PS222S

3-Channel Secondary Monitoring IC

With Over-Current Protection

And an Additional 12V OCP Channel

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General Description

PS222S is specially designed for switching power supply system.   Four important functions of PS222S are the following: over-voltage protection, over-current protection, under-voltage protection and power good signal generating.

OVP/UVP (Over-Voltage/Under-Voltage Protection) monitors 3.3V, 5V and 12V to protect our power supply. FPO/ goes to high when one of these supply voltages exceeds their normal operation voltage range.

OCP (Over Current Protection) monitors IS33, IS5, IS12 input current sense. Composed of "I$_{ref}$" and "protection current range resistor", an adjustable over-current condition helps users design OCP easily.

An additional OCP channel helps users monitor another 12V rail output current.

Power good signal generating can notify personal computer when power supply is ready or power supply is going to shutdown, therefore it can provide a reliable power supply environment.

Features
- Over/Under-voltage protection and lock out
- Over-current protection and lock out
- Fault protection output with open drain output stage
- Open drain power good output signal for power good input
- Built-in 300mS power good delay
- AC on 75mS delay for UV/OC protection
- 38mS PSON/ control de-bounce
- 73uS de-bounce for noise immunity
- Wide power supply range (4.2V~16V)
- Special care for AC power off

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SiTI Silicon Touch Technology Inc.

