General Description

EST.7630B is higher integrated circuit incorporates all advanced sensing function to protect from over and under voltage a four-channels protection supervisor (3.3V/5V/ and double12V). The function of Over Current Protection (OCP) monitors output currents through sense resistor by using smart comparator circuit is more exact and easy.

EST.7630B provide the fault protection latch (FPOB), a power good output (PGO), the PSONB control and the power good input control (PGI).

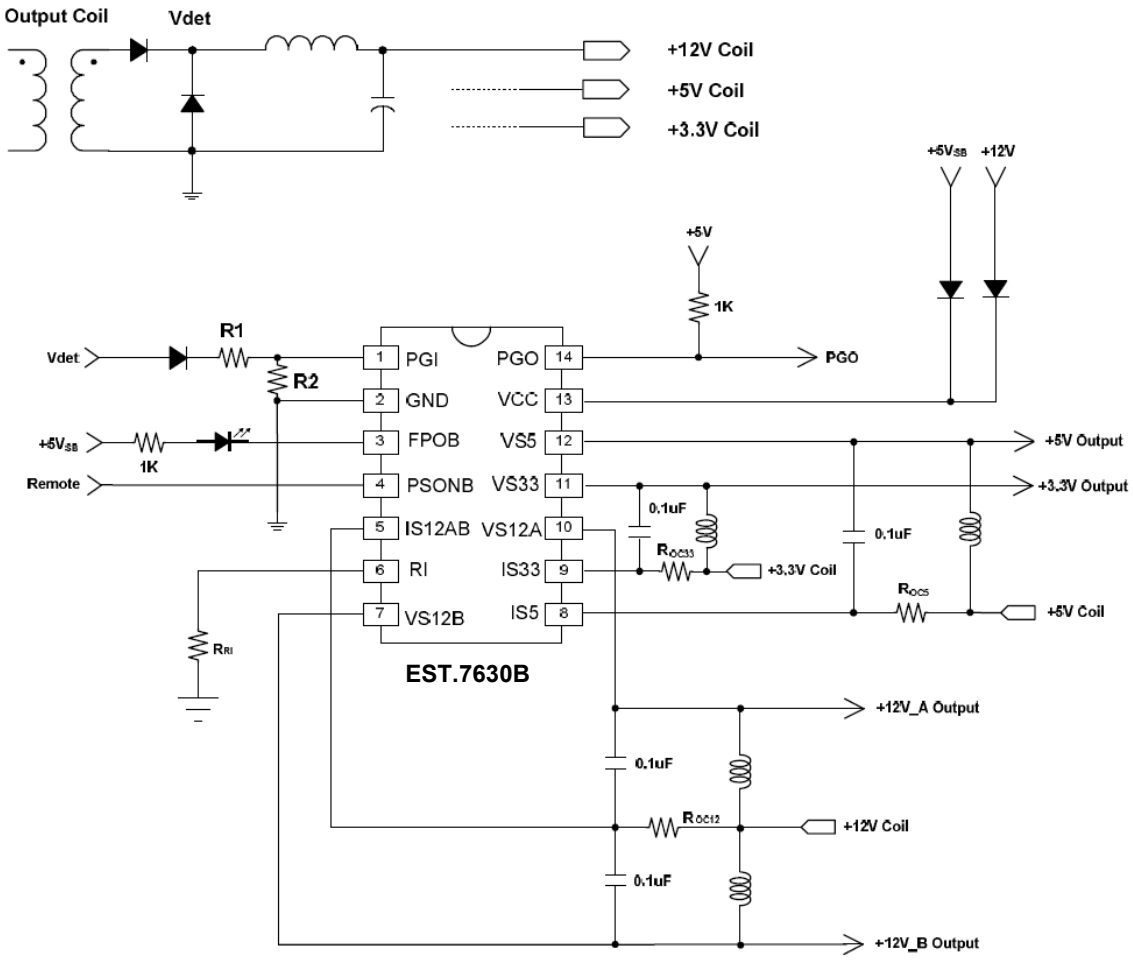
Application

- PC SPS line housekeeping IC (3.3V, 5V, and 12V)
- Industry Computer
- Mining Pool Power

Feature

- The Over/Under Voltage Protection for 3.3V/5V and double 12V
- The Over Current Protection monitors 3.3V/5V and double 12V output currents and related lockout
- Both of fault protection output and power good output are open drain output stage
- 75ms delay for SPS short circuit protect
- 2ms PSONB input signal de-bounce
- 73us for OVP noise immunity de-bounce.
- 150us for internal noise immunity de-bounce
- 125ms power good delay time for PGO
- 4ms time delay between PGO and FPOB when PSONB turn off

