

Product Summary

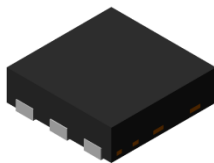
BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
40V	11.5mΩ @ V _{GS} = 10V	11.6A
	18mΩ @ V _{GS} = 4.5V	9.3A

Description

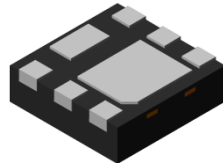
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Power Management Functions
- DC-DC Converters
- Backlighting

U-DFN2020-6 (SWP) (Type F)



Top View



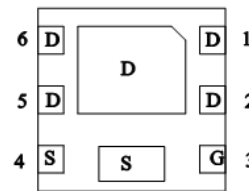
Bottom View

Features

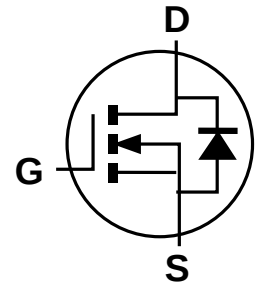
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching – Ensures More Reliable and Robust End Application
- Low R_{DS(ON)} – Ensures On State Losses Are Minimized
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- **Totally 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 (SWP) (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 - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 
- Weight: 0.0065 grams (Approximate)



Pin Out
Bottom View



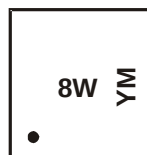
Internal Schematic

Ordering Information (Note 5)

Part Number	Case	Quantity Per Reel
DMTH4008LFDFWQ-7	U-DFN2020-6 (SWP) (Type F)	3,000
DMTH4008LFDFWQ-13	U-DFN2020-6 (SWP) (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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



8W = 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
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}	40	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Note 7) V _{GS} = 10V	I _D	T _A = +25°C 11.6	A
		T _A = +100°C 8.2	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	80	A
Continuous Source-Drain Diode Current (Note 7)	I _S	2.55	A
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	80	A
Avalanche Current, L = 0.3mH (Note 8)	I _{AS}	14.7	A
Avalanche Energy, L = 0.3mH (Note 8)	E _{AS}	32.4	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P _D	0.99	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	153	°C/W
Total Power Dissipation (Note 7)	P _D	2.35	W
Thermal Resistance, Junction to Ambient (Note 7)	R _{θJA}	64.5	°C/W
Thermal Resistance, Junction to Case (Note 7)	R _{θJC}	14.8	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°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}	40	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	µA	V _{DS} = 32V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1	1.7	3	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	9.1	11.5	mΩ	V _{GS} = 10V, I _D = 10A
			12.9	18		V _{GS} = 4.5V, I _D = 8.5A
Diode Forward Voltage	V _{SD}	—	0.8	1.0	V	V _{GS} = 0V, I _S = 10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	1030	—	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	324	—		
Reverse Transfer Capacitance	C _{rss}	—	27	—		
Gate Resistance	R _g	—	1.82	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	6.8	—	nC	V _{DD} = 20V, I _D = 10A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	14.2	—		
Gate-Source Charge	Q _{gs}	—	2.0	—		
Gate-Drain Charge	Q _{gd}	—	2.7	—		
Turn-On Delay Time	t _{D(ON)}	—	3.1	—	ns	V _{DD} = 20V, V _{GS} = 10V, R _g = 6Ω, I _D = 10A
Turn-On Rise Time	t _r	—	3.1	—		
Turn-Off Delay Time	t _{D(OFF)}	—	14.2	—		
Turn-Off Fall Time	t _f	—	5.8	—		
Reverse Recovery Time	t _{RR}	—	19.6	—	ns	I _F = 10A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	8.2	—	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.