Block Diagram
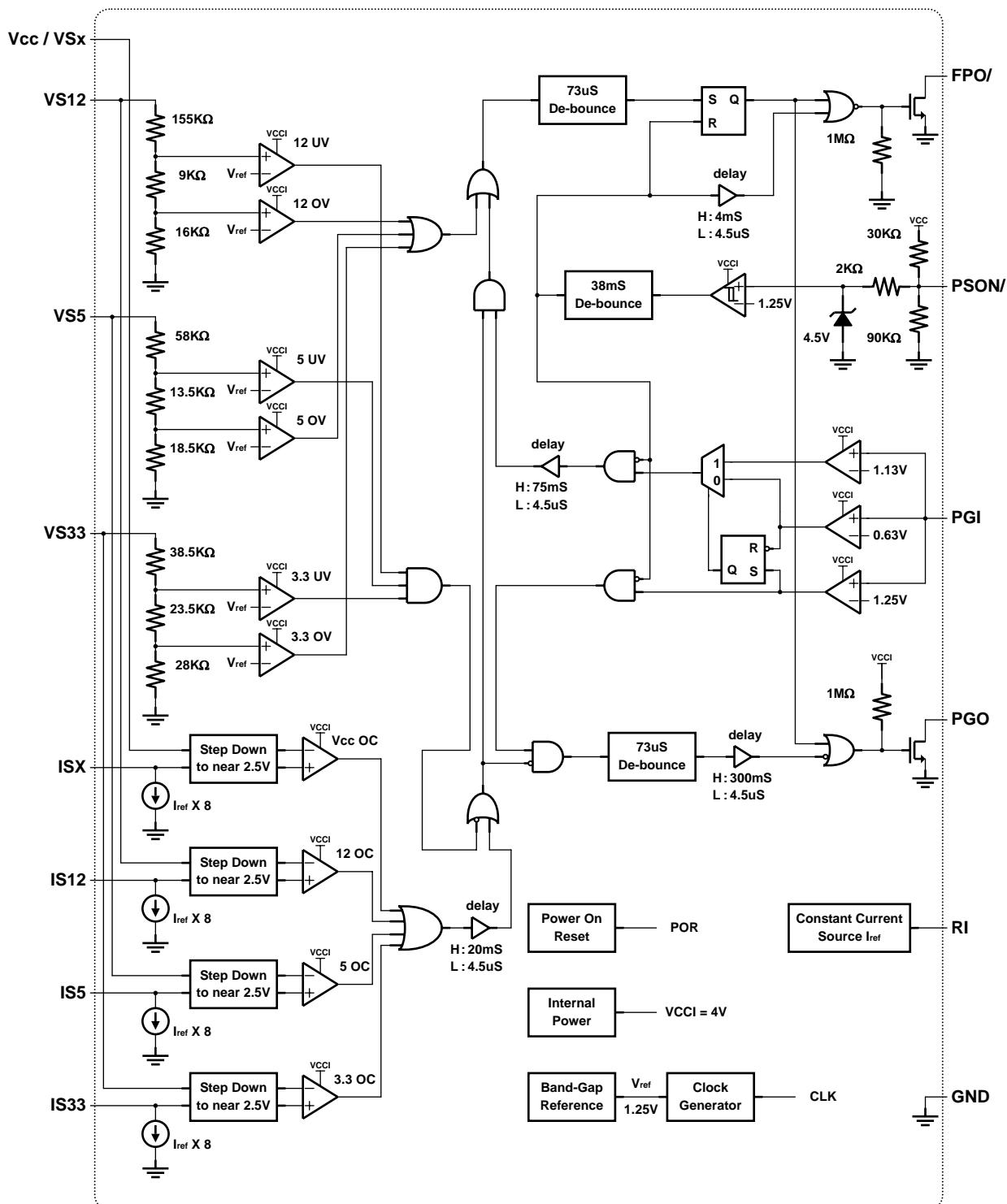
Timing Chart
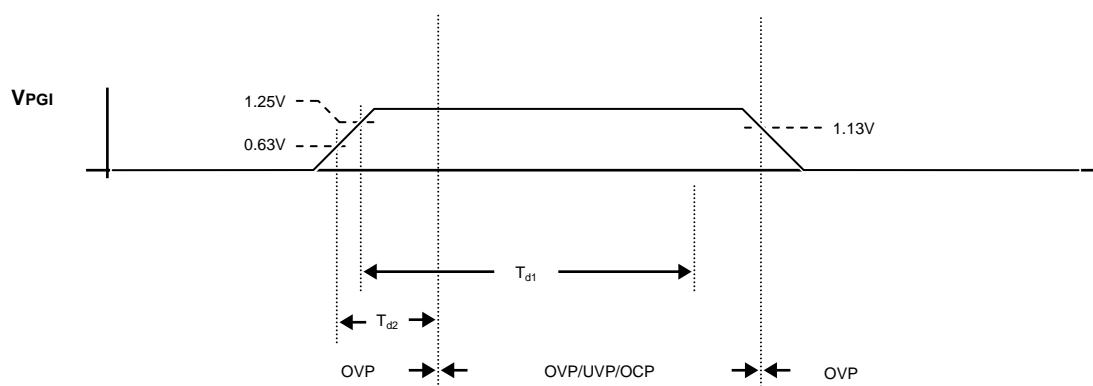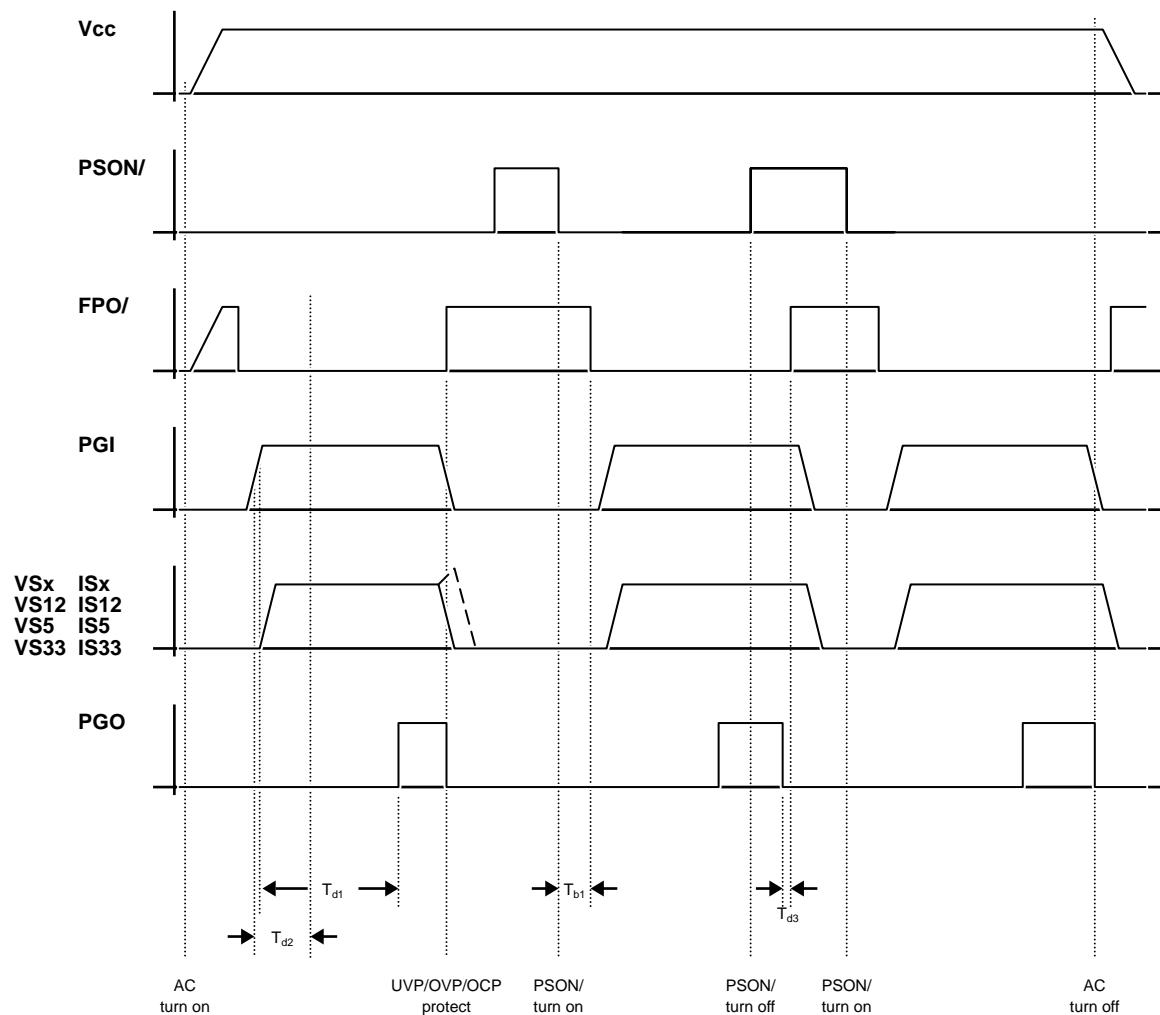
Pin Descriptions

