

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-12V	11mΩ @ V _{GS} = -4.5V	-11A
	14mΩ @ V _{GS} = -3.7V	-9.7A
	19mΩ @ V _{GS} = -2.5V	-8.3A
	30mΩ @ V _{GS} = -1.8V	-6.6A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

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

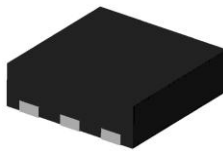
Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low On-Resistance
- Fast Switching Speed
- 100% Unclamped Inductive Switching (Test in Production) – Ensures More Reliability
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**
- PPAP Capable (Note 4)**

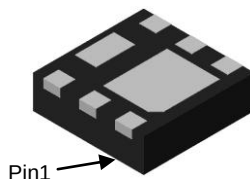
Mechanical Data

- 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 (e4)
- Weight: 0.007 grams (Approximate)

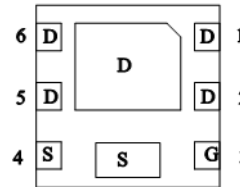
U-DFN2020-6 (Type F)



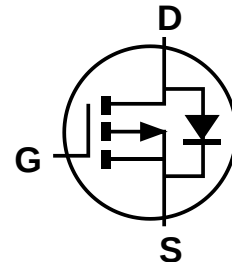
Top View



Bottom View



Pin Out
Bottom View



Internal Schematic

Ordering Information (Note 5)

Part Number	Case	Packaging
DMP1009UFDQ-7	U-DFN2020-6 (Type F)	3,000/Tape & Reel
DMP1009UFDQ-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) & 2015/863/EU (RoHS 3) compliant.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 - For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



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

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024
Code	E	F	G	H	I	J	K	L

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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-12	V
Gate-Source Voltage			V _{GSS}	±8	V
Continuous Drain Current V _{GS} = -4.5V (Note 7)	Steady State	T _A = +25°C	I _D	-11	A
		T _A = +70°C		-8.7	
	t<5s	T _A = +25°C	I _D	-15	A
		T _A = +70°C		-12	
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	-70	A
Maximum Body Diode Continuous Current (Note 7)			I _S	-2.5	A
Avalanche Current (Note 8) L = 0.1mH			I _{AS}	-24	A
Avalanche Energy (Note 8) L = 0.1mH			E _{AS}	31	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	0.8	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	152	°C/W
	t < 5s		81	
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	2.0	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	63	°C/W
	t < 5s		34	
Thermal Resistance, Junction to Case (Note 7)	Steady State	R _{θJC}	15	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-12	—	—	V	V _{GS} = 0V, I _D = -250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-100	nA	V _{DS} = -9.6V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-0.3	—	-1.0	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	8.3	11	mΩ	V _{GS} = -4.5V, I _D = -5A
			9	14		V _{GS} = -3.7V, I _D = -5A
			12	19		V _{GS} = -2.5V, I _D = -4A
			16	30		V _{GS} = -1.8V, I _D = -1A
			—	—		V _{GS} = 0V, I _S = -10A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iSS}	—	1860	—	pF	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	498	—		
Reverse Transfer Capacitance	C _{rss}	—	416	—		
Gate Resistance	R _g	—	11	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	26	—	nC	V _{DS} = -6V, I _D = -10A
Total Gate Charge (V _{GS} = -8V)	Q _g	—	44	—		
Gate-Source Charge	Q _{gs}	—	3.3	—		
Gate-Drain Charge	Q _{gd}	—	8.1	—		
Turn-On Delay Time	t _{D(ON)}	—	7.0	—	ns	V _{DS} = -6V, V _{GS} = -4.5V, R _g = 1Ω, I _D = -8A
Turn-On Rise Time	t _r	—	10.6	—		
Turn-Off Delay Time	t _{D(OFF)}	—	62.2	—		
Turn-Off Fall Time	t _f	—	61	—		
Reverse Recovery Time	t _{RR}	—	34.4	—	ns	I _F = -12A, di/dt = 500A/µs
Reverse Recovery Charge	Q _{RR}	—	28.1	—	nC	

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 8. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.

