

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
60V	18mΩ @ V _{GS} = 10V	9.4A
	27.5mΩ @ V _{GS} = 4.5V	7.6A

Description

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

- Power Management Functions
- DC-DC Converters
- Backlighting

Features

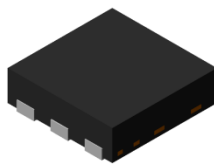
- Rated to +175°C—Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production: Ensures More Reliable and Robust End Application
- Low R_{DS(ON)}—Ensures On-State Losses Are Minimized
- 0.6mm Profile—Ideal for Low-Profile Applications
- PCB Footprint of 4mm²
- Sidewall Plated for Improved Optical Inspection
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. “Green” Device (Note 3)**
- **The DMTH6016LDFWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

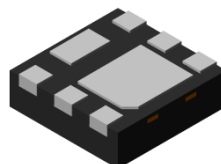
Mechanical Data

- 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—Matte Tin Annealed over Copper Lead-Frame; Solderable per MIL-STD-202, Method 208 ^(e3)
- Weight: 0.007 grams (Approximate)

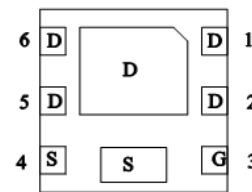
U-DFN2020-6 (SWP) (Type F)



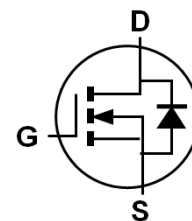
Top View



Bottom View



Pin Out
Bottom View



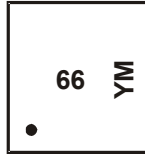
Internal Schematic

Ordering Information (Note 4 & 5)

Part Number	Case	Quantity Per Reel
DMTH6016LDFWQ-7	U-DFN2020-6 (SWP) (Type F)	3,000
DMTH6016LDFWQ-7R	U-DFN2020-6 (SWP) (Type F)	3,000
DMTH6016LDFWQ-13	U-DFN2020-6 (SWP) (Type F)	10,000
DMTH6016LDFWQ-13R	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. The options -7 and -7R stand for different taping orientations. Please refer to Diodes Incorporated's website at <https://www.diodes.com> for further details.
 5. For packaging details, see <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



66 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

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

Month Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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}	60	V	
Gate-Source Voltage	V _{GSS}	±20	V	
Continuous Drain Current (Note 7) V _{GS} = 10V	I _D	T _A = +25°C	9.4	A
		T _A = +100°C	6.6	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	70	A	
Continuous Source-Drain Diode Current (Note 7)	I _S	3.0	A	
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)	I _{SM}	70	A	
Avalanche Current, L = 0.1mH	I _{AS}	15.3	A	
Avalanche Energy, L = 0.1mH	E _{AS}	11.7	mJ	

