



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

MOSFET		
BV _{DSS}	R _{DS(on)} Max	I _D
-20V	85mΩ @ V _{GS} = -10V	-3.3A
	125mΩ @ V _{GS} = -4.5V	-2.8A
SCHOTTKY DIODE		
V _R	V _F Max	I _o
20V	400mV @ I _F = 0.5A	1.0A
	470mV @ I _F = 1.0A	

Description

This new generation 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.

Applications

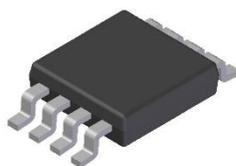
- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

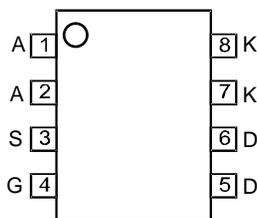
- Low Input Capacitance
- MOSFET with Low R_{DS(ON)} – Minimize Conduction Losses
- Schottky Diode with Low Forward Voltage Drop
- Fast Switching Speed

Mechanical Data

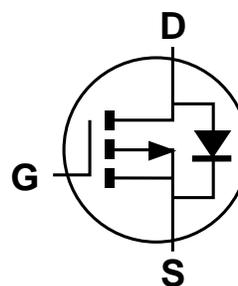
- Package: SO-8
- Package Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 ^(e3)
- Weight: 0.074 grams (Approximate)



Top View



Top View



Q1 P-Channel MOSFET



D1 Schottky Diode

Maximum Ratings – P-CHANNEL MOSFET – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V _{DSS}	-20	V
Gate-Source Voltage		V _{GSS}	±20	V
Continuous Drain Current (Note 6) V _{GS} = 10V	Steady State	T _A = +25°C T _A = +70°C	-3.3 -2.7	A
	t < 10s	T _A = +25°C T _A = +70°C	-4.3 -3.4	A
Maximum Body Diode Forward Current (Note 6)		I _S	-1.5	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)		I _{DM}	-11.2	A
Avalanche Current (Note 7) L = 0.1mH		I _{AS}	-12	A
Avalanche Energy (Note 7) L = 0.1mH		E _{AS}	7	mJ

Maximum Ratings – SCHOTTKY – D1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V _R RM	20	V
Working Peak Reverse Voltage	V _R WM		
DC Blocking Voltage	V _R		
Average Rectified Output Current (Note 7, t < 10s)	I _O	1	A
Peak Repetitive Forward Current (Note 7, t < 10s)	I _{FRM}	2	A
Non-Repetitive Peak Forward Surge Current (Note 7, t < 10s) Single Half Sine-Wave Superimposed on Rated Load	I _{FSM}	20	A

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	T _A = +25°C	1.1	W
	T _A = +70°C	0.7	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	108	°C/W
	t < 10s	65	
Total Power Dissipation (Note 6)	T _A = +25°C	1.8	W
	T _A = +70°C	1.0	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	78	°C/W
	t < 10s	50	
Thermal Resistance, Junction to Case (Note 6)	R _{θJC}	22	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

- 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°C.

Electrical Characteristics P-Channel Q1 (@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	I _{DSS}	—	—	-1	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(th)}	-0.5	-1.5	-2.2	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	70	85	mΩ	V _{GS} = -10V, I _D = -3.05A
		—	100	125		V _{GS} = -4.5V, I _D = -1.50A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.0	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	353	—	pF	V _{DS} = -15V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	49	—		
Reverse Transfer Capacitance	C _{rss}	—	41	—		
Gate Resistance	R _G	—	6.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	3.7	—	nC	V _{DS} = -15V, I _D = -3A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	7.8	—		
Gate-Source Charge	Q _{gs}	—	1.1	—		
Gate-Drain Charge	Q _{gd}	—	1.3	—		
Turn-On Delay Time	t _{D(on)}	—	3.3	—	ns	V _{DS} = -15V, R _L = 15Ω V _{GS} = -10V, R _G = 6Ω
Turn-On Rise Time	t _r	—	3.0	—		
Turn-Off Delay Time	t _{D(off)}	—	14	—		
Turn-Off Fall Time	t _f	—	6.8	—		
Body Diode Reverse Recovery Time	t _{rr}	—	33	—	ns	I _S = -3.05A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{rr}	—	46	—	nC	I _S = -3.05A, dI/dt = 100A/μs