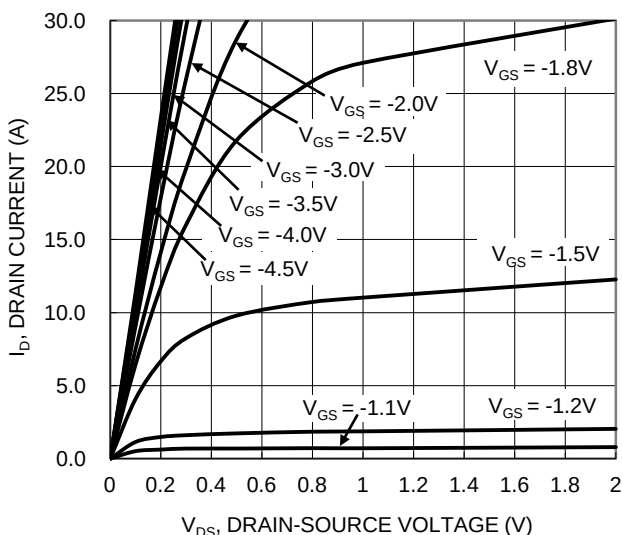


Figure 1. Typical Output Characteristic

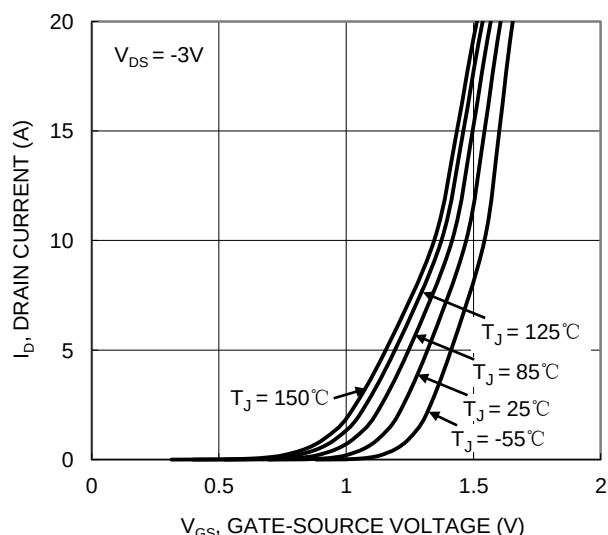


Figure 2. Typical Transfer Characteristic

