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
-20V	27mΩ @ V_{GS} = -4.5V	-7.6A
	32mΩ @ V_{GS} = -2.5V	-6.7A
	50mΩ @ V_{GS} = -1.8V	-5.2A
	90mΩ @ V_{GS} = -1.5V	-3.9A

Features

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

Description

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

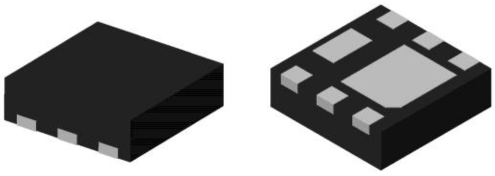
- Battery management applications
- Power management functions
- DC-DC converters

Mechanical Data

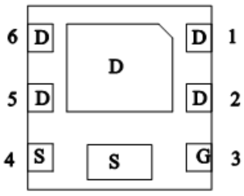
- Package: U-DFN2020-6
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.007 grams (Approximate)

e4

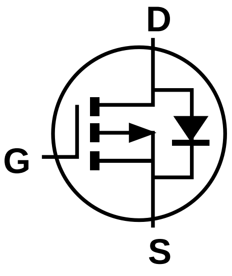
U-DFN2020-6
(Type F)



Top View Bottom View



Pin Out
Bottom View



Internal Schematic

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±8	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-7.6 -6.1	A
	t < 5s	T_A = +25°C T_A = +70°C	I_D	-9.5 -7.6	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I_{DM}	-40	A
Continuous Source-Drain Diode Current		T_A = +25°C	I_S	-2	A
Avalanche Current (Note 6) L = 0.1mH			I_{AS}	- 23	A
Avalanche Energy (Note 6) L = 0.1mH			E_{AS}	27	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	0.73	W
	T_A = +70°C		0.47	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	171	°C/W
	t < 5s		112	
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	2.03	W
	T_A = +70°C		1.30	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	62	°C/W
	t < 5s		40	
Thermal Resistance, Junction to Case (Note 5)	Steady State	$R_{\theta JC}$	9.3	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1	μA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	27	mΩ	V_{GS} = -4.5V, I_D = -7.0A
			—	32		V_{GS} = -2.5V, I_D = -5.0A
			—	50		V_{GS} = -1.8V, I_D = -3.0A
			—	90		V_{GS} = -1.5V, I_D = -1.0A
Diode Forward Voltage	V_{SD}	—	-0.8	-1.2	V	V_{GS} = 0V, I_S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1837	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	131	—		
Reverse Transfer Capacitance	C_{rss}	—	115	—		
Gate Resistance	R_g	—	14.8	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	27	—	nC	V_{DS} = -15V, V_{GS} = -4.5V I_D = -4.0A
Gate-Source Charge	Q_{gs}	—	2.8	—		
Gate-Drain Charge	Q_{gd}	—	3.1	—		
Turn-On Delay Time	$t_{D(ON)}$	—	5.8	—	ns	V_{DS} = -15V, V_{GS} = -4.5V R_G = 1Ω, I_D = -4.0A
Turn-On Rise Time	t_R	—	19.3	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	168.5	—		
Turn-Off Fall Time	t_F	—	77.3	—		
Reverse Recovery Time	t_{RR}	—	46.5	—	ns	I_F = -1.0A, dI/dt = 100A/μs
Reverse Recovery Charge	Q_{RR}	—	33.8	—	nC	I_F = -1.0A, dI/dt = 100A/μs

