



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**

0755-83047638

ysbdt@szyoushang.cn

www.szyoushang.cn



企业微信二维码



企业QQ二维码

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>A</sub> = +25°C
30V	7mΩ @ V <sub>GS</sub> = 10V	14.1A
	10mΩ @ V <sub>GS</sub> = 4.5V	11.8A
	15mΩ @ V <sub>GS</sub> = 3.7V	9.6A

## Features

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low Gate Threshold Voltage
- Fast Switching Speed

## Description and Applications

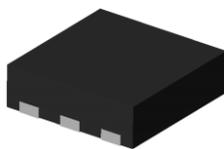
This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Battery Management Application
- Power Management Functions
- DC-DC Converters

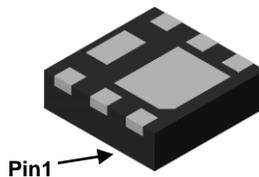
## Mechanical Data

- 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 (e4)
- Weight: 0.0065 grams (Approximate)

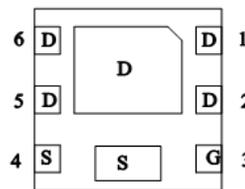
U-DFN2020-6 (Type F)



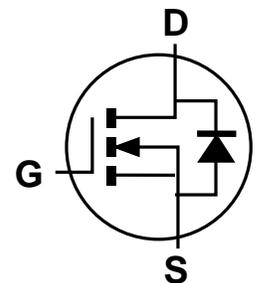
Top View



Bottom View



Pin Out  
Bottom View



Internal Schematic

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	14.1	A
		$T_A = +70^\circ\text{C}$		12.5	
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	80	A
Continuous Source-Drain Diode Current (Note 6)		$T_A = +25^\circ\text{C}$	$I_S$	2	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AS}$	25	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AS}$	31	mJ

**Thermal Characteristics**

Characteristic		Symbol	Value	Unit	
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	0.8	W	
Thermal Resistance, Junction to Ambient (Note 5)		Steady State	$R_{\theta JA}$	155	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	2.1	W	
Thermal Resistance, Junction to Ambient (Note 6)		Steady State	$R_{\theta JA}$	60	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)		$T_C = +25^\circ\text{C}$	$R_{\theta JC}$	6.9	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$	

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current ( $T_J = +25^\circ\text{C}$ )	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = +20\text{V}, V_{DS} = 0\text{V}$ $V_{GS} = -16\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	1.3	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	5.8	7	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 9\text{A}$
			7.8	10		$V_{GS} = 4.5\text{V}, I_D = 8\text{A}$
			9.3	15		$V_{GS} = 3.7\text{V}, I_D = 5\text{A}$
						$V_{GS} = 3.7\text{V}, I_D = 5\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.0	V	$V_{GS} = 0\text{V}, I_S = 2\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	1,155	—	pF	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	456	—		
Reverse Transfer Capacitance	$C_{rss}$	—	72	—		
Gate Resistance	$R_G$	—	1.6	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_G$	—	16.7	—	nC	$V_{DD} = 15\text{V}, I_D = 9\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_G$	—	8.4	—		
Gate-Source Charge	$Q_{GS}$	—	2.2	—		
Gate-Drain Charge	$Q_{GD}$	—	3.5	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.5	—	ns	$V_{DD} = 15\text{V}, V_{GS} = 10\text{V}, R_G = 3\Omega, I_D = 9\text{A}$
Turn-On Rise Time	$t_R$	—	5.5	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	13.5	—		
Turn-Off Fall Time	$t_F$	—	4.6	—		
Reverse Recovery Time	$t_{RR}$	—	19.3	—	ns	$I_F = 1.5\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	8.6	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - $I_{AS}$  and  $E_{AS}$  ratings are based on low frequency and duty cycles to keep  $T_J = +25^\circ\text{C}$ .
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