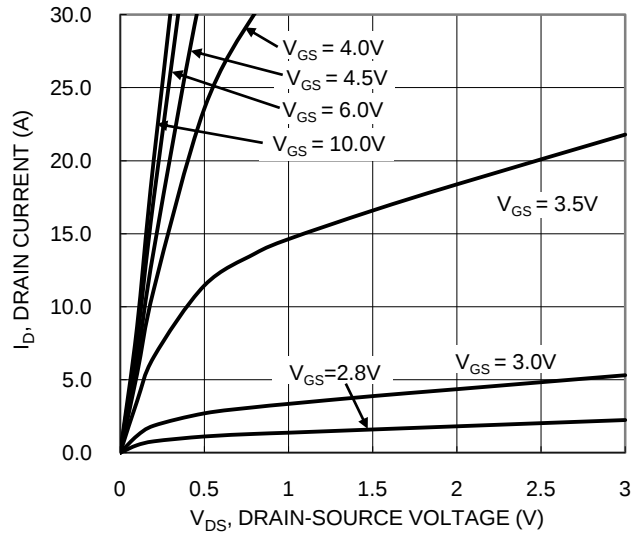


Figure 1. Typical Output Characteristic

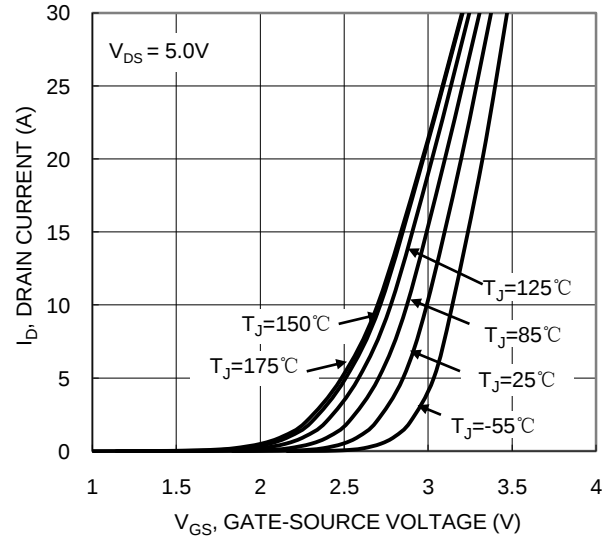


Figure 2. Typical Transfer Characteristic

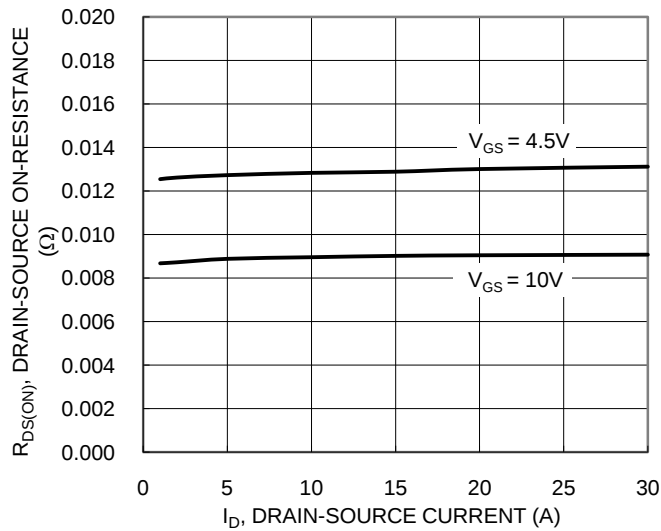


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