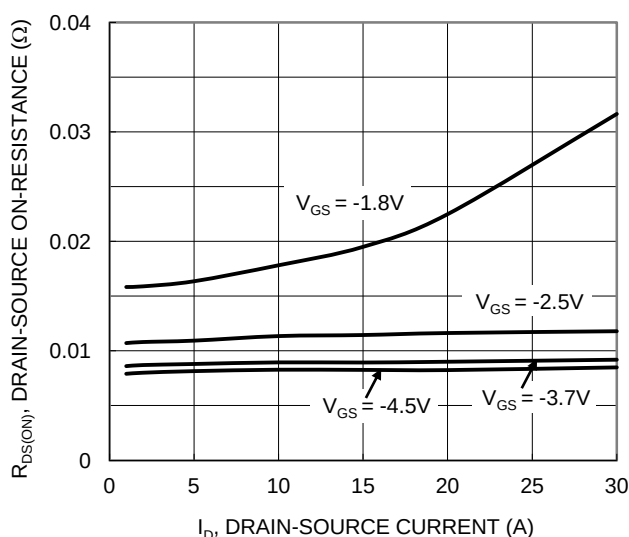


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

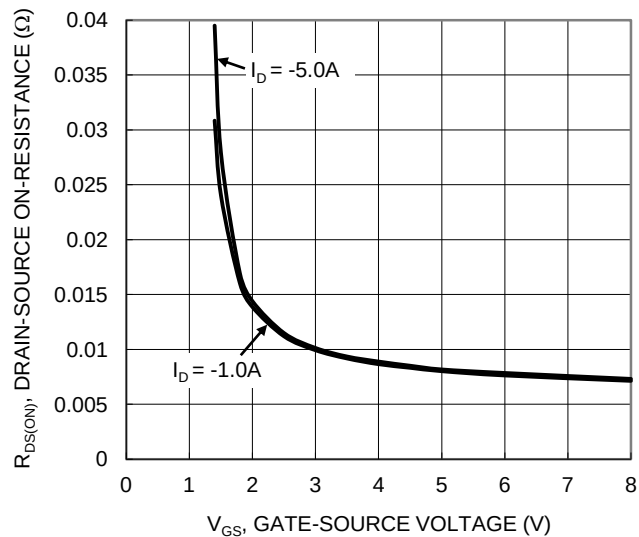


Figure 4. Typical Transfer Characteristic

