



## Description

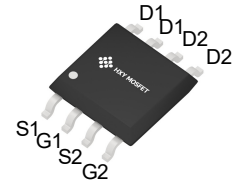
The FDS3890 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

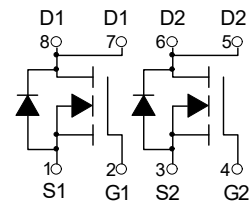
$V_{DS} = 60V$   $I_D = 6.5A$   
 $R_{DS(ON)} < 36m\Omega$  @  $V_{GS}=10V$   
 $R_{DS(ON)} < 48m\Omega$  @  $V_{GS}=4.5V$

## Application

Battery protection  
Load switch  
Uninterruptible power supply



SOP-8  
(SO-8)



Dual N-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
FDS3890	SOP-8(SO-8)	HXY MOSFET	3000

## Absolute Maximum Ratings@T<sub>J</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_A=25^\circ C$	Drain Current, $V_{GS}$ @ 4.5V <sup>3</sup>	6.5	A
$I_D@T_A=70^\circ C$	Drain Current, $V_{GS}$ @ 4.5V <sup>3</sup>	5	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	30	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.1	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{thj-a}$	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	60	°C/W



**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	60	69	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics <sup>(Note 3)</sup>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.4	2.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =6A		32	36	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A		34	48	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =6A		20	-	S
Dynamic Characteristics <sup>(Note4)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1.0MHz		1920		PF
Output Capacitance	C <sub>oss</sub>			155		PF
Reverse Transfer Capacitance	C <sub>rss</sub>			116		PF
Switching Characteristics <sup>(Note 4)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =30V, R <sub>L</sub> =4.7Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	-	8	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	29	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	6	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =6A, V <sub>GS</sub> =10V	-	50	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	16	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =6A	-	-	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	7	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> =7A di/dt = 100A/μs <sup>(Note3)</sup>	-	35	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	43	-	nC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

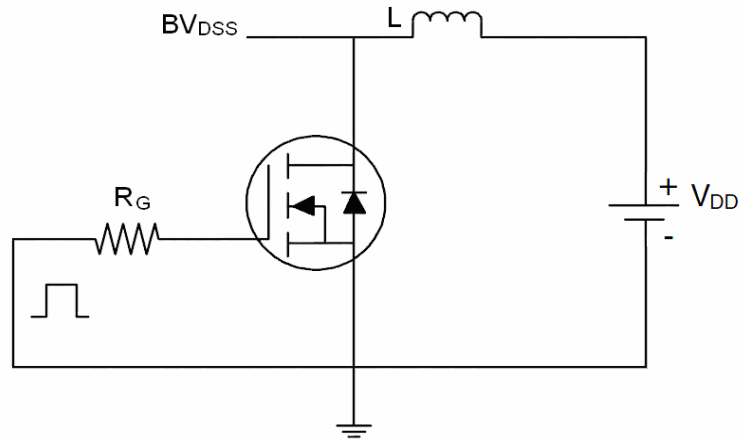
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