Application Circuit



Ordering Information

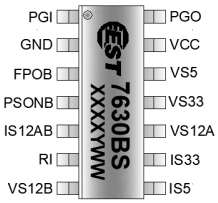
Part Number	Package	Packaging	Weight (mg)	Note
EST.7630B	DIP-14	Tube/Carton	106	Green
EST.7630BS	SOP-14	Tube or Tape&Reel	135	-30~85C

Note: EST lead-free products contain molding compounds/die attach materials and 100% matte tin plate termination finish; which are fully compliant with RoHS. EST lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020C for MSL classification at lead-free peak reflow temperature. EST defines "Green" to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

Pin connection (Top View)

EST: LOGO
7627B: Product name DIP
XXXXYWW:
XXXX= Production lot
YWW=Date Code

DIP-14L



EST: LOGO
7627BS: Product name SMD
XXXXYWW:
XXXX= Production lot
YWW= Date Code

SOP-14L

Pin Assignments and Package Type

Designation	No.	I/O	Description
PGI	1	I	Power good input signal pin
VSS	2	I	Ground
FPOB	3	O	Inverted fault protection output ,open drain output stage
PSONB	4	I	Remote ON/OFF switch input pin
IS12AB	5	I	12V over current protection sense input pin(A/B)
RI	6	O	OCP reference current setting pin
VS12B	7	I	12V over/under voltage protection input pin(B)
IS5	8	I	5.0V over current protection sense input pin
IS33	9	I	3.3V over current protection sense input pin
VS12A	10	I	12V over/under voltage protection input pin(A)
VS33	11	I	3.3V over current protection sense input pin
VS5	12	I	5.0V over/under voltage protection input pin
VCC	13	I	Power supply
PGO	14	O	Power good output stage

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Storage Temperature (Tstg)	---	-40 to 140	℃
Operating Temperature (Topr)	---	-25 to 85	℃
Junction Temperature (Tj)	---	150	℃
Supply Voltage (VCC)	VCC	-0.5 to 18	V
Input Voltage Range (VI)	VS12A,VS12B, IS12AB	-0.5 to 16	
	VS5,IS5,VS33,IS33	-0.5 to 8	
	PGI	-0.5 to 8	
	PSONB	-0.5 to 8	
Output Voltage Range (VO)	FPOB	-0.5 to 16	V
	PGO	-0.5 to 8	
	RI	-0.5 to 8	
Power Dissipation	PD	800	mW
Thermal Resistance	θJA	85	℃/W
	θJC	42.41	℃/W

Stress beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliablity.

DC Electrical Characteristics (VCC =12V, Ta=25)

Input Power Supply:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	$VCC_{(N)}$	4.3	12	16	V	
Supply Current	Icc		1.0	2.0	mA	VPSONB = 0 V
Reset Threshold Voltage	VIH	2.9	3.2	3.5	V	HIGH→LOW

Over-Voltage function:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Temperature coefficient
Over-Voltage Threshold	OVT_{VS33}	3.7	3.9	4.1	V	
	OVT_{VS5}	5.7	6.1	6.5		
	OVT_{VS12}	13.1	13.8	14.5		For VS12A and VS12B

Under-Voltage function:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Temperature coefficient
Under-Voltage Threshold	UVT_{VS33}	2.0	2.2	2.4	V	
	UVT_{VS5}	3.3	3.5	3.7		
	UVT_{VS12}	8.5	9.0	9.5		For VS12A and VS12B

Over-Current function:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Offset voltage	V_{OS33}	-4	0	2	mV	Offset voltage between IS and VS
	V_{OS5}	-4	0	2		
	$V_{OS12A/B}$	-4	0	2		
IS33,IS5,IS12AB sink current	Isink	155	160	165	uA	RI Resistance=62.5KΩ

PSONB, Analog Input function:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Temperature coefficient
Threshold Voltage		1.6			V	LOW->HIGH
				0.9		HIGH->LOW
OP hysteresis voltage	V_{HV1}	0		50	mV	

PGI, Analog Input:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Temperature coefficient
Threshold Voltage of PGI		0.6	0.65	0.7	V	Enable UVP/OCP
		1.17	1.20	1.23		Disable PGO/UVP
		0.70	0.80	0.90		Disable OCP
	V_{HV2}	0		50	mV	OP hysteresis voltage

FPOB, Open Drain Output:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Leakage Current	ILKG			5	uA	VFPOB=12V
Low Level Output Voltage	VOL			0.45	V	ISINK=5mA

