优尚

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

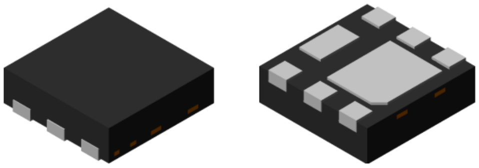
BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
40V	11.5mΩ @ V_{GS} = 10V	11.6A
	18mΩ @ V_{GS} = 4.5V	9.3A

Description

This 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:

- Power Management Functions
- DC-DC Converters
- Backlighting

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



Top View

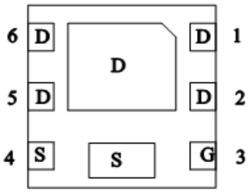
Bottom View

Features

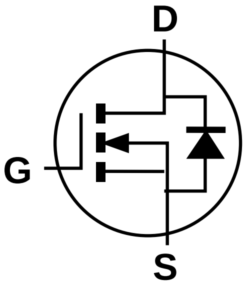
- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching, Test in Production – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Ensures On State Losses Are Minimized
- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm^2

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 ⓔ3
- Weight: 0.007 grams (Approximate)



Pin Out
Bottom View



Internal Schematic

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	T_A = +25°C T_A = +100°C	I_D	11.6 8.2	A
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 5)	T_A = +25°C	P_D	0.99	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	153	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.35	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	64.5	°C/W
Thermal Resistance, Junction to Case (Note 7)	T_C = +25°C	$R_{\theta JC}$	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:
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.
7. Thermal resistance from junction to soldering point (on the exposed drain pad).
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.

