



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

BV_{DSS}	$BV_{DSS}@T_{J\ Max}$	$R_{DS(ON)\ Max}$	$I_D\ Max$ $T_A = +25^\circ C$
115V	120V	65m Ω @ $V_{GS} = 10V$	4.3A
		70m Ω @ $V_{GS} = 4.5V$	4.5A

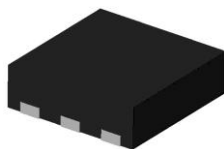
Description

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

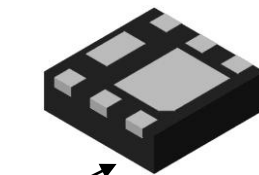
Applications

- DC-DC Primary Switch
- Load Switch

U-DFN2020-6 (Type F)

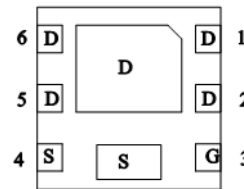


Top View

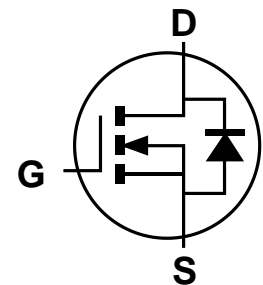


Pin1

Bottom View



Pin Out
Bottom View



Equivalent Circuit

Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm²
- Low On-Resistance
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application

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 – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 @4
- Weight: 0.0065 grams (Approximate)

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	115	V
Gate-Source Voltage	V_{GSS}	± 12	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6)	I_D	$T_A = +25^\circ\text{C}$	4.3
		$T_A = +70^\circ\text{C}$	3.4
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	25	A
Maximum Body Diode Continuous Current (Note 6)	I_S	6	A
Pulsed Body Diode Continuous Current (10 μs Pulse, Duty Cycle = 1%)	I_{SM}	25	A
Avalanche Current, $L = 0.3\text{mH}$	I_{AS}	4	A
Avalanche Energy, $L = 0.3\text{mH}$	E_{AS}	2.4	mJ

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	$T_A = +25^\circ\text{C}$	1.0
		$T_A = +70^\circ\text{C}$	0.6
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	124	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	P_D	$T_A = +25^\circ\text{C}$	1.8
		$T_A = +70^\circ\text{C}$	1.2
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	69	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	13	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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.

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}	115	—	—	V	V _{GS} = 0V, I _D = 10mA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 92V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±9.6V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.6	—	2.2	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	43	65	mΩ	V _{GS} = 10V, I _D = 3A
		—	54	70		V _{GS} = 4.5V, I _D = 3A
		—	58	150		V _{GS} = 3.8V, I _D = 1.0A
		—	75	350		V _{GS} = 3V, I _D = 0.5A
		—	—	—		V _{GS} = 0V, I _S = 2.4A
Diode Forward Voltage	V _{SD}	—	0.8	1.3	V	V _{GS} = 0V, I _S = 2.4A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{ISS}	—	252	—	pF	V _{DS} = 50V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{OSS}	—	80	—	pF	
Reverse Transfer Capacitance	C _{RSS}	—	3	—	pF	
Gate Resistance	R _g	—	6.9	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	5.5	—	nC	V _{DS} = 50V, I _D = 4.5A, V _{GS} = 10V
Gate-Source Charge	Q _{gs}	—	0.4	—	nC	
Gate-Drain Charge	Q _{gd}	—	1.7	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	2.1	—	ns	V _{DS} = 50V, R _L = 11Ω V _{GS} = 10V, R _{GEN} = 3Ω
Turn-On Rise Time	t _r	—	2	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	10	—	ns	
Turn-Off Fall Time	t _f	—	3.6	—	ns	
Reverse Recovery Time	t _{RR}	—	101	—	ns	
Reverse Recovery Charge	Q _{RR}	—	212	—	nC	I _F = 4.5A, di/dt = 300A/μs

