

Description

The EST7619 provides over-current protection (OCP) circuits, fault protection output (FPOB) and on/off control (PSONB).

The over-current protection (OCP) monitors VS1&IS1, VS2&IS2, VS3&IS3 and VS4&IS4. When an OC condition is detected, the fault protection output (FPOB) is high.

Features

- Over-current protection (OCP).
- Fault protection output (FPOB) with open drain output
- 38ms PSONB debounce time
- 75ms OCP delay time
- Adjustable OCP debounce time by DELAY pin

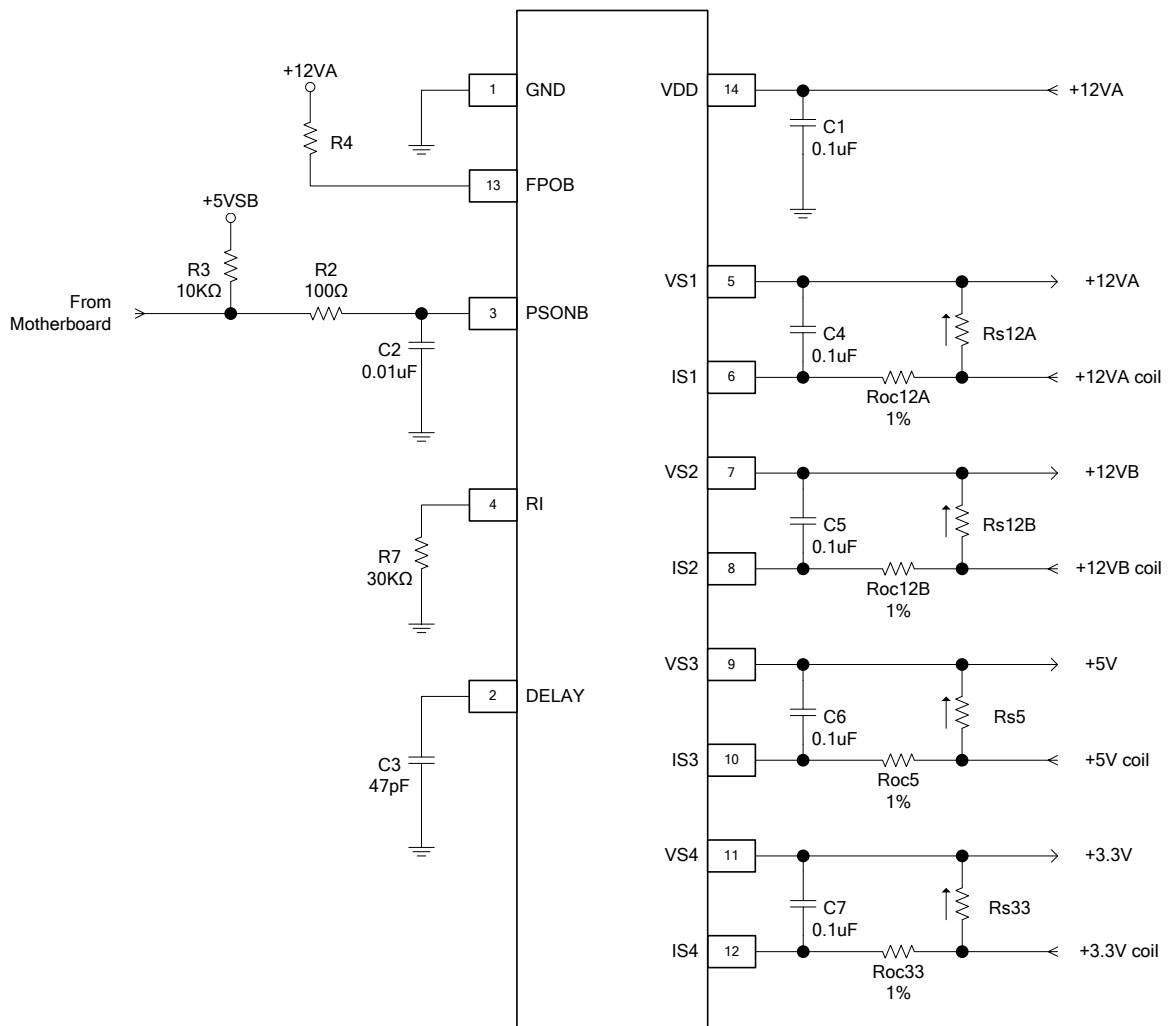
Pin Configuration (Top View)

