

## Product Summary

BV <sub>DSS</sub>	R <sub>D1D2 max</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
-20V	90mΩ @ V <sub>GS</sub> = -4.5V	-3.2A
	120mΩ @ V <sub>GS</sub> = -2.5V	-2.7A

## Features

- PCB Footprint of 4mm<sup>2</sup>
- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Maximum Height
- **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 [contact us](https://www.diodes.com/quality/product-definitions/) or your local Diodes representative.**

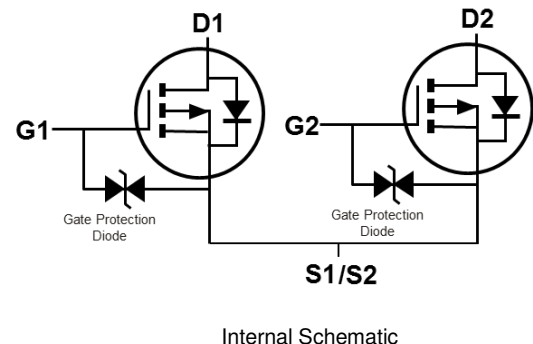
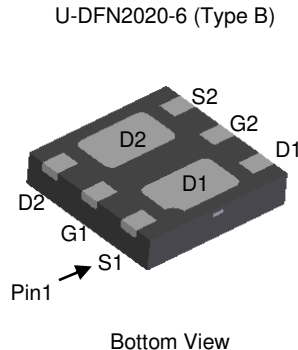
## Description and Applications

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, which makes it ideal for high-efficiency power management applications.

- Load Switch
- Power Management Functions
- Portable Power Adaptors

## 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
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)



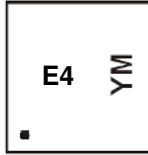
## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2090UFDB-7	U-DFN2020-6 (Type B)	3000/Tape & Reel
DMP2090UFDB-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:

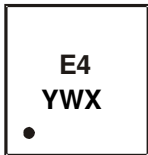


E4 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: G = 2019)  
 M = Month (ex: 9 = September)

Date Code Key

<b>Year</b>	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<b>Code</b>	G	H	I	J	K	L	M	N	O	P	R	S
<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:



E4 = Product Type Marking Code  
 YWX = Date Code Marking  
 Y = Year (ex: 9 = 2019)  
 W = Week (ex: a = week 27; z represents week 52 and 53)  
 X = Internal Code (ex: U = Monday)

Date Code Key

<b>Year</b>	2019	2020	2021	2022	2023	2024	2025	2026	2027
<b>Code</b>	9	0	1	2	3	4	5	6	7
<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>	±8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	-3.2	A
Steady State T <sub>A</sub> = +25°C T <sub>A</sub> = +70°C		-2.5	
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	-1.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-22	A
Avalanche Current (Note 7) L = 0.1mH	I <sub>AS</sub>	-11	A
Avalanche Energy (Note 7) L = 0.1mH	E <sub>AS</sub>	7	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P <sub>D</sub>	0.79	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	159	°C/W
Total Power Dissipation (Note 6)	P <sub>D</sub>	1.39	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	90	°C/W
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> = -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>	-0.3	—	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250µA
Static Drain1-Drain2 On-Resistance	R <sub>D1D2</sub>	—	37	90	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A
		—	50	120		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.7	-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>	—	634	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oSS</sub>	—	81	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	66	—	pF	
Gate Resistance	R <sub>g</sub>	—	20	—	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>	—	6.8	—	nC	V <sub>DS</sub> = -4.5V, I <sub>D</sub> = -4A, V <sub>DS</sub> = -10V
Gate-Source Charge	Q <sub>gs</sub>	—	0.7	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.6	—	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	4.2	—	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 3.3Ω, R <sub>g</sub> = 1Ω
Turn-On Rise Time	t <sub>r</sub>	—	3.4	—	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	23	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	9.6	—	ns	
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	1.8	—	ns	I <sub>S</sub> = -1.0A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	9.4	—	nC	I <sub>S</sub> = -1.0A, dI/dt = 100A/µs

- Notes:
- Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PCB, 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.

