

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 2.8V_{DC} to 36V_{DC}. 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 CSP-6L footprint, DFN2x2-8L and SOT23-6L package, ideally for small PCB area application.

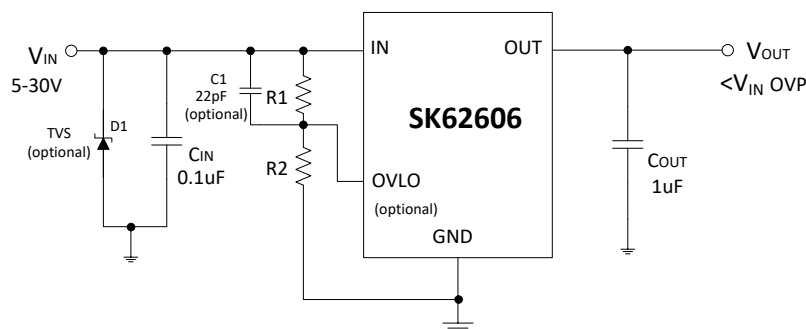
FEATURES

- Absolute maximum input voltage: 36V
- Maximum load current: 2A
- Extremely low power path resistance:
CSP-6L: 80mΩ (typ.)
DFN2x2-8L: 90mΩ (typ.)
SOT23-6L: 120mΩ (typ.)
- Fixed Internal OVP threshold(SOT23-6L) 5.8V/6.1V (Typ.) or customization
- OVP response time: 50ns
- Internal 15ms Start-Up or OVP Recovery Delay
- Internal over current limit protection: 3A (Min)
- Programmable over voltage threshold: 4V to 11V
- Internal soft start to prevent In-rush current
- Thermal shutdown protection & Auto recovery
- Output short-circuit protection
- RoHS compliant and Halogen free
- Compact package: CSP-6L, DFN2x2-8L, SOT23-6L

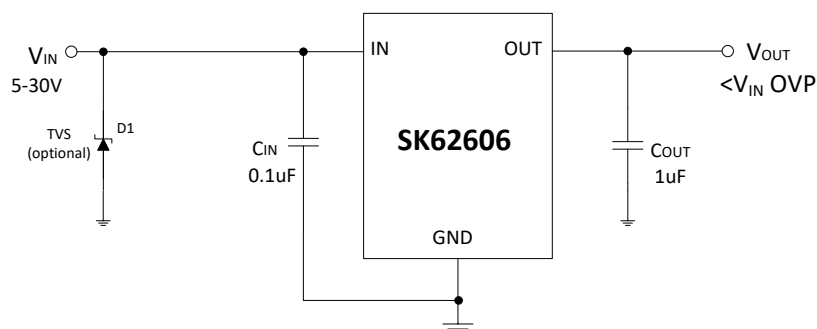
APPLICATIONS

- Wearable Device
- Mobile device
- In-Car device

TYPICAL APPLICATION CIRCUIT



Typical Application Schematic with OVLO



Typical Application Schematic without OVLO

Note:

1. If OVLO is connected to ground, OVP is the internally set OVLO value.
2. R2 is recommend to use 100K, R1 can be calculated from the following formula:

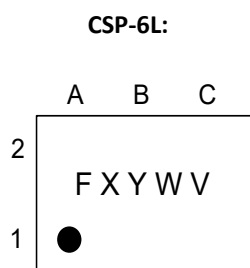
$$V_{IN_OVP} = V_{OVLO_TH} \times (1 + R1/R2)$$

$$V_{OVLO_TH}$$
 is OVLO Preset Threshold, please see electrical characteristics.
3. R1 and R2 is recommend to use high precision resister, and R2 should connected to IC's GND, not CIN's or VIN's.
4. D1 is recommended for hot-plug input application, such as USB interface.
5. C1 is recommended for the situation that input voltage is raising very slowly to trigger OVP. It can help to eliminate the shake of output voltage.

ORDERING INFORMATION

PART NO	OVP TYPE	PACAKGE	TEMPERATUR	TAPE & REEL
SK62606B6-ADJ	6.1V/adj	CSP-6L	-40 ~ +85°C	3000/REEL
SK62606D8-ADJ	6.1V/adj	DFN2x2-8L	-40 ~ +85°C	4000/REEL
SK62606S6-61	6.1V	SOT23-6L	-40 ~ +85°C	3000/REEL
SK62606S6-58	5.8V	SOT23-6L	-40 ~ +85°C	3000/REEL

MARKING DESCRIPTION



“F”: Product Code.