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

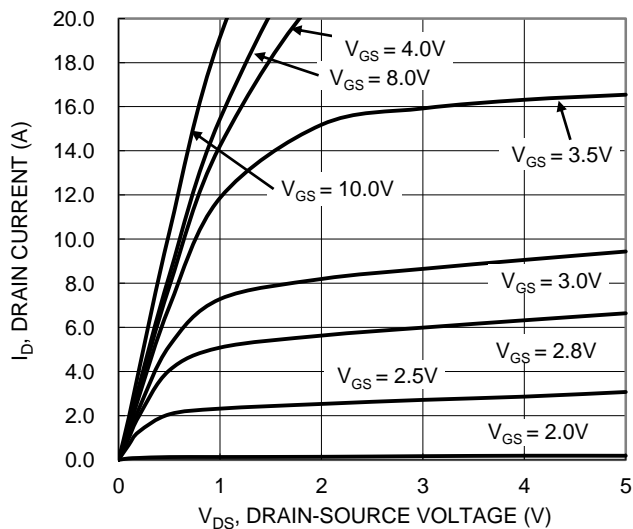


Figure 1. Typical Output Characteristic

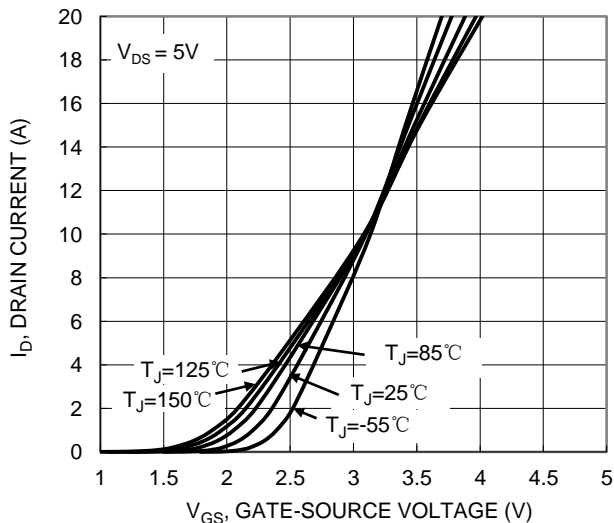


Figure 2. Typical Transfer Characteristic

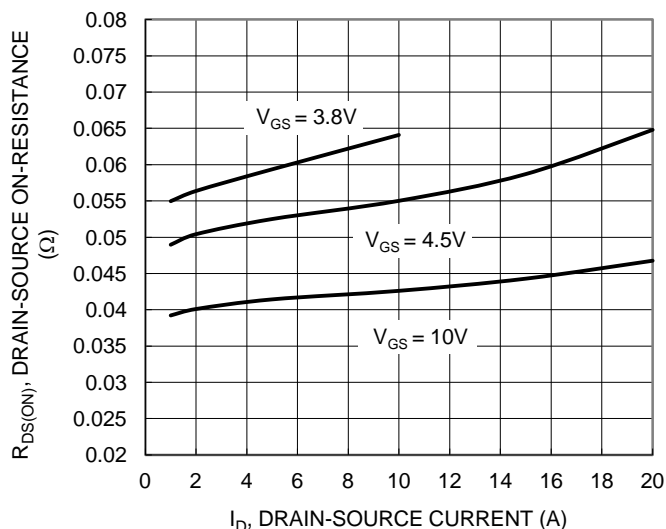


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