Pin No	PIN NAME	Descriptions
1	PGI	Power good input signal pin
2	GND	Ground
3	FPO/	Inverted fault protection output ,open drain output stage
4	PSON/	Remote ON/OFF control input pin
5	IS12	12V(1) over current protection input pin
6	RI	Current sense setting
7	ISx	12V(2) over current protection input pin
8	IS5	5.0V over current protection input pin
9	IS33	3.3V over current protection input pin
10	VS12	12V(1) over/under voltage protection input pin
11	VS33	3.3V over/under voltage protection input pin
12	VS5	5.0V over/under voltage protection input pin
13	VCC / VSx	Power supply
14	PGO	Power good output signal pin , open drain output stage

Absolute Maximum Ratings

Parameter			Rating			Unit
Storage Temperature	(T_{stg})		-40	to	+125	°C
Operating Temperature	(T_{opr})		-30	to	+90	°C
Supply Voltage	(V_{cc})	VCC/VSx	-0.5	to	+16.0	V
Input Voltage Range	(V_I)	ISX, VS12, IS12	-0.5	to	+16.0	V
		VS5, IS5	-0.5	to	+9.0	V
		VS33, IS33	-0.5	to	+7.0	V
		PGI	-0.5	to	+16.0	V
		PSON/	-0.5	to	Vcc+0.5	V
Output Voltage Range	(V_O)	FPO/	-0.5	to	+16.0	V
		PGO	-0.5	to	Vcc+0.5	V
Output Current for RI	(I_{RI})	RI	12.5	to	62.5	uA
ESD Susceptibility*	(V_{ESD})	PSON/, PGO		>	5000	V
		FPOB, VS12		>	2000	V
		PGI, IS12, VS5		>	3000	V
		Others		>	4000	V

* Human Body Model (HBM).