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

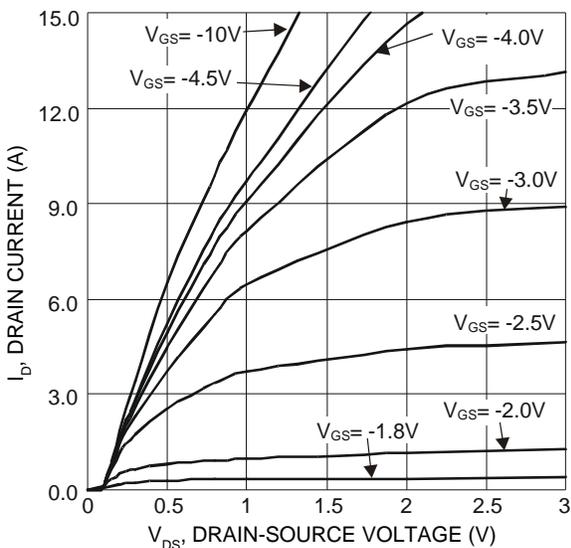


Figure 1. Typical Output Characteristic

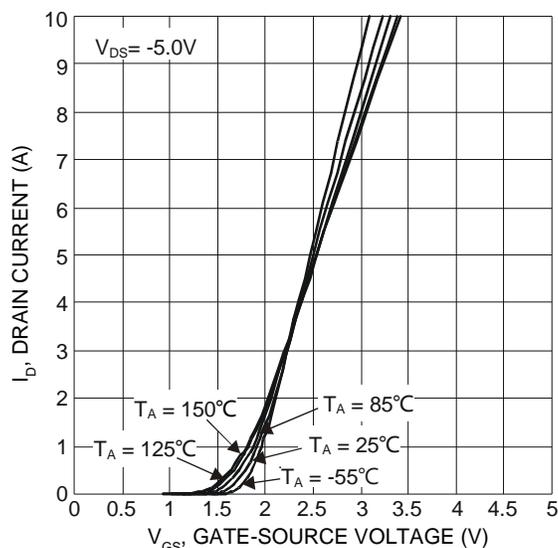


Figure 2. Typical Transfer Characteristic

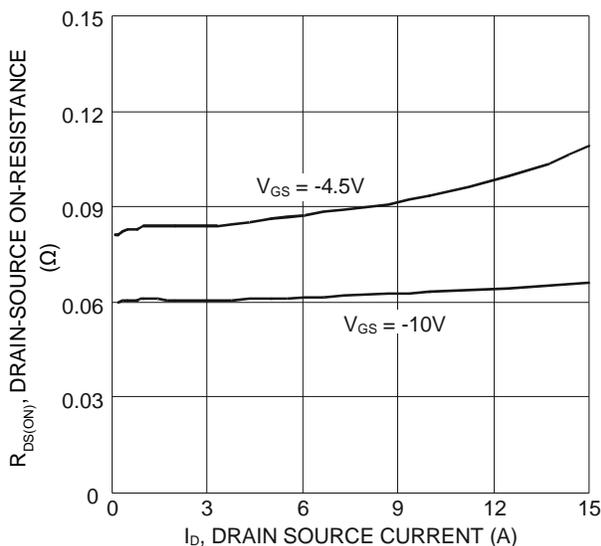


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

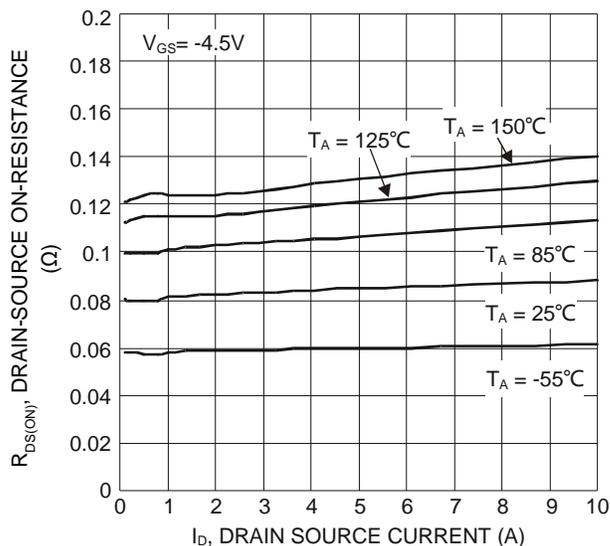


Figure 4. Typical On-Resistance vs. Drain Current and Temperature

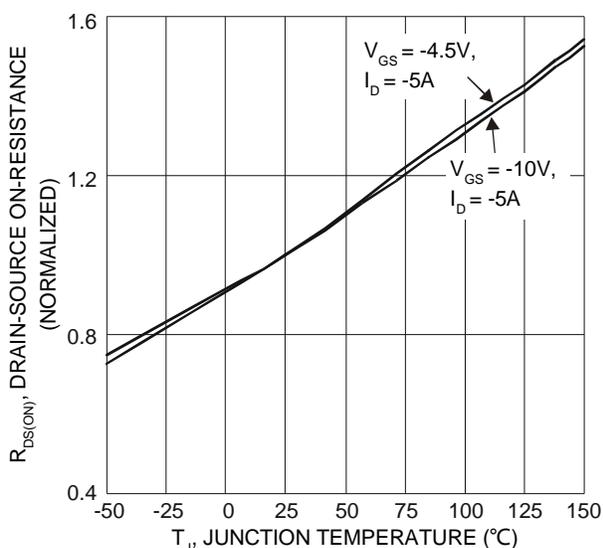