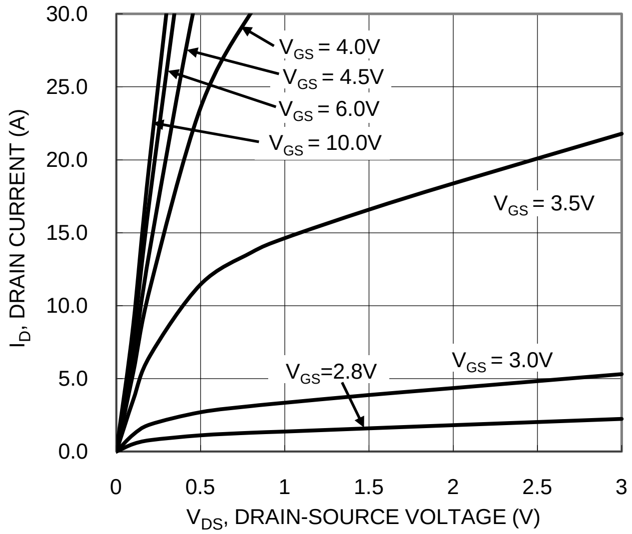


Figure 1. Typical Output Characteristic

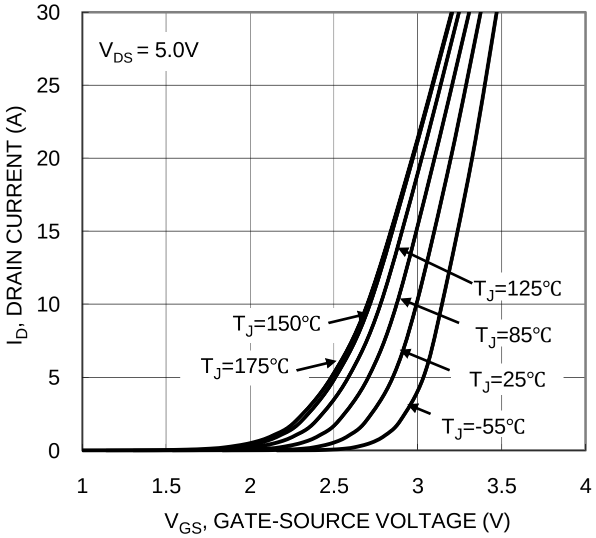


Figure 2. Typical Transfer Characteristic

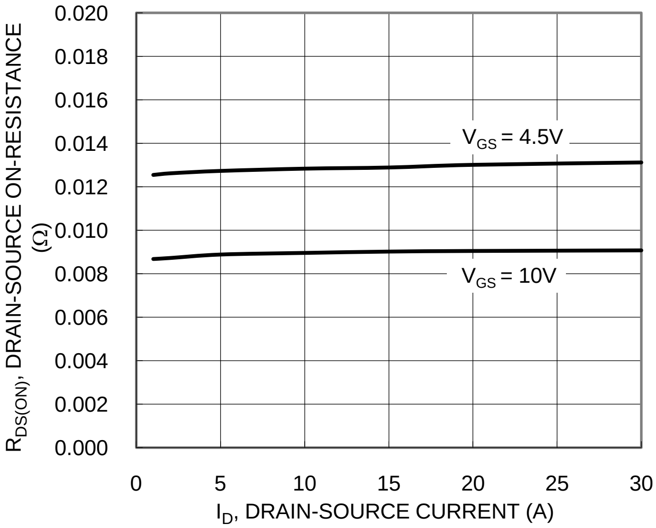


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

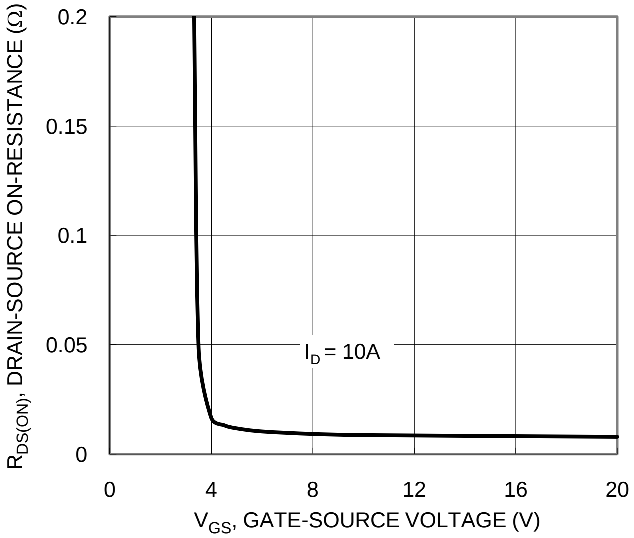


Figure 4. Typical Transfer Characteristic