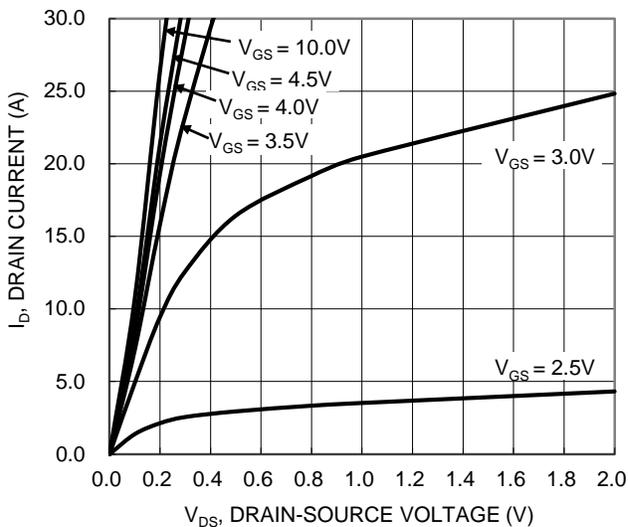


Figure 1. Typical Output Characteristic

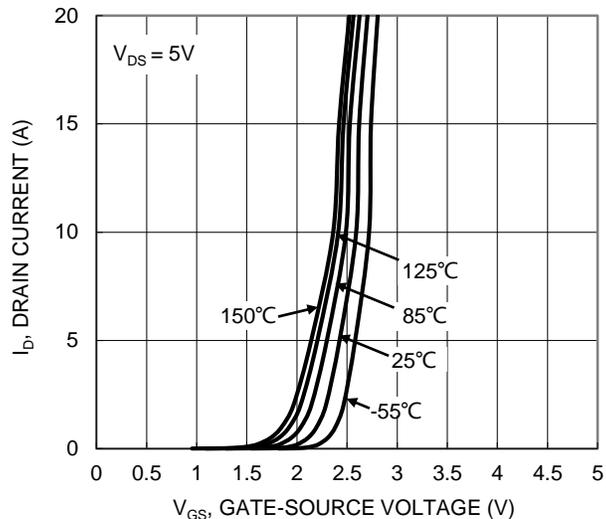


Figure 2. Typical Transfer Characteristic

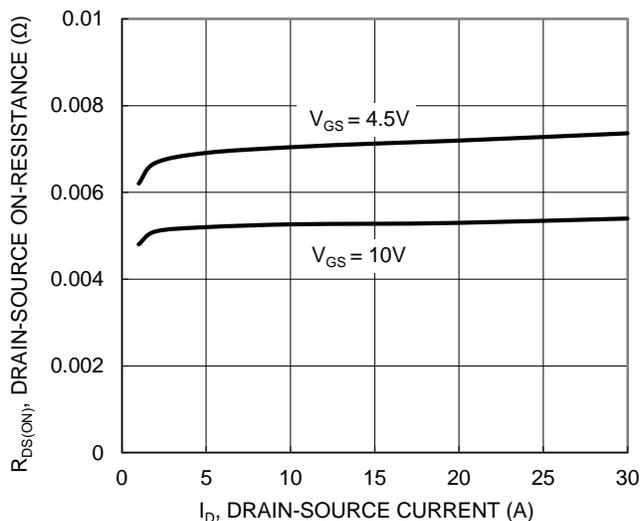


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

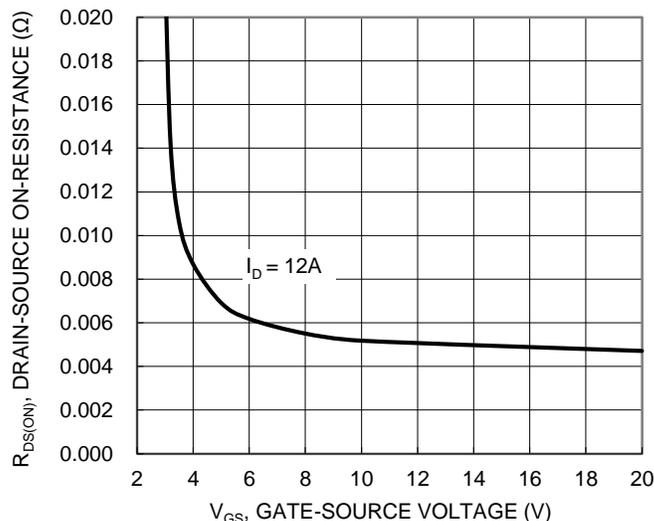


