60V +175°C N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
60V	25mΩ @ V_{GS} = 10V	6.2A
	40mΩ @ V_{GS} = 4.5V	5.5A

Features and Benefits

- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production — Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$—Ensures On-State Losses Are Minimized
- 0.6mm Profile—Ideal for Low-Profile Applications
- PCB Footprint of 4mm^2
- Sidewall Plated for Improved Optical Inspection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**
- **An automotive-compliant part is available under separate datasheet (DMTH6030LFDFWQ)**

Description

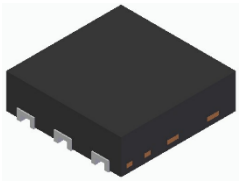
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

- Power-management functions
- DC-DC converters
- Backlighting

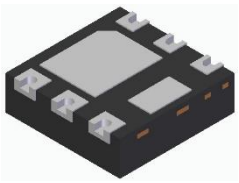
Mechanical Data

- Package: U-DFN2020-6
- Package 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)

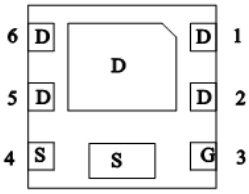
U-DFN2020-6/SWP (Type UXG)



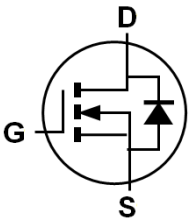
Top View



Bottom View



Pinout
Bottom View



Internal Schematic

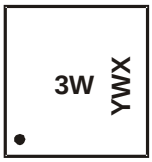
Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMTH6030LFDFW-7	U-DFN2020-6/SWP (Type UXG)	3,000	Reel
DMTH6030LFDFW-13	U-DFN2020-6/SWP (Type UXG)	10,000	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/.

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Marking Information



3W = Product Type Marking Code
YWX = Date Code Marking
Y = Year (ex: 4 = 2024)
W = Week (ex: a = week 27; z represents week 52 and 53)
X = Internal Code (ex: U = Monday)

Date Code Key

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Code	3	4	5	6	7	8	9	0	1	2	3	4

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

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 5) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +100°C	I_D	6.2 4.4	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	41	A
Continuous Source-Drain Diode Current (Note 5)			I_S	2.1	A
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	41	A
Avalanche Current, L = 0.1mH			I_{AS}	17	A
Avalanche Energy, L = 0.1mH			E_{AS}	14.5	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	108.9	°C/W
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	2.1	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	71.3	°C/W
Thermal Resistance, Junction to Case (Note 5)	T_C = +25°C	$R_{\theta JC}$	13.1	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
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 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	2.5	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	19	25	mΩ	V_{GS} = 10V, I_D = 6.5A
			27	40		V_{GS} = 4.5V, I_D = 4A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	452	—	pF	V_{DS} = 30V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	154	—		
Reverse Transfer Capacitance	C_{rss}	—	14.3	—		
Gate Resistance	R_g	—	1.5	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 10V)	Q_g	—	9.3	—	nC	V_{DS} = 30V, I_D = 10A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.1	—		
Gate-Source Charge	Q_{gs}	—	1.2	—		
Gate-Drain Charge	Q_{gd}	—	2.2	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.9	—	ns	V_{GS} = 10V, V_{DS} = 30V R_g = 6Ω, I_D = 10A
Turn-On Rise Time	t_R	—	23.1	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	17.3	—		
Turn-Off Fall Time	t_F	—	32.1	—		
Reverse-Recovery Time	t_{RR}	—	23	—	ns	I_F = 10A, di/dt = 100A/µs
Reverse-Recovery Charge	Q_{RR}	—	12.6	—	nC	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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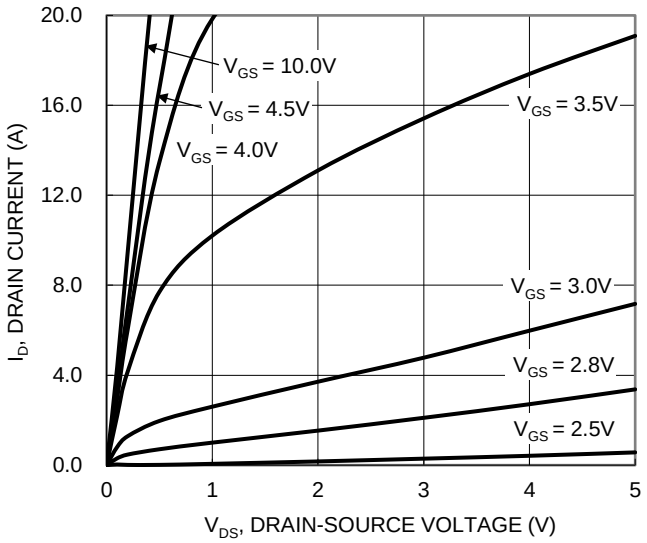


