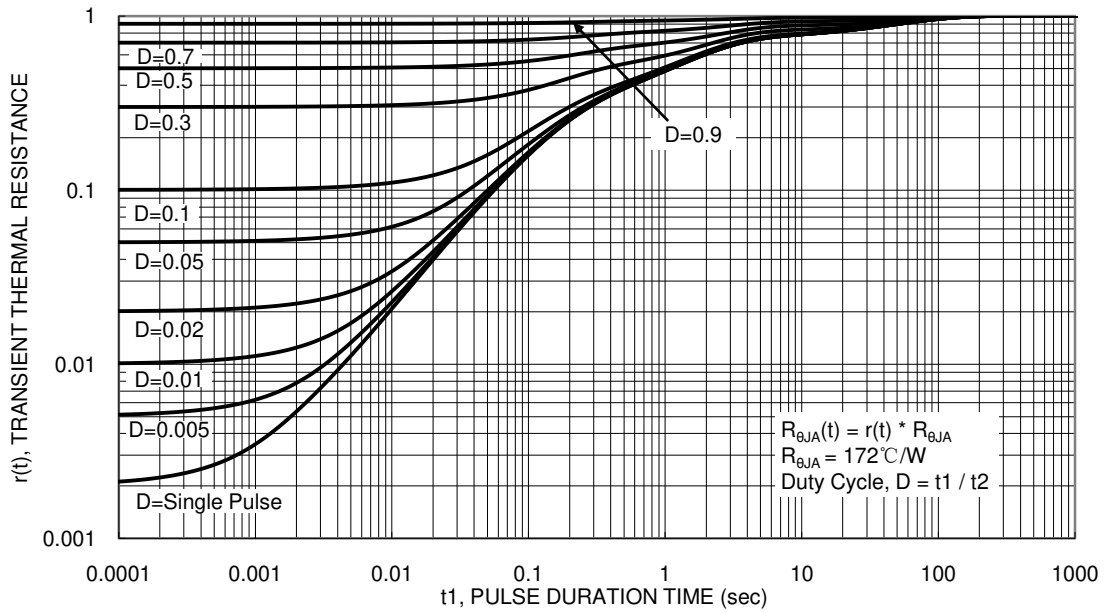
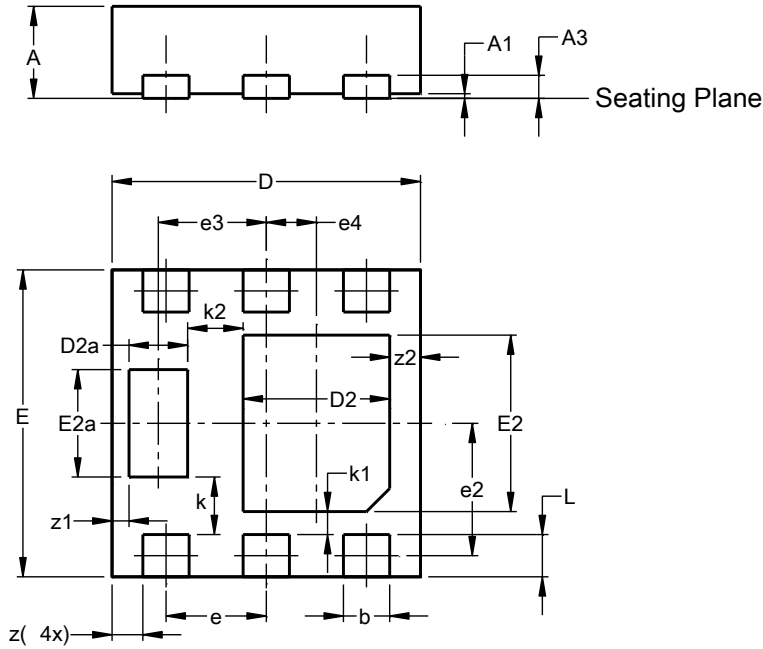


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

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

U-DFN2020-6 (Type F)

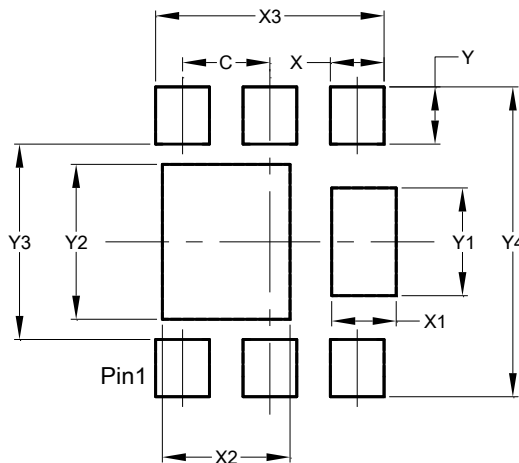


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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

## 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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