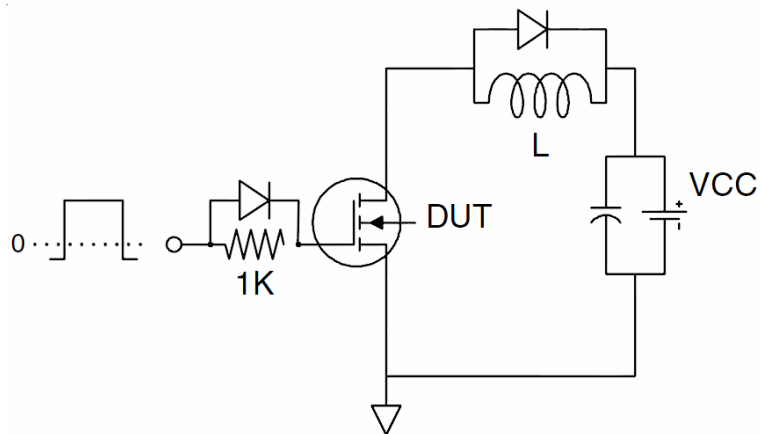


## Test Circuit

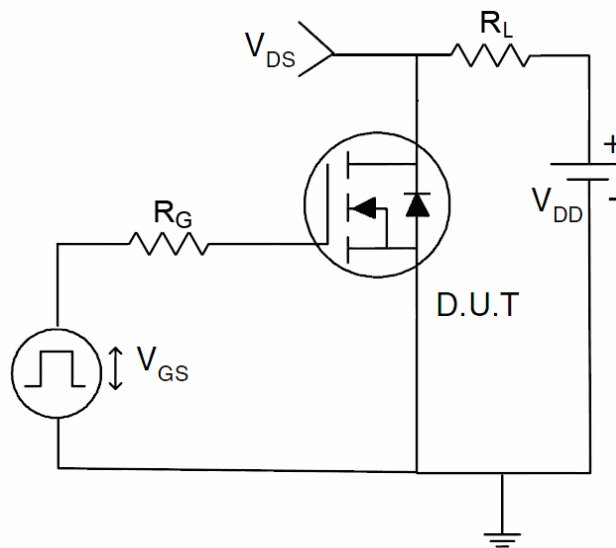
### 1) $E_{AS}$ test Circuits



### 2) Gate charge test Circuit



### 3) Switch Time Test Circuit





## Typical Electrical and Thermal Characteristics (Curves)

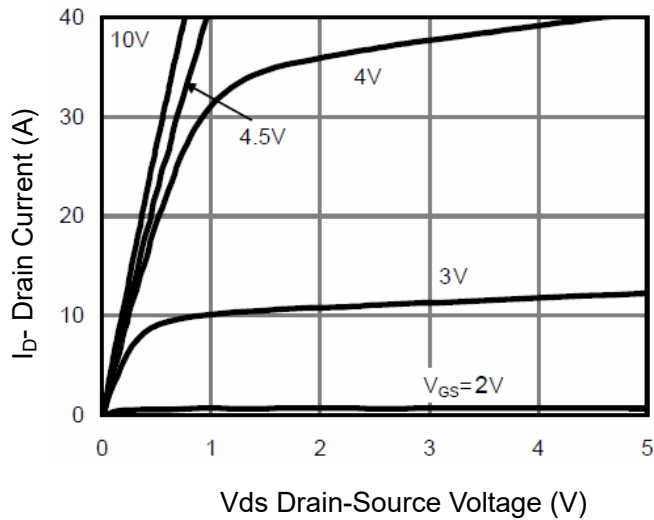