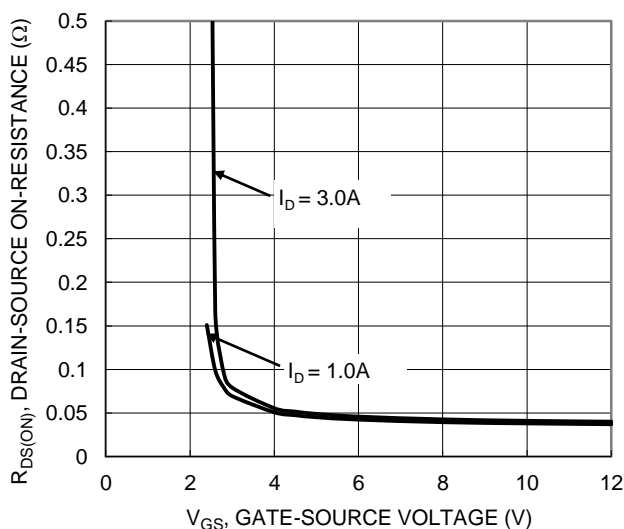


Figure 4. Typical Transfer Characteristic

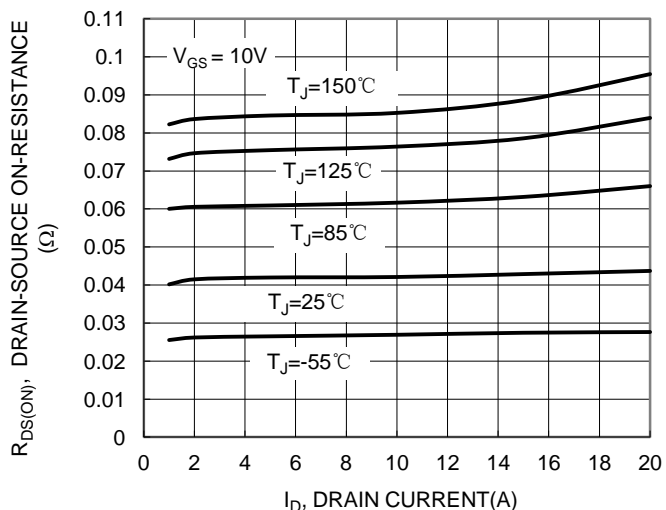


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

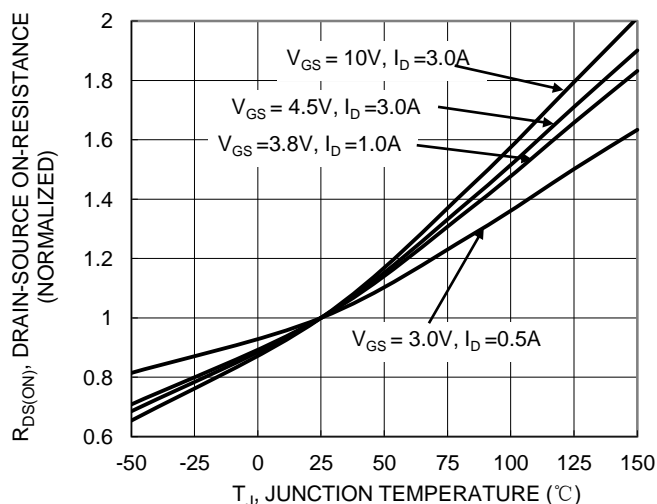


Figure 6. On-Resistance Variation with Junction Temperature

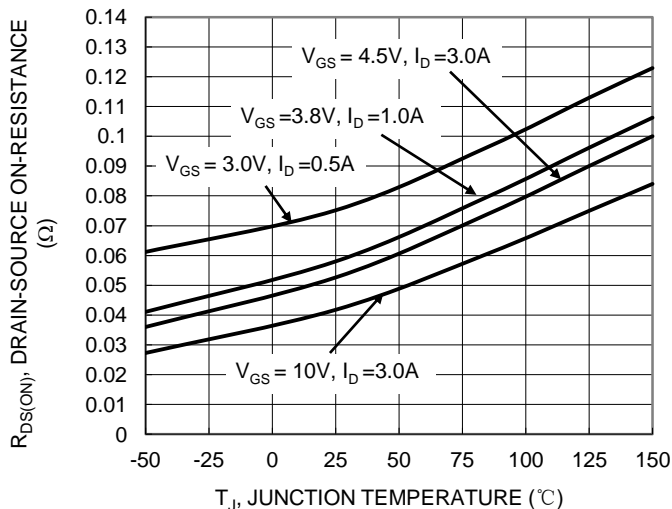