Figure 1. Typical Output Characteristic

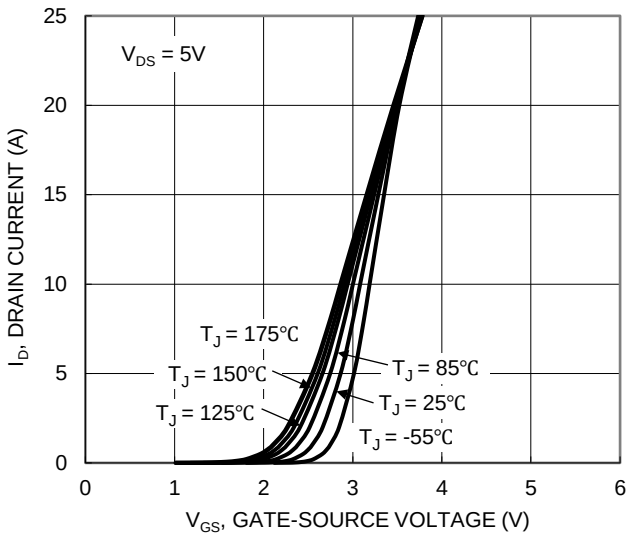


Figure 2. Typical Transfer Characteristic

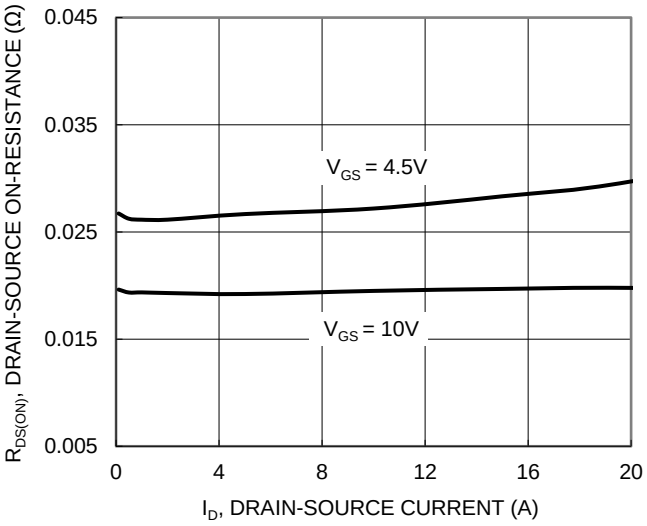


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

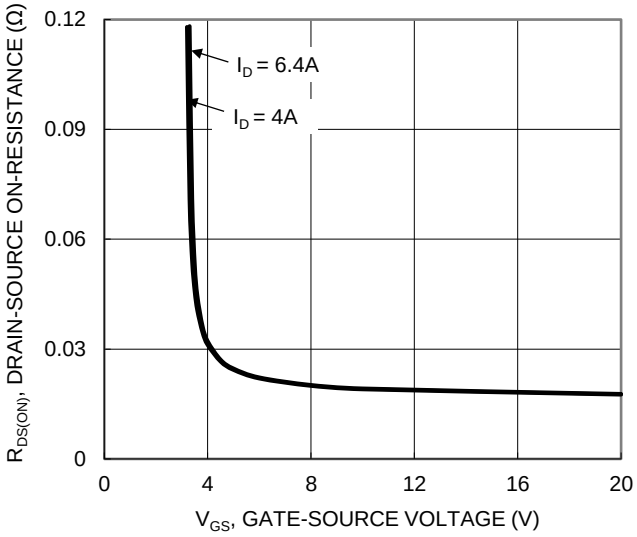


Figure 4. Typical Transfer Characteristic