Figure 4. Typical Transfer Characteristic

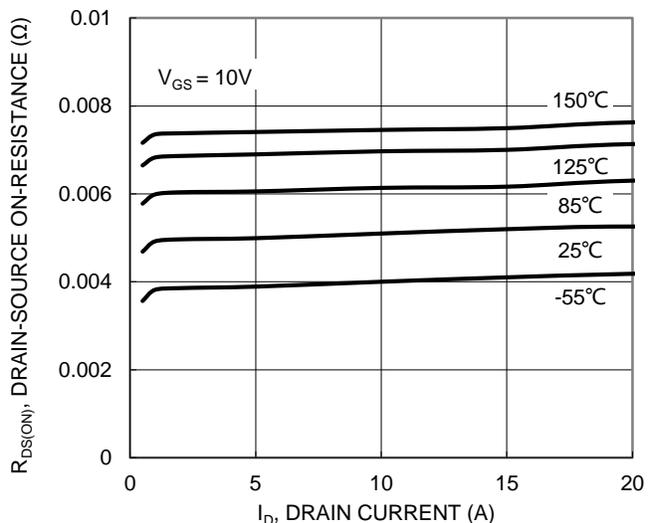


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

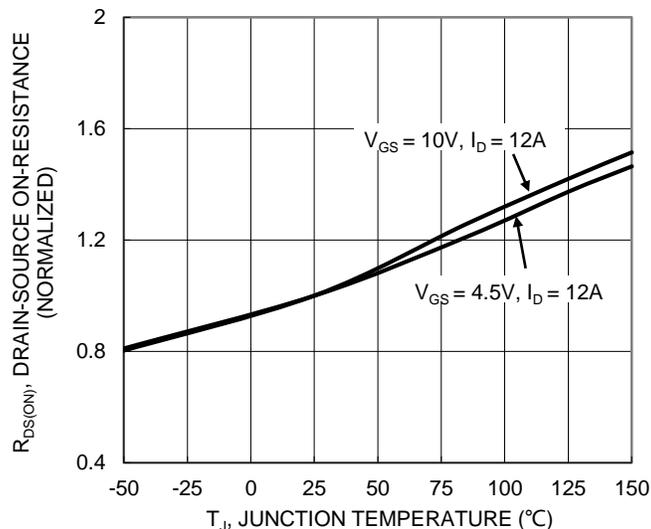


Figure 6. On-Resistance Variation with Temperature

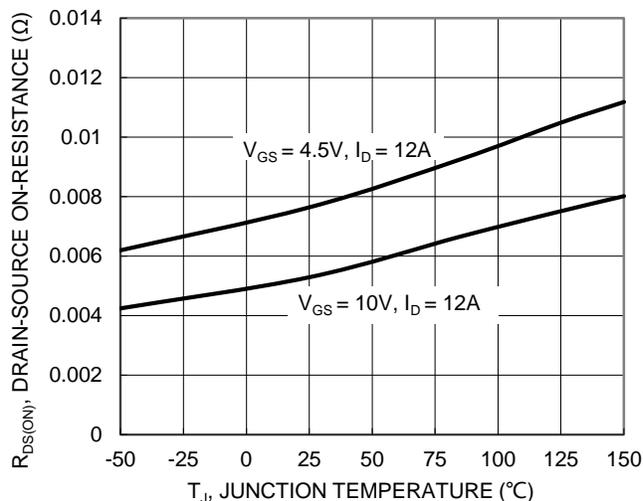


Figure 7. On-Resistance Variation with Temperature