Electrical Characteristics, Vcc=12V, T$_a$ = 25° C. (unless otherwise specified)

Power Supply Section

Parameter	Conditions	MIN	TYP	MAX	Unit
Supply Voltage		4.2	5.0	16.0	V
Supply Current	V$_{PSON/}$ = 5V		2	3	mA
Power On Reset Threshold Voltage (V$_{POR}$)		3.2	3.4	3.6	V
Power On Reset Hysteresis (V$_{HYST}$)		-0.15	-0.3	-0.45	V

Over-Voltage Section

Parameter		Conditions	MIN	TYP	MAX	Unit
Over-Voltage Threshold	VS33		3.7	3.9	4.1	V
	VS5		5.7	6.1	6.5	V
	VS12		13.1	13.8	14.5	V

Under-Voltage Section

Parameter		Conditions	MIN	TYP	MAX	Unit
Under-Voltage Threshold	VS33		2.0	2.2	2.4	V
	VS5		3.3	3.5	3.7	V
	VS12		8.5	9.0	9.5	V

Over-Current Section

Parameter		Conditions	MIN	TYP	MAX	Unit
Offset Voltage (OCP Comparator)	VSx, ISx		-5	-2	1	mV
	VS33, IS33		-5	-2	1	mV
	VS5, IS5		-5	-2	1	mV
	VS12, IS12		-5	-2	1	mV
Constant Current Generator Voltage (V$_{RI}$)			1.20	1.25	1.30	V

Electrical Characteristics (Continued)

PSON/, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
High-Level Input Voltage (V_{IH})		1.60			V
Low-Level Input Voltage (V_{IL})				0.80	V

PGI, Analog Input

Parameter	Conditions	MIN	TYP	MAX	Unit
Threshold Voltage for start T_{d1}		1.16	1.25	1.33	V
Threshold Voltage for start T_{d2}		0.60	0.63	0.75	V
Threshold Voltage for mask OC,UV		1.05	1.13	1.21	V
Hysteresis (V_{HYST})*		-20	-50	-80	mV

* All of the comparator for PGI input in block diagram.

PGO, Open Drain Digital Output

Parameter	Conditions	MIN	TYP	MAX	Unit
Leakage Current (I_{LKG})	V_{PGO}=5V			5	uA
Low Level Output Voltage (V_{OL})	I_{SINK}=4mA			0.3	V

FPO/, Open Drain Digital Output

Parameter	Conditions	MIN	TYP	MAX	Unit
Leakage Current (I_{LKG})	$V_{FPO/}$=5V			5	uA
Low Level Output Voltage (V_{OL})	I_{SINK}=6mA			0.3	V

Switching Characteristics, Vcc=12V, T_a = 25° C.

Parameter	Conditions	MIN	TYP	MAX	Unit
PGI to PGO Delay Time (T_{d1})		200	300	400	mS
Short Circuit Delay Time (T_{d2})		49	75	100	mS
PGO to FPO/ Delay Time (T_{d3})		2	4	6	mS
Over Current Delay Time (T_{d4})		13	20	27	mS
PSON/ De-bounce Time (T_{b1})		24	38	52	mS
FPO/ Noise De-glitch Time (T_{b2})		47	73	100	uS
PGO Noise De-glitch Time (T_{b3})		47	73	100	uS