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

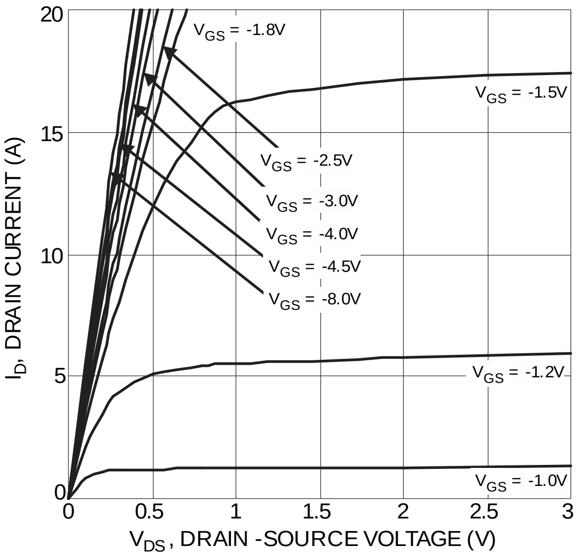


Figure 1 Typical Output Characteristics

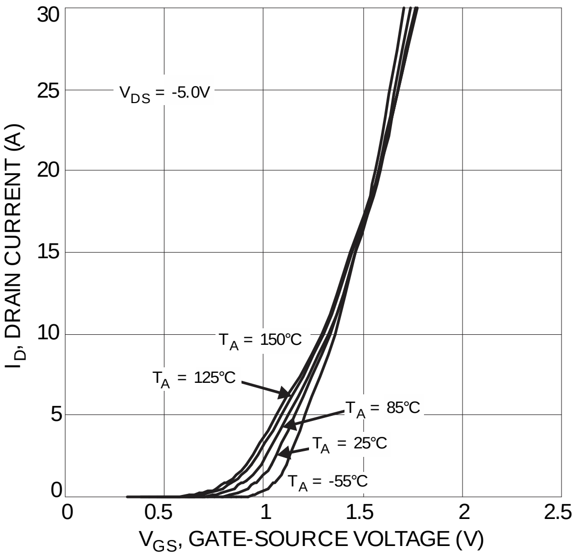


Figure 2 Typical Transfer Characteristics

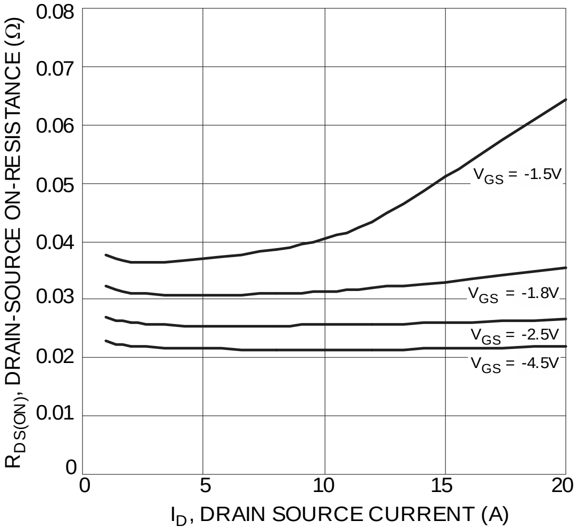


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

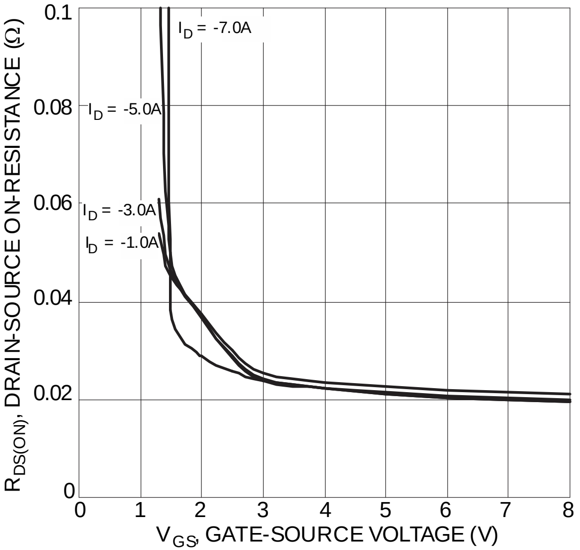


