Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
60V	15mΩ @ V_{GS} = 10V	10.0A
	21.5mΩ @ V_{GS} = 4.5V	8.4A

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- 0.6mm Profile—Ideal for Low Profile Applications
- PCB Footprint of 4mm^2
- Low On-Resistance
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description

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

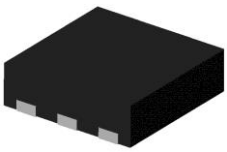
Mechanical Data

- 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)

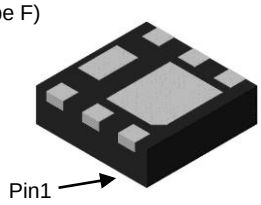
Applications

- DC/DC Converter
- Adaptor Switch
- Wireless Charging

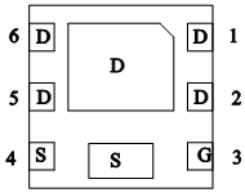
U-DFN2020-6 (Type F)



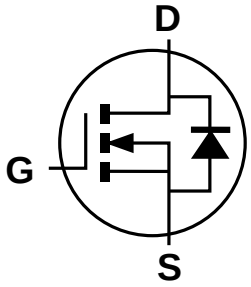
Top View



Bottom View



Pin Out
Bottom View



Equivalent Circuit

Ordering Information (Note 4)

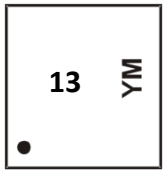
Part Number	Package	Quantity per Reel
DMT6013LFDF-7	U-DFN2020-6 (Type F)	3000
DMT6013LFDF-13	U-DFN2020-6 (Type F)	10,000

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, see https://www.diodes.com/design/support/packaging/diodes-packaging/.

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Marking Information

Site 1:



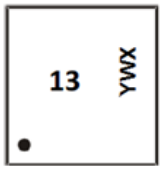
13 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: F = 2018)
M = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	E	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

Site 2:



13 = Product Type Marking Code
YWX = Date Code Marking
Y = Year (ex: 8 = 2018)
W = Week (ex: a = week27; z represents week 52 and 53)
X = Internal code (ex: U = Monday)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
Code	7	8	9	0	1	2	3	4	5

Week	1-26	27-52	53
Code	A-Z	a-z	z

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

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	10.0 8.0	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	60	A
Maximum Body Diode Continuous Current			I_S	10	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	60	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	11.7	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	6.8	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.9	W
	T_A = +70°C		0.58	
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\Theta JA}$	139	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.9	W
	T_A = +70°C		1.2	
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\Theta JA}$	67	°C/W
Total Power Dissipation (Note 6)	T_C = +25°C	P_D	10.8	W
Thermal Resistance, Junction to Case (Note 6)		$R_{\Theta JC}$	11.6	°C/W
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 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	2.3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	12.2	15	mΩ	V_{GS} = 10V, I_D = 8.5A
		—	16.9	21.5		V_{GS} = 4.5V, I_D = 6A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1081	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	253	—		
Reverse Transfer Capacitance	C_{rss}	—	22	—		
Gate Resistance	R_g	—	1.22	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	15	—	nC	V_{DS} = 30V, I_D = 10A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	8.5	—		
Gate-Source Charge	Q_{gs}	—	2.2	—		
Gate-Drain Charge	Q_{gd}	—	4.4	—		
Turn-On Delay Time	$t_{D(ON)}$	—	4.3	—	ns	V_{GS} = 10V, V_{DD} = 30V, R_g = 6Ω,I_D = 10A
Turn-On Rise Time	t_R	—	6.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	15.8	—		
Turn-Off Fall Time	t_F	—	6.1	—		
Body Diode Reverse Recovery Time	t_{RR}	—	19.7	—	ns	I_S = 10A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	9.5	—	nC	

