

**Description**

The EST7502C is designed with a pulse-width-modulation control circuit and a complete power supervisor for use in the switched mode power supply .

It contains various functions, like under voltage protection (UVP), over voltage protection (OVP), power good output (PG) and ON/OFF control (REM).

UVP(Under voltage protection) function is for +3.3V, +5V, +12V outputs.  
 OVP(Over voltage protection) function is for +3.3V, +5V, +12V and PT is for extra protection input.

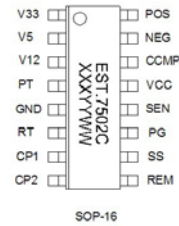
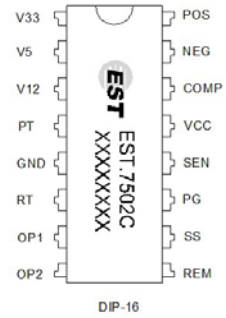
PG(Power good signal) is a safe operation signal to inform the external parts.

REM(Remote on/off) is used to control the SMPS on/off. The REM control signal has the on/off transferred debounce–time.

**FEATURE**

- 3-channel under voltage protection (UVP)
- 3-channel over voltage protection (OVP)
- 1-channel extra protection (PT)
- 1-channel sense input to control the PG (SEN)
- Remote on/off control function (REM)
- Dual output for push-pull operation (OP1/OP2)
- Soft start capability by external capacitor (SS)
- VCC under voltage lockout
- 16-Pin dual in-line package
- Pb-free Package are available

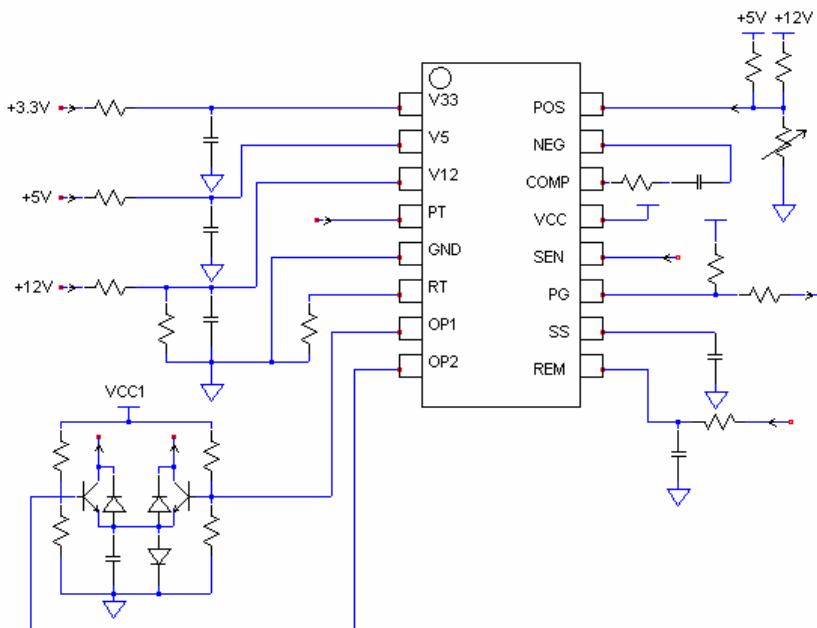
**PIN CONFIGURATION (Top View)**



**ORDERING INFORMATION**

ORDER NUMBER	Package	Shipping	Top Marking
EST7502C	DIP-16 (Pb-free)	Tube	EST.7502C
EST7502C	SOP-16(Pb-free)	Tube	EST.7502C