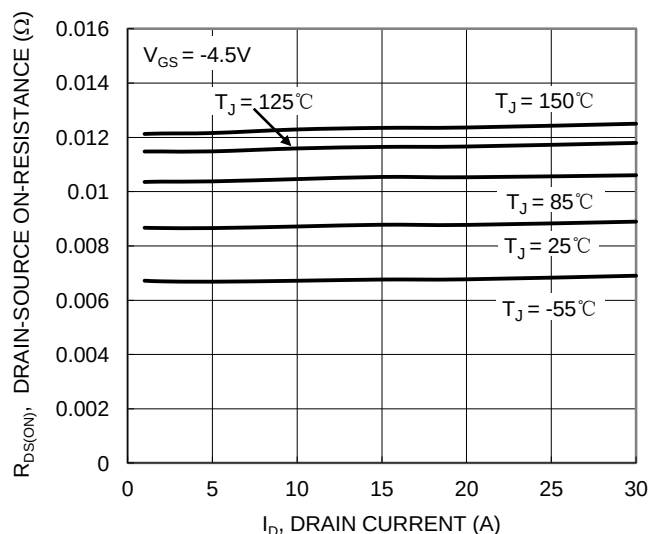


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

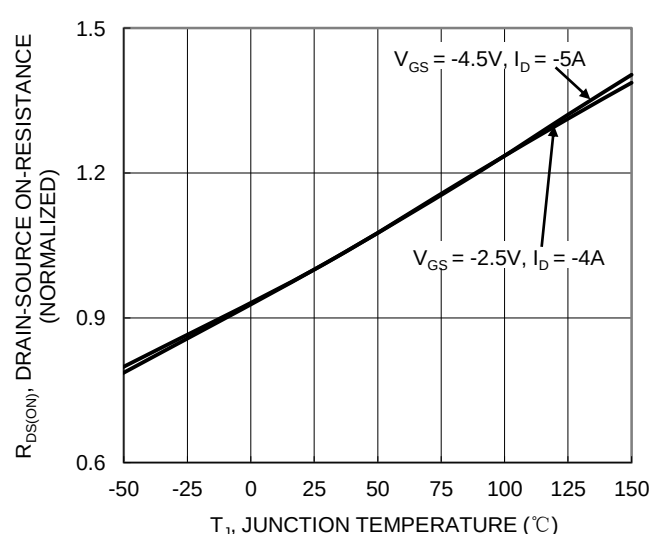
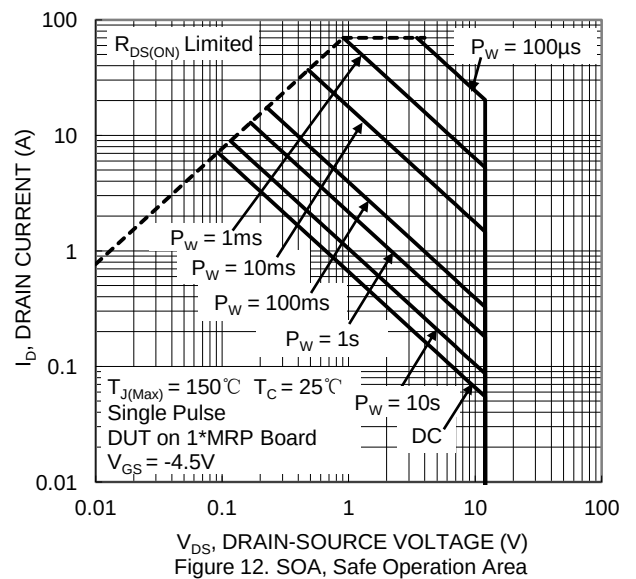
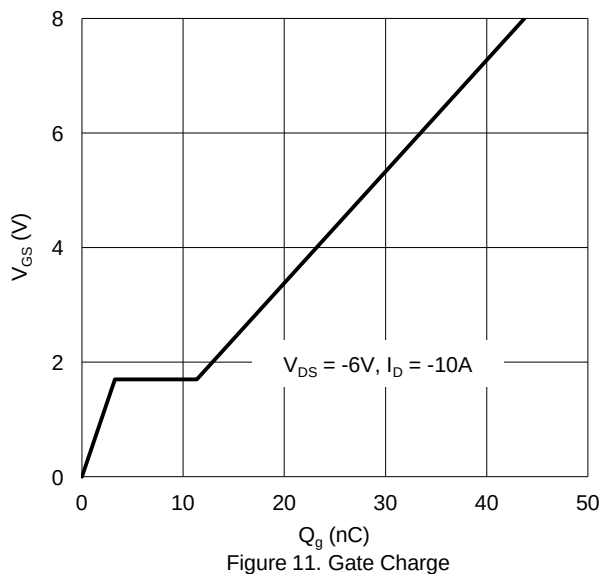