1	GND	VDD	14
2	DELAY	FPOB	13
3	PSONB	IS4	12
4	RI	VS4	11
5	VS1	IS3	10
6	IS1	VS3	9
7	VS2	IS2	8

ing Information

Order Number	Package Type	Packing	Top Marking	Note
EST7619	DIP-14 (Pb-free)	Tube	EST.7619	Green Package
EST7619S	SOP14 (Pb-free)	Tube	EST.7619S	Green Package
EST7619SR	SOP-14 (Pb-free)	Tape & Reel	EST.7619S	Green Package

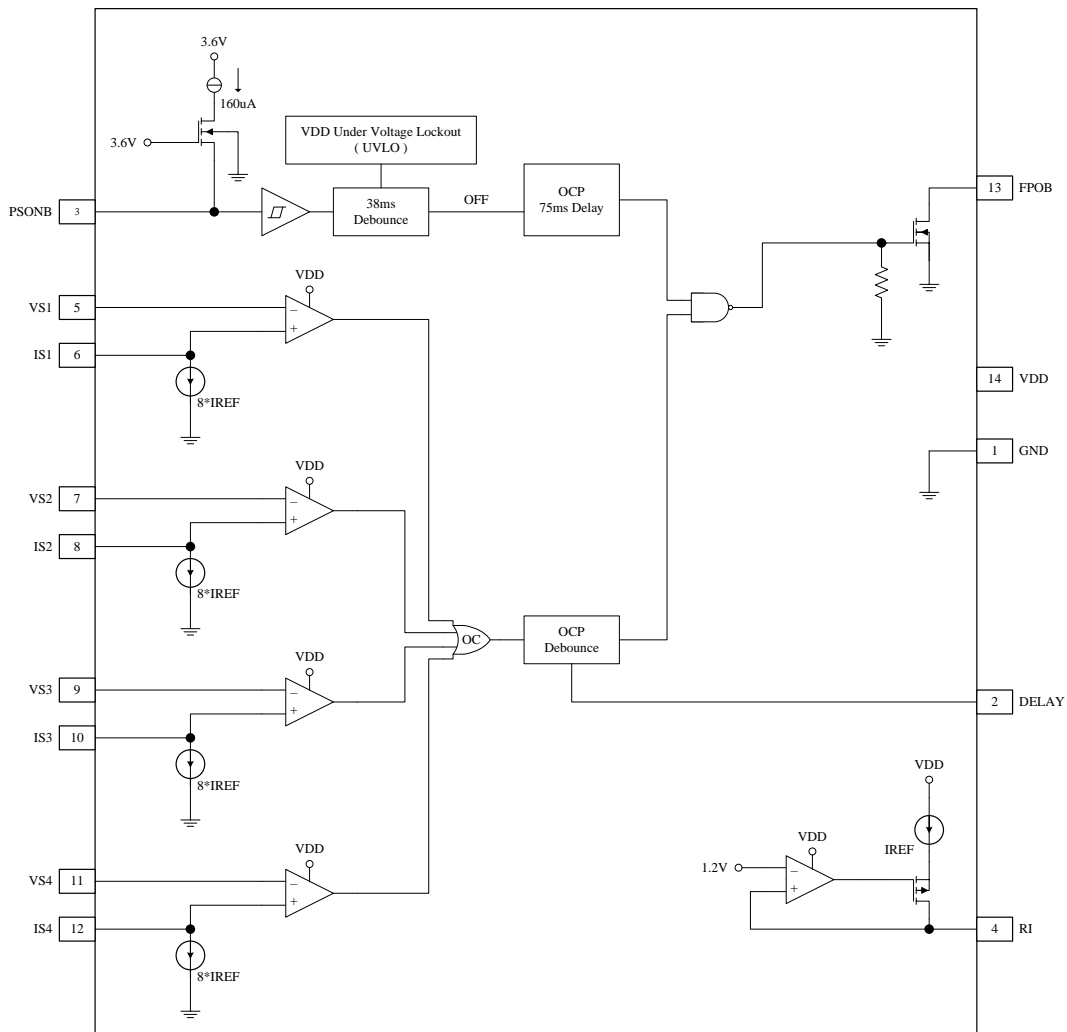
Typical Application Circuit



Pin Description

Pin Number	Pin Name	Function
1	GND	Ground.
2	DELAY	Adjustable OCP deboune time by connect a capacitor to ground.
3	PSONB	ON/OFF control input pin.
4	RI	Current sense adjust input.
5	VS1	1 st over current protection sense input.
6	IS1	1 st over current protection sense input.
7	VS2	2 nd over current protection sense input.
8	IS2	2 nd over current protection sense input.
9	VS3	3 rd over current protection sense input.
10	IS3	3 rd over current protection sense input.
11	VS4	4 th over current protection sense input.
12	IS4	4 th over current protection sense input.
13	FPOB	Open drain output of the fault protection.
14	VDD	Power supply.