Application

Typical 4 rails SPS (Dual 12V OCP)
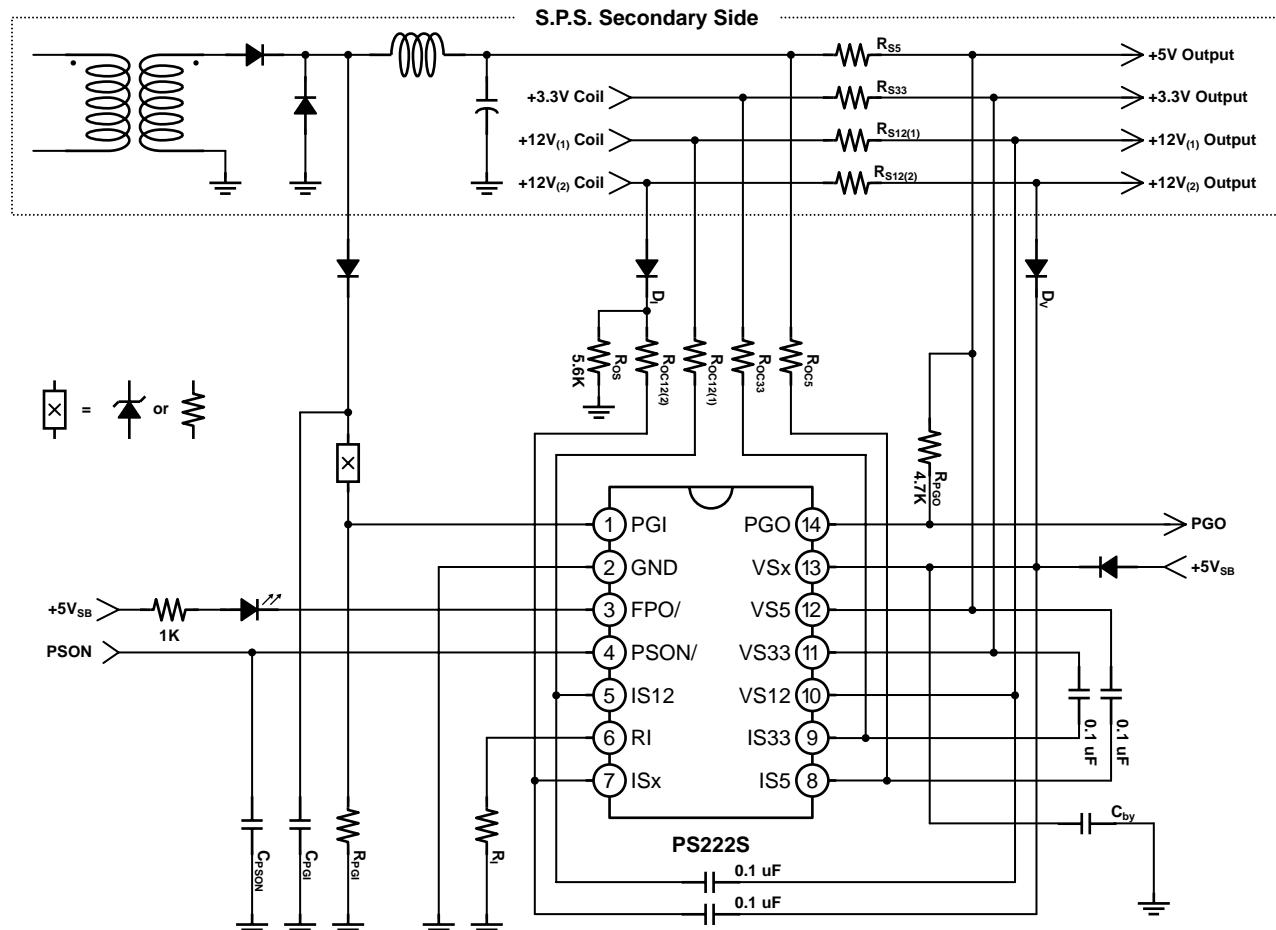
Application (Continued)

