

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

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/>

Description

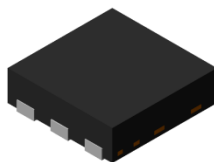
This MOSFET is designed to meet the stringent requirements of automotive applications. The device is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Power Management Functions
- DC-DC Converters
- Backlighting

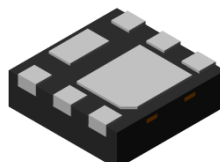
Mechanical Data

- 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)

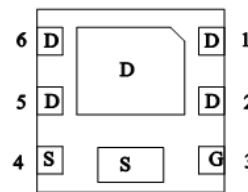
U-DFN2020-6 (SWP) (Type F)



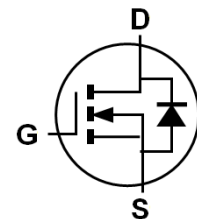
Top View



Bottom View



Pin Out
Bottom View



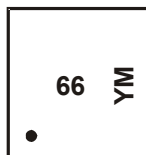
Internal Schematic

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 7) $V_{GS} = 10\text{V}$	I_D	$T_A = +25^\circ\text{C}$: 9.4 $T_A = +100^\circ\text{C}$: 6.6	A
Pulsed Drain Current (10 μs 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 (10 μs Pulse, Duty Cycle = 1%)	I_{SM}	70	A
Avalanche Current, $L = 0.1\text{mH}$	I_{AS}	15.3	A
Avalanche Energy, $L = 0.1\text{mH}$	E_{AS}	11.7	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6) $T_A = +25^\circ\text{C}$	P_D	1.06	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	141	$^\circ\text{C/W}$
Total Power Dissipation (Note 7) $T_A = +25^\circ\text{C}$	P_D	2.3	W
Thermal Resistance, Junction to Ambient (Note 7)	$R_{\theta JA}$	63	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 7) $T_C = +25^\circ\text{C}$	$R_{\theta JC}$	9.6	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$

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.