Block Diagram



Absolute Maximum Ratings

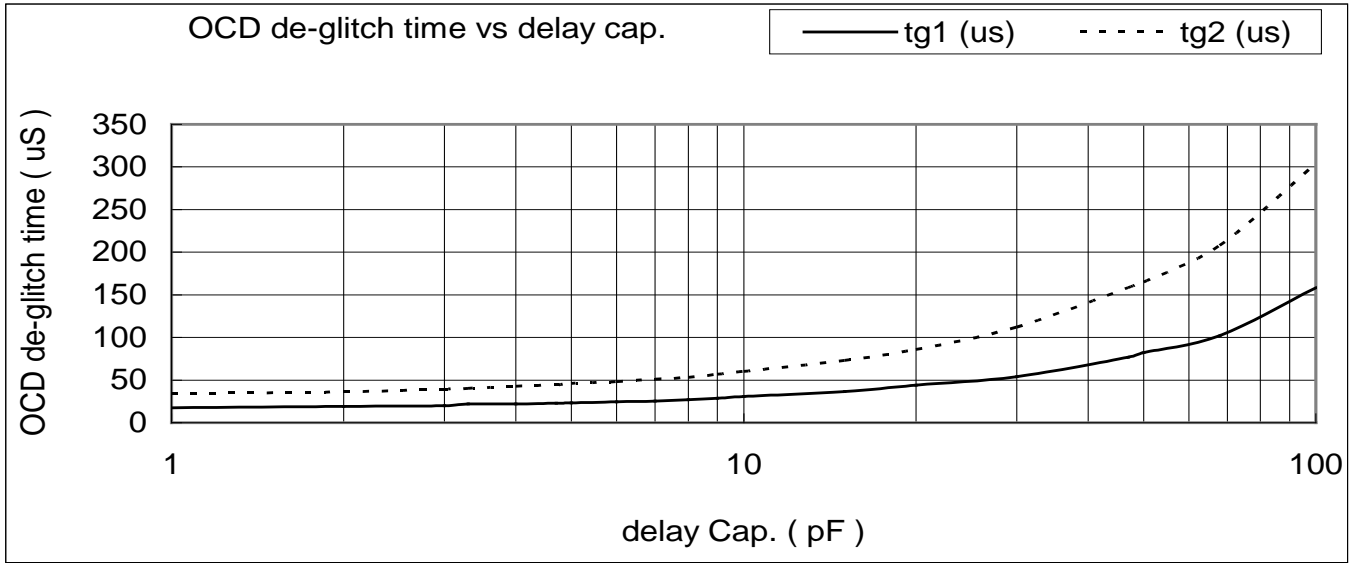
Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameter	Symbol	Min.	Max.	Units
Supply Voltage	V_{DD}	-0.3	16	V
Supply Voltage Rising Time	V_{DD}	1	-	ms
Input Voltage	RI	-0.3	7	V
	VS1,VS2,VS3,VS4, IS1,IS2,IS3,IS4	-0.3	$V_{DD} + 0.6$ (Max. 16V)	V
Output Voltage	FPOB	-0.3	16	V
Operating Temperature Range		-40	85	°C
Storage Temperature Range		-65	150	°C
Soldering Temperature		-	260	°C

Electrical Characteristics ($T_A=25^\circ\text{C}$, $V_{DD} = 12\text{V}$, unless otherwise noted.)