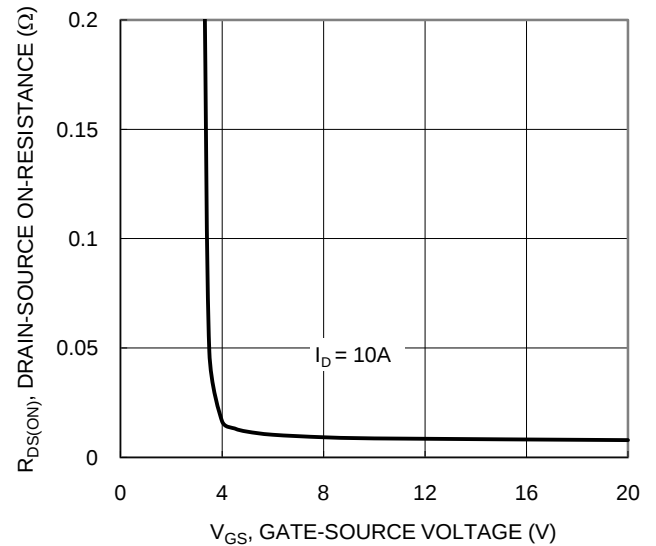


Figure 4. Typical Transfer Characteristic

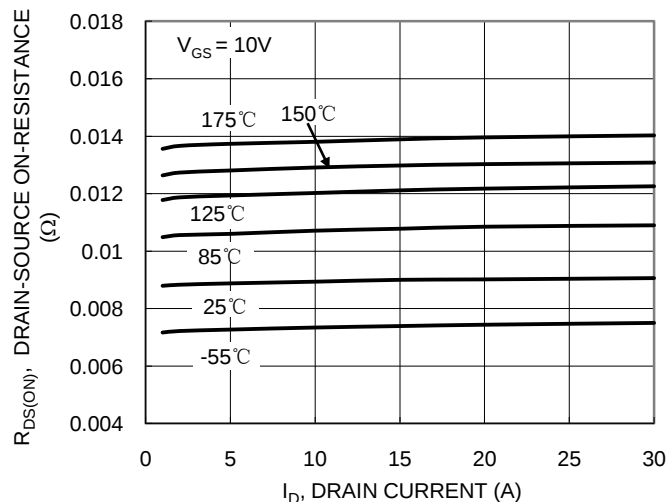


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

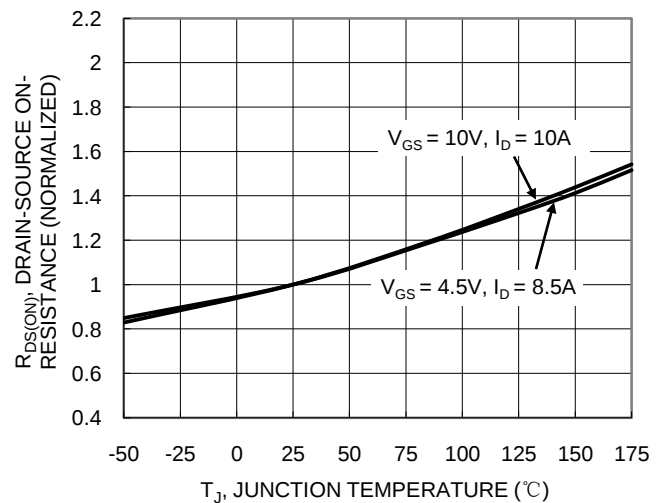