PGO, Open Drain Output:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output low voltage of FPOB	V_{OL}			0.5	V	Isink = 10mA
Leakage current of FPOB	I_{leak}			+/- 5	uA	VFPOB=12V

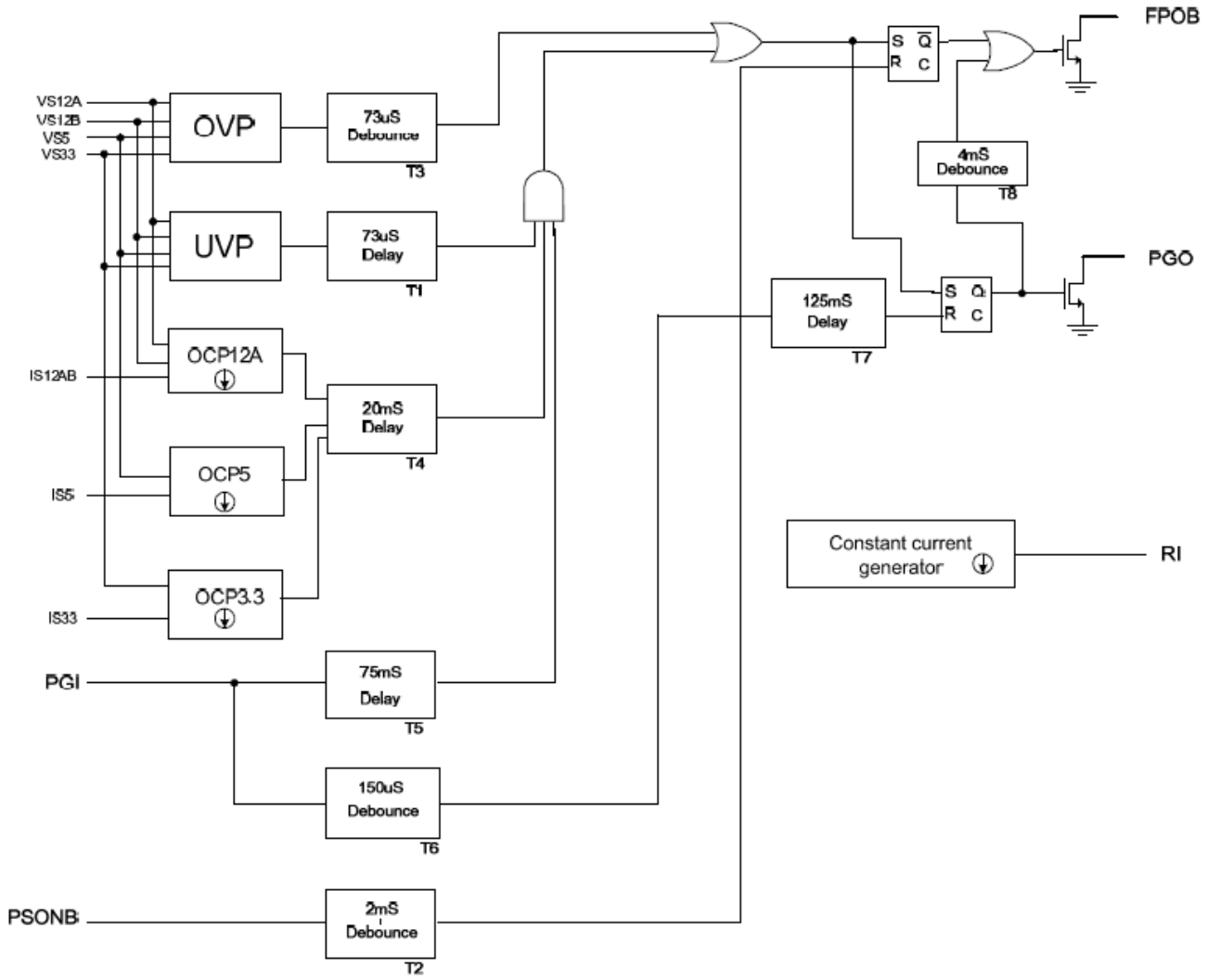
Pext, Analog Input:

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Threshold Voltage		1.2	1.25	1.3	V	LOW➔HIGH
Temperature coefficient		-100		100	ppm/℃	0℃~75℃

AC Electrical Characteristics (Vcc=12V, Ta=25°C)