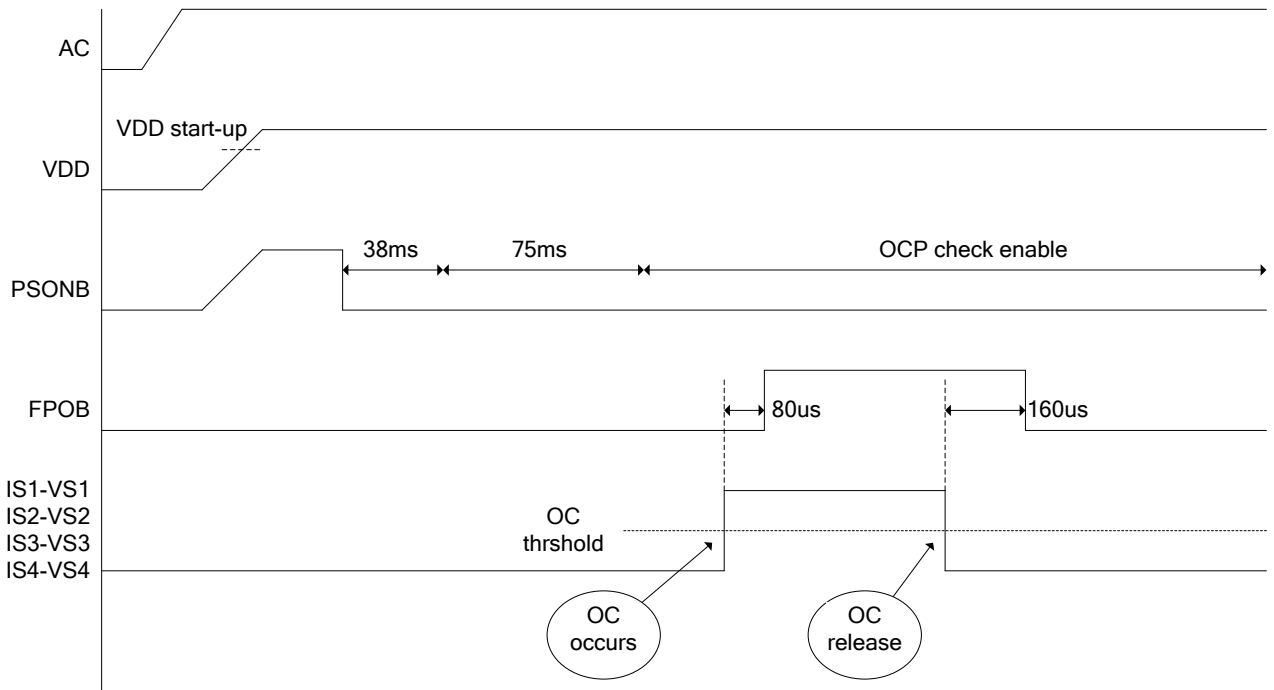
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
VDD Power Supply						
VDD Operating Voltage	V_{DD}		10	12	15	V
IDDD Supply Current	I_{DD}	$V_{DD} = 5\text{V}$	-	0.5	1	mA
VDD Start-up Voltage			-	9.0	9.4	V
VDD Under Voltage Lockout after Start-up			7.6	8.0	-	V
Over Current Protection (OCP)						
Input Offset Voltage of OCP Comparators	V_{os}		-6	0	6	mV
Output voltage of RI pin	RI		1.16	1.20	1.24	V
Ratio of Pull-down Current to RI pin Sink Current	K		7.5	8	8.5	
Pull-down Current	IS1,IS2,IS3,IS4	RI=30K Ω	290	320	350	μA
Output						
Low Level Output Voltage	$V_{OL(FPOB)}$	$I_{SINK}=20\text{mA}$	-	-	0.4	V
Leakage Current of FPOB	I_{LKG}		-1	0	1	μA
PSOVB Control						
High Level Input Voltage	V_{IH}		1.8	1.55	-	V
Low Level Input Voltage	V_{IL}		-	1.25	1.0	V
Pull-up Current			60	160	260	μA
Timing						
PSOVB Debounce Time	t_{db1}		24	38	52	mS
Debounce Time of OCP active	t_{db2}		120	160	200	μS
Debounce Time of OCP release	t_{db3}		240	320	400	μS
OCP Enable Delay Time	$t_{delay3-2}$		49	75	100	mS

Fig.1 OCP debounce time vs DELAY pin capacitor



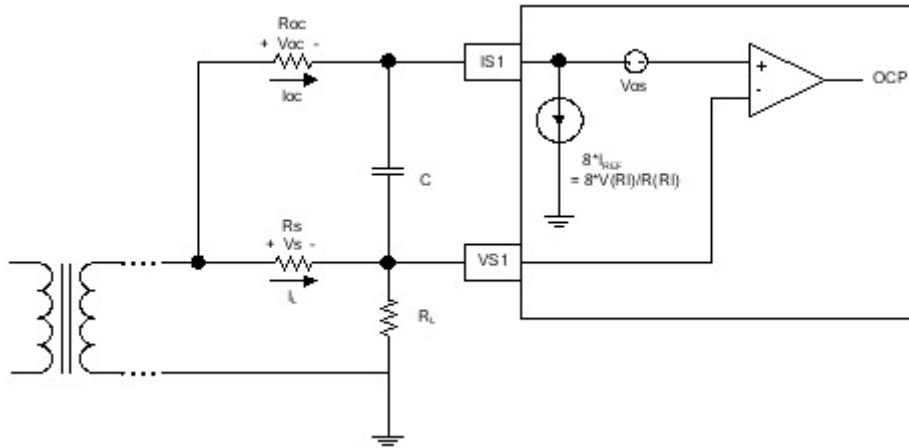
Timing Diagram

Fig.2 Normal → OCP



Application Hints

Over Current Protection (OCP)