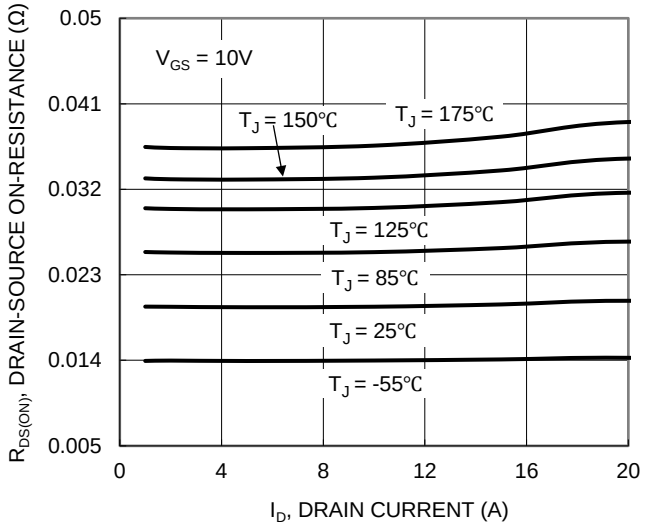


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

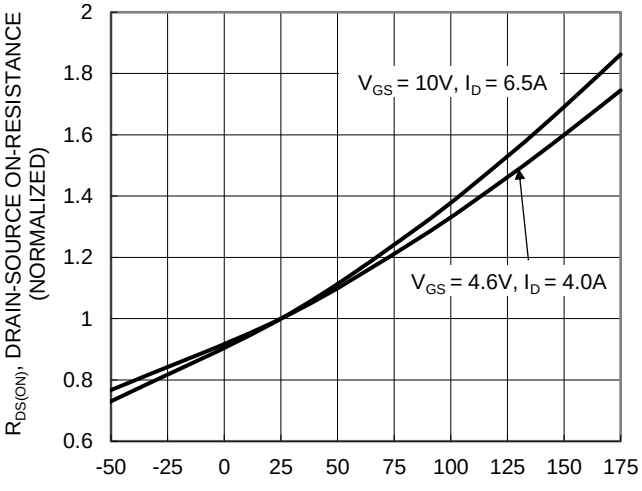


Figure 6. On-Resistance Variation with Junction Temperature

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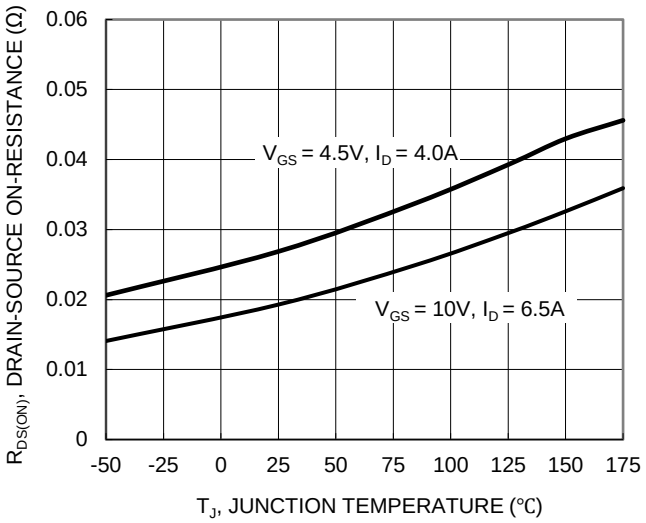