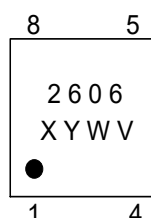
“XY”: Internal Control Code.

“W”: The week of manufacturing.

“A” stands for week 1, “Z” stands for week 26, “a” stands for week 27, “z” stands for week 52.

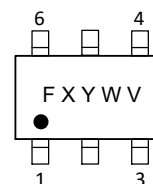
“V”: Version.

DFN2x2-8L:



“XY”: Internal Control Code

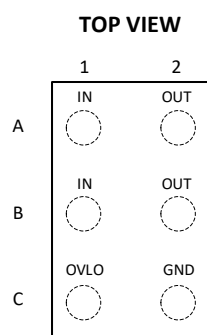
SOT23-6L:



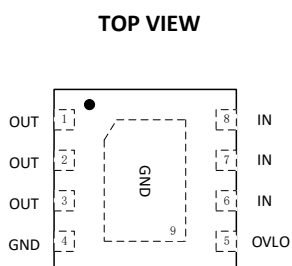
“F”: Product Code.

“XY”: Internal Control Code.

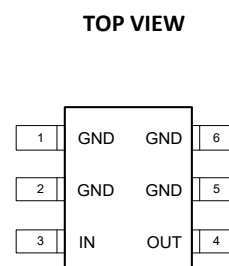
PIN CONFIGURATION



CSP-6L



DFN2x2-8L



SOT23-6L

PIN DESCRIPTION

PIN (CSP)	PIN (DFN)	PIN (SOT)	SYMBOL	TYPE	PIN DESCRIPTION
A1/B1	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.
A2/B2	1/2/3	4	OUT	O	Output voltage pin. Source side of the internal FET. Connect OUT pins together for normal operation.
C1	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.
C2	4	1/2/5/6	GND	Ground	Power ground pin.

ABSOLUTE MAXIMUM RATINGS (Note)

SYMBOL	ITEMS	VALUE	UNIT
V _{IN}	Input Voltage	-0.3~36	V
V _{OUT}	Output Voltage	-0.3~11	V
V _{OVLO}	OVLO Voltage	-0.3~20	V
I _{OMAX}	Maximum Output Continues Load Current	2	A
P _{DMAX}	Power Dissipation	CSP-6L	1.1
		DFN2x2-8L	1
		SOT23-6L	0.5
R _{θJA}	Thermal Resistance	CSP-6L	110
		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	8	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	5 to 30	V
V _{OUT}	Output Voltage	≤10	V
I _{OUT}	Continue Output Current	≤2	A
	Peak Output Current	≤4	A
V _{OVLO}	OVLO Voltage	0 to 12	V
T _{OPR}	Operating Temperature	0 to 85	°C