Figure 1 Output Characteristics

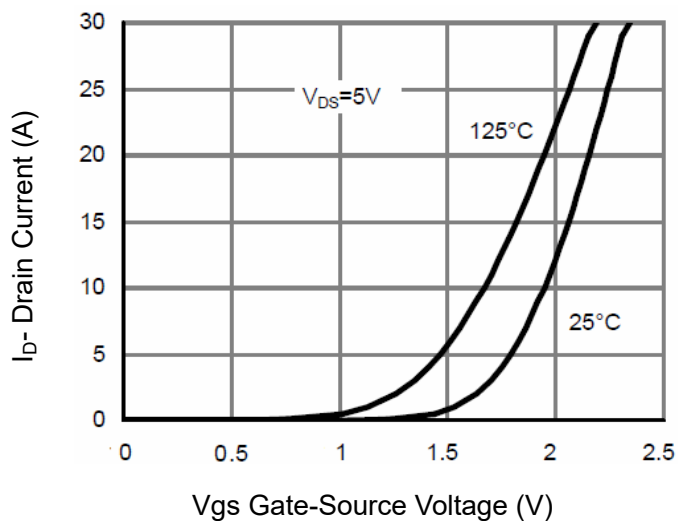


Figure 2 Transfer Characteristics

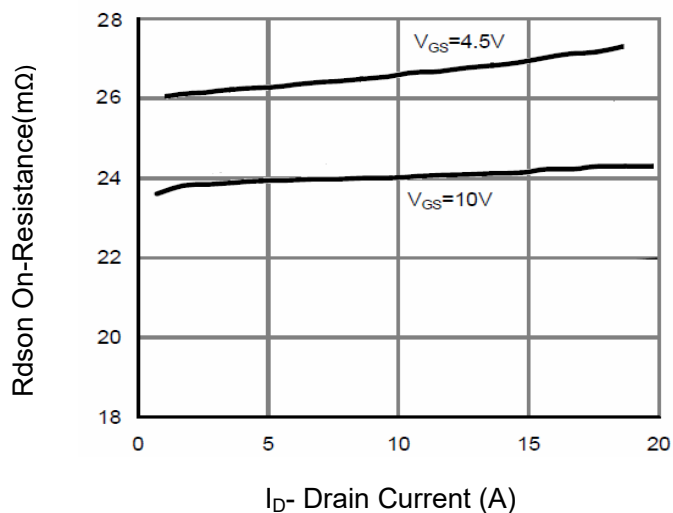


Figure 3 Rdson- Drain Current

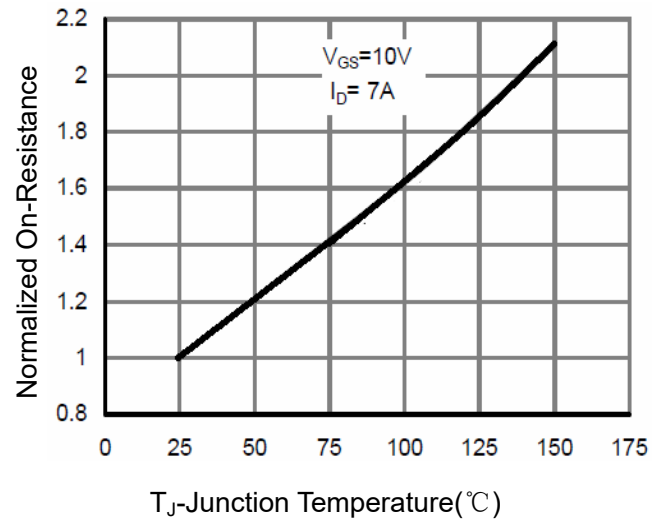


Figure 4 Rdson-Junction Temperature

