

SK62606 Programmable Overvoltage Protection Switch with Maximum 2A Current

GENERAL DESCRIPTION

The SK62606 is a front-end over voltage and over current protection device. It achieves wide input voltage range from 2.5VDC to 36VDC. The over voltage threshold can be programmed externally or set to internal default setting. The ultra-low resistance of integrated power path nFET switch ensures better performance for battery charging system applications. It can deliver up to 2A current to satisfy the battery supply system. It integrates the over-temperature protection shutdown and auto-recovery circuit with hysteresis to protect against over current events. This device is available in ultra-small DFN2x2-8L, SOT23-6L package, ideally for small PCB area application.

FEATURES

- Absolute maximum input voltage: 36V
- Maximum load current : 2A
- Extremely low power path resistance : 100mΩ (typ.)
- Fixed Internal OVP threshold : 5.85/6.1/6.8/10.5/14.0V(Typ.)
- OVP response time : 50ns
- Internal 15-ms Start-Up or OVP Recovery Delay
- Internal over current limit protection: 3A(Min)
- Programmable over voltage threshold : 4V to 20V
- Internal soft start to prevent In-rush current
- Thermal shutdown protection & Auto recovery
- Output short-circuit protection
- RoHS compliant and Halogen free
- Compact package: DFN2x2-8L, SOT23-6L

APPLICATIONS

- Wearable Device
- Mobile device
- In-Car device

TYPICAL APPLICATION CIRCUIT

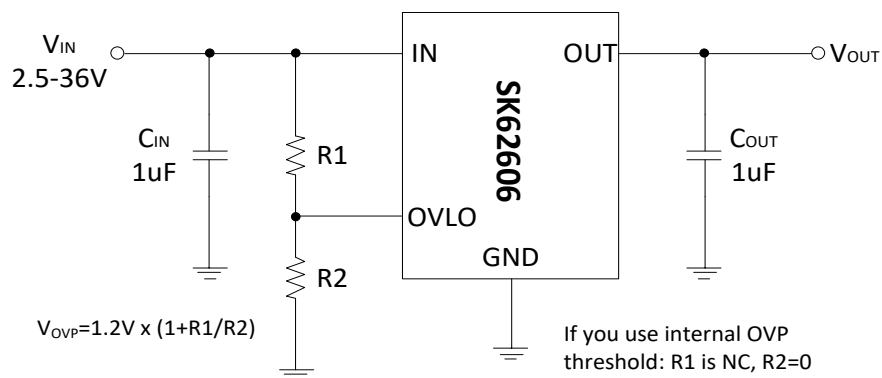


Figure 1. Typical Application Schematic

TYPICAL APPLICATION CIRCUIT

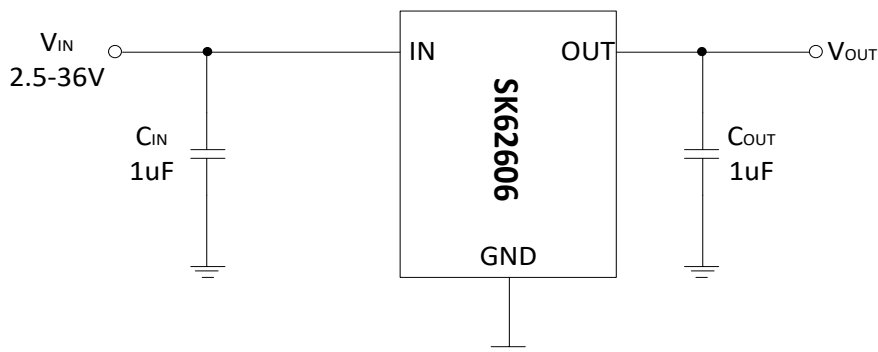
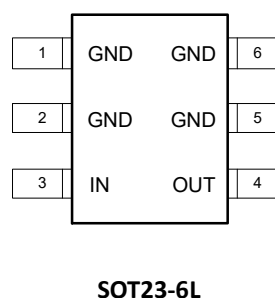
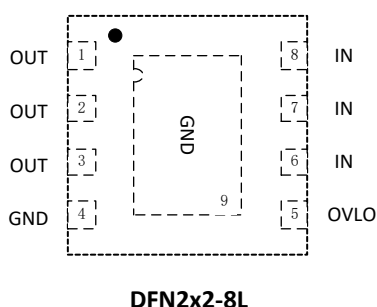