Thermal Characteristics

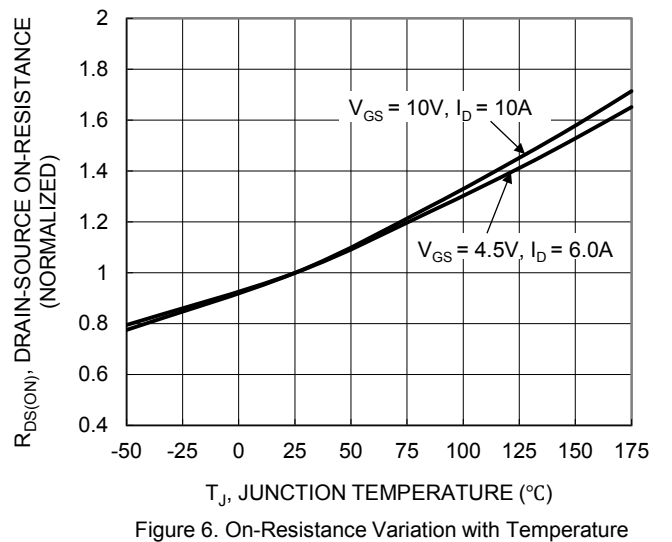
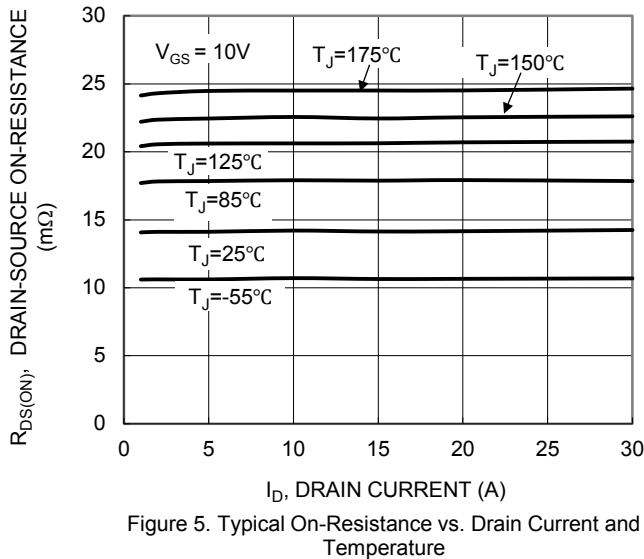
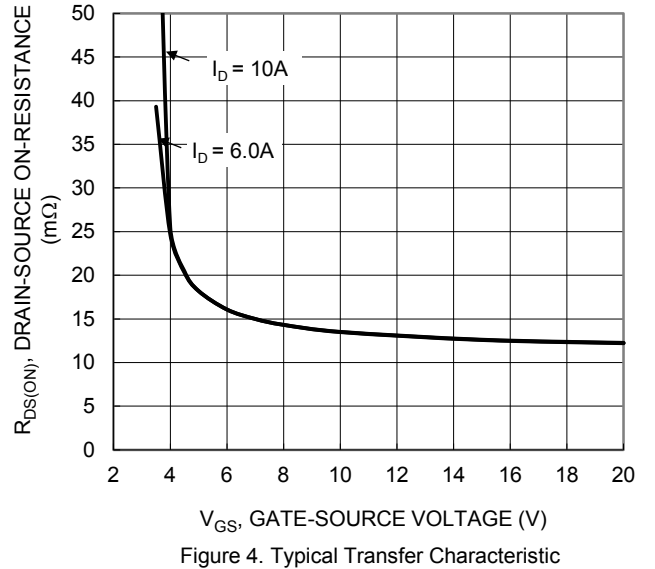
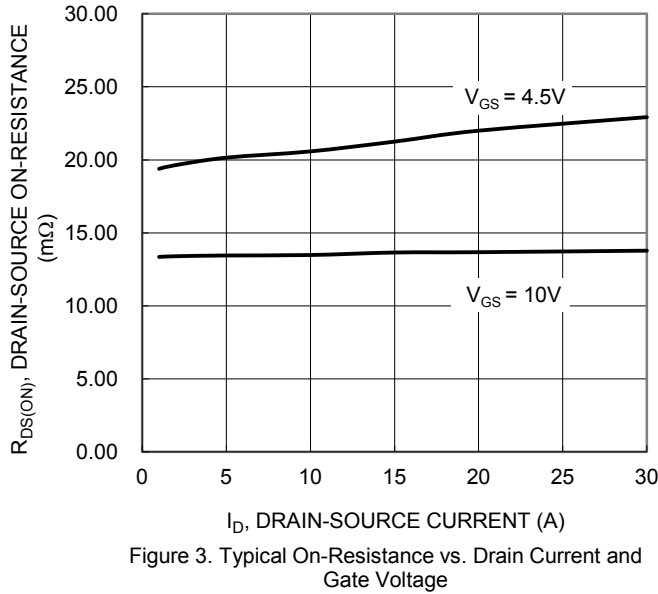
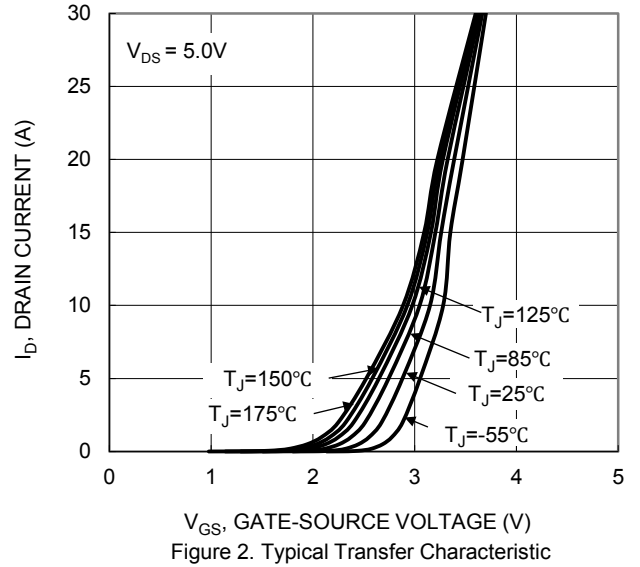
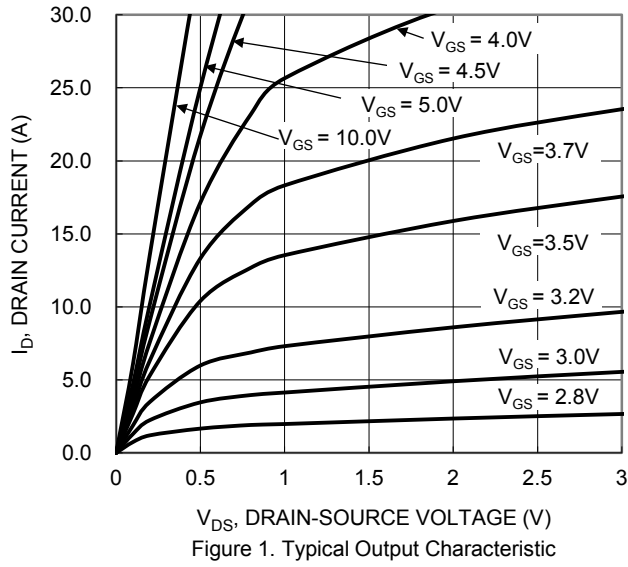
Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 6)	P _D	T _A = +25°C	1.06	W
Thermal Resistance, Junction to Ambient (Note 6)		R _{θJA}	141	
Total Power Dissipation (Note 7)	P _D	T _A = +25°C	2.3	W
Thermal Resistance, Junction to Ambient (Note 7)		R _{θJA}	63	
Thermal Resistance, Junction to Case (Note 7)	R _{θJC}	9.6	°C/W	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +175	°C	