Figure 5. On-Resistance Variation with Temperature

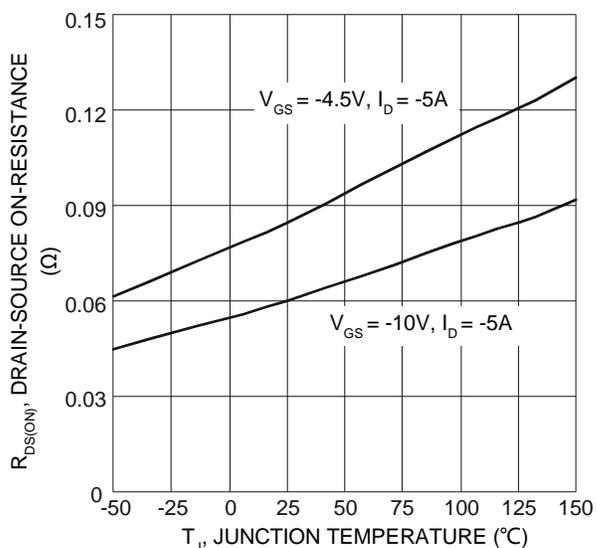


Figure 6. On-Resistance Variation with Temperature

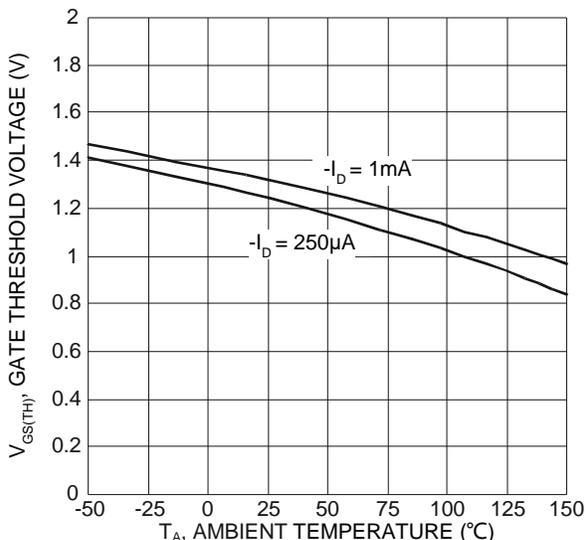


Figure 7. Gate Threshold Variation vs. Ambient Temperature

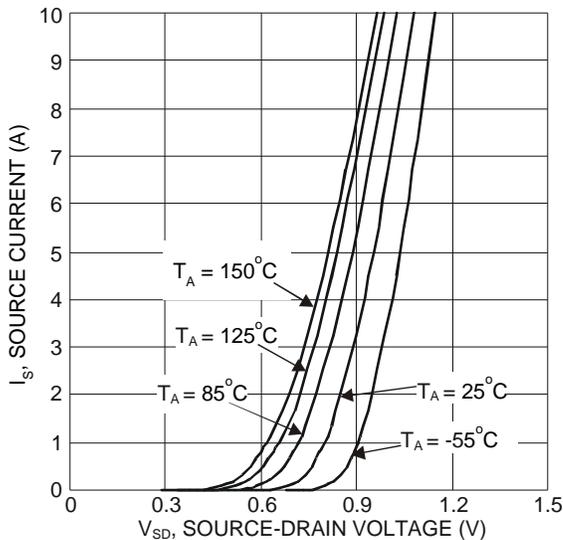


Figure 8. Diode Forward Voltage vs. Current

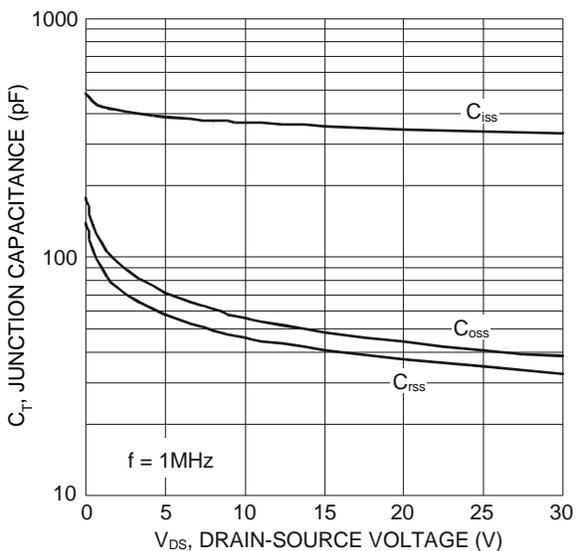


Figure 9. Typical Junction Capacitance

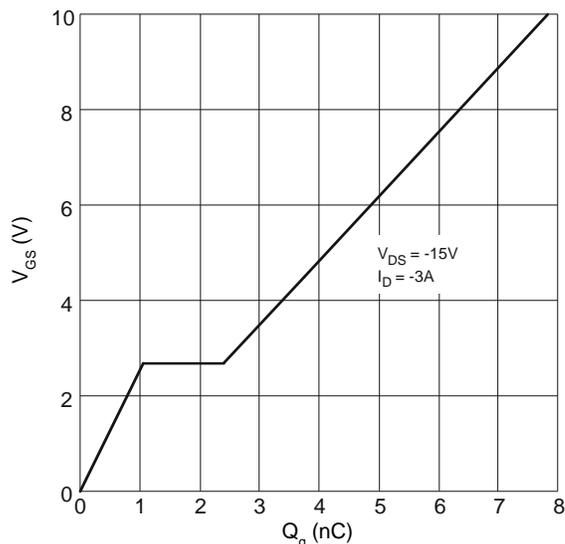