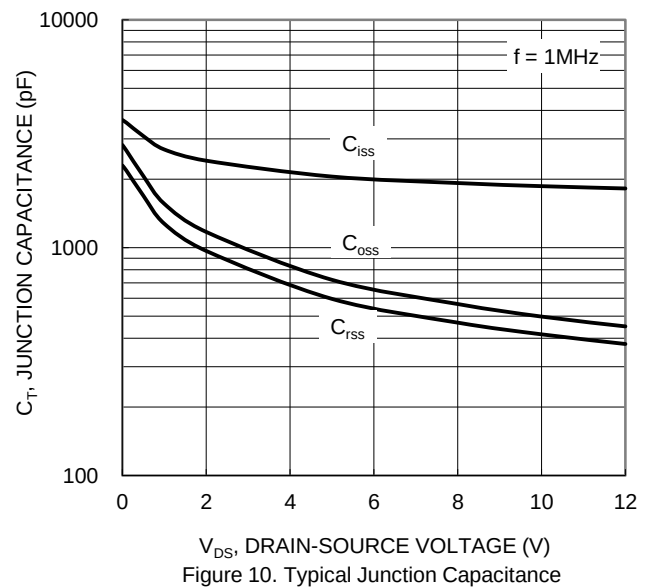
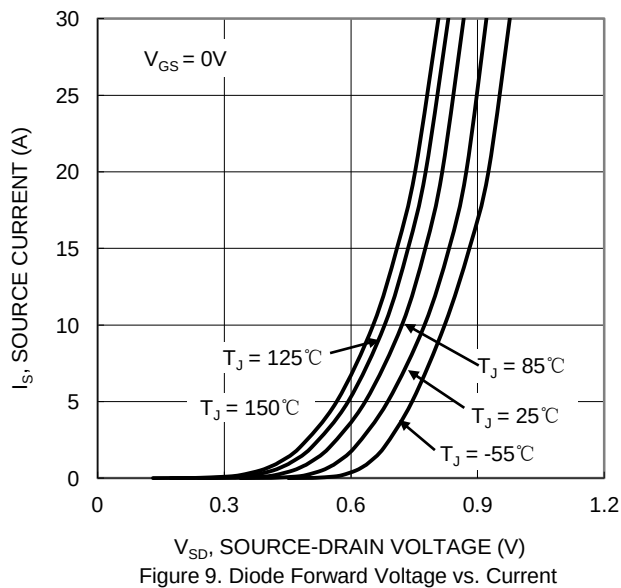
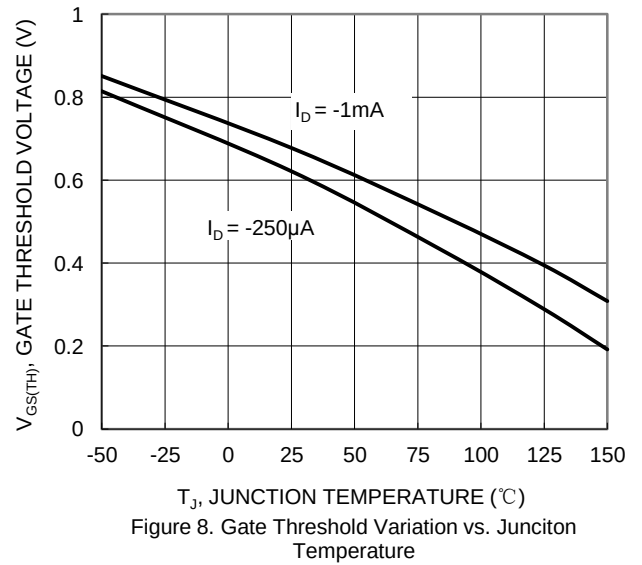
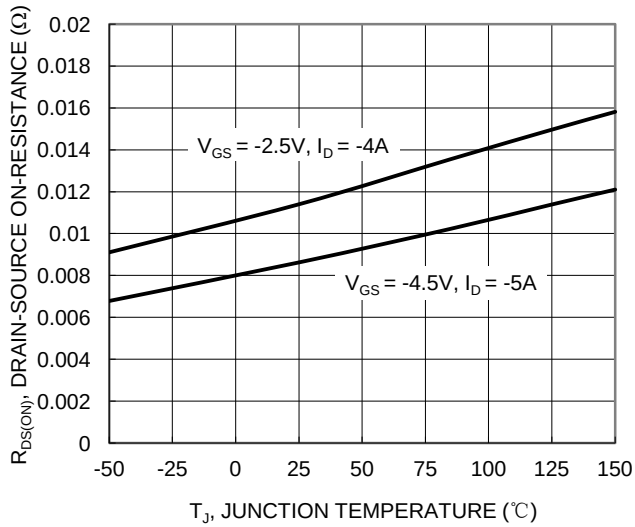