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.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 48V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	13.8	18	m Ω	$V_{GS} = 10V, I_D = 10A$
			20.3	27.5		$V_{GS} = 4.5V, I_D = 6A$
Diode Forward Voltage	V_{SD}	—	—	1.0	V	$V_{GS} = 0V, I_S = 10A$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	925	—	pF	$V_{DS} = 30V, V_{GS} = 0V,$ $f = 1MHz$
Output Capacitance	C_{oss}	—	242	—		
Reverse Transfer Capacitance	C_{rss}	—	25.4	—		
Gate Resistance	R_g	—	1.3	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge ($V_{GS} = 4.5V$)	Q_g	—	7.5	—	nC	$V_{DS} = 30V, I_D = 10A$
Total Gate Charge ($V_{GS} = 10V$)	Q_g	—	15.3	—		
Gate-Source Charge	Q_{gs}	—	2.6	—		
Gate-Drain Charge	Q_{gd}	—	3.5	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.2	—	ns	$V_{GS} = 10V, V_{DS} = 30V,$ $R_g = 6\Omega, I_D = 10A$
Turn-On Rise Time	t_R	—	4.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	14.5	—		
Turn-Off Fall Time	t_F	—	7.2	—		
Reverse Recovery Time	t_{RR}	—	20.8	—	ns	$I_F = 10A, di/dt = 100A/\mu s$
Reverse Recovery Charge	Q_{RR}	—	11.4	—	nC	