Figure 10. Gate-Charge Characteristics

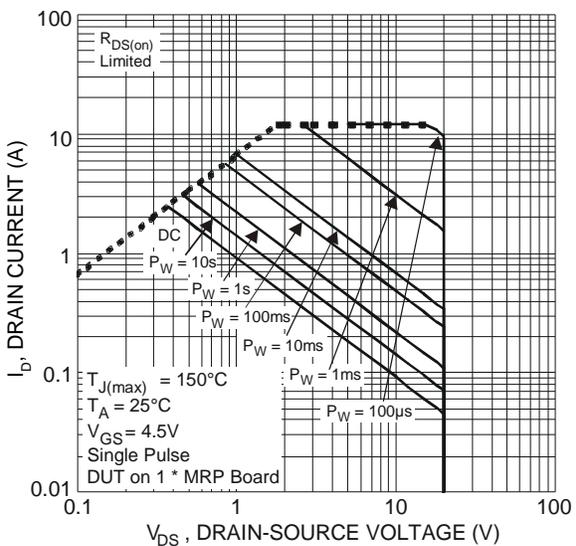


Figure 11. SOA, Safe Operation Area

Electrical Characteristics – SCHOTTKY – D1 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 10)	$V_{(BR)R}$	20	35	—	V	$I_R = 1\text{mA}$
Forward Voltage (Note 10)	V_F	—	—	0.40 0.47	V	$I_F = 0.5\text{A}$ $I_F = 1.0\text{A}$
Reverse Current (Note 10)	I_R	—	30	80	μA	$V_R = 20\text{V}$

Note: 10. Short duration pulse test used to minimize self-heating effect.