Figure 7. On-Resistance Variation with Junction Temperature

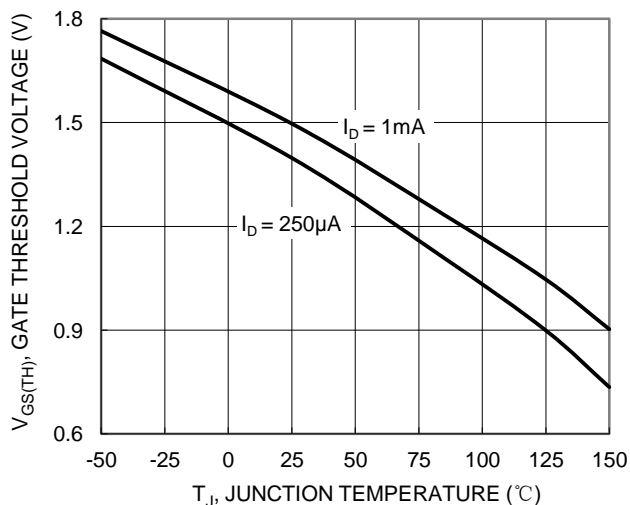


Figure 8. Gate Threshold Variation vs. Junction Temperature

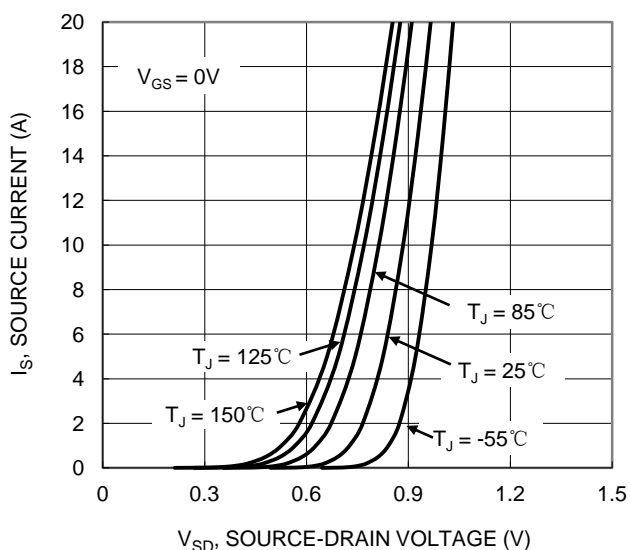


Figure 9. Diode Forward Voltage vs. Current

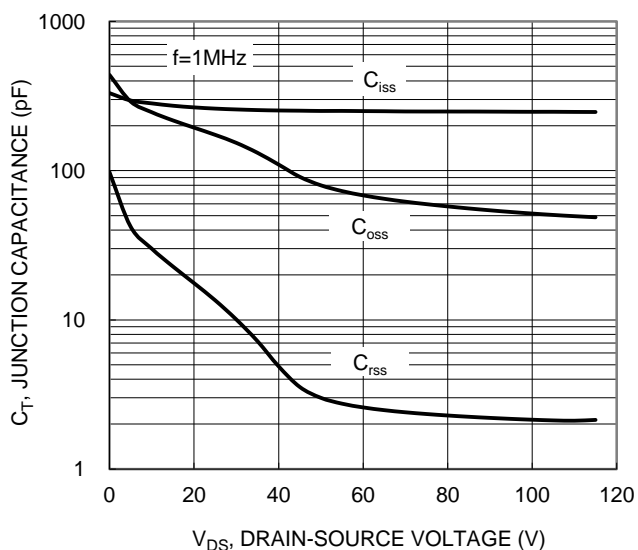


Figure 10. Typical Junction Capacitance

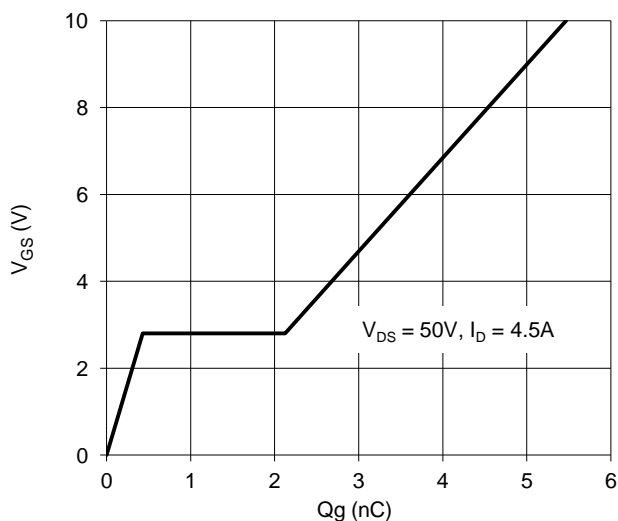