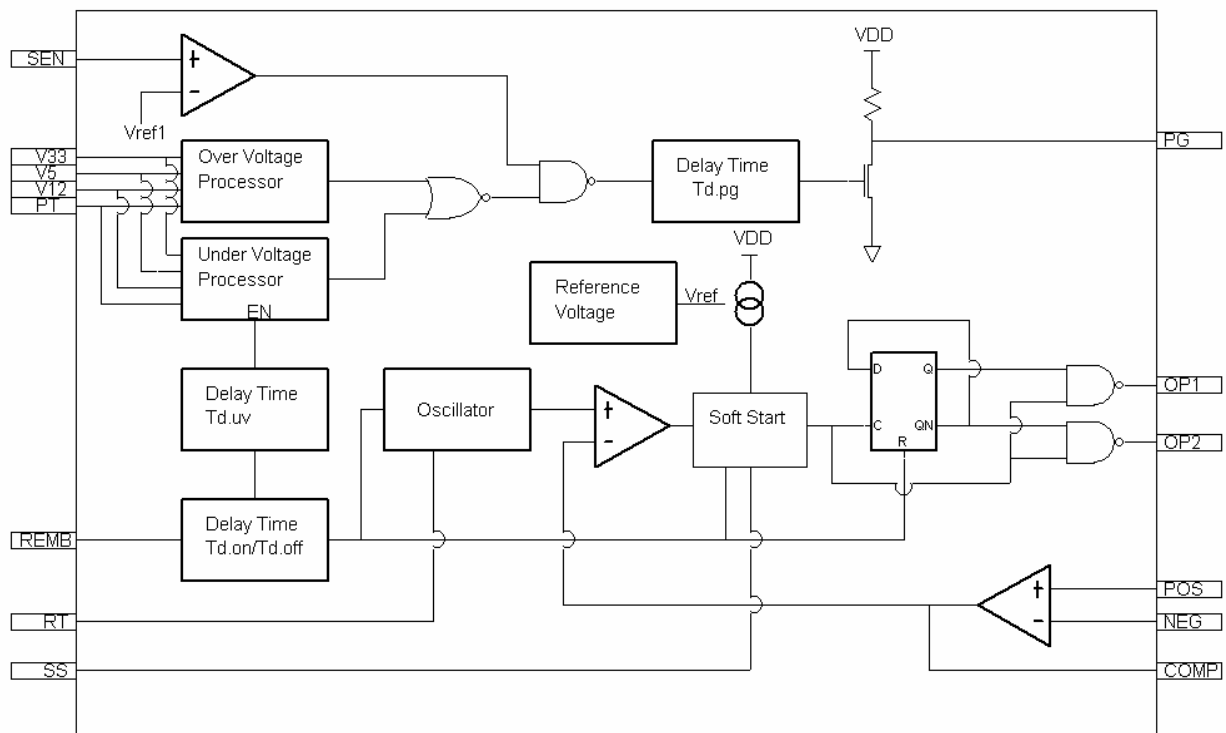
**REFERENCE APPLICATION CIRCUIT**



**PIN DESCRIPTION**

Pin	Symbol	Type	Function
1	V33	I	OVP, UVP for +3.3V
2	V5	I	OVP, UVP for +5V
3	V12	I	OVP, UVP for +12V
4	PT	I	Extra protection input
5	GND	-	Ground
6	RT	-	Oscillation frequency setting resistor
7	OP1	O	PWM output1
8	OP2	O	PWM output2
9	REM	I	Remote ON/OFF control input
10	SS	-	Soft start function setting capacitor
11	PG	O	Power good signal
12	SEN	I	Sense signal input
13	VCC	I	Supply voltage
14	COMP	O	Error amplifier output
15	NEG	I	Error amplifier (-) input
16	POS	I	Error amplifier (+) input

**FUNCTION BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

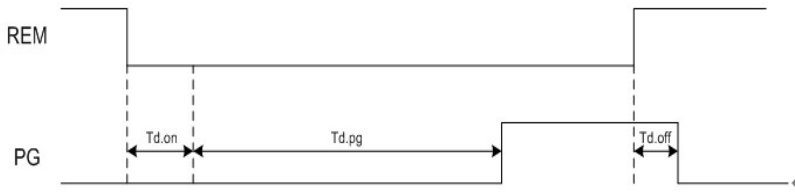
	PARAMETER	MIN	MAX	UNITS
Supply Voltage	VCC	-0.3	7	V
Input Voltage	V33,V5,V12,PT,REMB,SEN,POS,NEG	-0.3	7	V
Output Voltage	OP1,OP2,PG,COMP	-0.3	7	V
Operating Temperature Range	T <sub>O</sub>	-20	+85	°C
Storage Temperature Range	T <sub>S</sub>	-65	150	°C