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



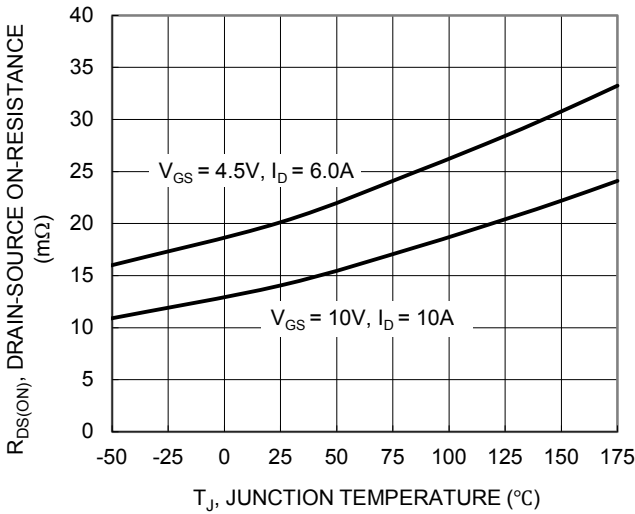


Figure 7. On-Resistance Variation with Temperature

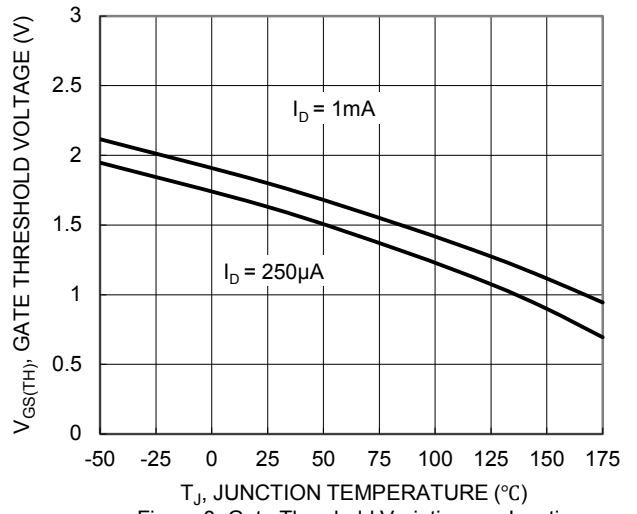


Figure 8. Gate Threshold Variation vs. Junction Temperature

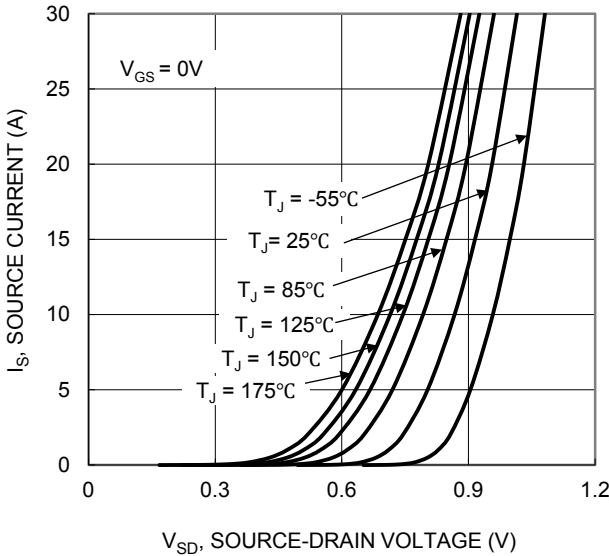


Figure 9. Diode Forward Voltage vs. Current

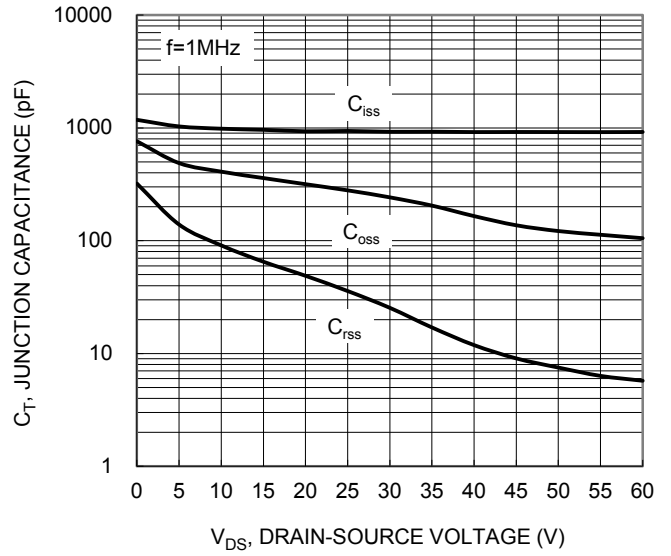