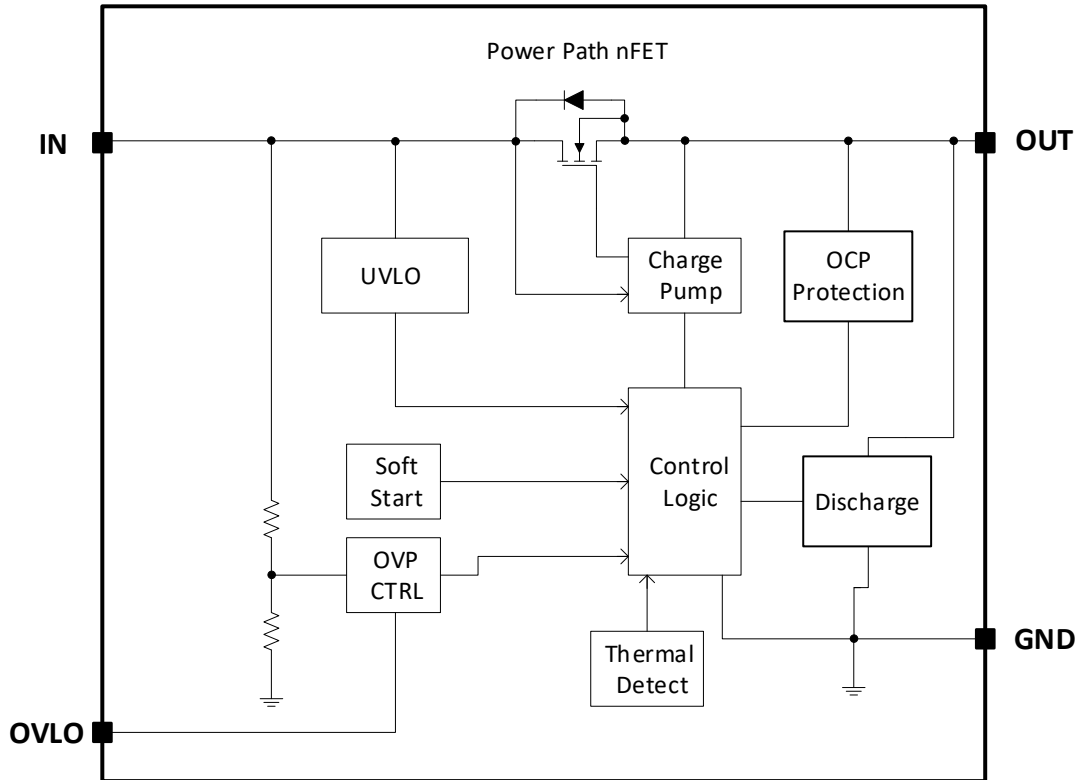
ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Test Conditions		MIN	TYP	MAX	UNIT
Input Voltage	V_{IN}			2.8		30	V
Input UVLO Threshold	V_{UVLO}				2.5		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	SK62606S6-58	5.6	5.8	6.0	V
			SK62606xx-61	5.9	6.1	6.3	V
Internal OVP Hysteresis	V_{OVLO_HYS}	Falling			190		mV
Internal OCP Threshold		Thermal foldback limited		3		5	A
OVLO Preset Threshold	V_{OVLO_TH}	Rising, 6.1V OVP version		1.218	1.25	1.281	V
OVLO Hysteresis		Falling			40		mV
External OVLO Select Threshold	V_{OVLO_SEL}	Falling			0.25	0.30	V
Programmable OVLO range	V_{OVPPR}			4		11	V
On Resistance of power path	R_{ON}	$V_{IN}=5V,$ $I_{OUT}=500mA,$ from IN to OUT	CSP-6L		80		m Ω
			DFN2x2-8L		90		
			SOT23-6L		120		
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, $V_{OUT}=1V$			500		Ω
Thermal Shutdown Temperature	T_{SD}				150		$^{\circ}C$
Thermal Shutdown Hysteresis	T_{HYS}				25		$^{\circ}C$

Note:

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

SIMPLIFIED BLOCK DIAGRAM



TIMING DIAGRAM

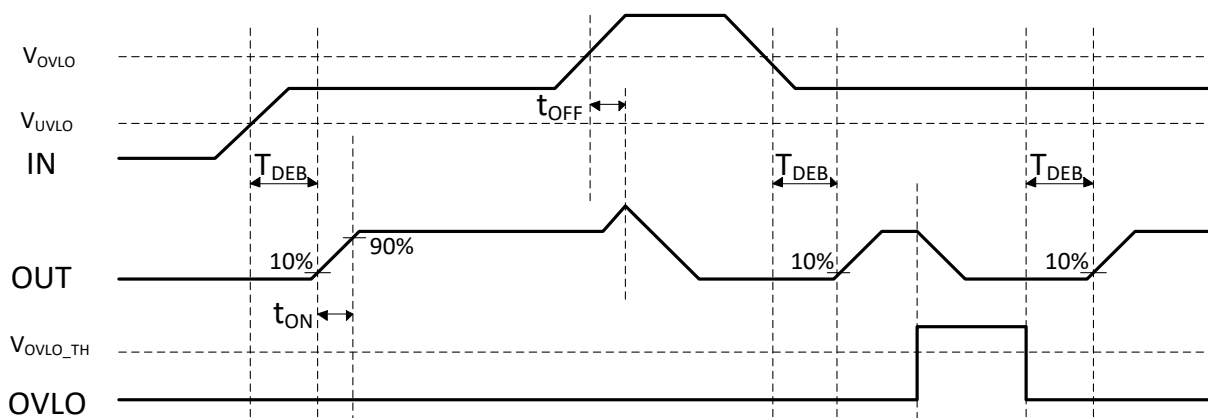
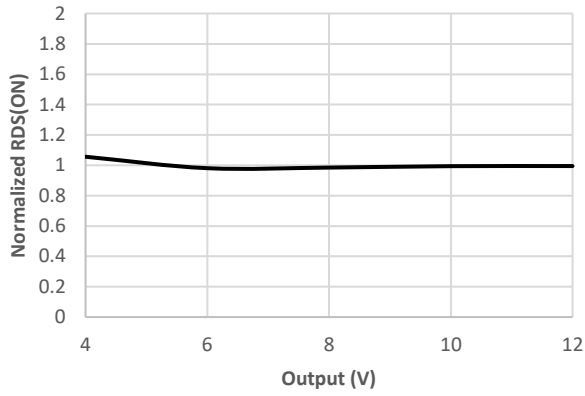