**ELECTRICAL CHARACTERISTICS** ( For VCC=5V and Tj=25 °C )

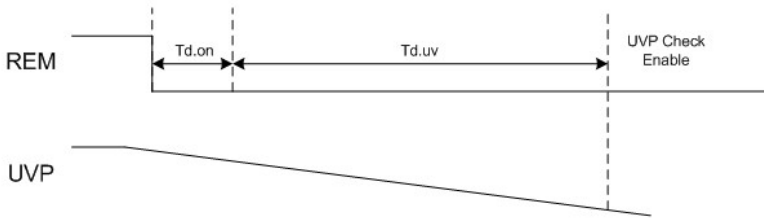
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
<b>Over Voltage Protection (OVP- V33,V5,V12,PT)</b>						
Over voltage threshold	OV33	3.8	4.1	4.4	V	
	OV5	5.8	6.2	6.6	V	
	OV12	4.4	4.6	4.9	V	
	PT	1.23	1.28	1.33	V	
Noise debounce time	Tg.ov		510		us	
<b>Under Volatge Protection (UVP- V33,V5,V12)</b>						
Under voltage threshold	UV33	1.7	1.9	2.2	V	
	UV5	2.7	3.0	3.3	V	
	UV12	2.1	2.4	2.7	V	
Noise debounce time	Tg.uv		120		us	
PG check under voltage delay time	Td.uv	180	280	380	ms	
<b>Soft Start (SS)</b>						
Sink current	Isink	RT=100 KΩ	15		uA	
Source current	Isource		310		uA	
<b>VCC Under Voltage Lockout (UVLO)</b>						
Start-up voltage			4.2		V	
<b>REM Input Pin (REM)</b>						
High level input voltage	V <sub>IH</sub>	1.8			V	
Low level input voltage	V <sub>IL</sub>			0.7	V	
REM delay time	Td.on/off		40		ms	
<b>Power Good (PG)</b>						
PG delay time	Td.pg	180	280	380	ms	
SEN voltage threshold			0.68		V	
Sink current	Ipg.sink	VPG=0.2V	10		mA	
Output load resistor	Rload	0.5	1	2	KΩ	
PG internal pull high resistor	Rpull.up		5		KΩ	
<b>Oscillation Frequency</b>						
PWM frequency	Fosc	RT=100 KΩ	70	75	80	KHz
<b>Error Amplifier (POS,NEG,COMP)</b>						
Reference voltage	Vref	Vneg	2.40	2.45	2.50	V
Open loop gain	Avo		75	85		dB
Unity gain bandwidth	BW	0dB		1		MHz
Power supply rejection ratio	PSRR		45			dB
<b>Total Device</b>						
Supply current	I <sub>CC</sub>	REM = 5V		6		mA

**TIMING DIAGRAM**

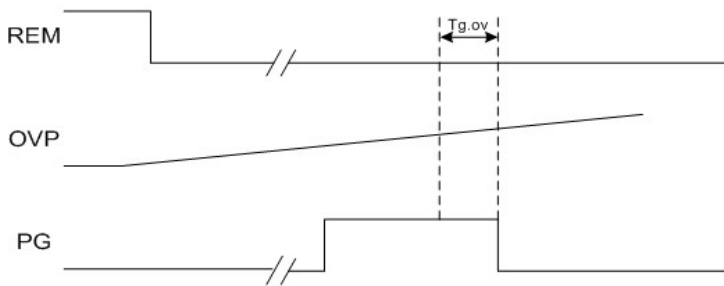
1. REM Turn ON(REM=0) , Turn OFF(REM=1) and PG



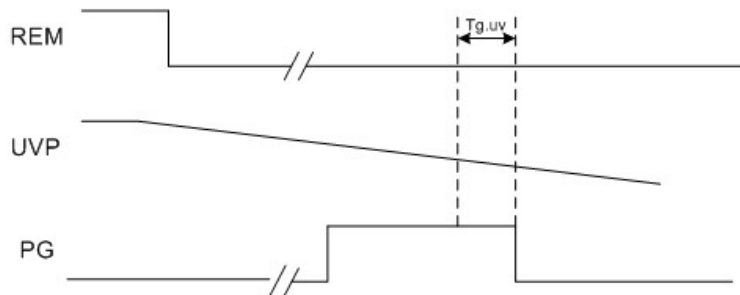
2. REM vs. Under Voltage Protection Delay time