Figure 10. Typical Junction Capacitance

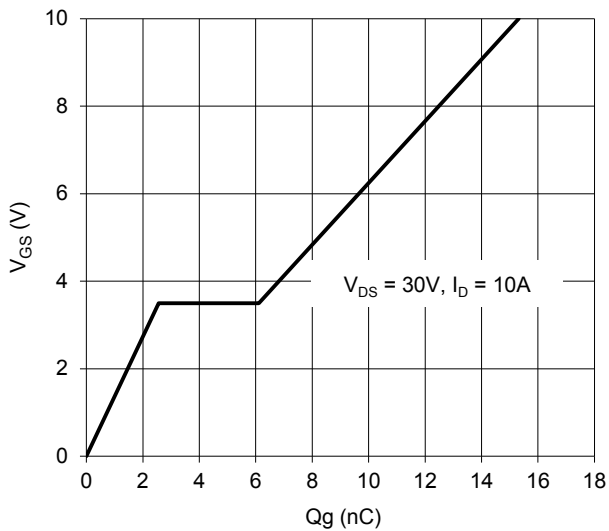


Figure 11. Gate Charge

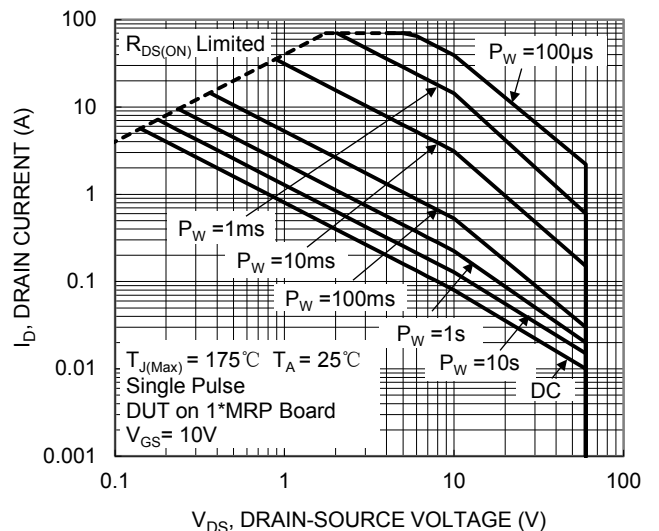


Figure 12. SOA, Safe Operation Area

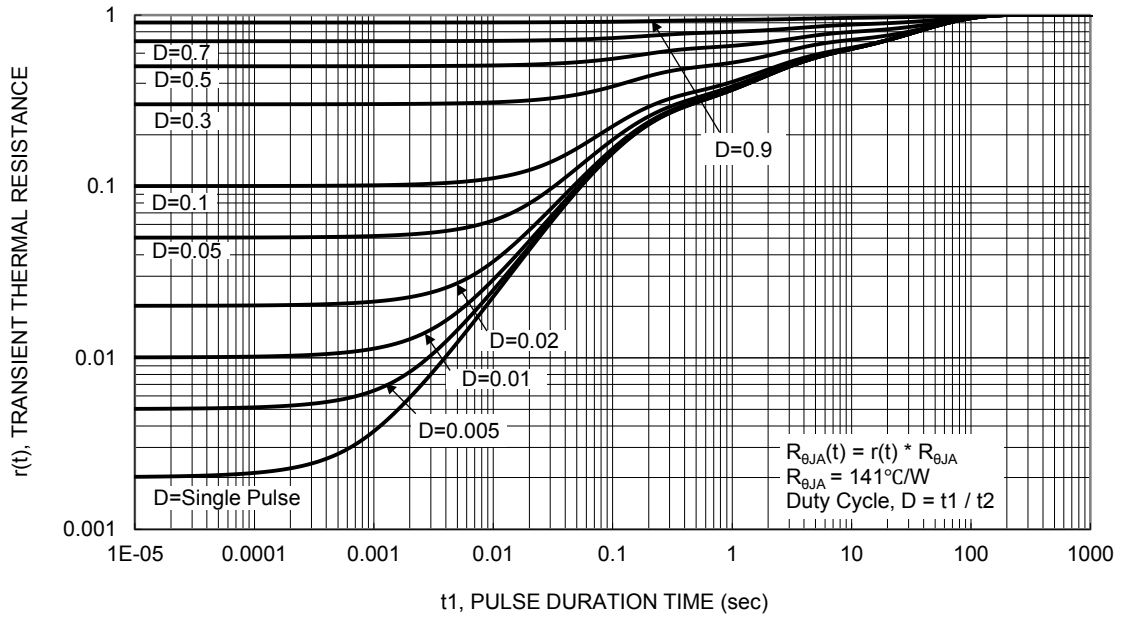
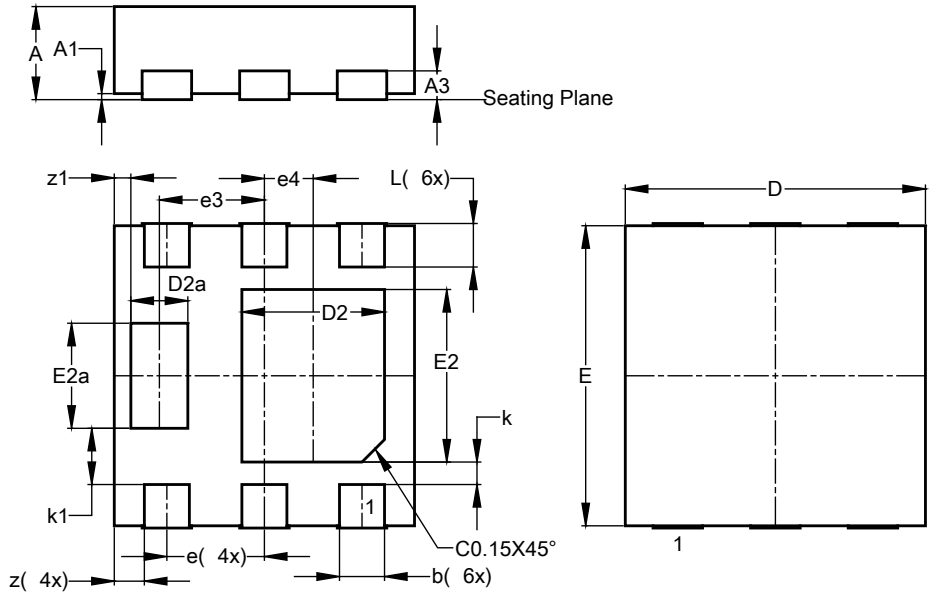


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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