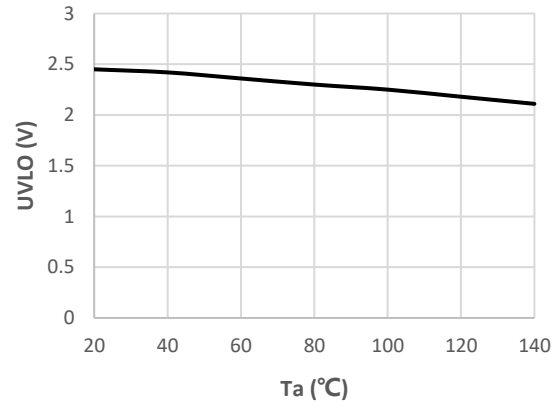
Figure 2. Timing diagram

TYPICAL PERFORMANCE CHARACTERISTICS

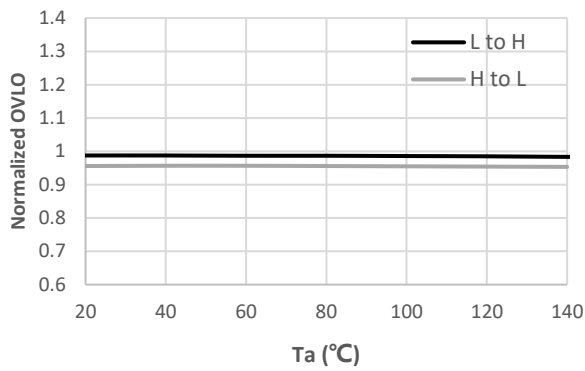
Normalized RDS(ON) vs Output Voltage



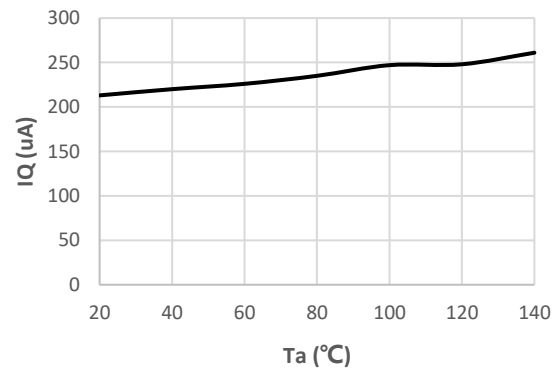
UVLO vs Ta



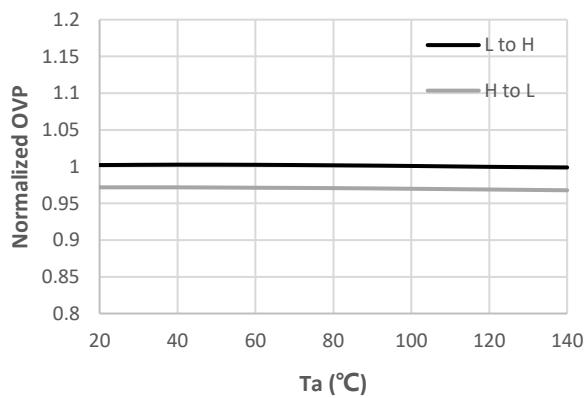