Typical 3 rails SPS (Only one 12V OCP)
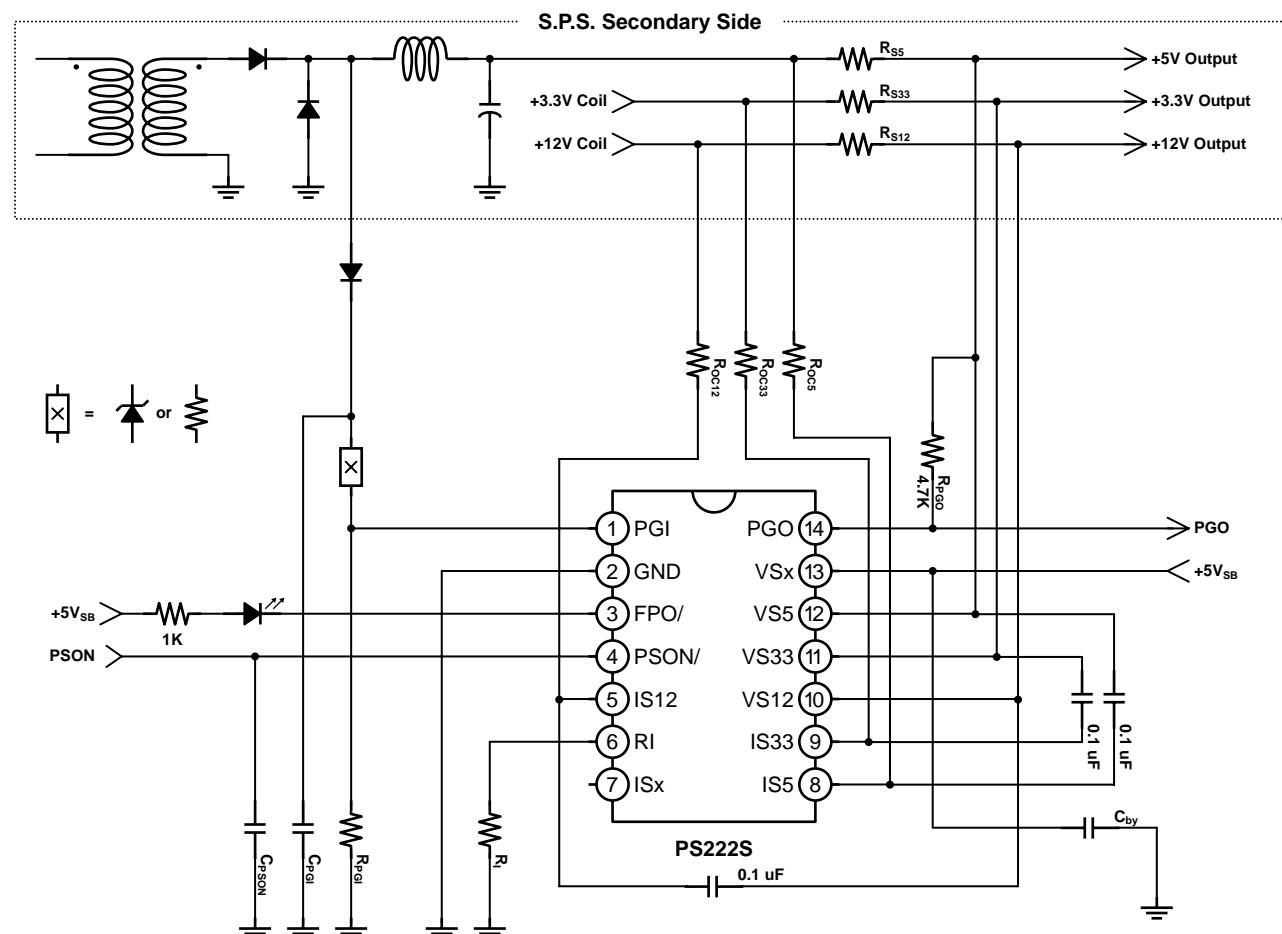
Notes:

1. Zener diode or resistor or both of them can be used in component X.

2. The bypass capacitor C_{by} suggests to be 0.1uF~ 10uF and layout nearby pin VCC.

3. The recommend sense values of $R_{S12(1)}$, $R_{S12(2)}$, R_{S5} and R_{S33} are $\geq 0.002\Omega$.

4. Over-Current Protection design example:

   (1) $I_{ref} = 20\mu A$, $R_I = \dfrac{V_{RI}}{I_{RI}} = \dfrac{1.25}{20\mu} = 62.5K(\Omega)$

   (2) $R_{S5}=0.002\Omega$, $\Delta V_{5V} = 0.002 \times I_{+5V} = R_{OC5} \times 8 \times I_{ref}$

   (3) If +5V OCP trip point is 20A, $R_{OC5} = \dfrac{0.002 \times 20}{8 \times 20\mu} = 250(\Omega)$

5. GND path:

   (1) The GND path width is <u>wider</u> as far as it could.

   (2) The better grounding ability has better performance at surge test.

6. PS222S uses only one 12VOCP protection function:

   As "Typical 3 rails SPS" application circuit, the pin7(ISx) must be connected one resistor(Resistance>10kΩ or floating) to GND.

Package Specification

(14-pin DIP)

Symbol	Dimension in mm			Dimension in inch			NOTE
	Min	Normal	Max	Min	Normal	Max	
A			5.33			0.210	
A₁	0.38			0.015			
b		1.52			0.06		
b₁		0.46			0.018		
D	18.67	19.18	19.69	0.735	0.755	0.775	
E		7.62			0.300		
E₁	6.00	6.30	6.60	0.236	0.248	0.260	
e		2.54			0.100		
e_b	7.32		9.53	0.288		0.375	
L	2.54		3.81	0.100		0.150	
θ°	0º	7º	15º	0º	7º	15º	
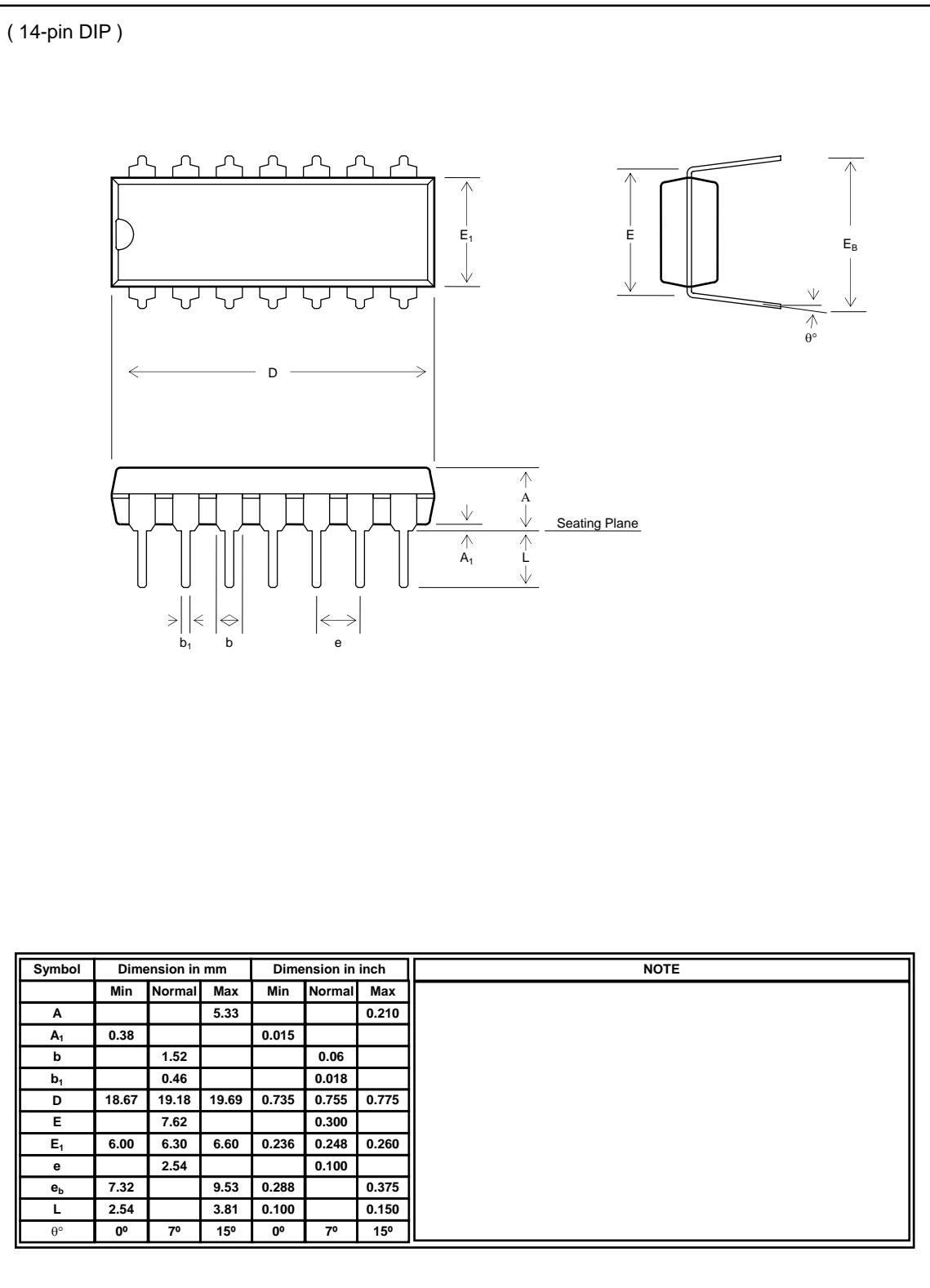
Package Specification (Continued)