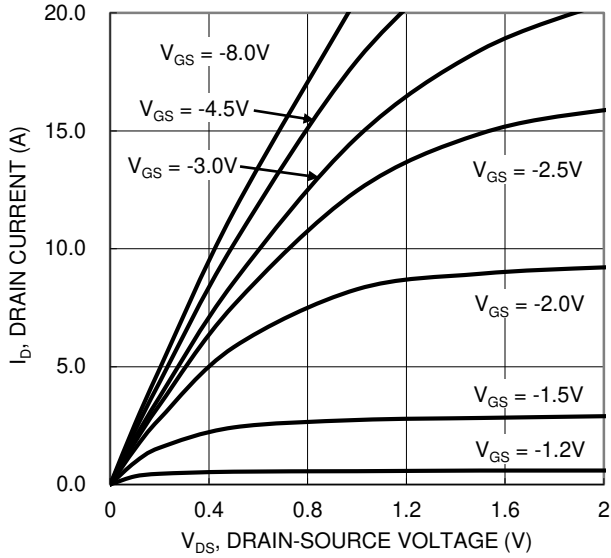


Figure 1. Typical Output Characteristic

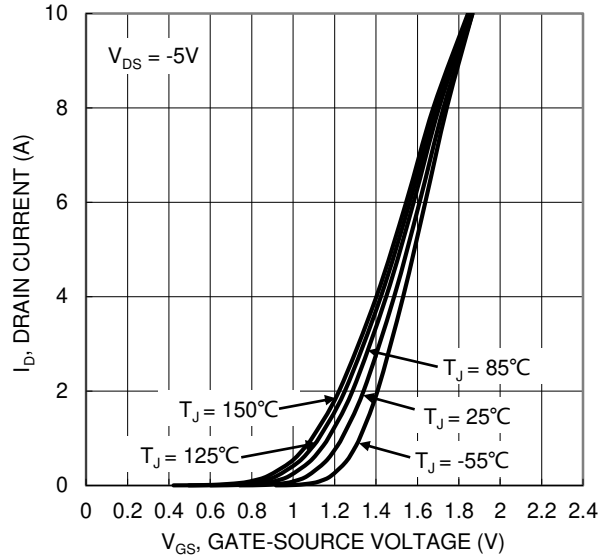


Figure 2. Typical Transfer Characteristic

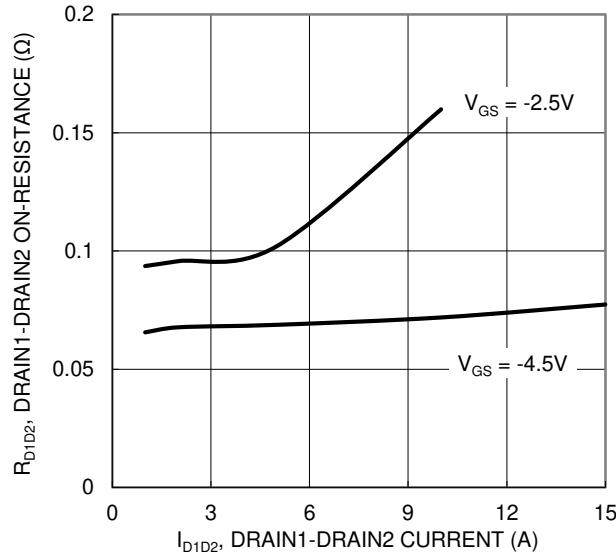


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

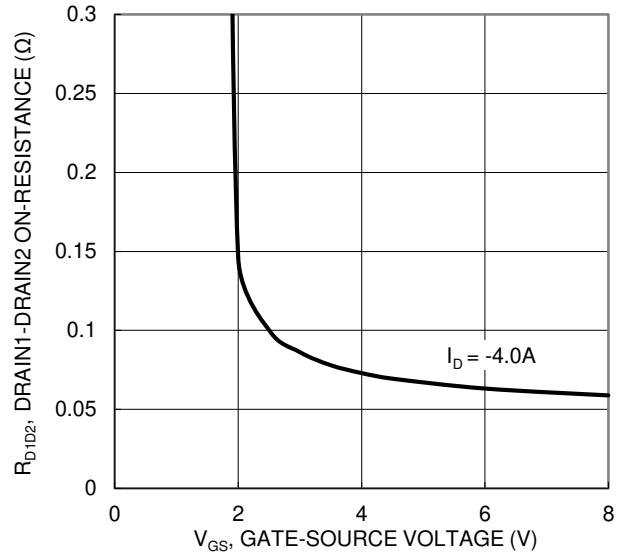