Figure 4 Typical Transfer Characteristics

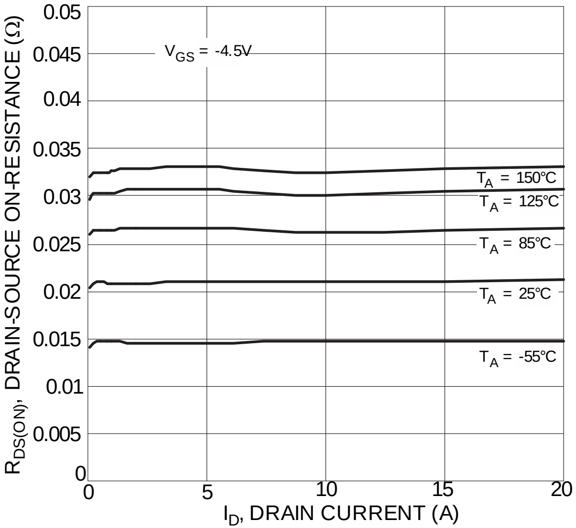


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

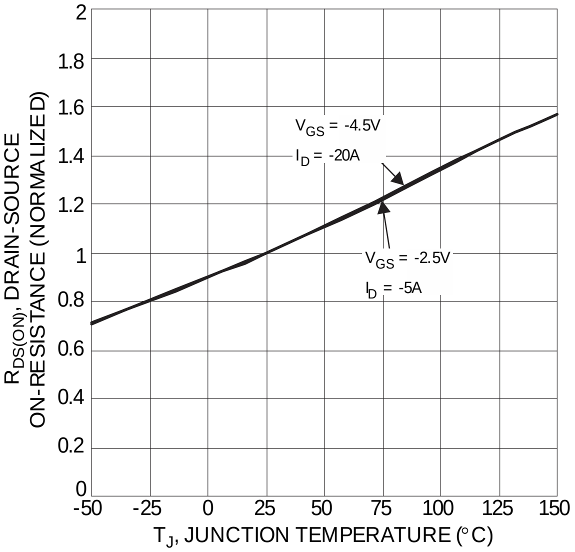


Figure 6 On-Resistance Variation with Temperature

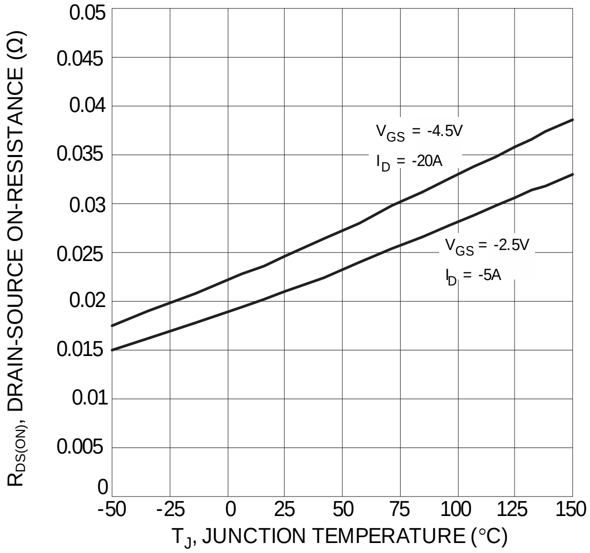


Figure 7 On-Resistance Variation with Temperature

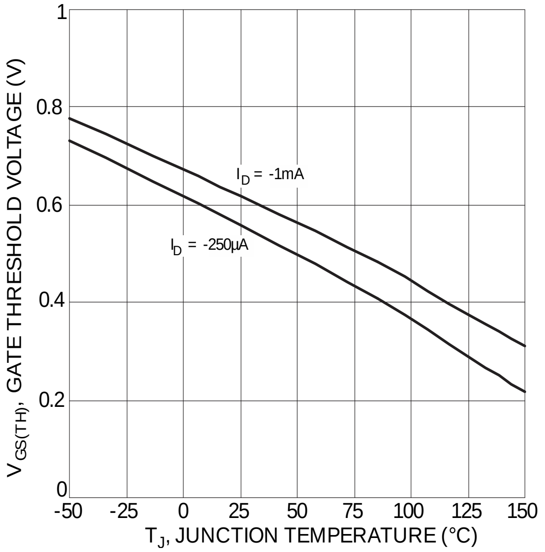