The Over-Current Protection (OCP) monitors VS1&IS1 and VS2&IS2. When an over-current condition appears more than 160us, the FPOB output goes high.

The resistor of RI pin connected to ground will provide a precise current IREF for the OCP operation. The input offset voltage Vos of OCP comparators are typical 0mV. We suggest that the OCP sense voltage Vs is large than 100mV. And the capacitor C is used to avoid power on fail or dynamic load fail. We suggest C > 0.1uF.

As shown in above, the over current of IL is determined by Rs, Roc and loc.

$$I_{REF} = \frac{V(RI)}{R(RI)} \dots\dots\dots(1)$$

$$I_{L_ocp} \times R_s = (I_{oc} \times R_{oc}) + V_{os}$$

$$\Rightarrow R_{oc} = \frac{[(I_{L_ocp} \times R_s) - V_{os}]}{8 \times I_{REF}} \dots\dots\dots(2)$$

Following is an example on calculating Roc.

Let $I_{L_ocp} = 20A$, $R_s = 5m\Omega$, $V(RI) = 1.2V$, $R(RI) = 30K\Omega$, $V_{os} = 0mV$

$$I_{REF} = \frac{V(RI)}{R(RI)} = \frac{1.2}{30K\Omega} = 40\mu A$$

$$R_{oc} = \frac{[(I_{L_ocp} \times R_s) - V_{os}]}{8 \times I_{REF}} = \frac{20A \times 5m\Omega - 0mV}{8 \times 40\mu A} = 312.5\Omega$$

The tolerance of parameter K, V(RI), R(RI), Roc and Rs would be proportioned to the tolerance of OCP current.

The ratio of $\frac{V_{os}}{(I_{L_ocp} \times R_s)}$ would be proportioned to the tolerance of OCP current.

Let $V_{os} = \pm 6mV$, $I_{L_ocp} = 20A$, $R_s = 5m\Omega$, then the tolerance of OCP current is $\pm 6mV / 100mV = \pm 6\%$

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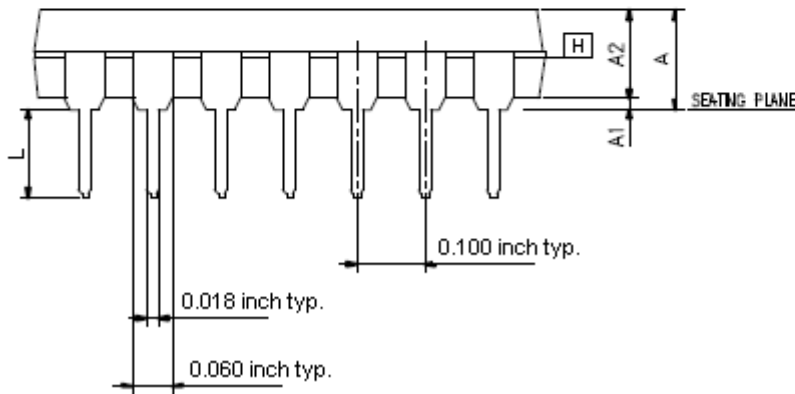
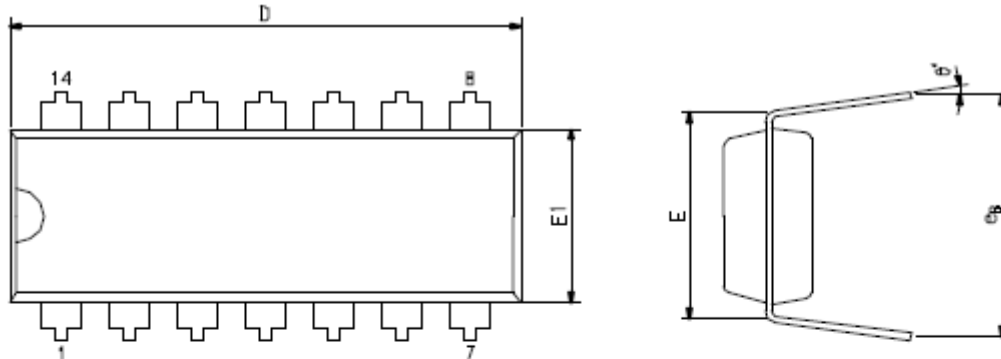
4-Channel of OCP PC Power Supply Supervisors