Figure 4. Typical Transfer Characteristic

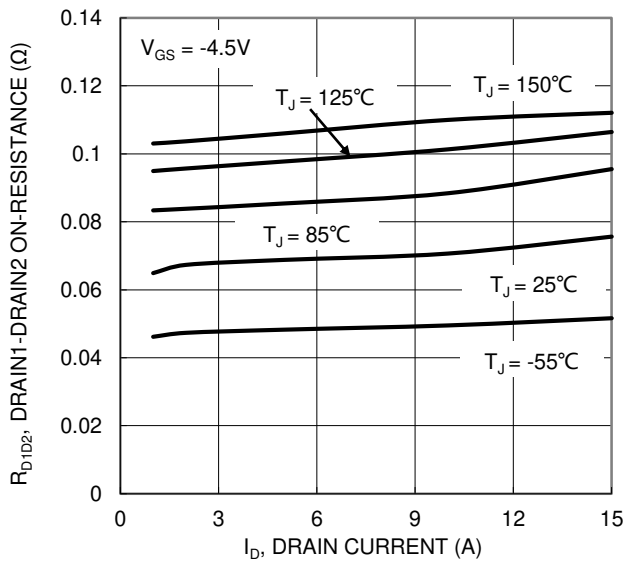


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

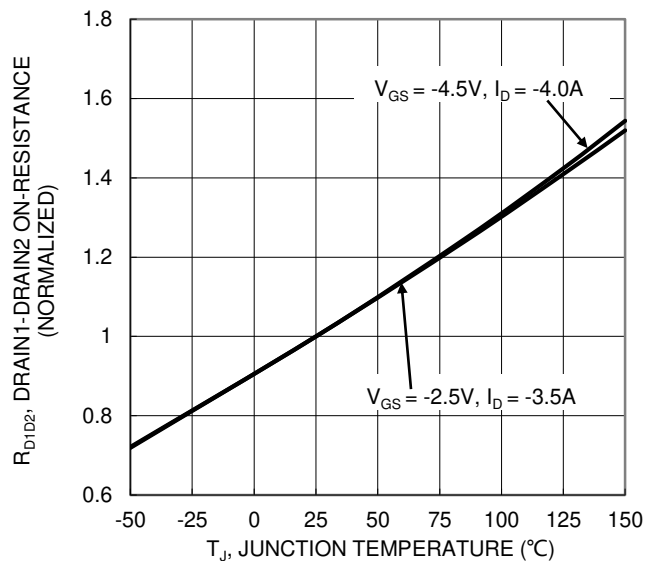


Figure 6. On-Resistance Variation with Junction Temperature

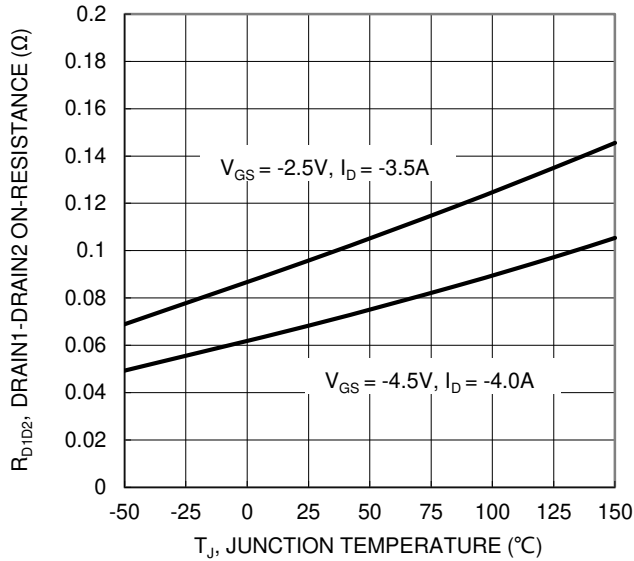


Figure 7. On-Resistance Variation with Junction Temperature