Figure 7. On-Resistance Variation with Junction Temperature

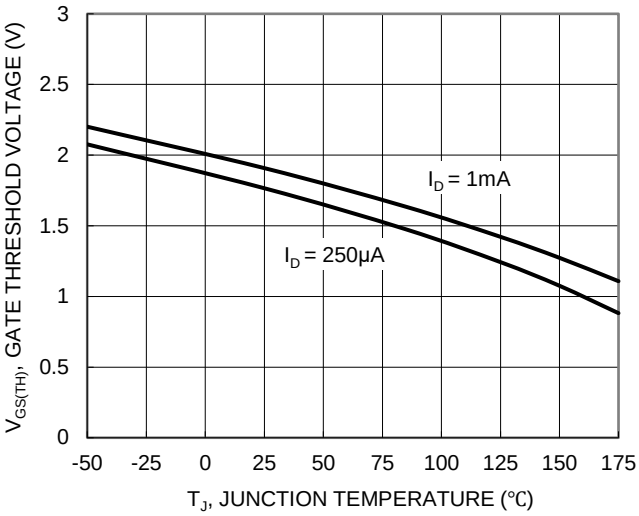


Figure 8. Gate Threshold Variation vs. Junction Temperature

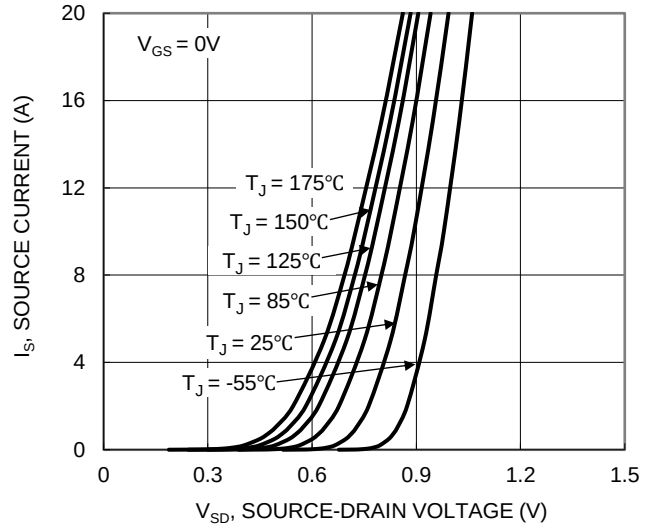


Figure 9. Diode Forward Voltage vs. Current

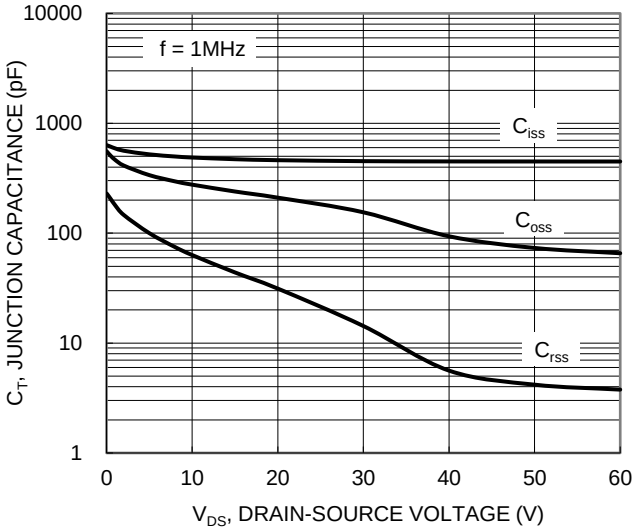