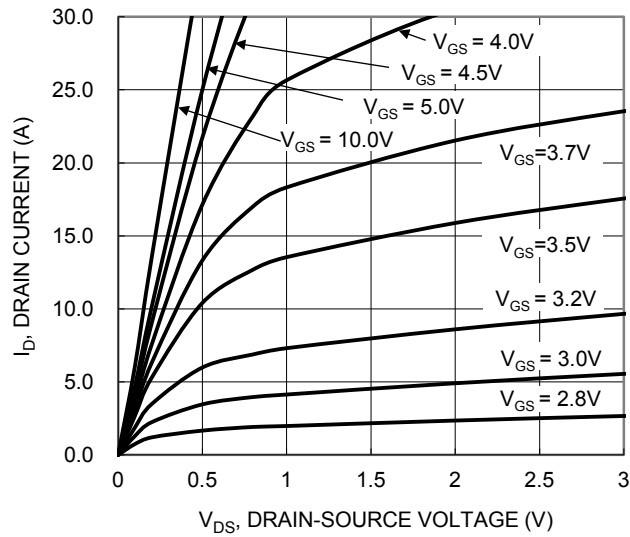


Figure 1. Typical Output Characteristic

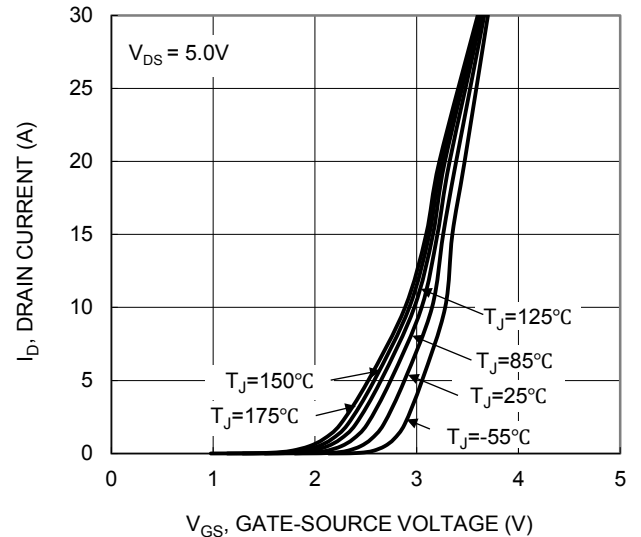


Figure 2. Typical Transfer Characteristic

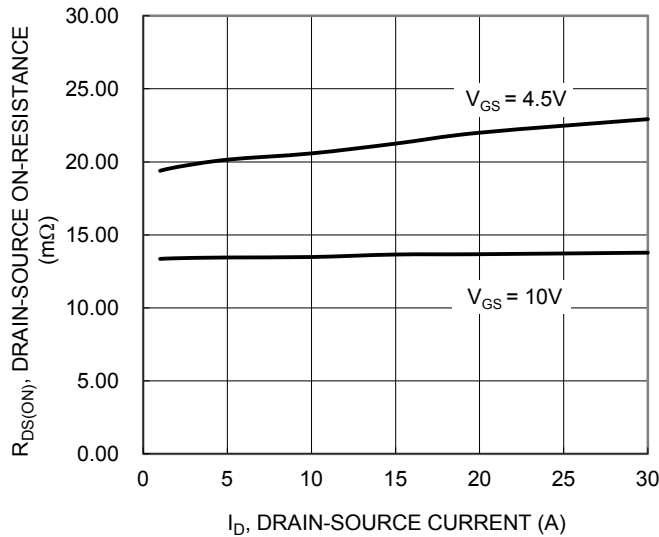


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