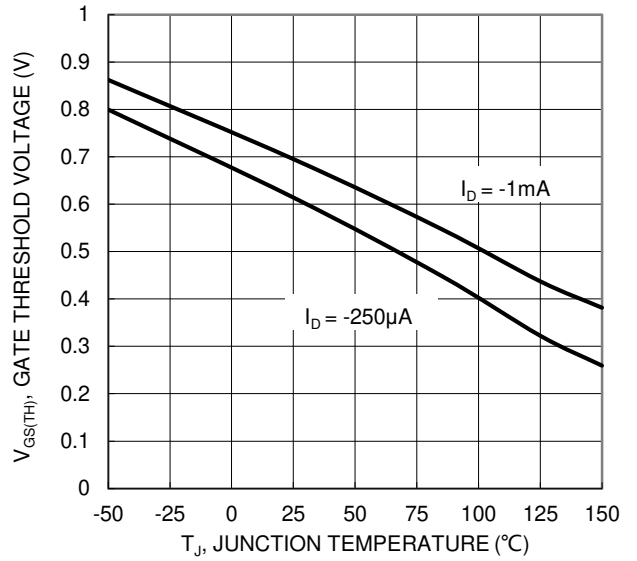


Figure 8. Gate Threshold Variation vs. Junction Temperature

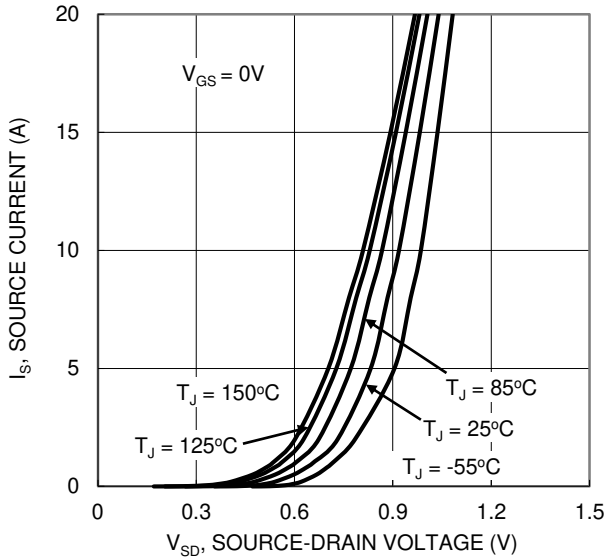


Figure 9. Diode Forward Voltage vs. Current

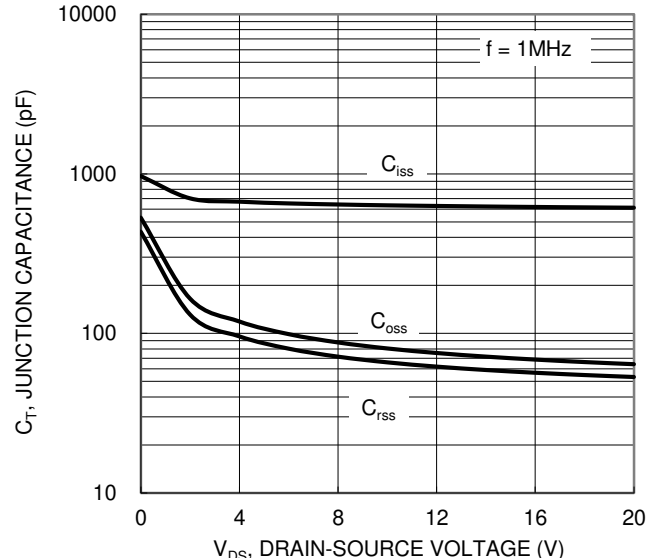


Figure 10. Typical Junction Capacitance