Figure 10. Typical Junction Capacitance

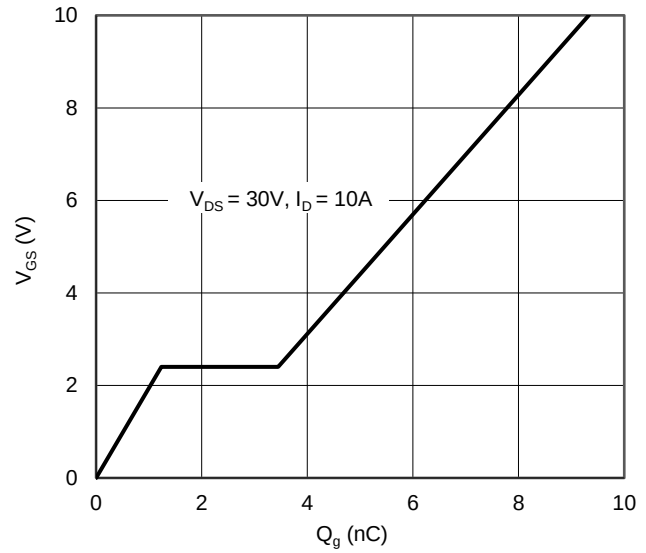


Figure 11. Gate Charge

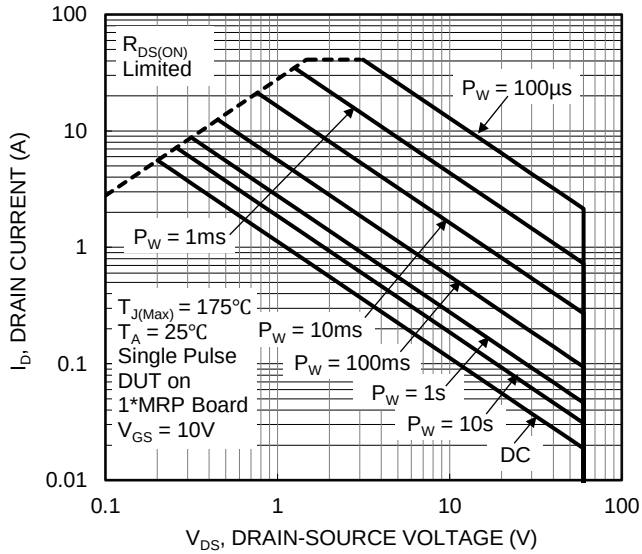


Figure 12. SOA, Safe Operation Area

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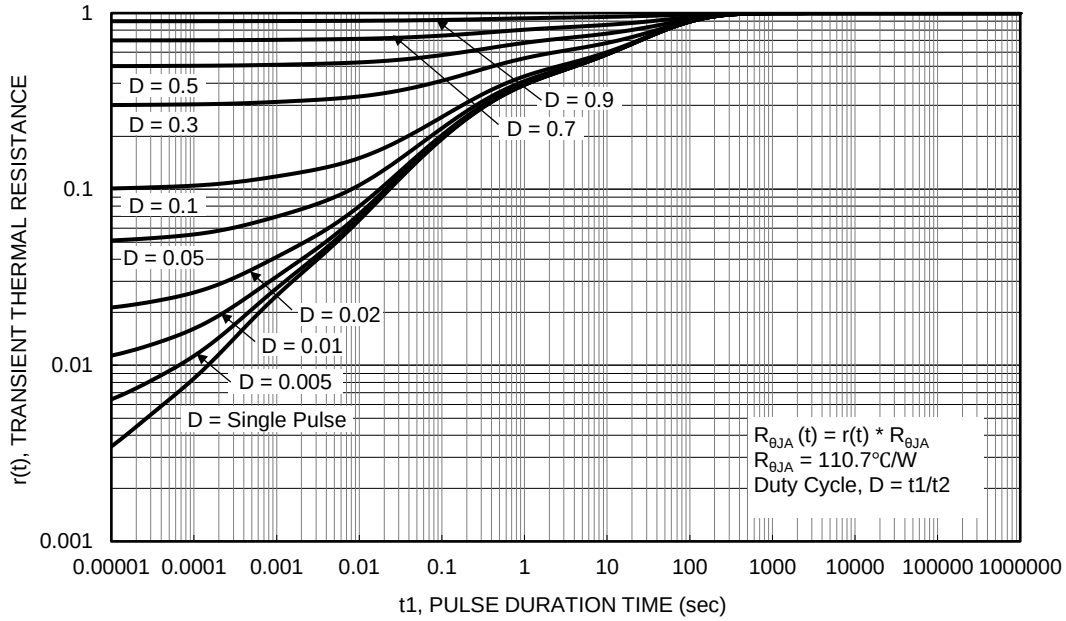