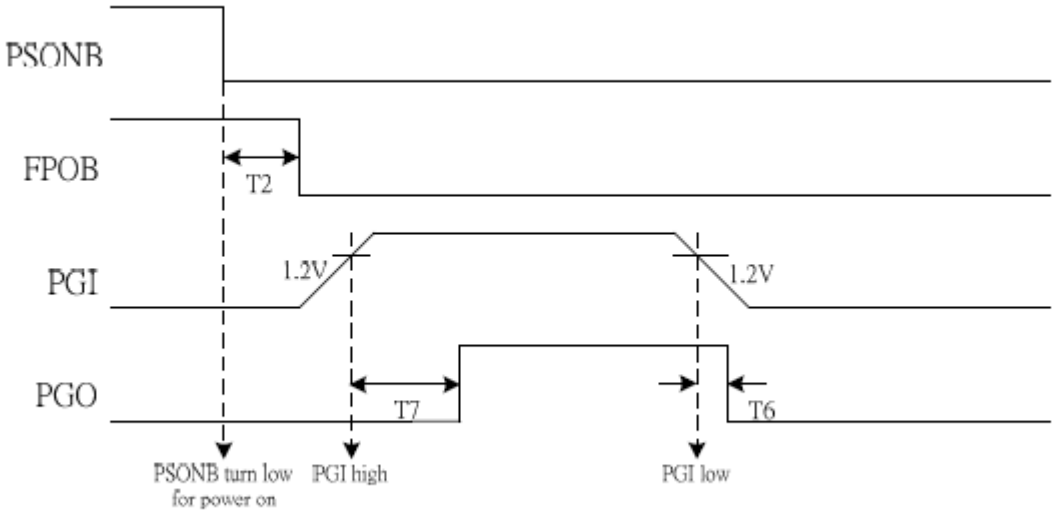
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Under voltage protection delay time	T1	49	73	100	uS	
PSON De-bounce time	T2	28	38	48	mS	
Over voltage protection delay time	T3	49	73	100	uS	
Over current delay time	T4	13	20	27	mS	
PGI OC/UV mask time	T5	49	75	100	mS	
PGO De-bounce time	T6	120	150	180	uS	
PGI to PGO delay time	T7	200	300	400	mS	
PGO to FPOB delay time	T8	2	4	6	mS	