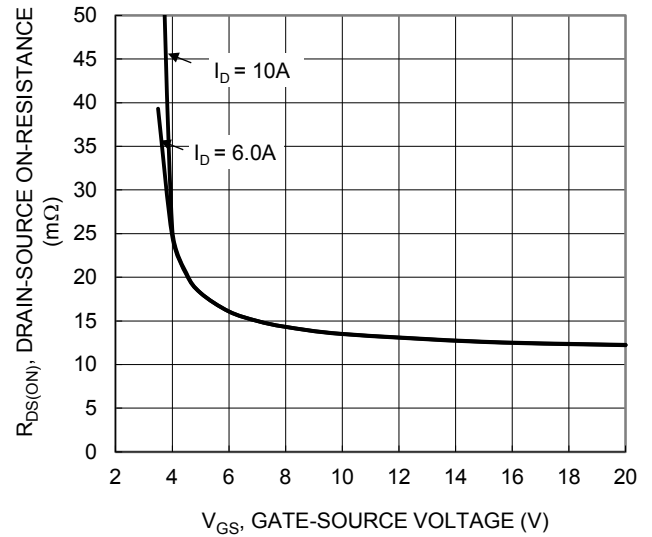


Figure 4. Typical Transfer Characteristic

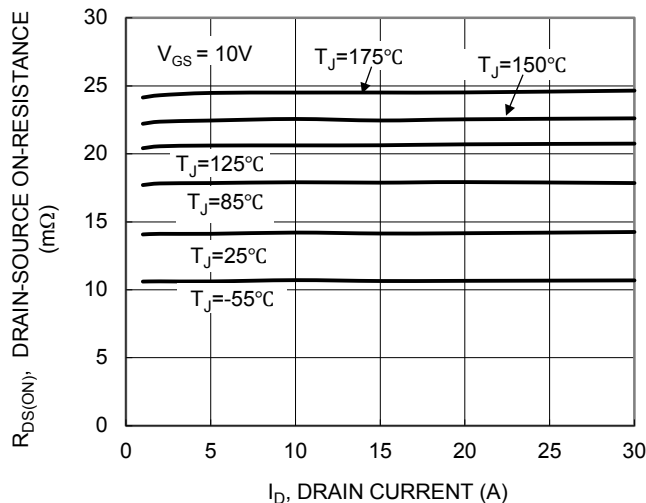


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

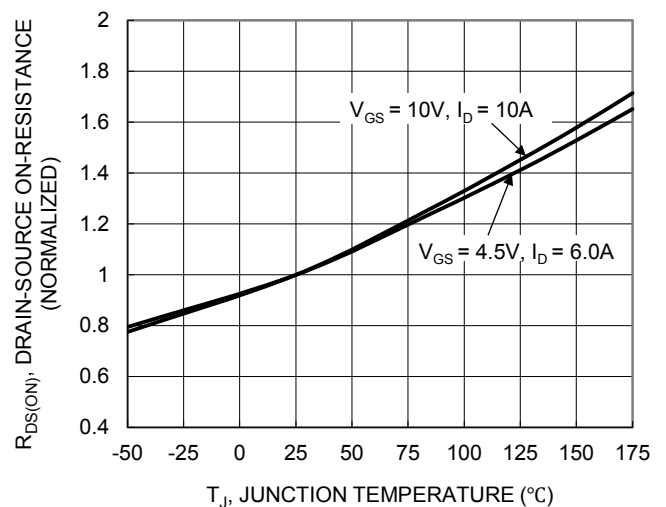