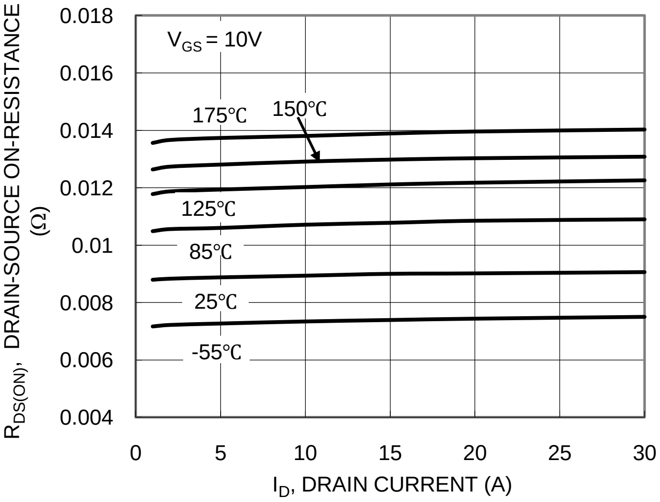


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

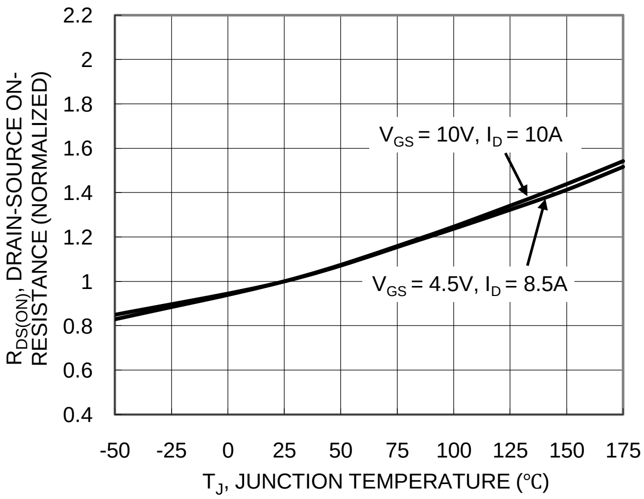


Figure 6. On-Resistance Variation with Temperature

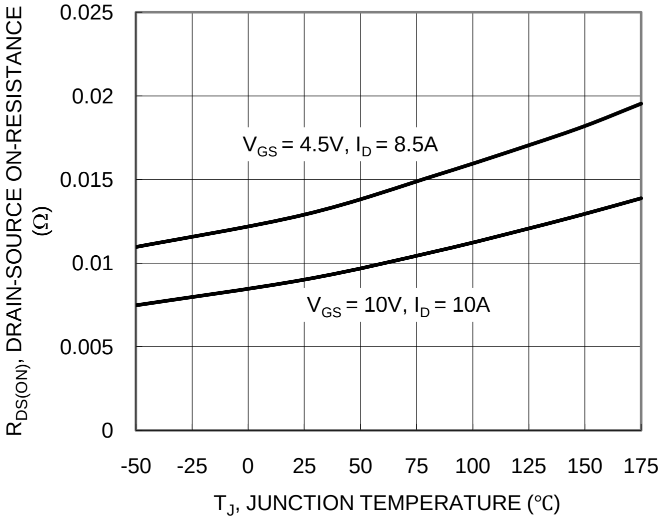


Figure 7. On-Resistance Variation with Temperature

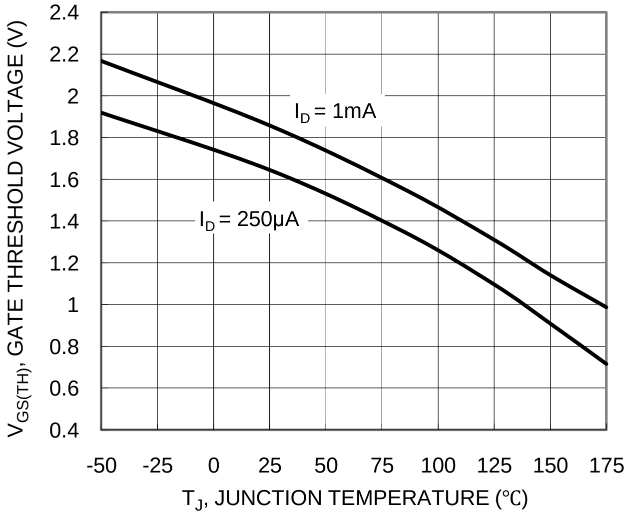