Figure 11. Gate Charge

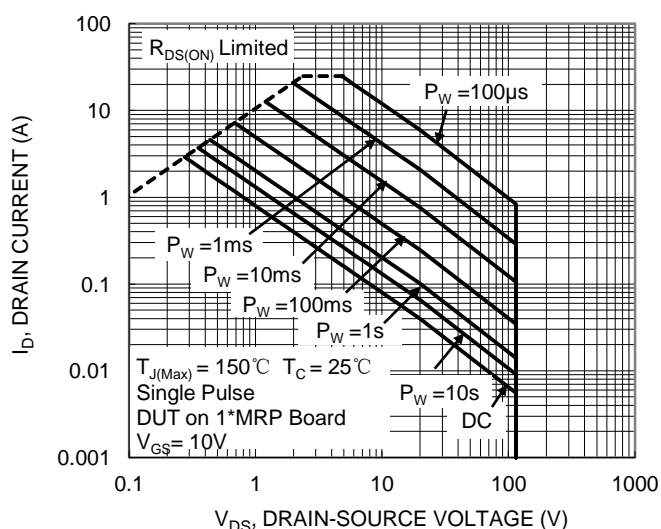


Figure 12. SOA, Safe Operation Area

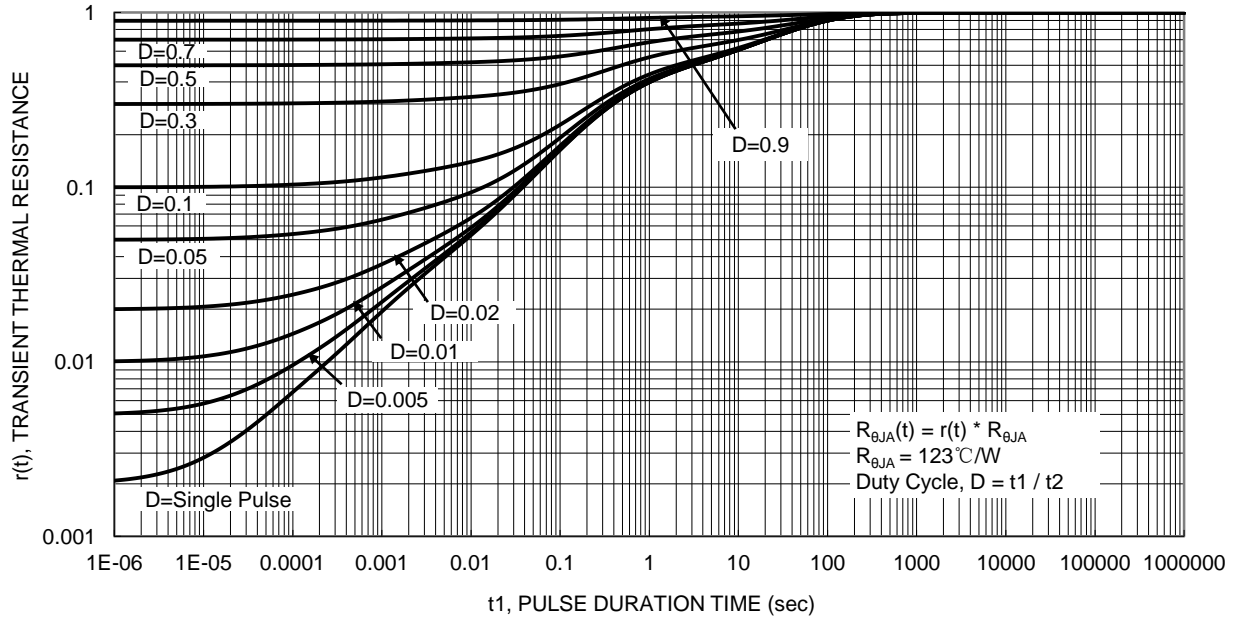
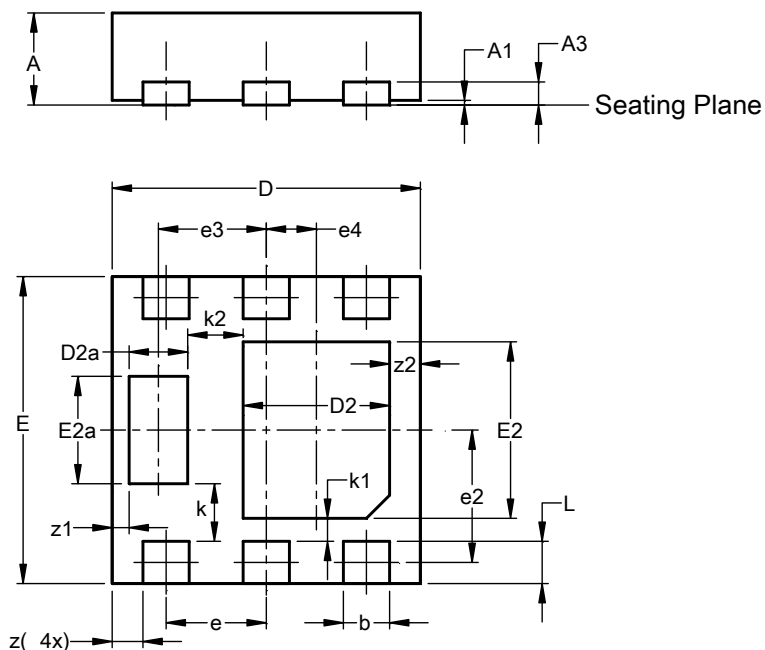


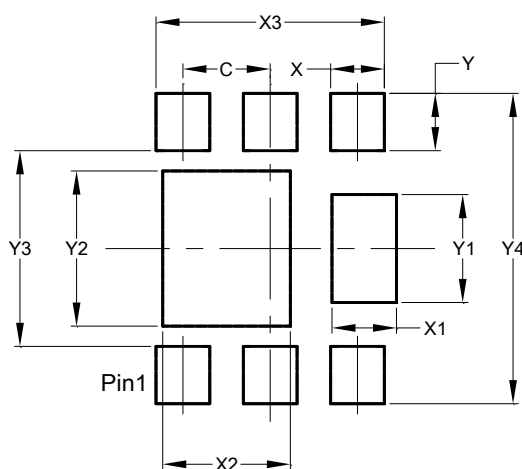
Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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