Figure 2. Typical Application Schematic

PIN ASSIGNMENT



PIN DESCRIPTION

PIN (DFN)	PIN (SOT)	SYMBOL	TYPE	PIN DESCRIPTION
6/7/8	3	IN	I	Power input pin. Connect IN pin together. Decouple high frequency noise by connecting at least 0.1uF MLCC to ground.
1/2/3	4	OUT	O	Output voltage pin. Source side of the internal FET. Connect OUT pins together for normal operation.
5	/	OVLO	I	External OVLO program pin. Connect resistor divider to this pin to program the OVLO threshold. Make sure V_{OVLO} is higher than the internal pre-set threshold; otherwise the internal default threshold will be activated. Pull down this pin to ground to disable external program function.
4	1/2/5/6	GND	Ground	Power ground pin.

ORDERING INFORMATION

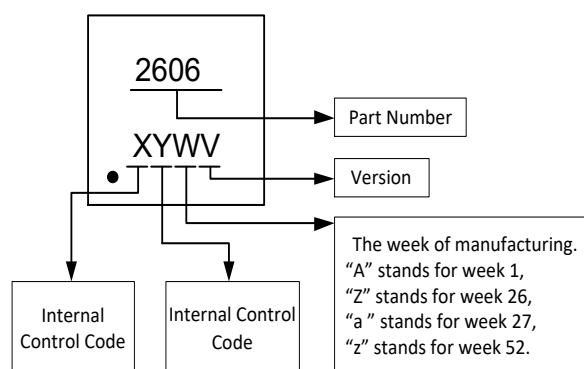
PART NO	PACAKGE	VOUTDISCHARGE	TEMPERATURE	TAPE & REEL
SK62606S6-XX	SOT23-6L	Yes	-40 ~ +85 °C	3000/REEL
SK62606D8-XX	DFN2x2-8L	Yes	-40 ~ +85 °C	4000/REEL

PART NUMBER RULES

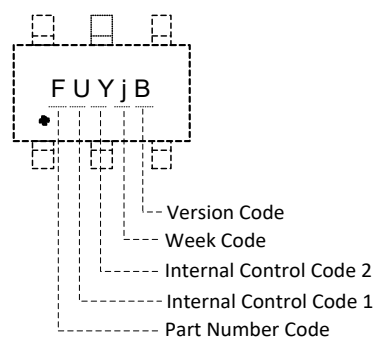
SK62606 1 - 2

Code	Description
1	Package: D8: DFN2x2-8L S6: SOT23-6L
2	OVP version: XX: OVP threshold voltage Example: 68: 6.8V

MARKING DESCRIPTION (DFN)



MARKING DESCRIPTION (SOT23)



ABSOLUTE MAXIMUM RATINGS (Note)

SYMBOL	ITEMS	VALUE	UNIT
V _{IN}	Input Voltage	-0.3~36	V
V _{OUT}	Output Voltage	-0.3~25	V
V _{OVLO}	OVLO Voltage	-0.3~20	V
I _{OMAX}	Maximum Output Continues Load Current	2	A
P _{DMAX}	Power Dissipation	DFN2x2-8L	1
		SOT23-6L	0.5
R _{θJA}	Thermal Resistance	DFN2x2-8L	118
		SOT23-6L	220
T _J	Junction Temperature	-40~150	°C
T _{stg}	Storage Temperature	-55~150	°C
T _{solder}	Package Lead Soldering Temperature (10s)	260	°C
HBM	ESD Susceptibility, Human Body Model	6	KV

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED OPERATING RANGE

SYMBOL	ITEMS	VALUE	UNIT
V _{IN}	Input Supply Voltage	2.8 to 20	V
V _{OUT}	Output Voltage	≤20	V
I _{OUT}	Continue Output Current	≤2	A
	Peak Output Current	≤4	A
V _{OVLO}	OVLO Voltage	0 to 20	V
T _{OPR}	Operating Temperature	-40 to +85	°C
C _{IN}	Input capacitance	1	μF
C _{LOAD}	Output load capacitance	1	μF

ELECTRICAL CHARACTERISTICS

($V_{IN} = 2.8V$ to $40V$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $T_A=25\text{ }^\circ\text{C}$, unless otherwise noted.)