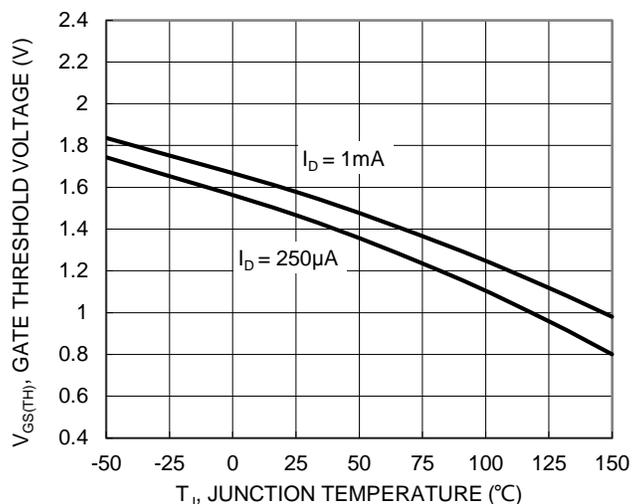


Figure 8. Gate Threshold Variation vs. Junction Temperature

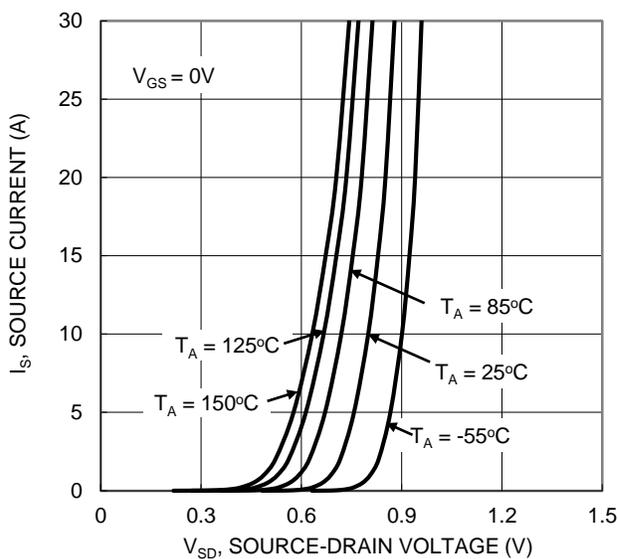


Figure 9. Diode Forward Voltage vs. Current

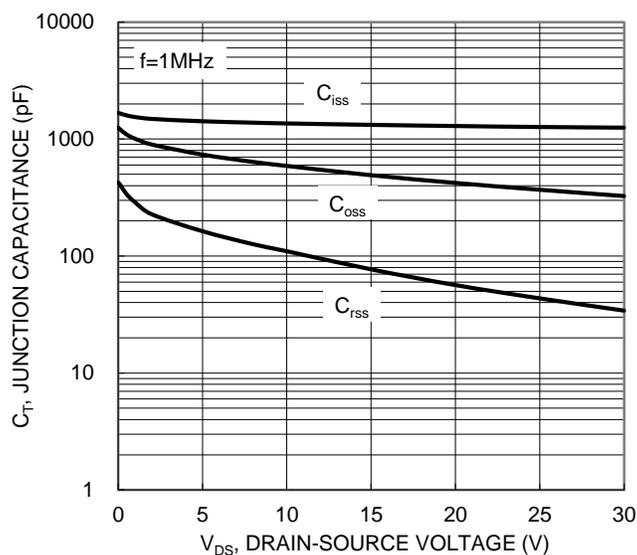


Figure 10. Typical Junction Capacitance

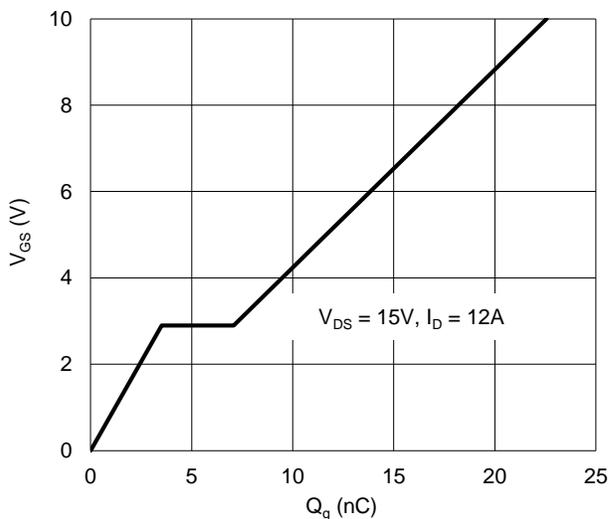


Figure 11. Gate Charge