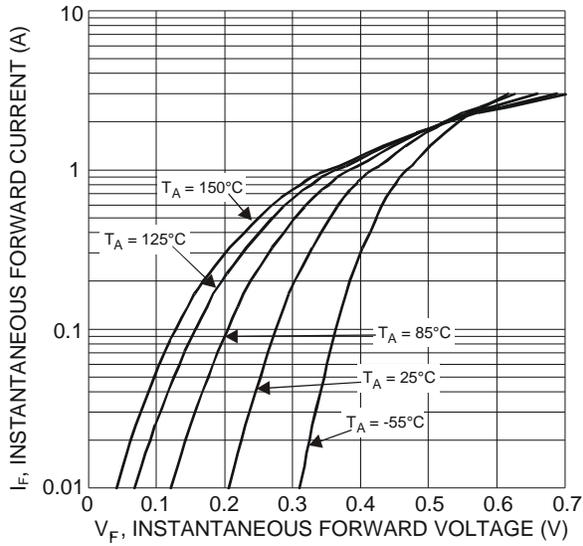


Figure 12. Typical Forward Characteristics

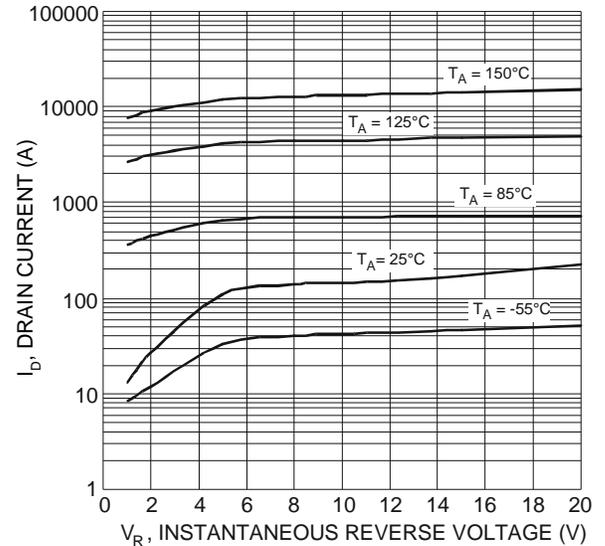
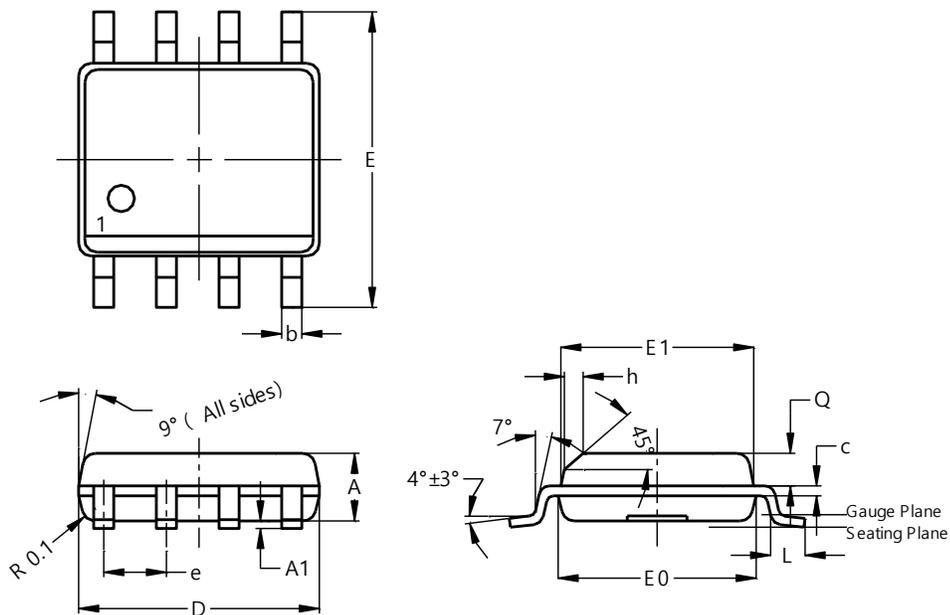


Figure 13. Typical Reverse Characteristics

Package Outline Dimensions

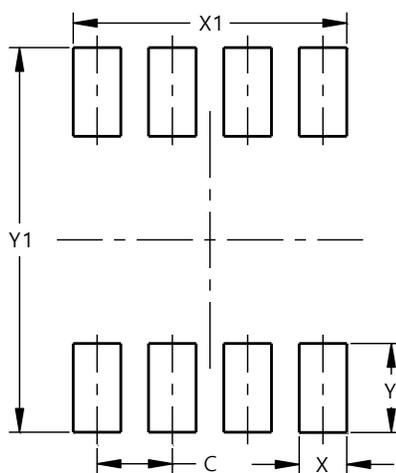
SO-8



SO-8			
Dim	Min	Max	Typ
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	--	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50