Figure 8 Gate Threshold vs. Junction Temperature

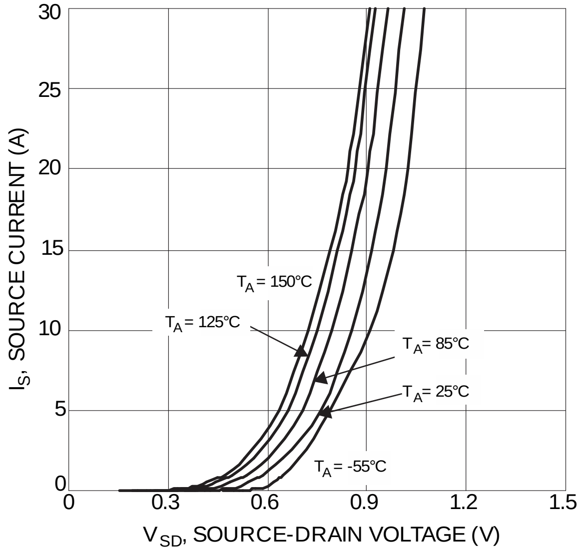


Figure 9 Diode Forward Voltage vs. Current

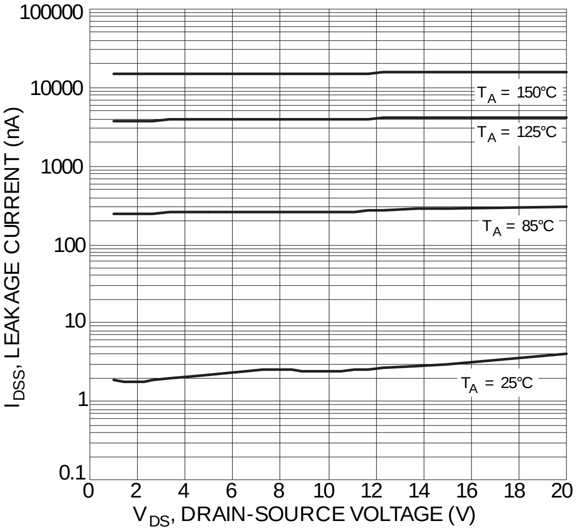


Figure 10 Typical Drain-Source Leakage Current
vs. Voltage

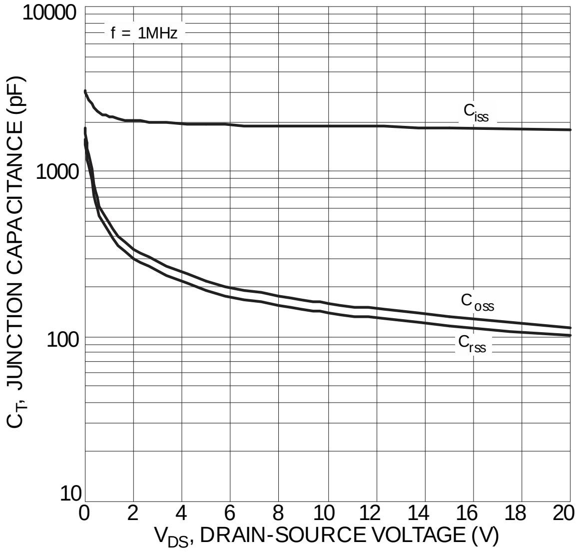


Figure 11 Typical Junction Capacitance

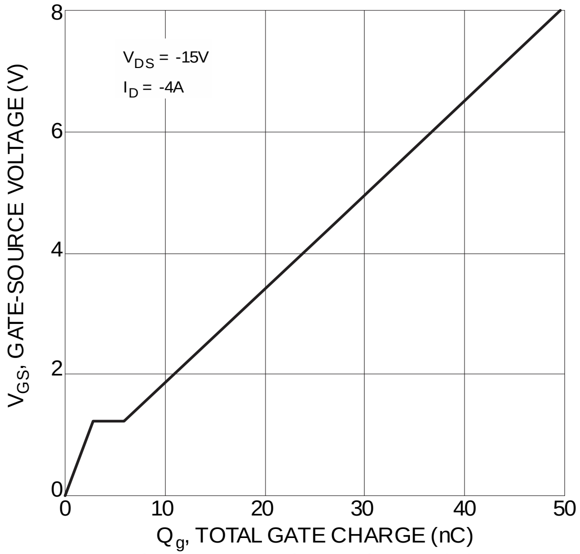