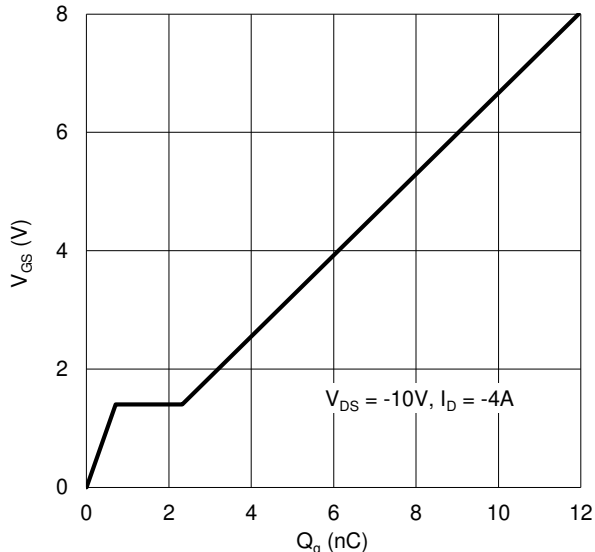


Figure 11. Gate Charge

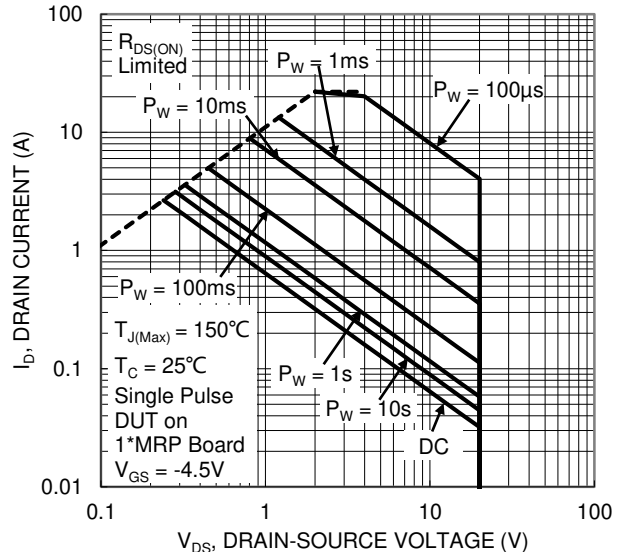


Figure 12. SOA, Safe Operation Area

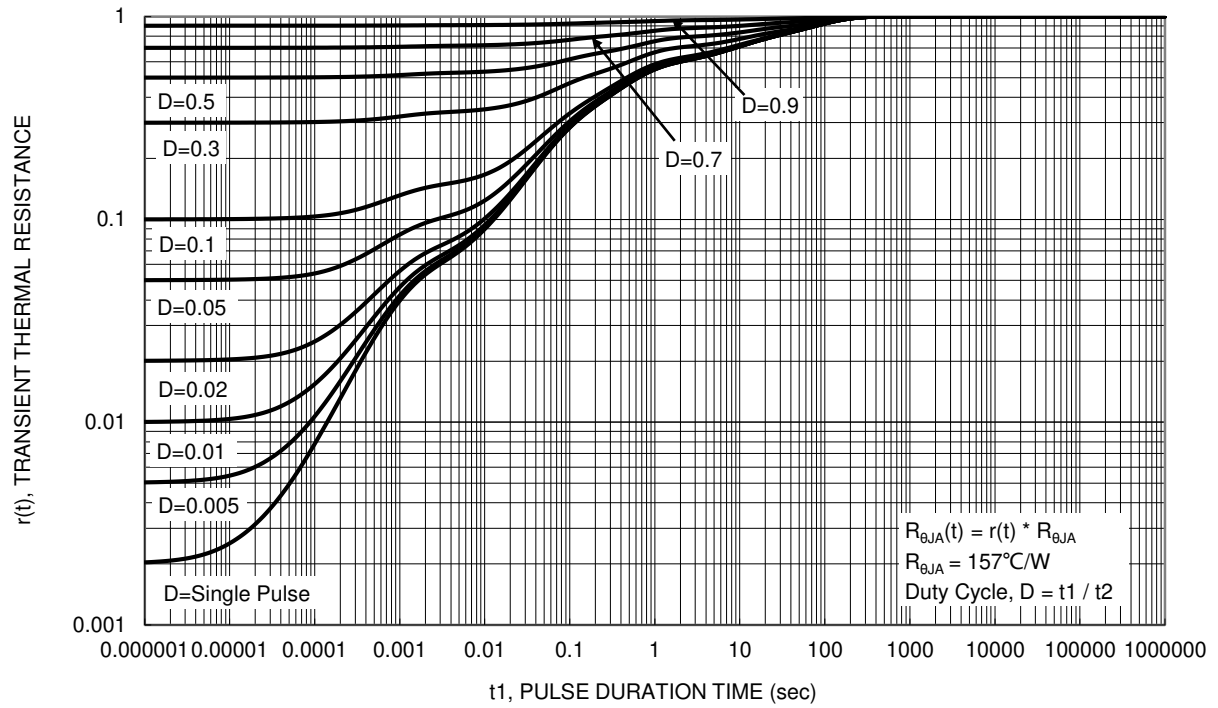
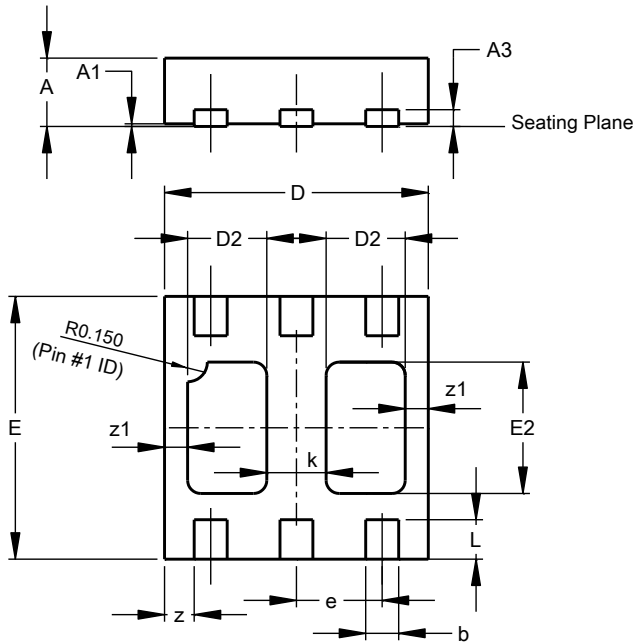


Figure 13. Transient Thermal Resistance

**Package Outline Dimensions**

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

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

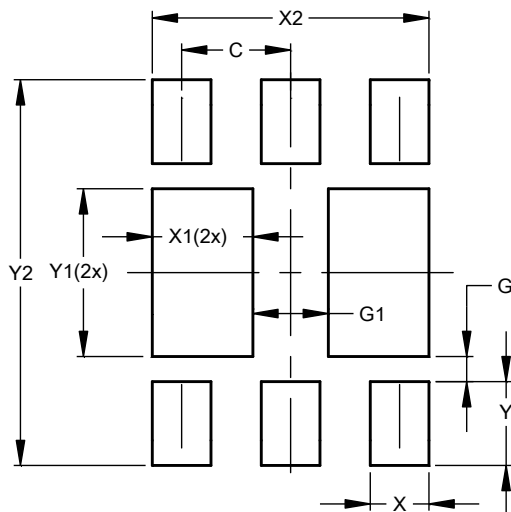


U-DFN2020-6 Type B			
Dim	Min	Max	Typ
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

**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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