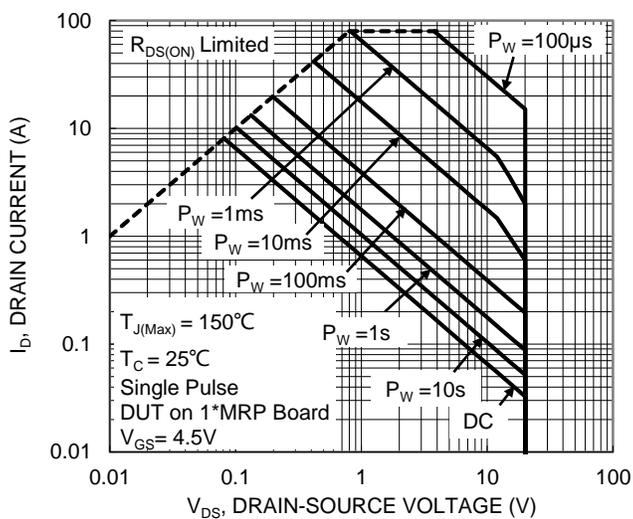


Figure 12. SOA, Safe Operation Area

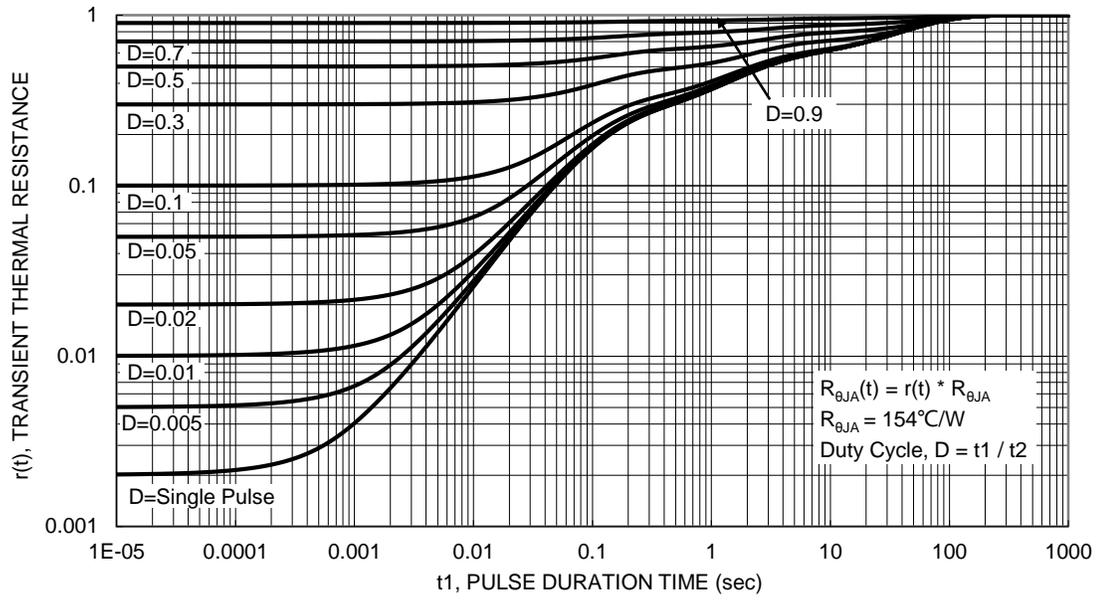
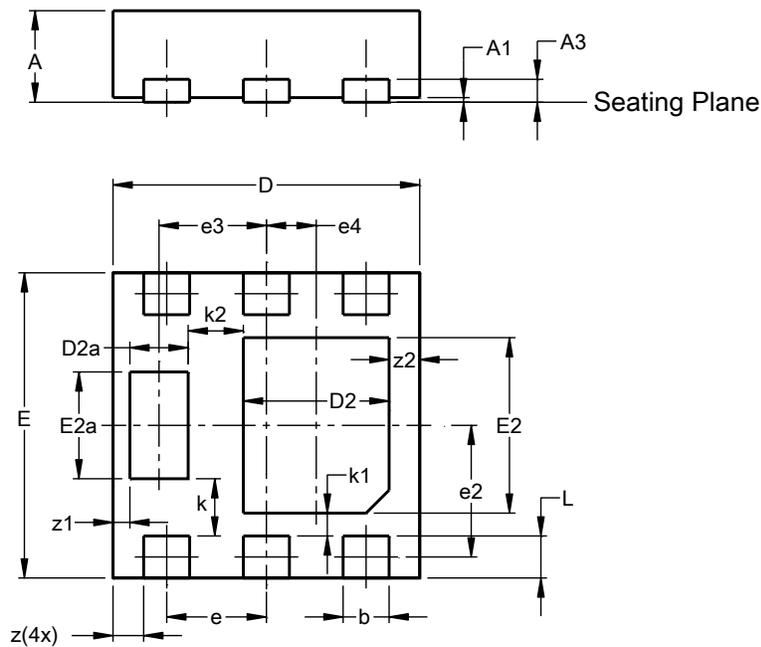


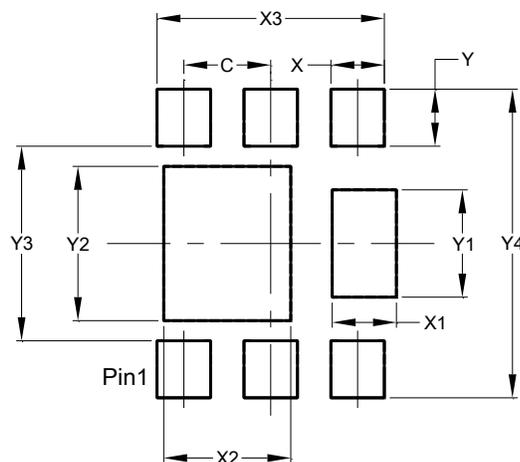
Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

**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