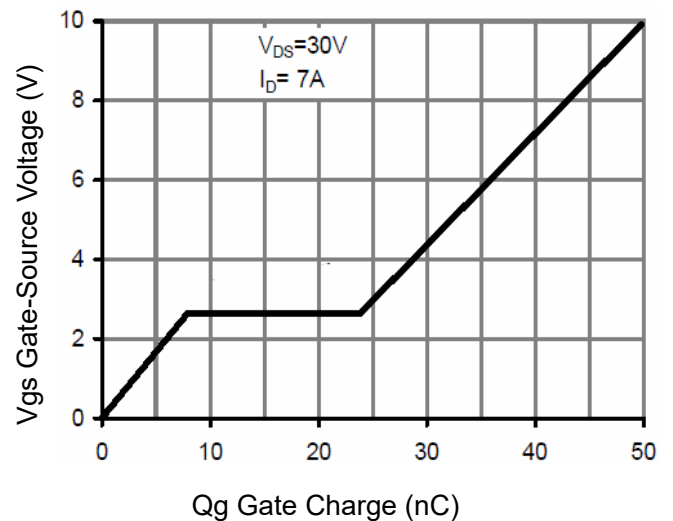


Figure 5 Gate Charge

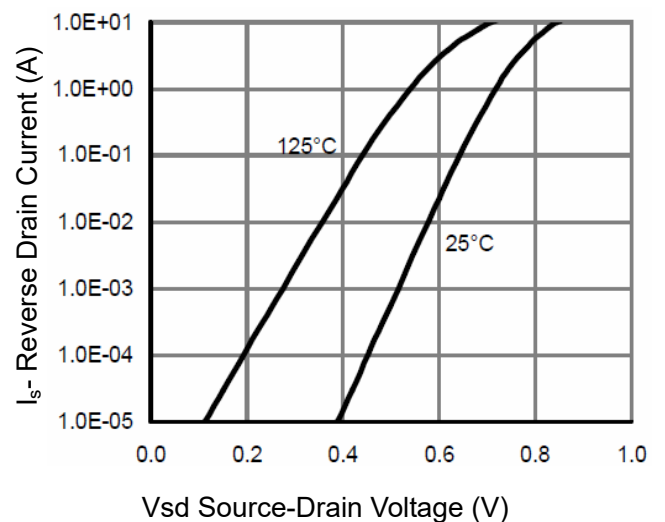
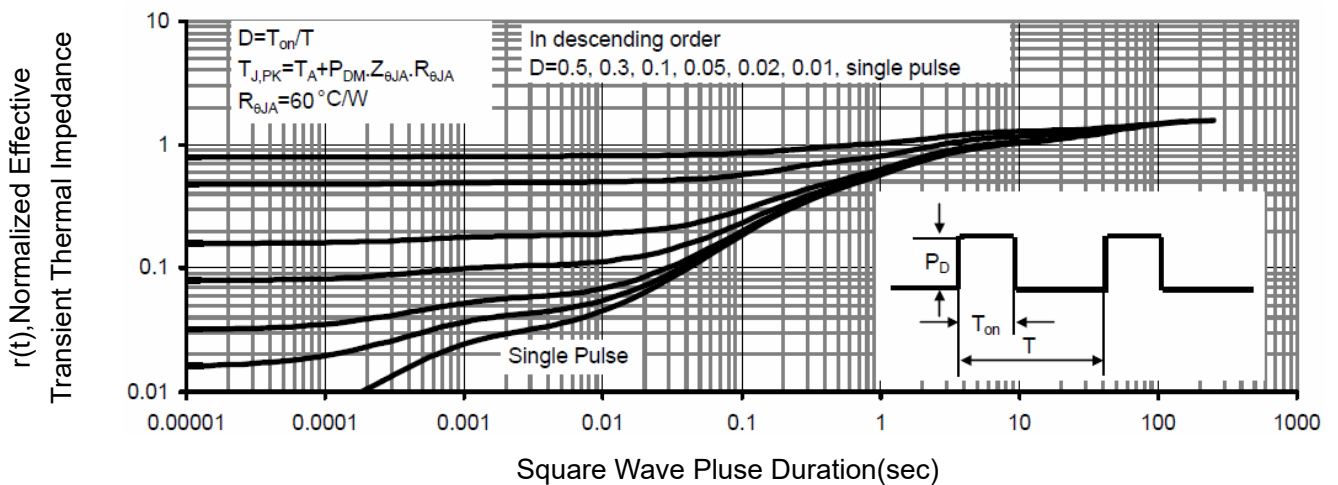
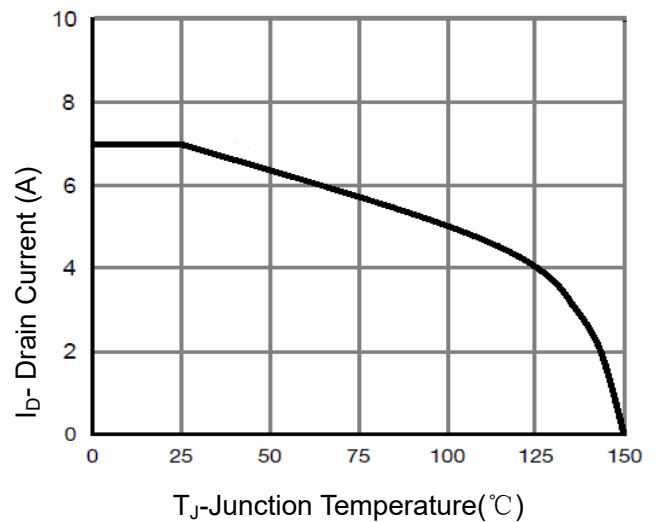
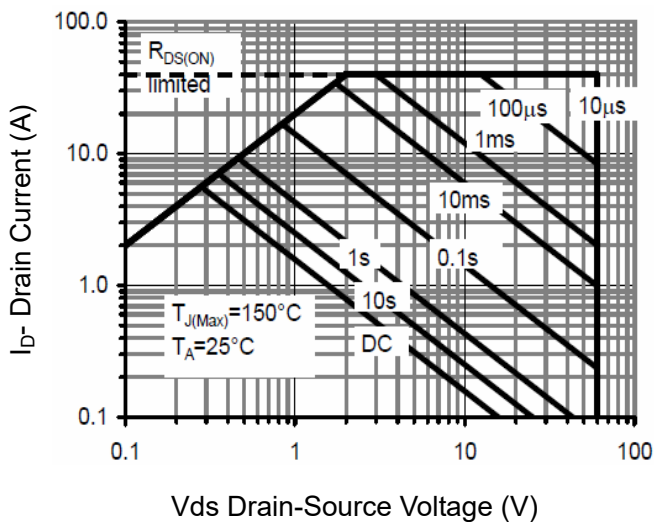
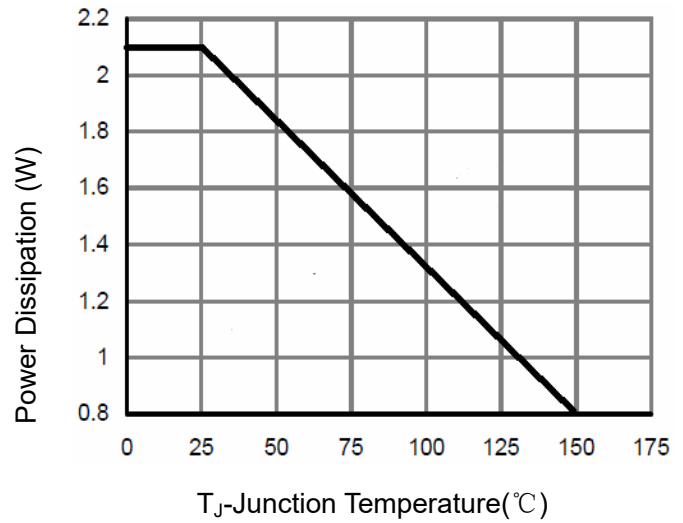