Figure 8. Gate Threshold Variation vs. Junction Temperature

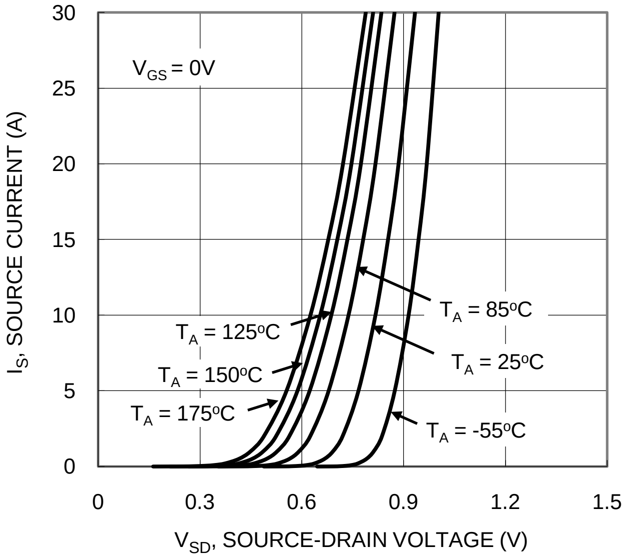


Figure 9. Diode Forward Voltage vs. Current

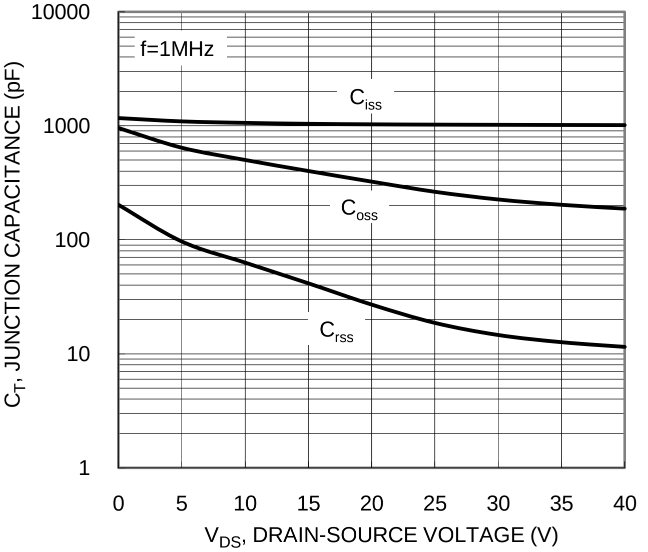


Figure 10. Typical Junction Capacitance

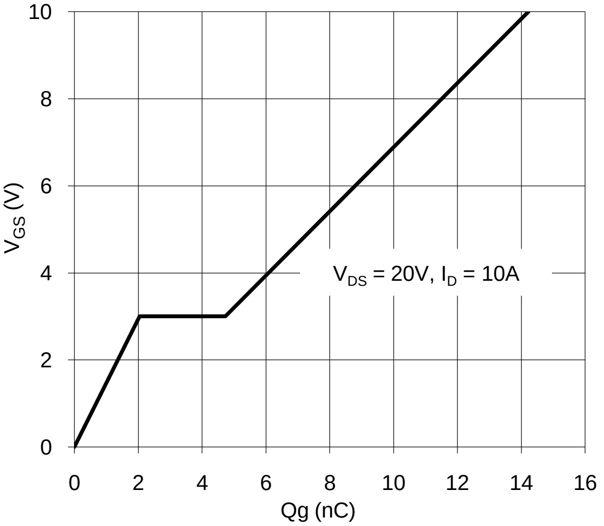


Figure 11. Gate Charge

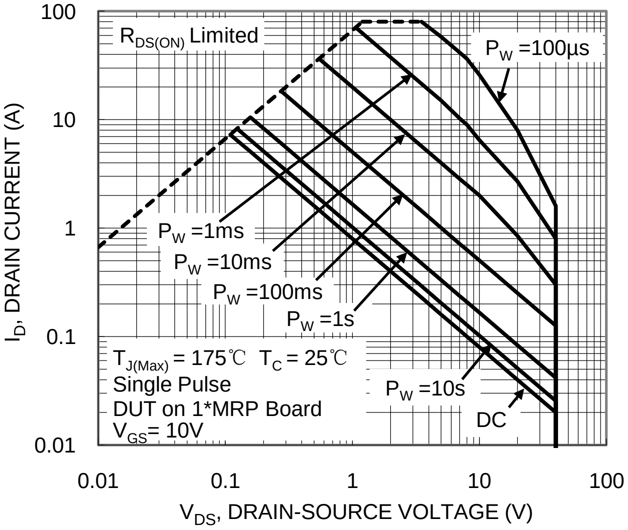