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	UNIT	
Input Voltage	V_{IN}		2.8		36	V	
Input UVLO Threshold	V_{UVLO}			2.5	2.8	V	
UVLO Hysteresis	V_{HYS}			260		mV	
Input Quiescent Current	I_Q	$V_{IN}=5V, V_{IN}<V_{OVLO}$		210		μA	
OVLO Input Leakage Current	I_{OVLO}	$V_{OVLO}=V_{OVLO_TH}$	-100		100	nA	
Internal Default OVP Threshold	V_{OVLO}	Rising	SK62606xx-585	5.67	5.85	6.03	V
			SK62606xx-61	5.9	6.1	6.3	
			SK62606xx-68	6.6	6.8	7.0	
			SK62606xx-100	9.7	10.0	10.3	
			SK62606xx-140	13.5	14.0	14.5	
Internal OVP Hysteresis	V_{OVLO_HYS}	Falling		200		mV	
Internal OCP Threshold		Thermal foldback limited	3		5	A	
OVLO Preset Threshold	V_{OVLO_TH}	Rising, other version	1.14	1.2	1.26	V	
		Rising, 6.1V OVP version	1.18	1.25	1.32		
OVLO Hysteresis		Falling		35		mV	
External OVLO Select Threshold	V_{OVLO_SEL}			0.25	0.30	V	
Programmable OVLO range	V_{OVPPR}		4		15	V	
On Resistance of power path	R_{ON}	$V_{IN}=5V, I_{OUT}=500mA$, from IN to OUT		100		m Ω	
Startup or OVP Recovery Debounce Time	T_{DEB}	Time from $2.5V<V_{IN}<V_{OVLO}$ to $V_{OUT}=10\%$ of V_{IN}		15		mS	
Soft start Turn-On Time	t_{ON}	$V_{IN}=5V, R_L=100, C_{OUT}=100\mu F$; $V_{OUT}=10\%$ of V_{IN} to $90\% V_{IN}$		0.2		mS	
OVP Switch Turn-Off Time	t_{OFF}	$V_{IN}>V_{OVLO}$ to V_{OUT} stop rising		50	100	nS	
Output Discharge Resistance	R_{DISC}	OVP Triggered		200		Ω	
Thermal Shutdown Temperature	T_{SD}			150		$^\circ\text{C}$	
Thermal Shutdown Hysteresis	T_{HYS}			25		$^\circ\text{C}$	

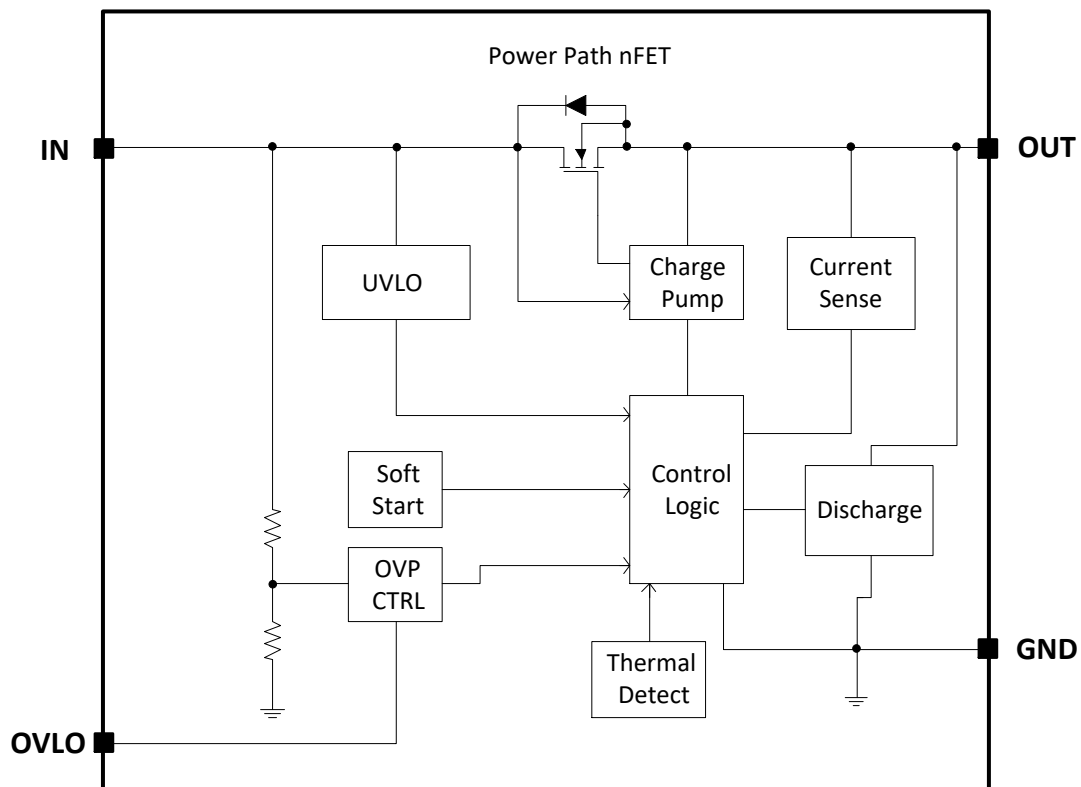
Note :