Normalized OVLO Preset vs Ta



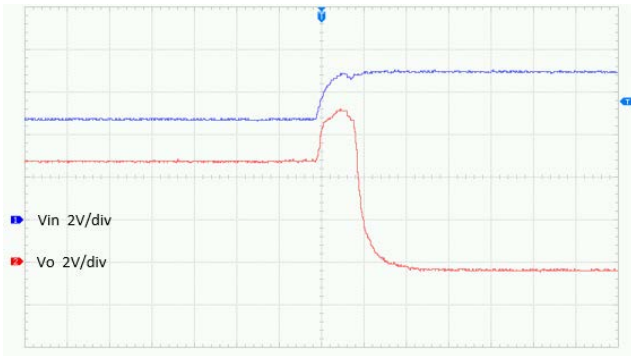
IQ vs Ta



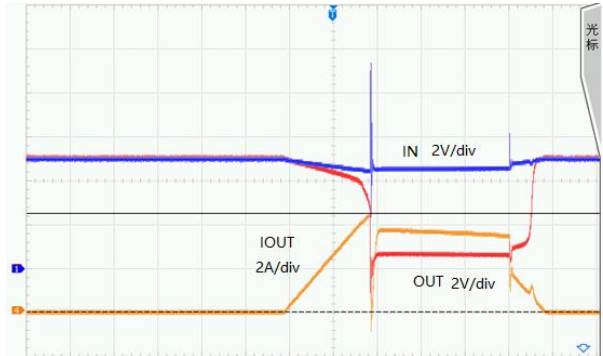
Normalized Internal OVP vs Ta



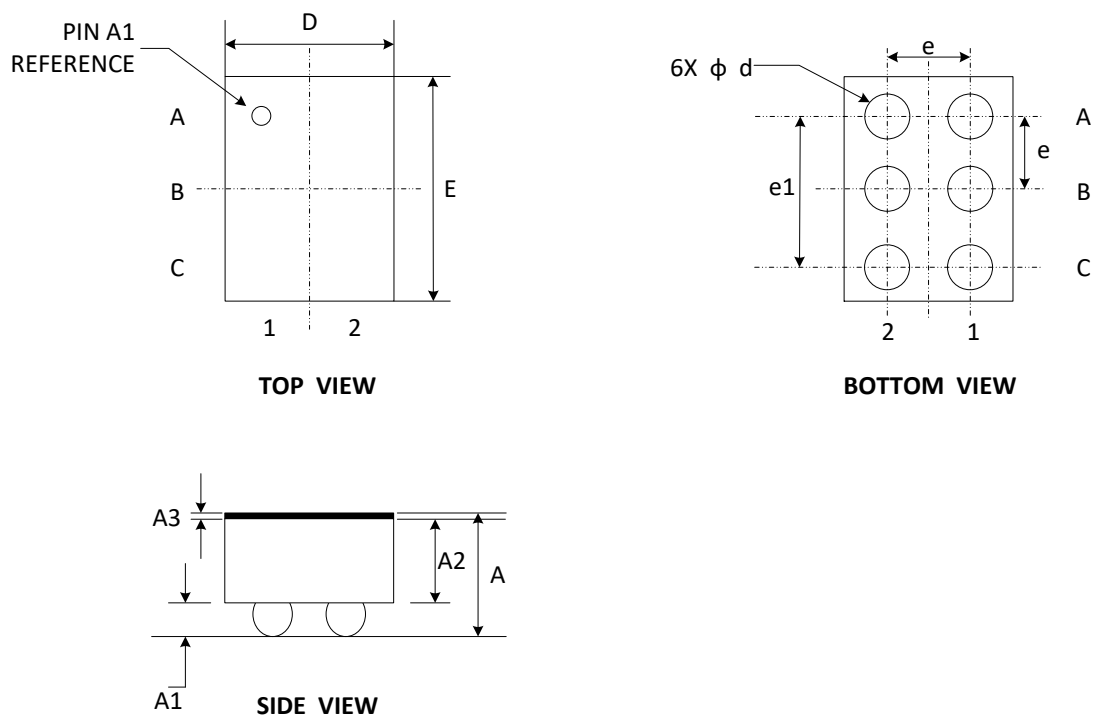
TYPICAL PERFORMANCE CHARACTERISTICS (Cont.)