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

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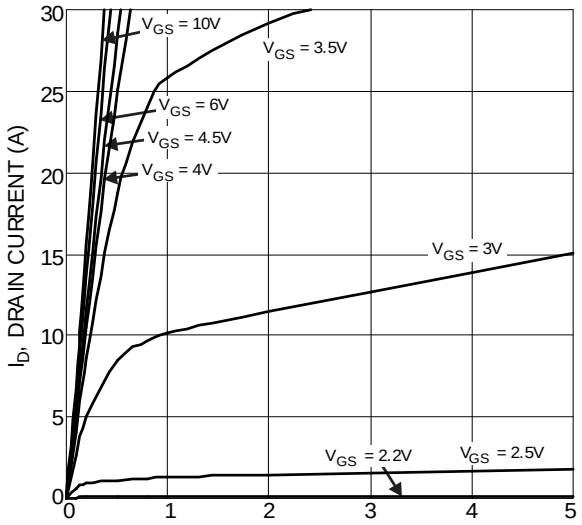


Figure 1 Typical Output Characteristic

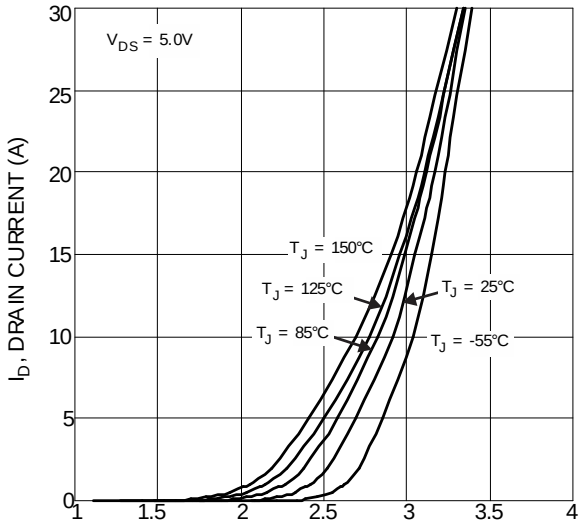


Figure 2 Typical Transfer Characteristics

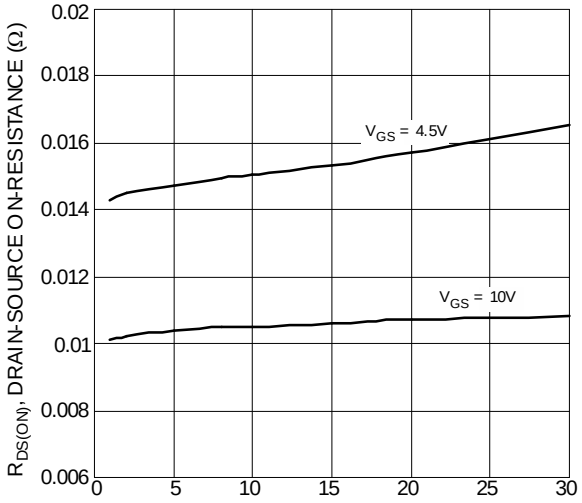


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