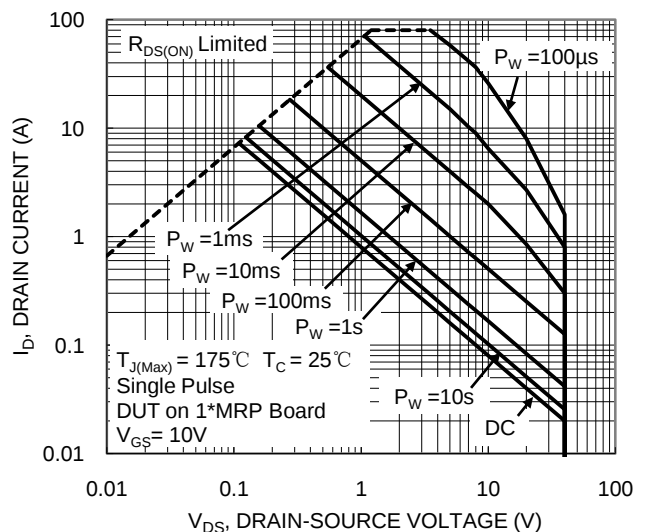
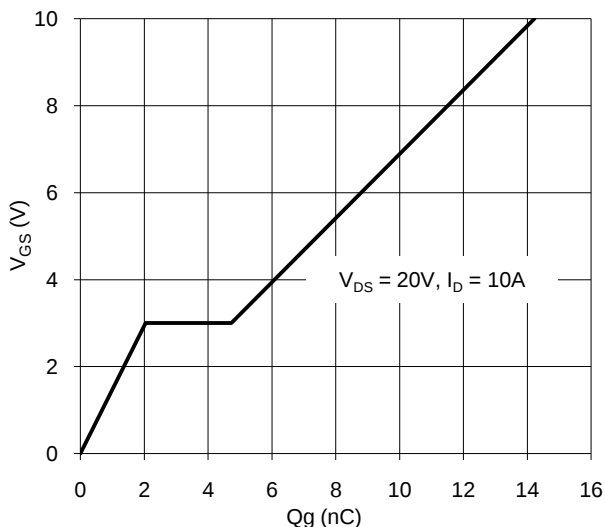
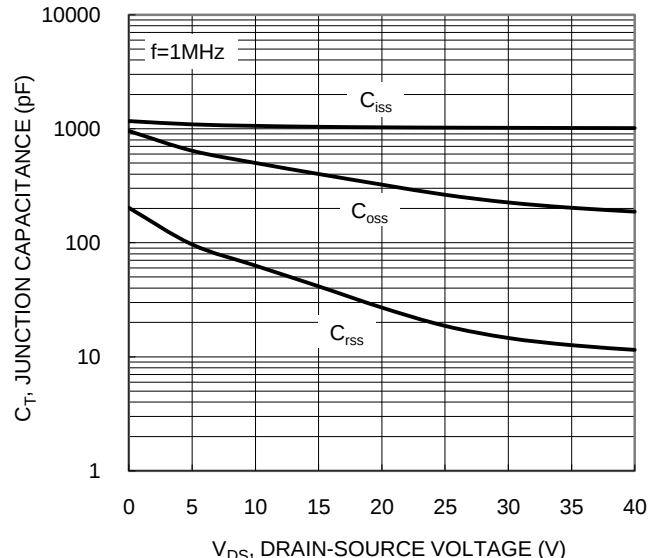
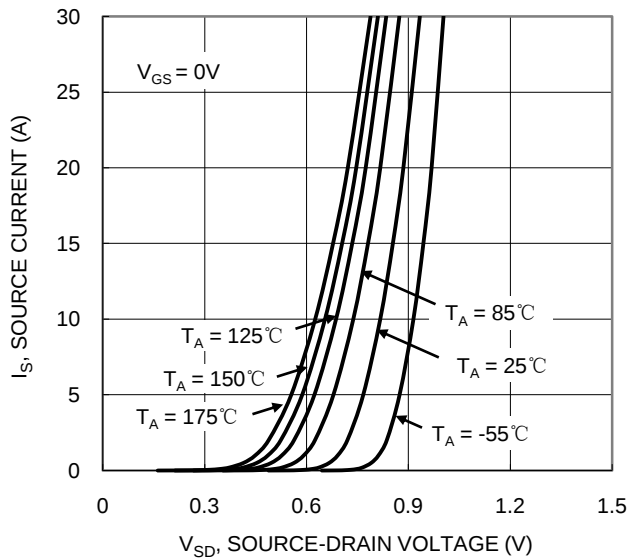
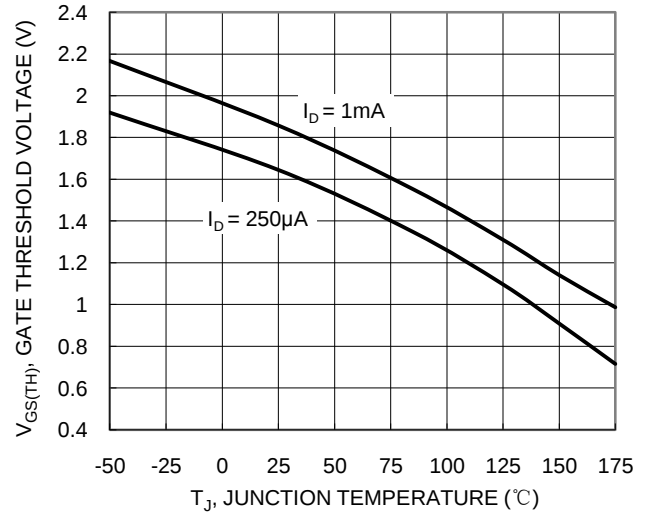
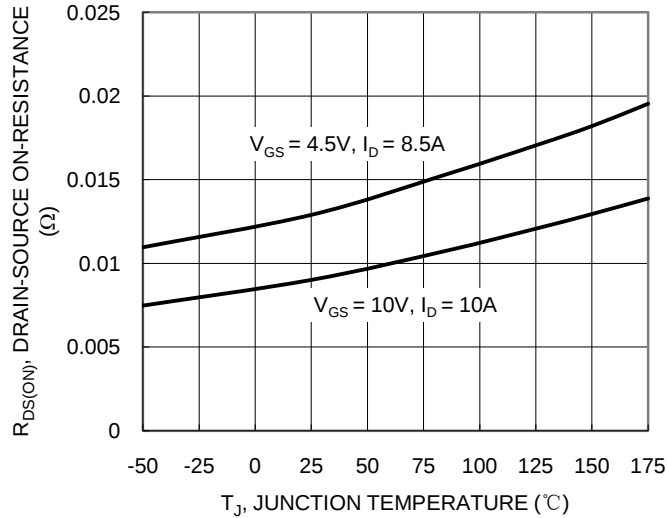