Block Diagram

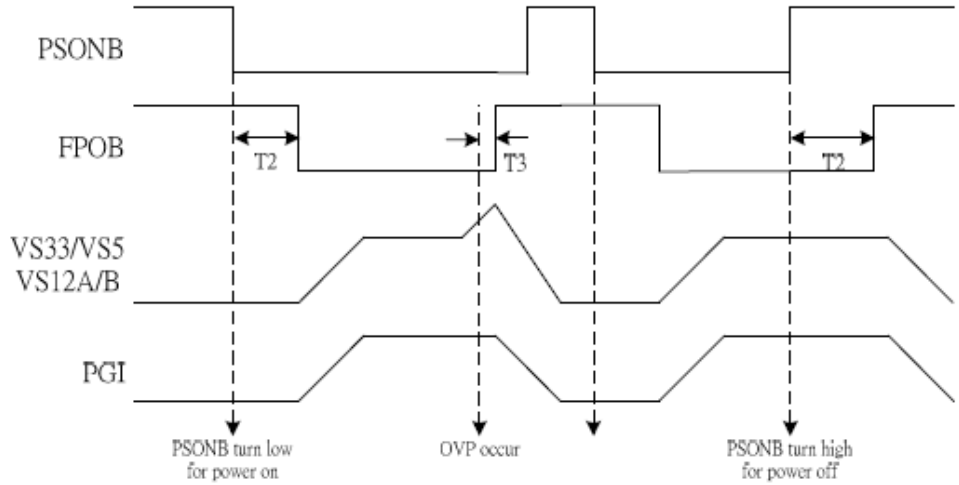


Time Chart

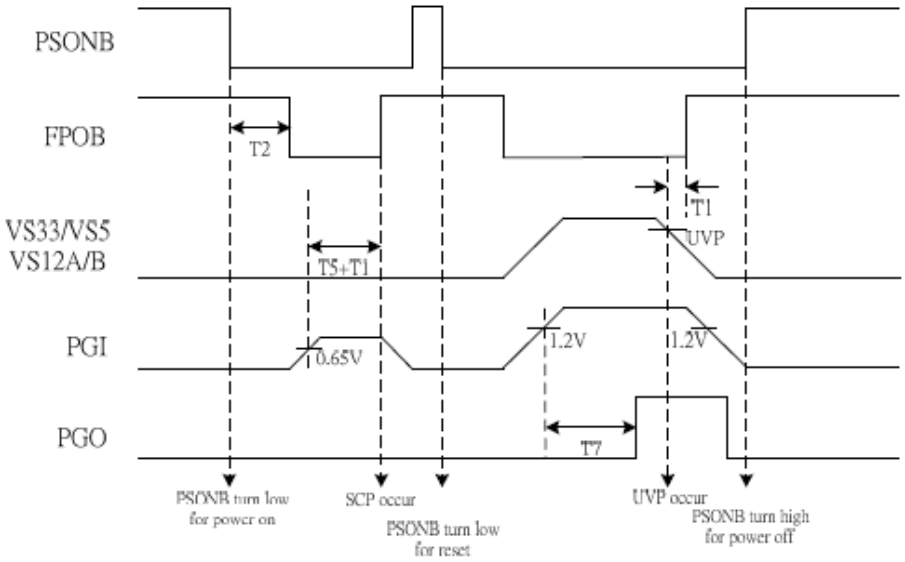
PGI Timing



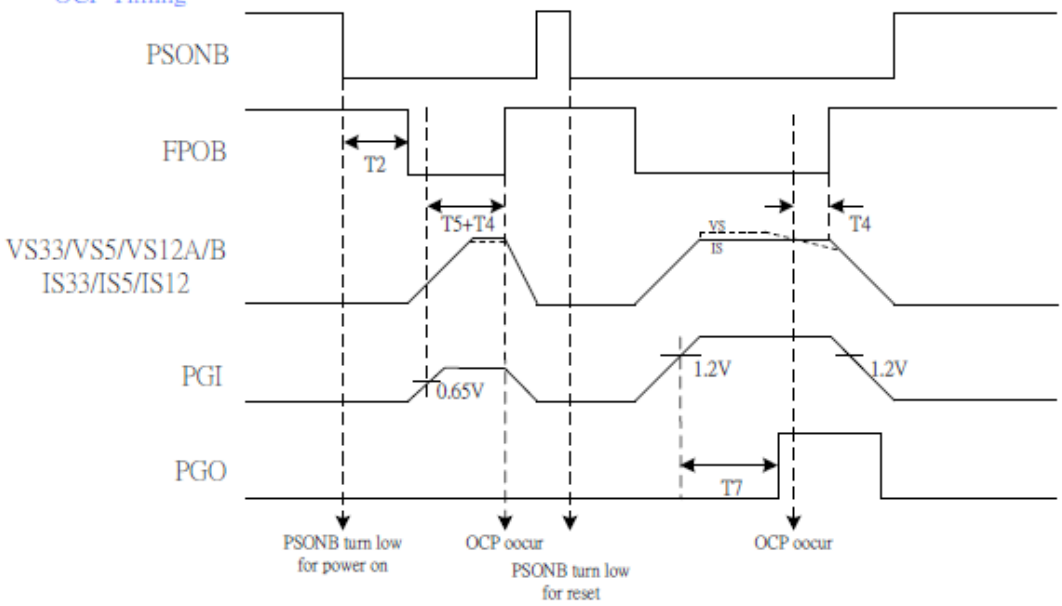
OVP Timing



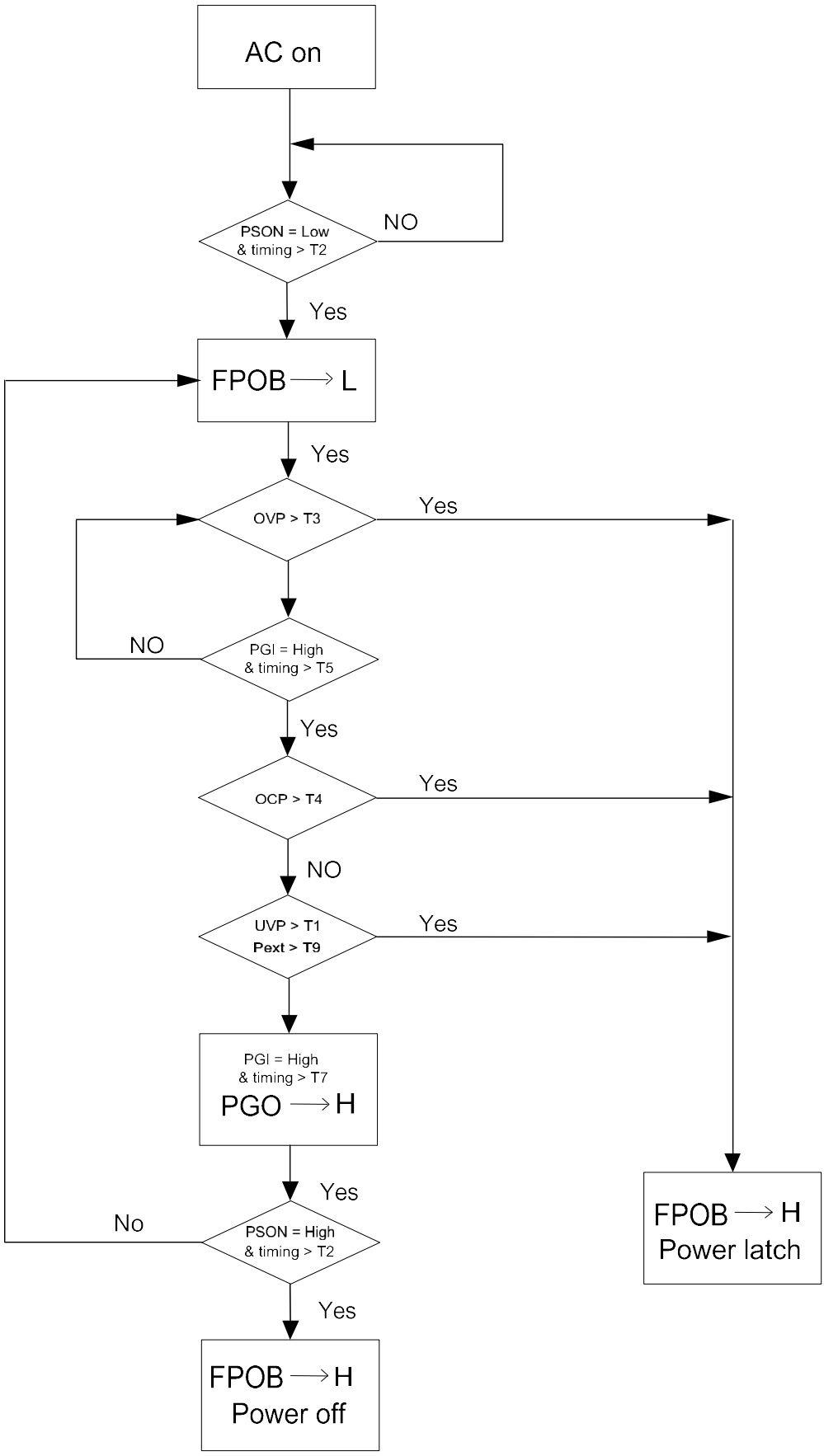
SCP &UVP Timing



OCP Timing



Flow Chart



Function & Application Descriptions

Pin-PGI:

Secondary detect point between flywheel diode and inductance. When AC on/off, PGI can control protection function when output voltages rise or fall to prevent the PSU malfunction.

a. Setting PGI voltage (range: 1.5V~2V) with resistance divider.

b. To suppress the PGI noise, user can use a capacitor (range: 0.1uF~1.0uF) between PGI and GND.

c. Exact OP switch point helps the PF time design easier.

d. PGI has three states (0.65V, 0.8V and 1.2V) control function. The state control function is described below: 1) V_{PGI} < 0.65V :

The UVP and OCP functions are disabled. 2) 0.65V < V_{PGI} < 1.2V :

If UV/OC conditions are set, PGI triggers UVP after T5 + T1 and OCP after T5 + T4. If no fail conditions, PSU outputs work normally but without Power Good signal.

3) V_{PGI} > 1.2V :

If UV/OC conditions are set before AC turn on, PGI triggers UVP after T5 + T1 and OCP after T5 + T4. If UV/OC conditions are set after AC turn on and delay T5, UVP triggered delay time is T1 and OCP triggered delay time is T4. If no fail conditions, PSU outputs work normally and with Power Good signal.

4) PGI function:

When V_{PGI} < 1.2V, the PG output signal and UVP is disabled. But OCP function is disabled when V_{PGI} < 0.8V.

Pin-PSON:

An input control pin, through a remote on/off input signals to control the FPOB and PGO output pin states.

a. A 2ms de-bounce built-in for rising and falling edge triggered control.

b. PSON is also built-in a pulled high resistance to VDD inside to provide a high state control when pin is floating.

c. TTL logic-compliant input voltage threshold with a hysteresis design.

Pin-VS/IS (VIS 33/VIS 5/VIS 12):

The IC OCP function input pins. When pin-VS voltage is under pin-IS voltage, OCP functions and changes FPOB/PGO states. The pin-VS also provides the OVP and UVP functions. If pin-VS voltage is unstable and keeps a under voltage condition for T1 or a over voltage condition for T3, the FPOB/PGO states will be changed.

a. The anti-noise capacitor between VS and IS can suppress input noises and make more accurate OCP function.

b. Due to high ESD performance, the VS series resistance or parallel capacitor can be ignored and indirectly reduce OCP function error.