3. Over Voltage Protection



4. Under Voltage Protection

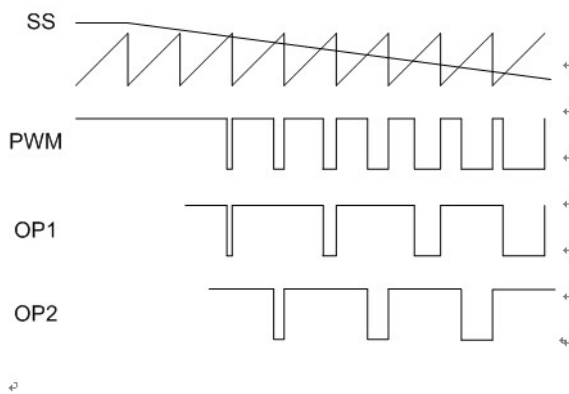


**APPLICATION HINTS**

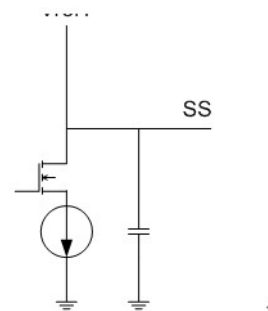
1. Input Impedence

Pin Name	Input Impedence
V33	58KΩ
V5	89KΩ
V12	58KΩ
PT	Pull-high to VCC= 33 KΩ Pull-low to GND= 5.4 KΩ

2. Soft Start



$I_{ss} = 15\mu A \quad (R_T = 100K\Omega)$



3. PWM Frequency

$T_{pwm} = K2 \cdot RT$   
 $K2 = 1.3 \cdot 10^{-10}$

Example.

$RT = 100K\Omega$   
 $T_{pwm} = (1.33 \cdot 10^{-10}) \cdot (100 \cdot 10^3) = 13.3\mu s$   
 $F_{pwm} = 75KHz$

4. PT

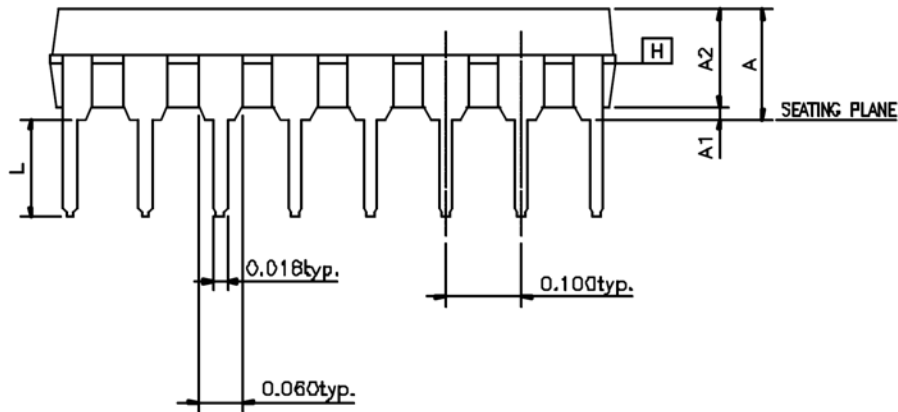
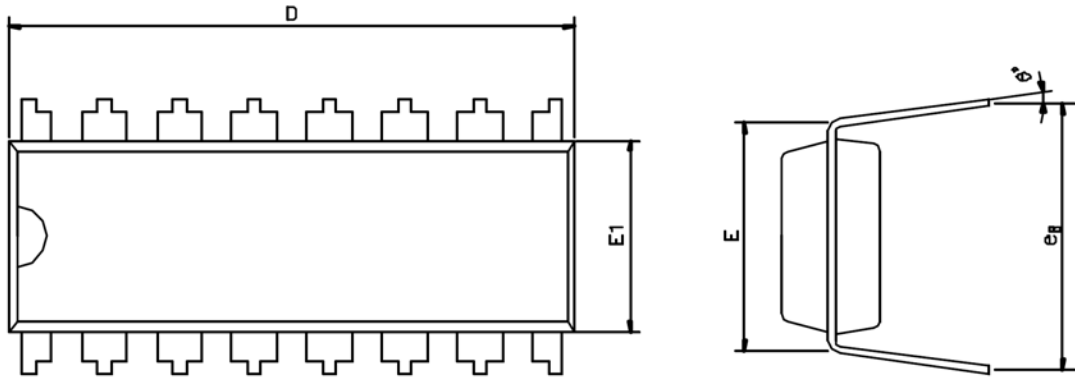
PT Voltage Level	Function
PT > 1.25V	Over voltage protection
PT < 0.57V	Disable under voltage check function

5. REM

In some application circuits, adding a resistor in series with the REM pin could reduce the noise spike and avoid the pin from damage.