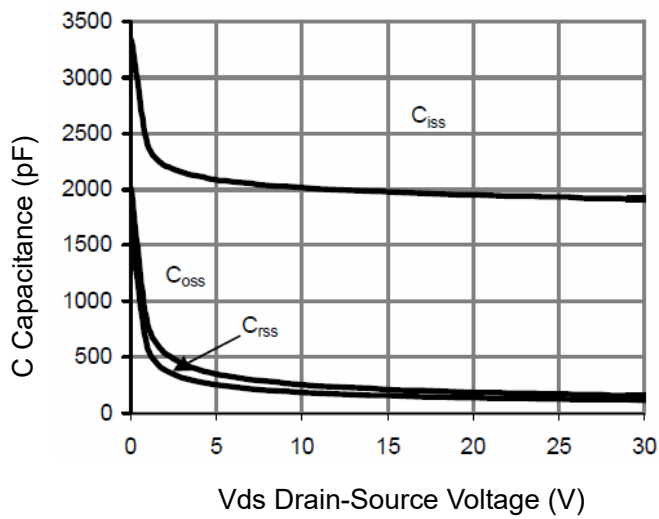
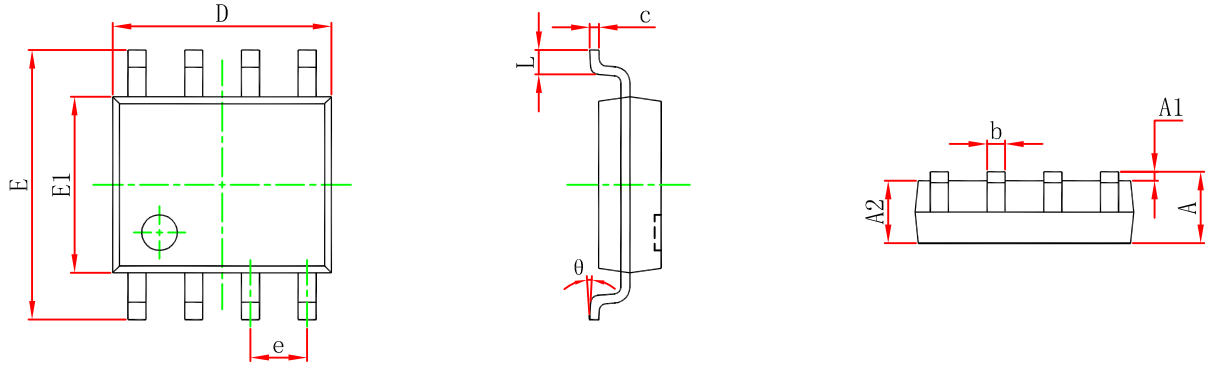


Figure 6 Source- Drain Diode Forward

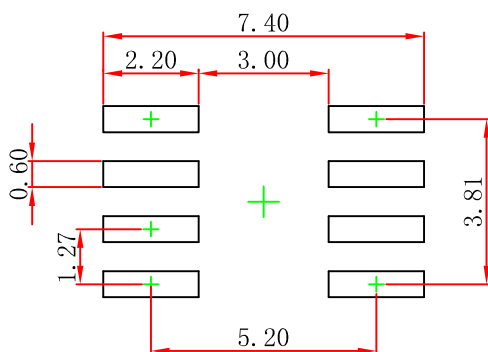




## SOP-8(SO-8) Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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