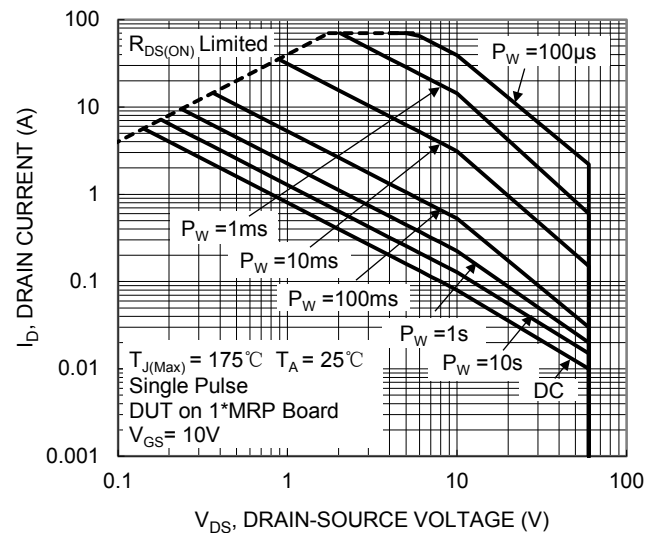
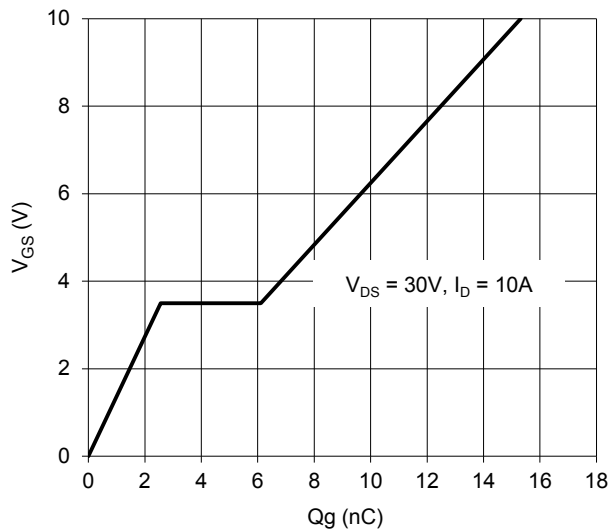
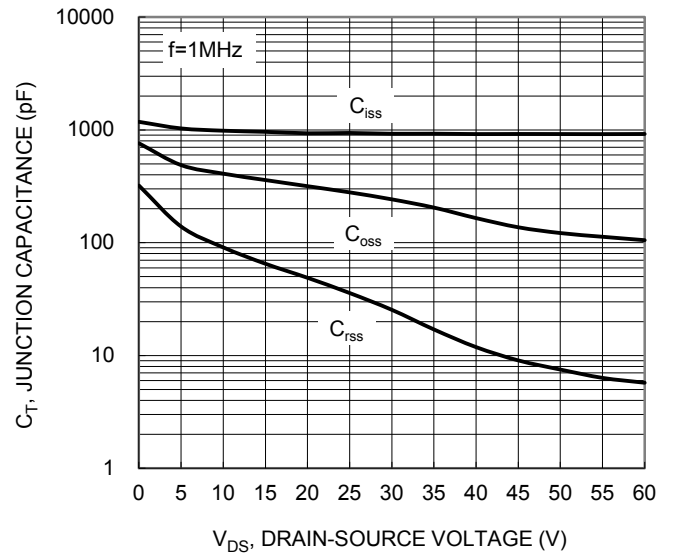
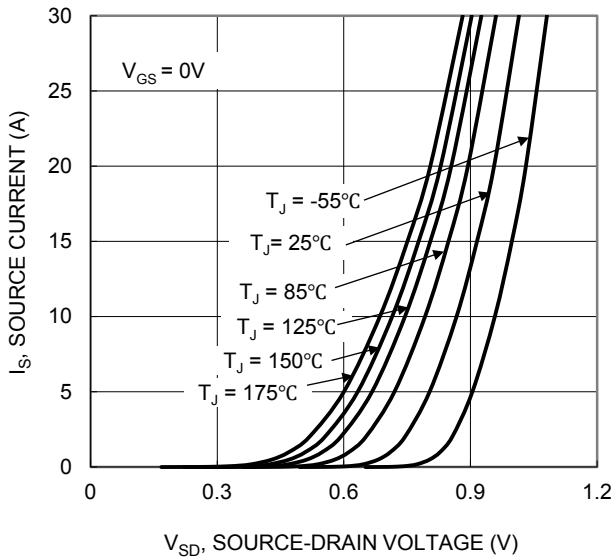
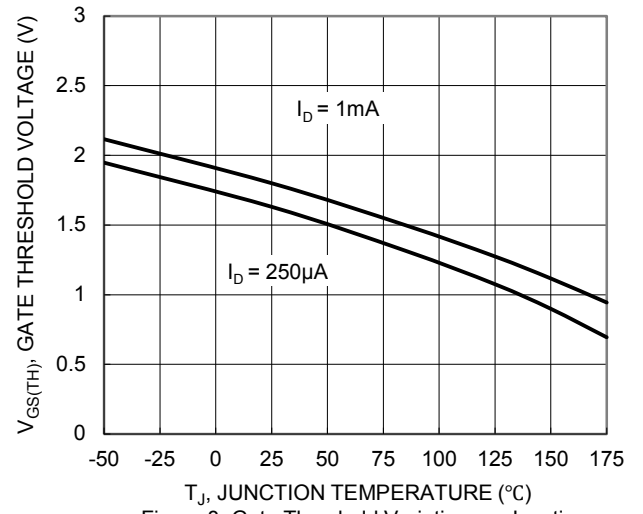
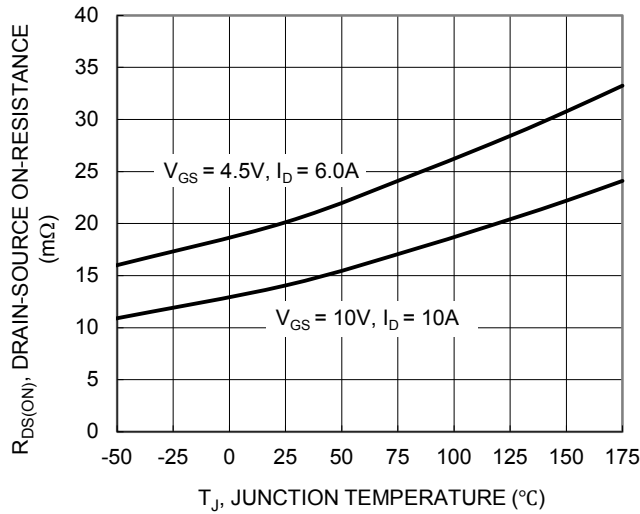