Figure 12. SOA, Safe Operation Area

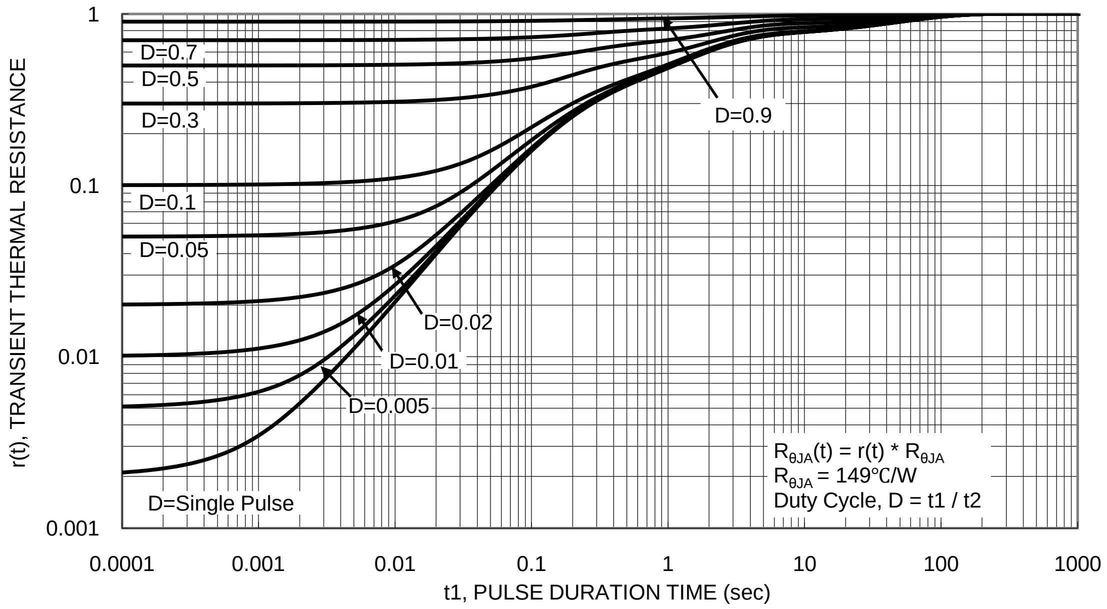
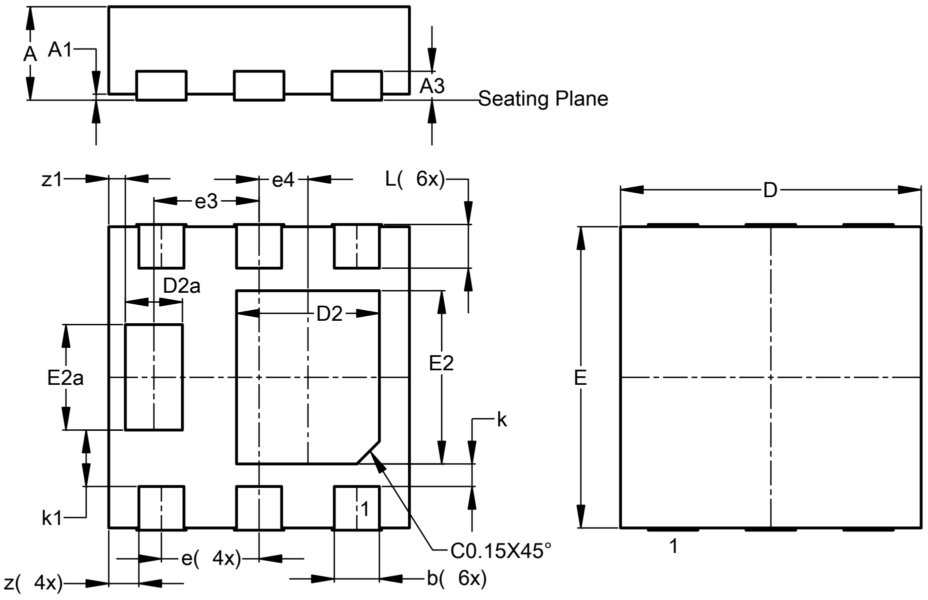


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

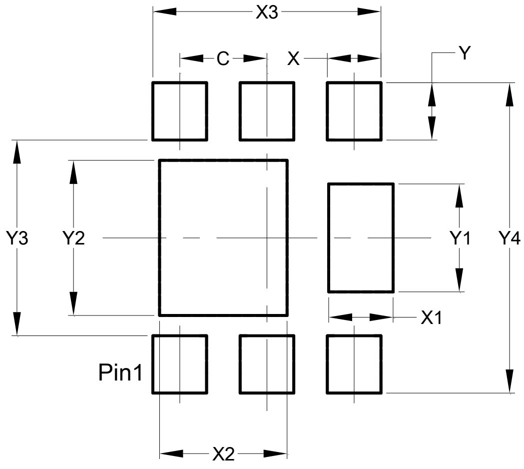
U-DFN2020-6 (SWP) (Type F)



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

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