Figure 6. On-Resistance Variation with Temperature



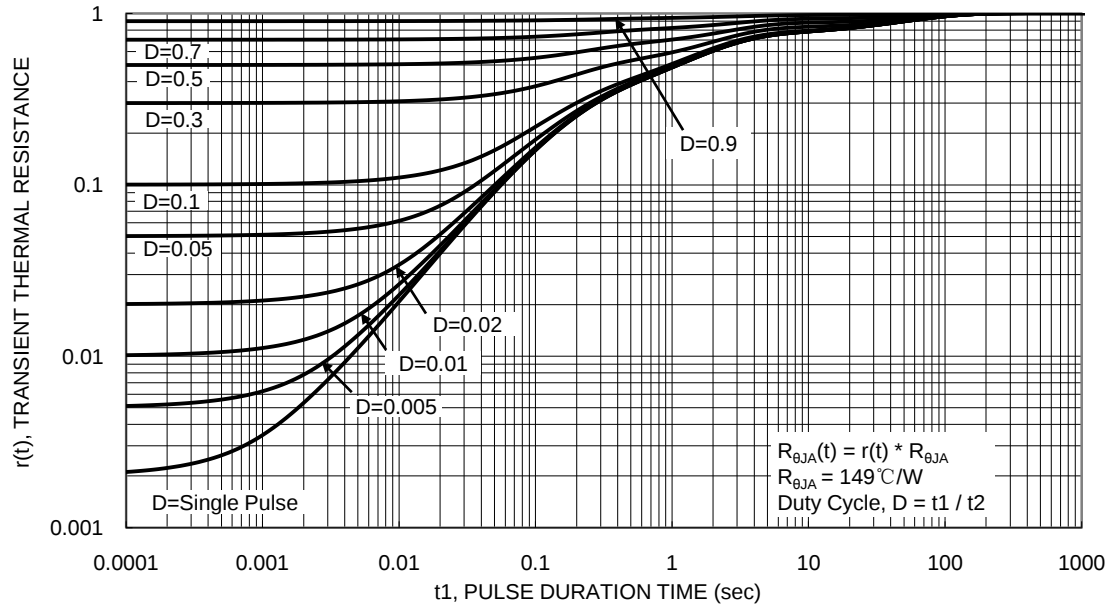
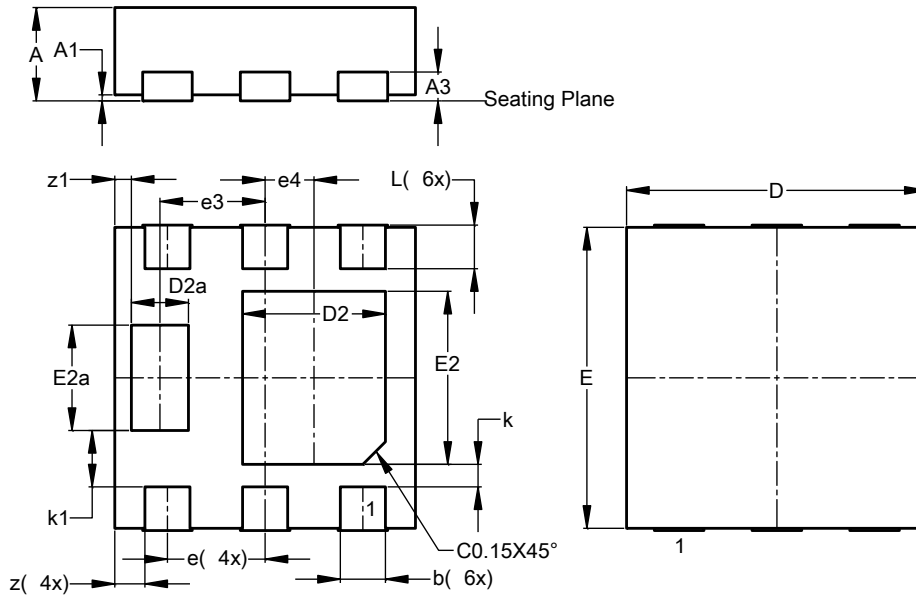


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

U-DFN2020-6 (SWP) (Type F)

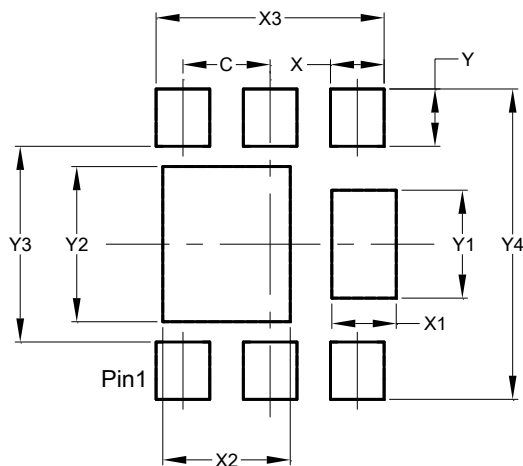


U-DFN2020-6 (SWP) (Type F)			
Dim	Min	Max	Typ
A	0.59	0.65	0.62
A1	0.00	0.05	0.03
A3	-	-	0.192
b	0.28	0.38	0.33
D	1.95	2.05	2.00
D2	0.87	1.07	0.97
D2a	0.35	0.45	0.40
E	1.95	2.05	2.00
E2	1.07	1.27	1.17
E2a	0.67	0.77	0.72
e	0.65 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	--	--	0.15
k1	--	--	0.375
L	0.225	0.355	0.305
z	--	--	0.20
z1	--	--	0.11
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 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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