1. $R_1=1M\Omega$ is a good starting value for minimum current consumption. Since V_{OVLO} , V_{OVLO_TH} , and R_1 are known, R_2 can be calculated from the following formula:

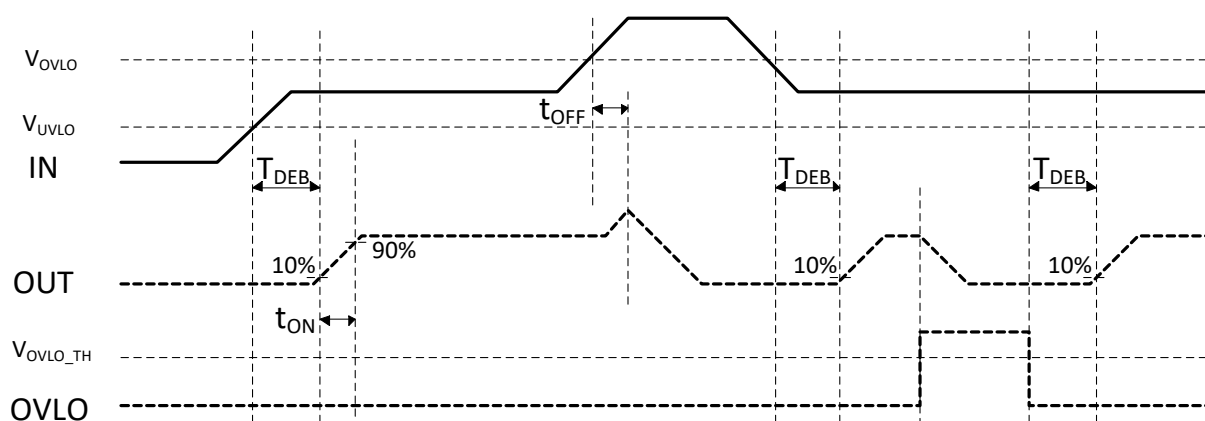
$$\begin{aligned}
 V_{OVLO} &= V_{OVLO_TH} \times (1 + R_1/R_2) \\
 &= 1.2V \times (1 + R_1/R_2), \\
 R_2 &= R_1 / [(V_{OVLO} / 1.2) - 1].
 \end{aligned}$$