Figure 6. On-Resistance Variation with Temperature



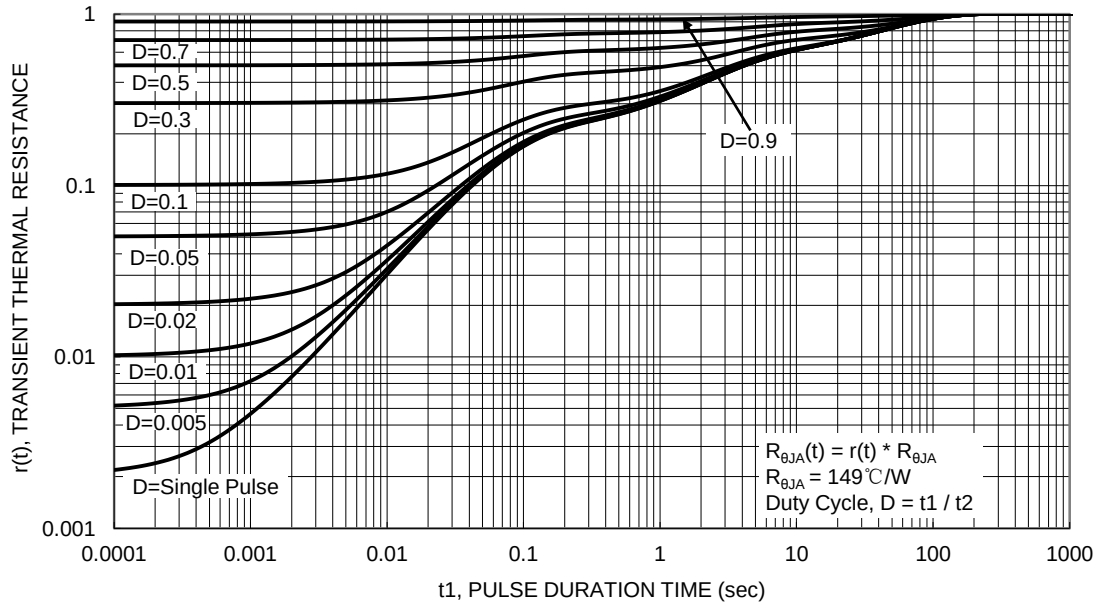
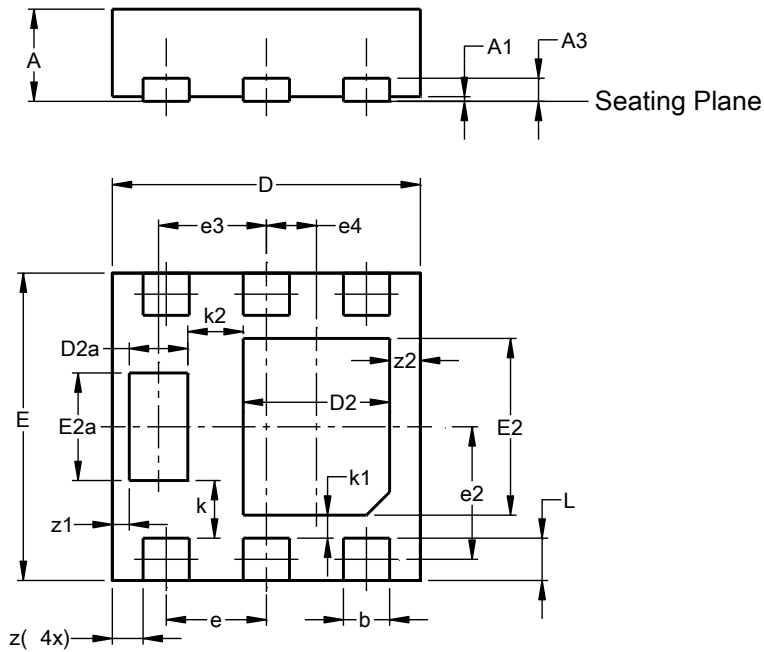


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

U-DFN2020-6 (Type F)

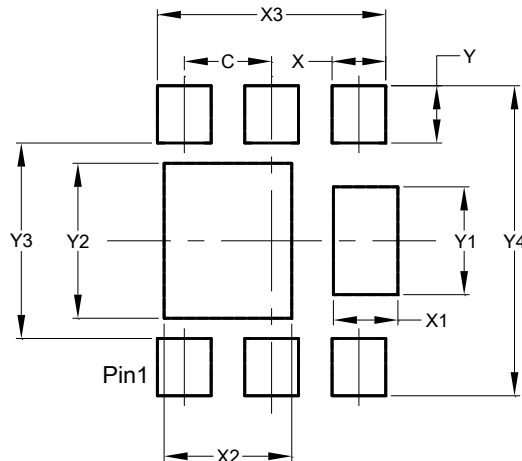


U-DFN2020-6 (Type F)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 BSC		
k2	0.36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