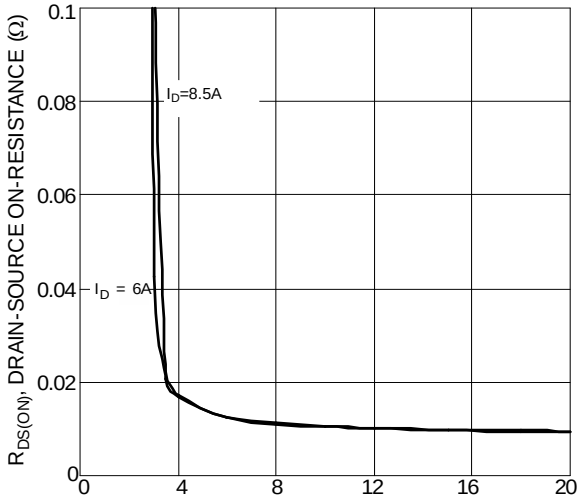


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

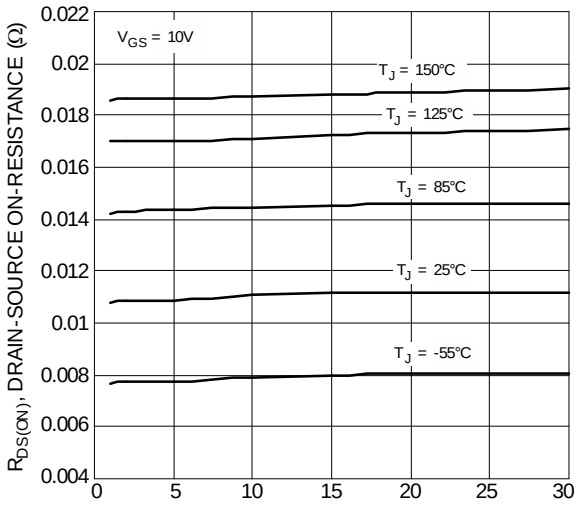


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

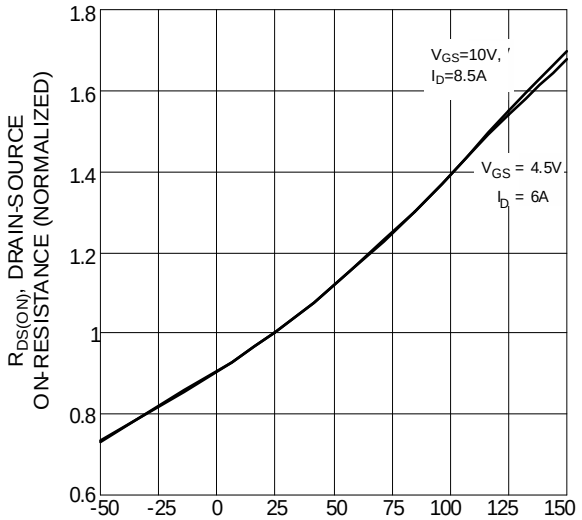


Figure 6 On-Resistance Variation with Temperature

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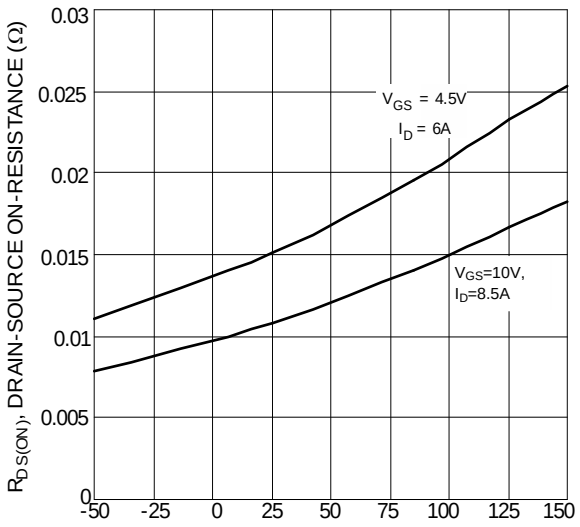