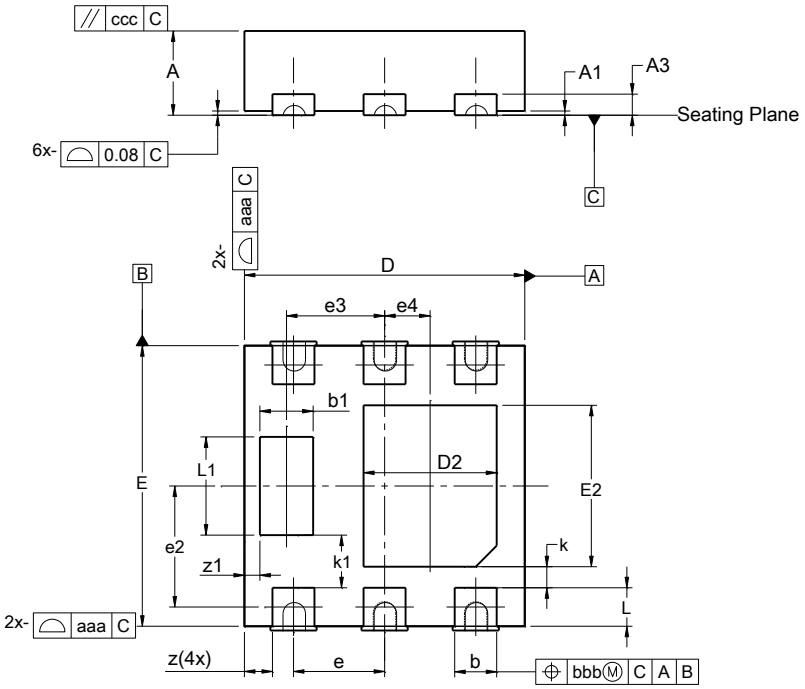
Figure 13. Transient Thermal Resistance

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Package Outline Dimensions

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

U-DFN2020-6/SWP (Type UXG)

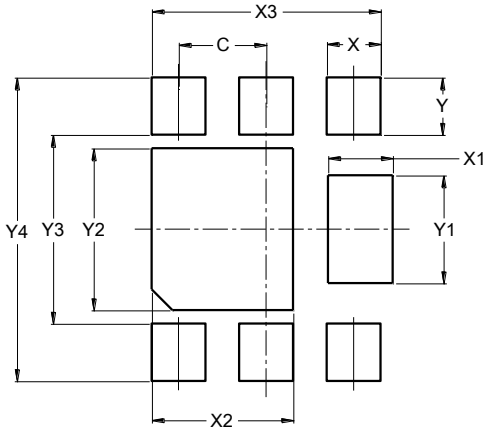


U-DFN2020-6/SWP (Type UXG)			
Dim	**Min**	**Max**	**Typ**
A	0.59	0.65	0.62
A1	0.00	0.05	0.03
A3	—	—	0.152
b	0.28	0.38	0.33
b1	0.35	0.45	0.40
D	1.95	2.05	2.00
D2	0.87	1.07	0.97
E	1.95	2.05	2.00
E2	1.07	1.27	1.17
e	0.65 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
L	0.225	0.325	0.275
L1	0.67	0.77	0.72
k	—	—	0.15
k1	—	—	0.375
z	—	—	0.20
z1	—	—	0.11
aaa	0.25		
bbb	0.10		
ccc	0.10		
All Dimensions in mm			

Suggested Pad Layout

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

U-DFN2020-6/SWP (Type UXG)



Dimensions	Value (in mm)
C	0.650
X	0.350
X1	0.480
X2	1.050
X3	1.700
Y	0.425
Y1	0.800
Y2	1.200
Y3	1.400
Y4	2.250

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