2. The OVLO pad is bounding to GND for SOT23-6L package and its OVP threshold is setting internally.

SIMPLIFIED BLOCK DIAGRAM

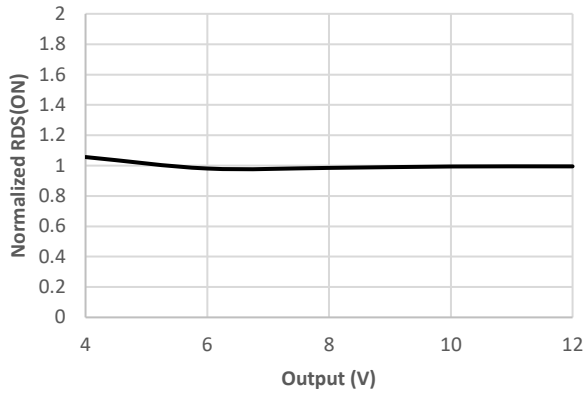


TIMING DIAGRAM

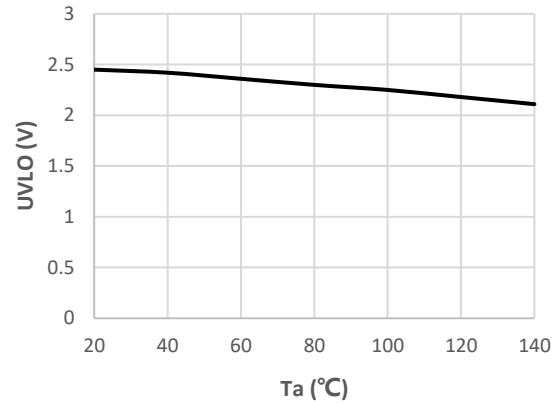


TYPICAL PERFORMANCE CHARACTERISTICS

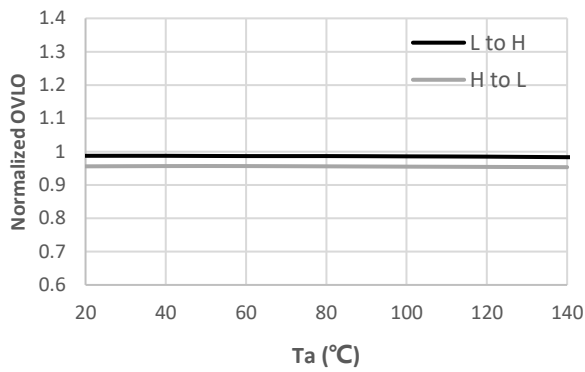
Normalized RDS(ON) vs Output Voltage



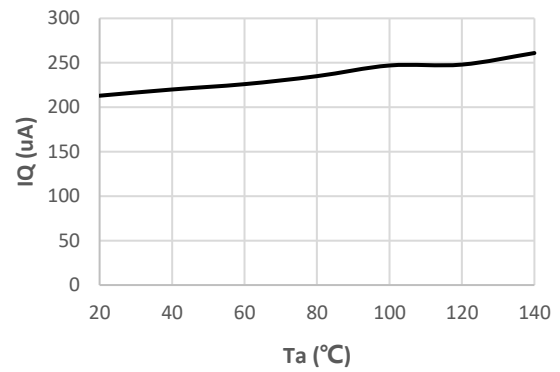
UVLO vs Ta



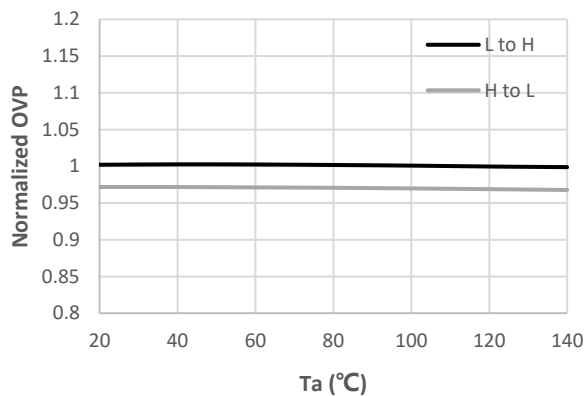
Normalized OVLO Preset vs Ta



IQ vs Ta



Normalized Internal OVP vs Ta



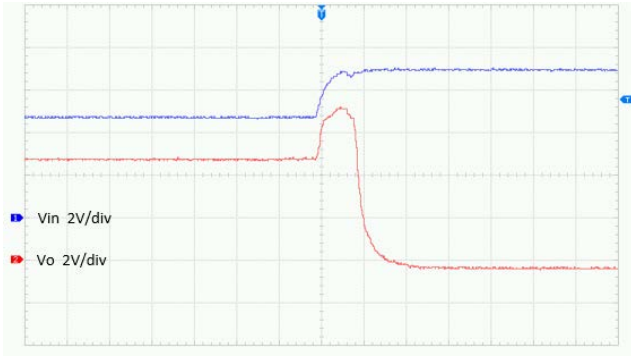


Figure-1 OVP Protection Response

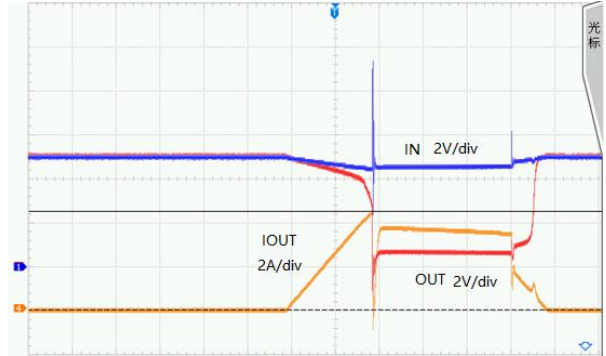
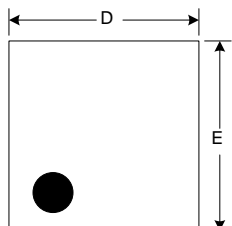
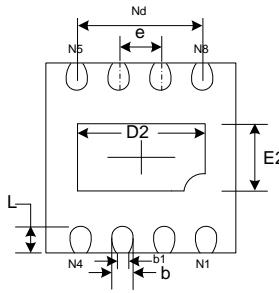
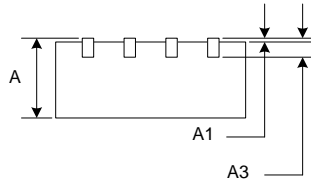
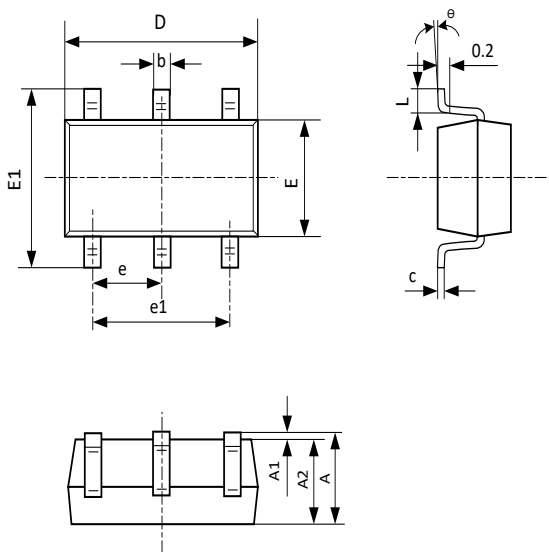


Figure 2 OCP Protection & Recovery

PACKAGE OUTLINE

Package	DFN-2x2-8L	Devices per reel	4000pcs	Unit	mm																																																							
Package Dimension:																																																												
 <p>TOP VIEW</p>		 <p>BOTTOM VIEW</p>																																																										
 <p>SIDE VIEW</p>																																																												