Pin-RI:

A constant output voltage for building OCP reference current. Set a 62.5KΩ resistance from RI to GND.

Pin-FPOB/PGO:

The FPOB and PGO are both open-drain devices. If AC turns on and PSU outputs are normal, V_{PGI} > 1.2V and delay T7 continually, PGO state will keep at high through a resistance pulled to 5V output. Due to high ESD performance, the PGO series resistance can be ignored.

The FPOB is used to control the primary side PWM via an opto-coupler. A series resistance pulled to standby power is used to limit the opto-coupler and FPOB operation current. When IC is not ready or one of protect function is triggered, PSON keeps at high state, the level of FPOB is high and the PWM will shut down.

Function & Application Descriptions (Cont.)

How to set output current protection:

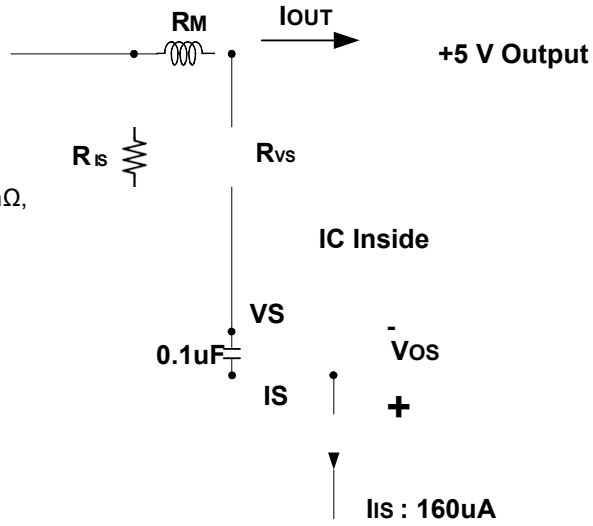
The parameters are IS pin sink current (I_{IS}), IS pin series resistance (R_S), Output resistance (R_M) and OP offset voltage (V_{OS}). For example, we want to set 5V output current "I_{OUT}",

$I_{OUT} \times R_M = I_{IS} \times R_{IS} + V_{OS} - I_{VS} \times R_{VS}$

$$\Rightarrow I_{OUT} = \frac{I_{IS} \times R_{IS} + V_{OS} - I_{VS} \times R_{VS}}{R_M}$$

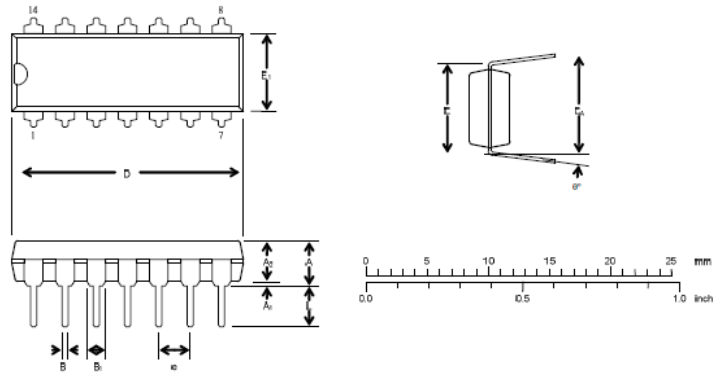
if I_{VS}=100uA, R_{VS}=100Ω, I_{IS}=160uA, V_{OS} =0mV, R_{IS}=500Ω, R_M=2mΩ,

$$\Rightarrow I_{OUT} = \frac{160u \times 500 + 0m - 100u \times 100}{2m} = 35A$$