Figure 12 Gate-Charge Characteristics

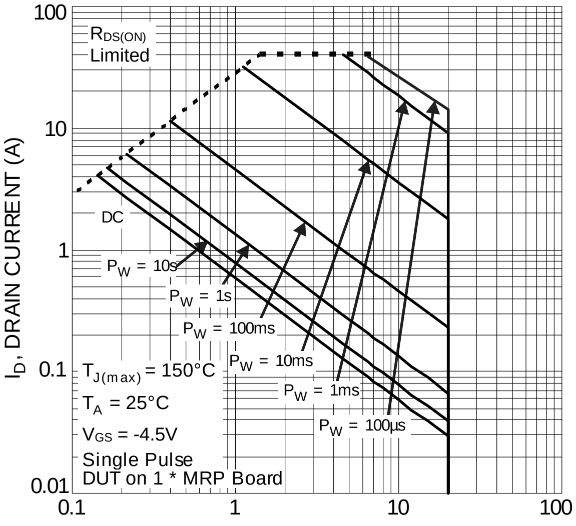


Figure 13 SOA, Safe Operation Area

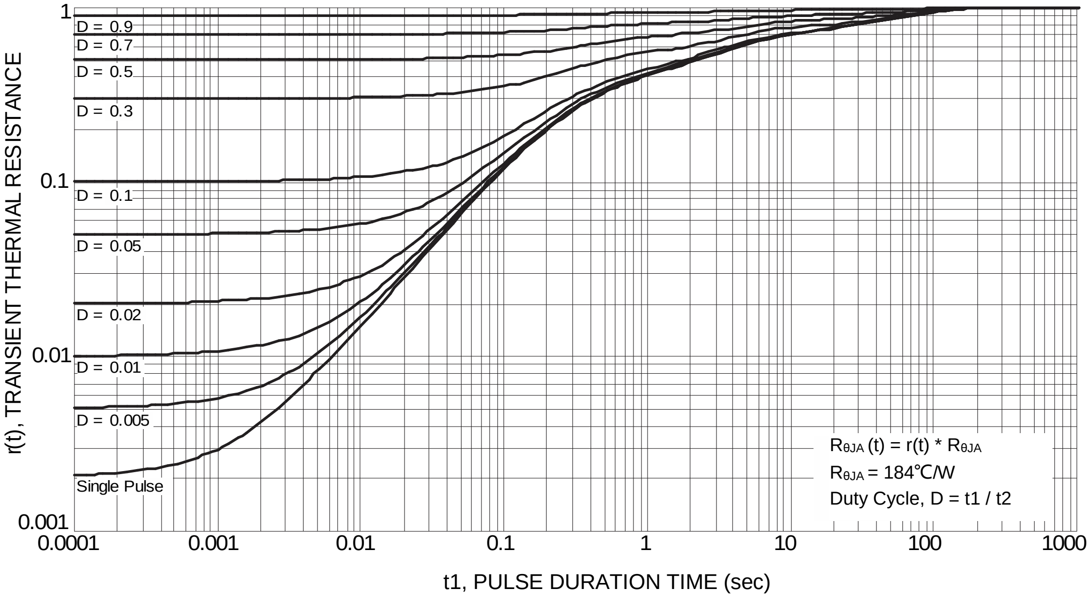
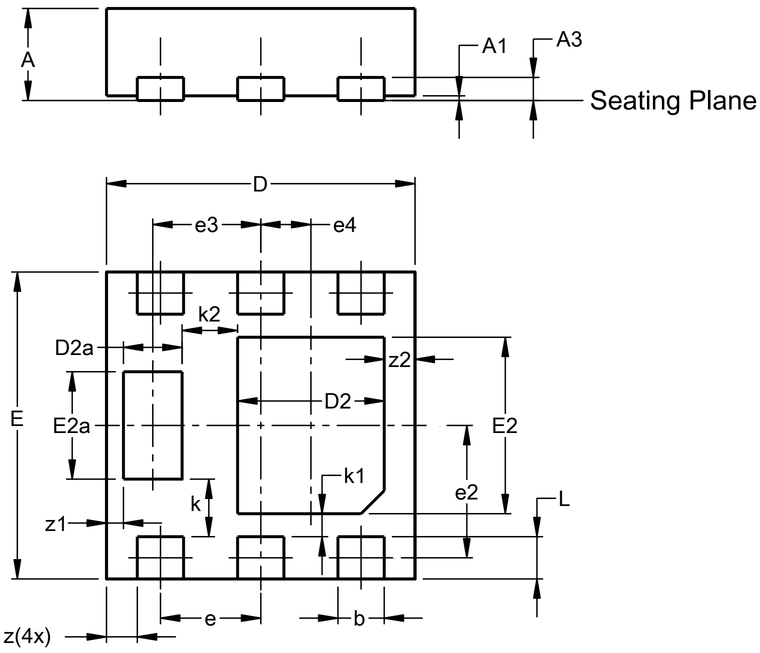


Figure 14 Transient Thermal Resistance

Package Outline Dimensions

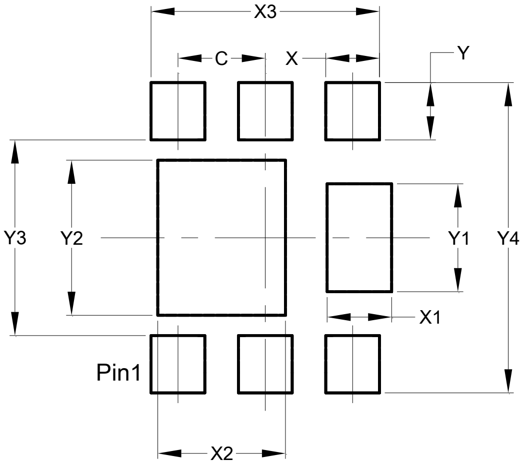
U-DFN2020-6 (Type F)



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