<table border="1"> <thead> <tr> <th rowspan="2">Symbol</th> <th colspan="3">Dimensions in Millimeters</th> </tr> <tr> <th>Min</th> <th>Nom</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.70</td> <td>0.75</td> <td>0.80</td> </tr> <tr> <td>A1</td> <td>0.00</td> <td>-</td> <td>0.05</td> </tr> <tr> <td>A3</td> <td colspan="3">0.2 REF.</td> </tr> <tr> <td>D</td> <td>1.95</td> <td>2.00</td> <td>2.05</td> </tr> <tr> <td>E</td> <td>1.95</td> <td>2.00</td> <td>2.05</td> </tr> <tr> <td>b</td> <td>0.20</td> <td>0.25</td> <td>0.30</td> </tr> <tr> <td>L</td> <td>0.20</td> <td>0.30</td> <td>0.40</td> </tr> <tr> <td>D2</td> <td>1.45</td> <td>1.60</td> <td>1.70</td> </tr> <tr> <td>E2</td> <td>0.75</td> <td>0.90</td> <td>1.00</td> </tr> <tr> <td>e</td> <td colspan="3">0.50 BSC</td> </tr> <tr> <td>Nd</td> <td colspan="3">1.50 BSC</td> </tr> <tr> <td>b1</td> <td colspan="3">0.20 BSC</td> </tr> </tbody> </table>						Symbol	Dimensions in Millimeters			Min	Nom	Max	A	0.70	0.75	0.80	A1	0.00	-	0.05	A3	0.2 REF.			D	1.95	2.00	2.05	E	1.95	2.00	2.05	b	0.20	0.25	0.30	L	0.20	0.30	0.40	D2	1.45	1.60	1.70	E2	0.75	0.90	1.00	e	0.50 BSC			Nd	1.50 BSC			b1	0.20 BSC		
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PACKAGE OUTLINE

Package	SOT23-6L	Devices per reel	3000Pcs	Unit	mm
Package Dimension:					
					
Symbol	Dimensions In Millimeters				
	Min.	Typ.	Max.		
A	-	-	1.260		
A1	0.010	-	0.110		
A2	1.050	-	1.150		
b	0.350 Typ.				
c	0.126	0.127	0.130		
D	2.870	2.920	2.970		
E	1.550	1.600	1.650		
E1	2.700	2.800	2.900		
e	0.950 Typ.				
e1	1.900 Typ.				
L	0.320	0.400	0.480		
θ	0°	-	6°		

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