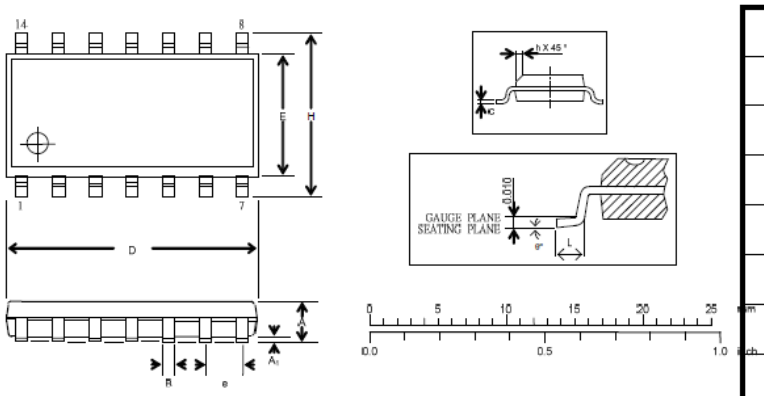
MECHANICAL INFORMATION

DIP-14L



Symbol	Dimension in mm		Dimension in inch	
A	4.318	(MAX)	0.170	(MAX)
A_1	0.381	(MIN)	0.015	(MIN)
A_2	3.302	±0.127	0.130	±0.005
B	0.457	(TYP)	0.018	(TYP)
B_1	1.524	(TYP)	0.060	(TYP)
D	19.101	± 0.127	0.752	± 0.005
E	7.620	± 0.254	0.300	± 0.010
E_1	6.401	± 0.127	0.252	±0.005
e	2.540	(TYP)	0.100	(TYP)
E_A	9.017	± 0.508	0.355	± 0.020
L	3.302	± 0.254	0.130	±0.010
θ°	0°~ 15°		0°~ 15°	

SOP-14L

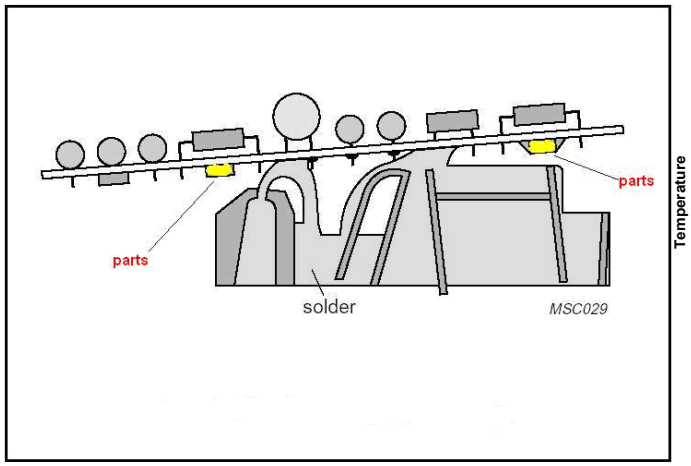
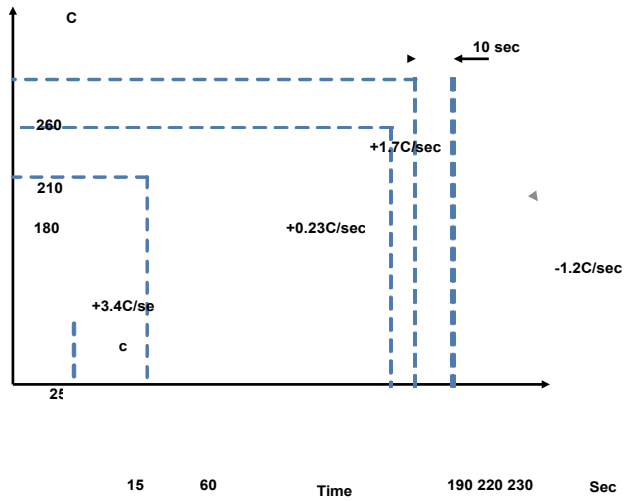


Symbol	Dimension in mm		Dimension in inch	
A	1.750	(MAX)	0.069	(MAX)
A_1	0.100	0.25	0.004	0.01
B	0.330	0.51	0.013	0.02
C	0.100	0.25	0.004	0.010
e	1.270	(TYP)	0.050	(TYP)
D	8.650	(TYP)	0.340	(TYP)
H	6.000	(TYP)	0.236	(TYP)
E	3.900	(TYP)	0.154	(TYP)
L	0.400	1.27	0.016	0.05
h	0.250	0.50	0.010	0.020
θ°	0°~ 8°		0°~ 8°	

Reliability Test Program

SOP-14/DIP-14

Reflow Condition (IR/Convection or VPR Reflow)

Wave Soldering Process	IR Re-flow Soldering Curve
	

Test Item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245℃, 5sec
HOLT	MIL-STD-883D-1005.7	1000Hrs Bias@125℃
PCT	JESD-22-B,A102	168Hrs, 100% RH, 121℃
TST	MIL-STD-883D-1011.9	-65℃~150℃, 200 Cycles
ESD	MIL-STD-883D-3015.7	VHMB>2KV, VMM>200V
Latch-Up	JESD 78	10ms, 1_{tr}> 100mA

Revision History

REVISION	DESCRIPTION	PAGE	DATE
1.0	Add IC weight information	1	2012/05/10