Figure 6. On-Resistance Variation with Temperature



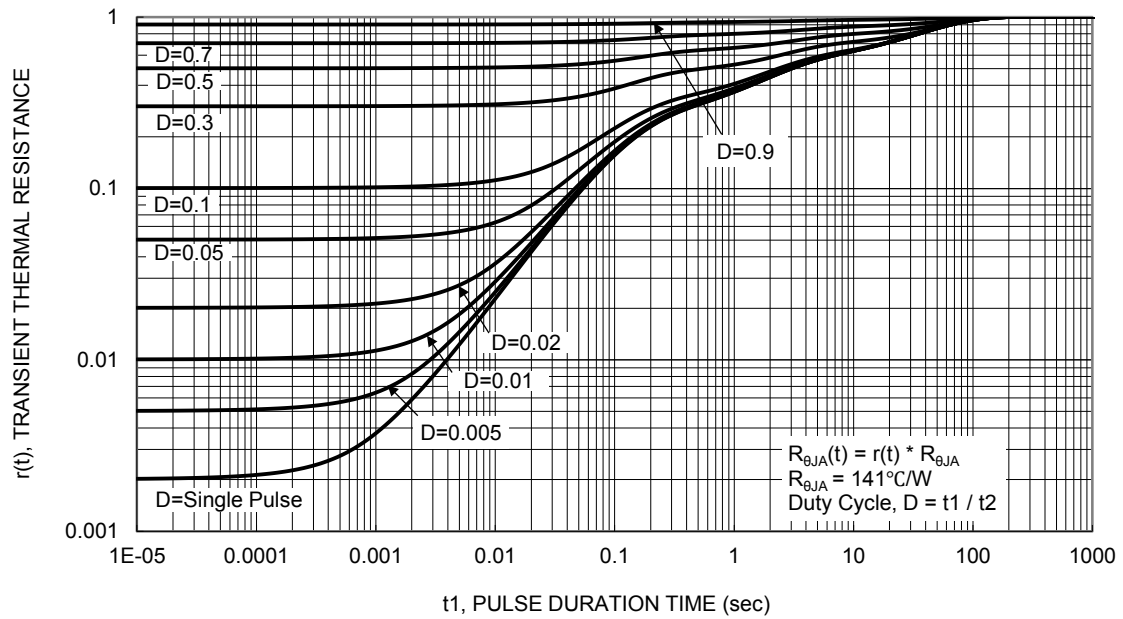
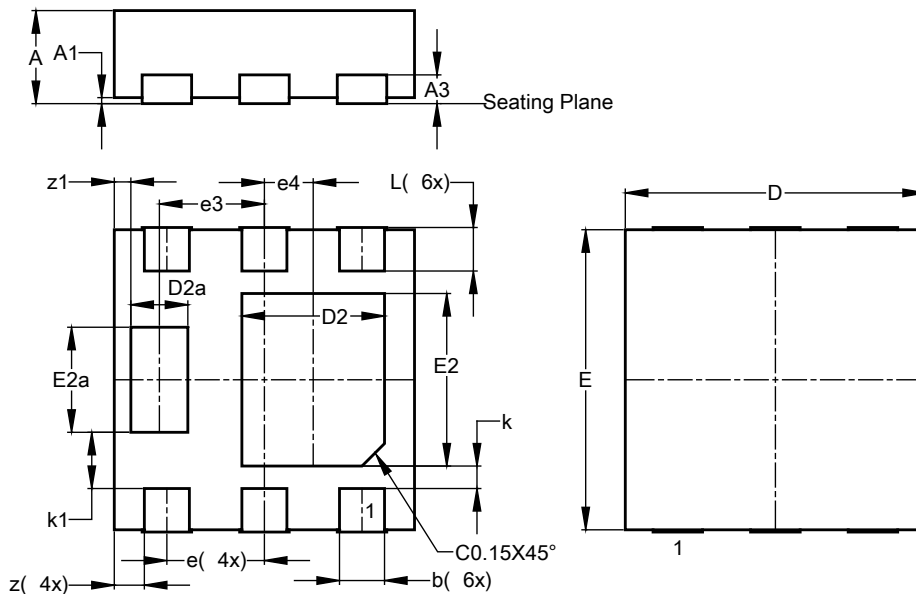


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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

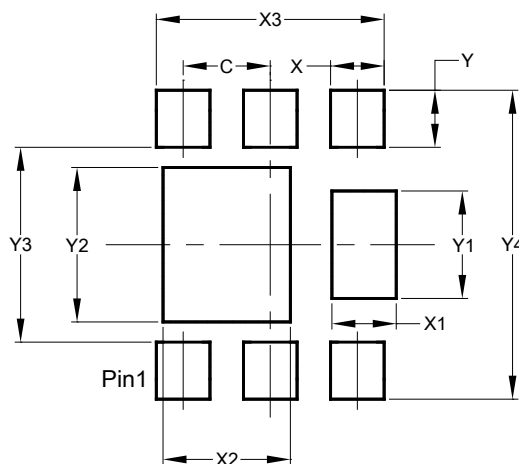


U-DFN2020-6 (SWP) (Type F)			
Dim	Min	Max	Typ
A	0.59	0.65	0.62
A1	0.00	0.05	0.03
A3	-	-	0.192
b	0.28	0.38	0.33
D	1.95	2.05	2.00
D2	0.87	1.07	0.97
D2a	0.35	0.45	0.40
E	1.95	2.05	2.00
E2	1.07	1.27	1.17
E2a	0.67	0.77	0.72
e	0.65 BSC		
e3	0.70 BSC		
e4	0.325 BSC		
k	--	--	0.15
k1	--	--	0.375
L	0.225	0.355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