OVP Protection Response

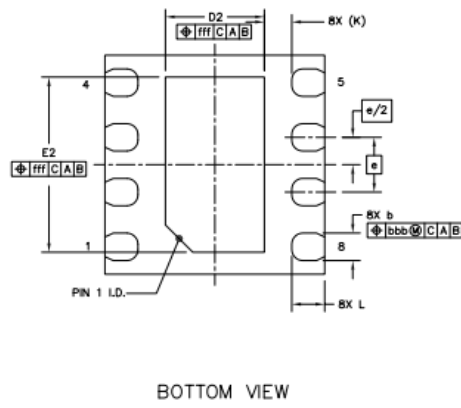
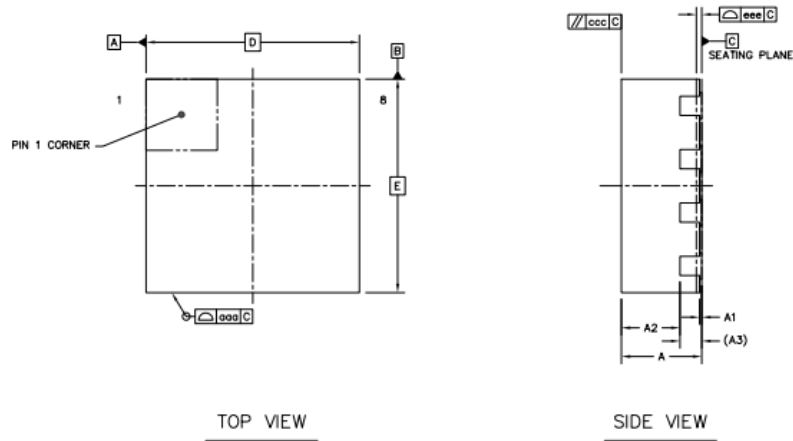


OCP Protection & Recovery

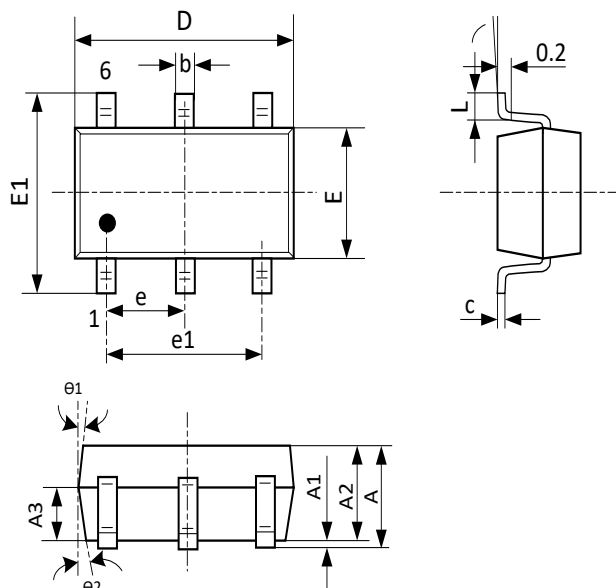
PACKAGE DIMENSION: CSP-6L


Symbol	Dimensions In Millimeter		
	Min.	Typ.	Max.
A	0.520	0.570	0.620
A1	0.164	0.194	0.224
A2	0.316	0.351	0.386
A3	0.020	0.025	0.030
d	0.190	0.230	0.270
D	0.750	0.785	0.820
E	1.340	1.375	1.410
e	0.400 Typ.		
e1	0.800 Typ.		

PACKAGE DIMENSION: DFN2x2-8L



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	0.75	0.90	1.00
E2	1.45	1.60	1.70
e	0.50 BSC		

PACKAGE DIMENSION: SOT23-6


Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	-	-	1.260
A1	0.010	0.060	0.110
A2	1.050	1.100	1.150
A3	0.620	0.650	0.680
b	0.350 BSC		
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 BSC		
e1	1.900 BSC		
L	0.320	0.400	0.480
θ	0°	-	6°
θ_1		10°	
θ_2		12°	