Package Outlines

PACKAGE DIMENSIONS
DIP-14

Plastic Dual In-line Package
UNIT : inch



Symbols	Dimensions in inches			Dimensions in millimeters		
	MIN.	NOR.	MAX.	MIN.	NOR.	MAX.
A	---	---	0.215	---	---	5.461
A1	0.010	---	---	0.254	---	---
A2	0.120	0.133	0.145	3.048	3.378	3.683
D	0.730	0.755	0.780	18.542	19.177	19.812
E	0.300 BSC			0.762 BSC		
E1	0.240	0.253	0.265	6.096	6.426	6.731
L	0.110	0.133	0.155	2.794	3.378	3.937
eB	0.320	0.350	0.380	7.620	8.890	10.922
θ	0°	7°	15°	0°	7°	15°

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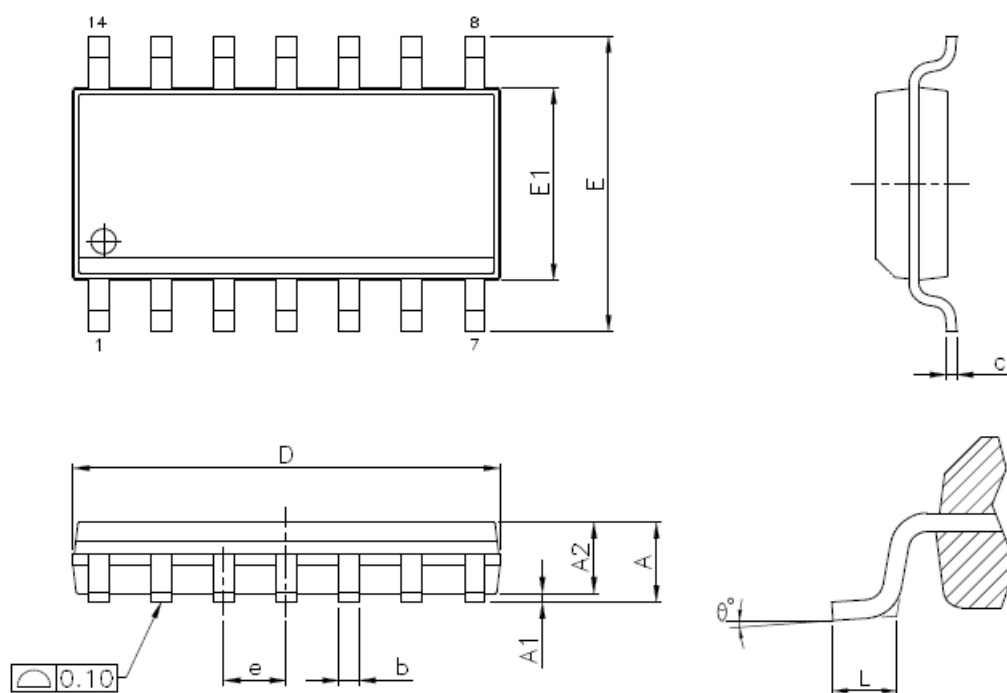
4-Channel of OCP PC Power Supply Supervisors



Package Outlines

PACKAGE DIMENSIONS
SOP 14

Small Outline Package
UNIT : inch



Symbols	Dimensions In inch		Dimensions In millimeters	
	Min.	Max.	Min.	Max.
A	-----	0.072	-----	1.837
A1	0.004	0.010	0.095	0.263
A2	0.047	-----	1.187	-----
b	0.012	0.021	0.294	0.535
c	0.004	0.010	0.095	0.263
D	0.341 BSC		8.650 BSC	
E	0.236 BSC		6.000 BSC	
E1	0.154 BSC		3.900 BSC	
e	0.050 BSC		1.270 BSC	
L	0.015	0.052	0.380	1.333
θ	0°	8°	0°	8°

EST7619

4-Channel of OCP PC Power Supply Supervisors



Update History

Revision	Date	Update
1.00	August 06, 2010	Preliminary version