Figure 7 On-Resistance Variation with Temperature

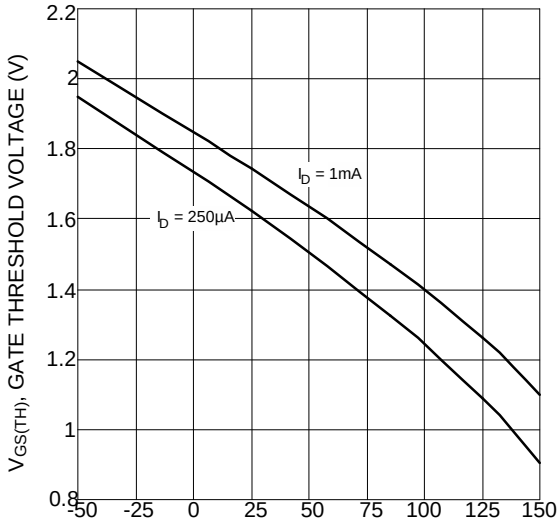


Figure 8 Gate Threshold Variation vs. Junction Temperature

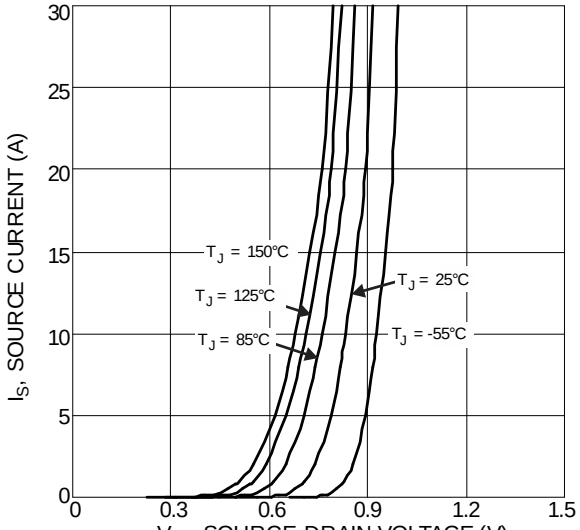


Figure 9 Diode Forward Voltage vs. Current

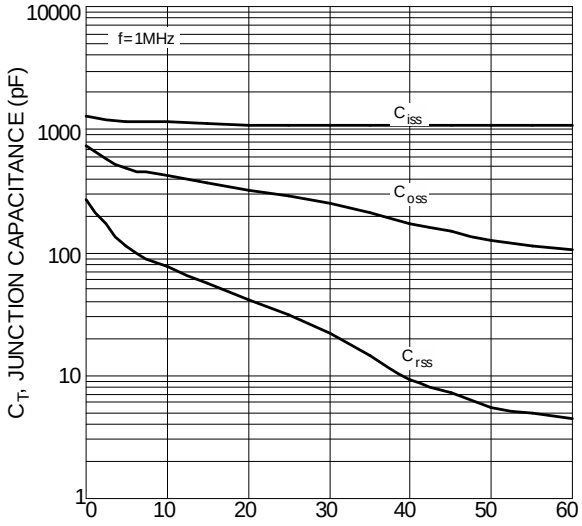


Figure 10 Typical Junction Capacitance

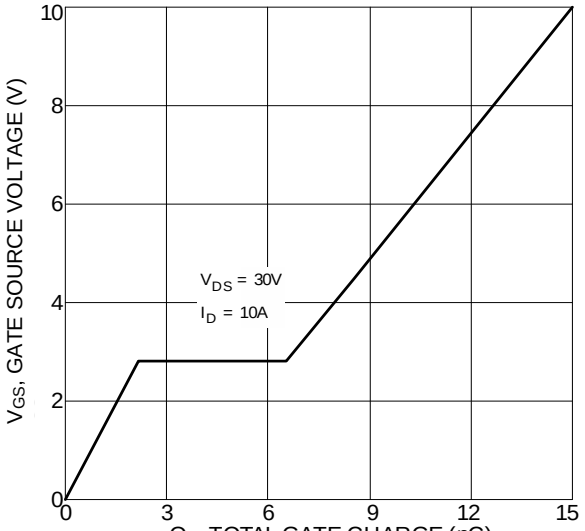


Figure 11 Gate Charge

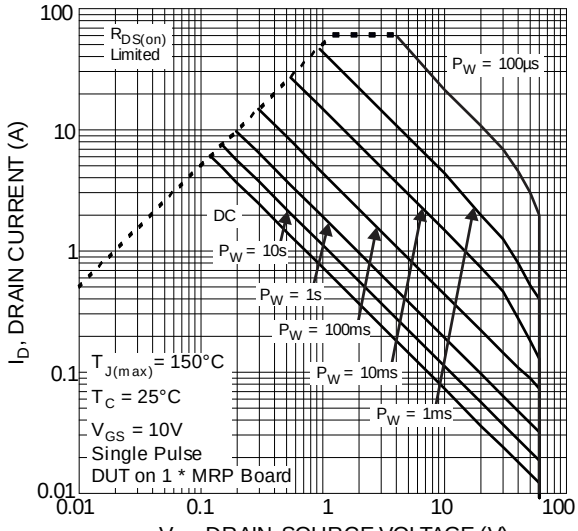


Figure 12 SOA, Safe Operation Area

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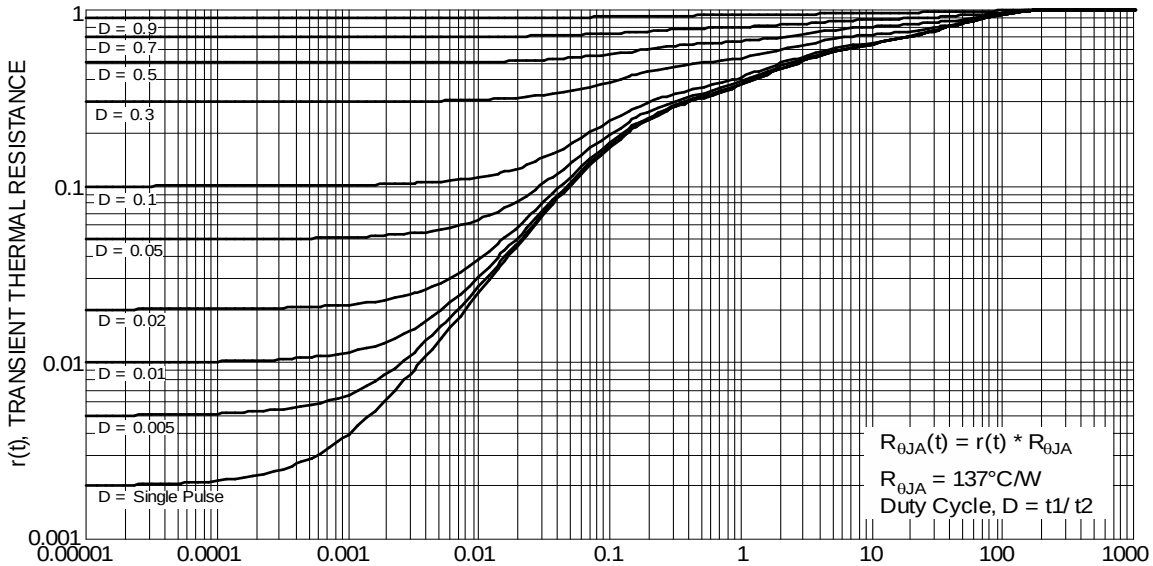


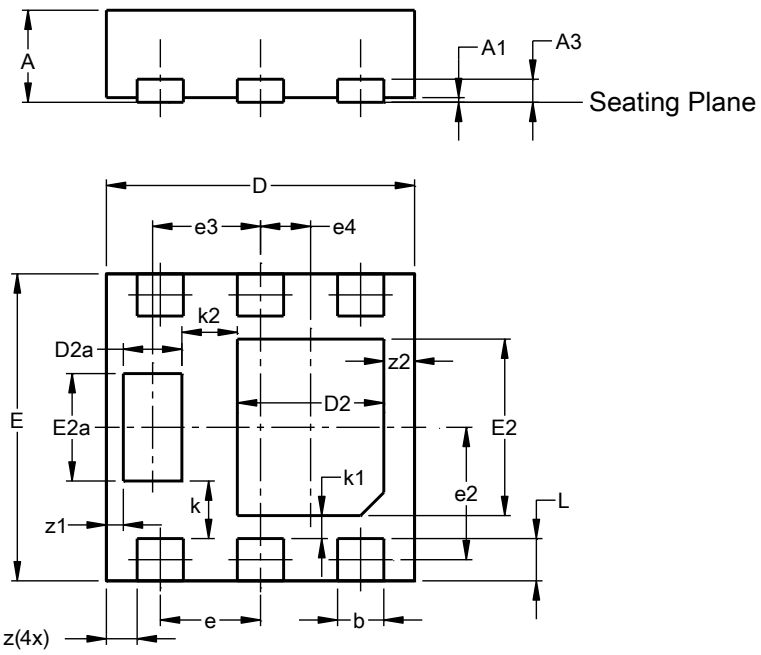
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

U-DFN2020-6 (Type F)

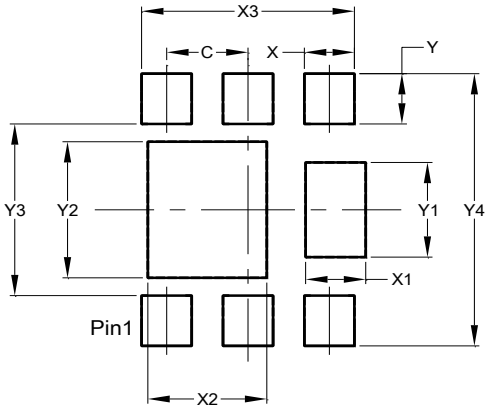


U-DFN2020-6 (Type F)			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0.00	0.05	0.03
A3	-	-	0.15
b	0.25	0.35	0.30
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
D2a	0.33	0.43	0.38
E	1.95	2.05	2.00
E2	1.05	1.25	1.15
E2a	0.65	0.75	0.70
e	0.65 BSC		
e2	0.863 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	0.37 BSC		
k1	0.15 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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1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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