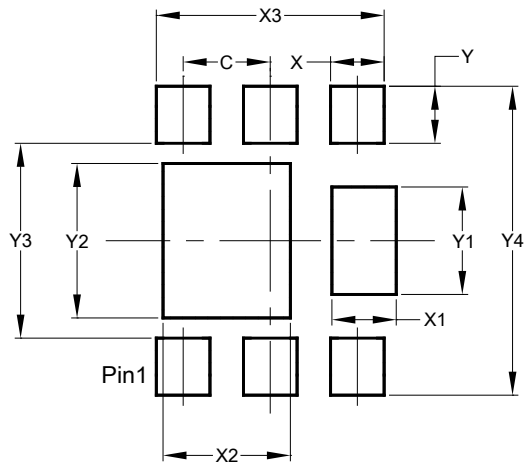


U-DFN2020-6 (SWP) (Type F)			
Dim	Min	Max	Typ
A	0.59	0.65	0.62
A1	0.00	0.05	0.03
A3	-	-	0.192
b	0.28	0.38	0.33
D	1.95	2.05	2.00
D2	0.87	1.07	0.97
D2a	0.35	0.45	0.40
E	1.95	2.05	2.00
E2	1.07	1.27	1.17
E2a	0.67	0.77	0.72
e	0.65 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	--	--	0.15
k1	--	--	0.375
L	0.225	0.355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