**PACKAGE DIMENSIONS**  
**PDIP-16**

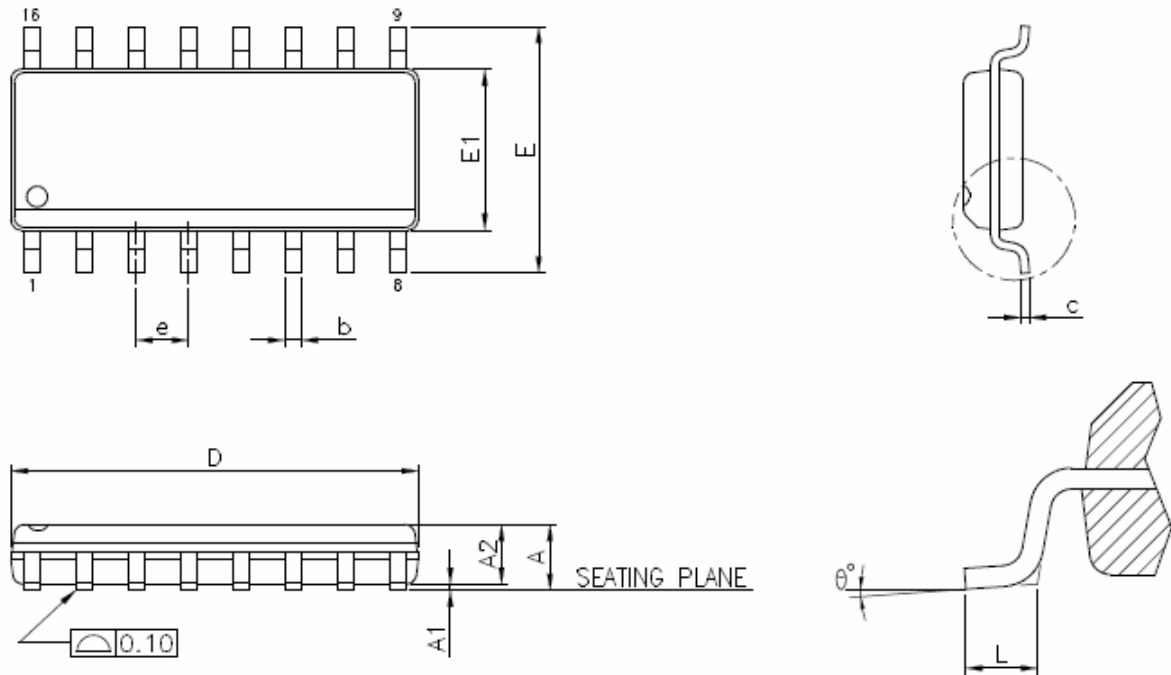
**PLASTIC DUAL IN LINE PACKAGE**  
 Unit : inch / mm



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			7.620 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	8.128	8.890	9.652
θ	0°	7°	15°	0°	7°	15°

Package Dimensions  
 SOP-16 (Standard)

Small Outline Package  
 UNIT : inch / mm



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	0.390 BSC		9.900 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°

1. 封装外形图片说明:



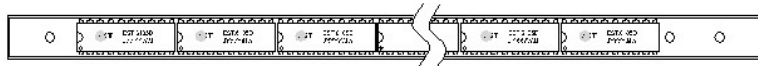
(XXXXXXXX=生产批次)

**Packing Information:**

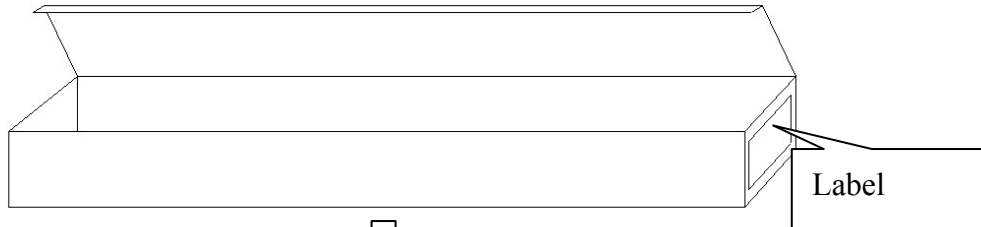
★DIP-16:



↓ 25Pcs / Tube



↓ 40Tube / Inner Box  
(1,000Pcs / Inner Box)



↓ 10 Inner Boxes / Carton  
(10,000Pcs / Carton)