(14-pin SOP)
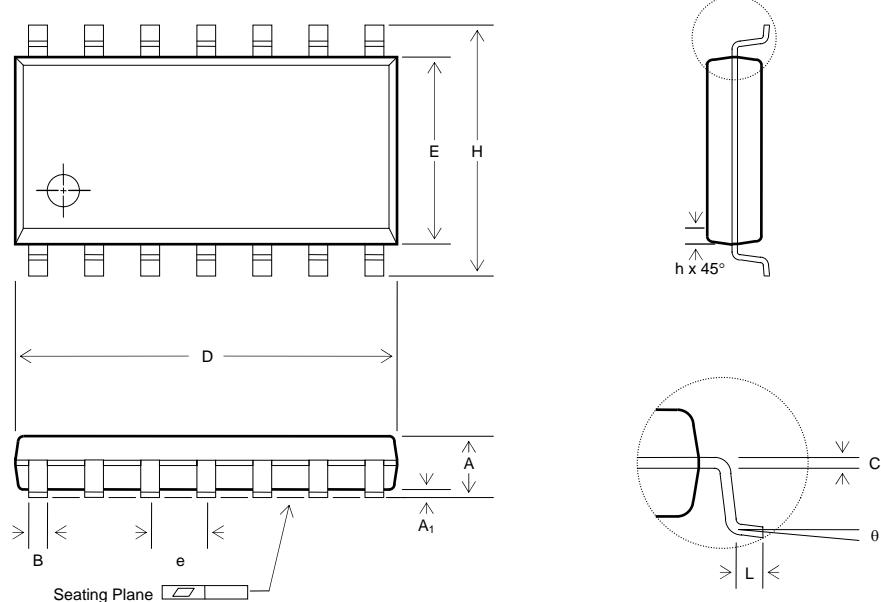
Symbol	Dimension in mm		Dimension in inch		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	1.346	1.753	0.053	0.069	
A_1	0.102	0.254	0.004	0.01	
B	0.330	0.508	0.013	0.020	
C	0.190	0.250	0.0075	0.0098	
e	1.27(TPY)		0.050(TYP)		
D	8.534	8.738	0.336	0.344	
H	5.80	6.20	0.228	0.244	
E	3.80	4.00	0.150	0.157	
L	0.38	1.27	0.015	0.050	
h	0.38(TPY)		0.015(TYP)		
θ	0°	8°	0°	8°	

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