

LW4933

POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

Description

The LW4933 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.

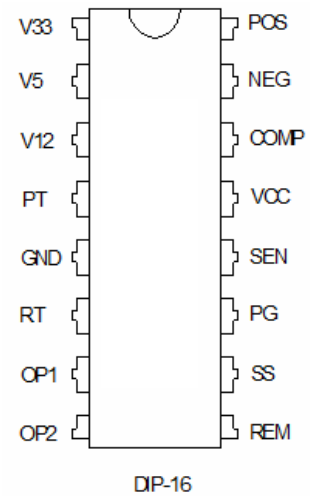
PG(Power good signal) is a safe operation signal to inform the external parts.

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

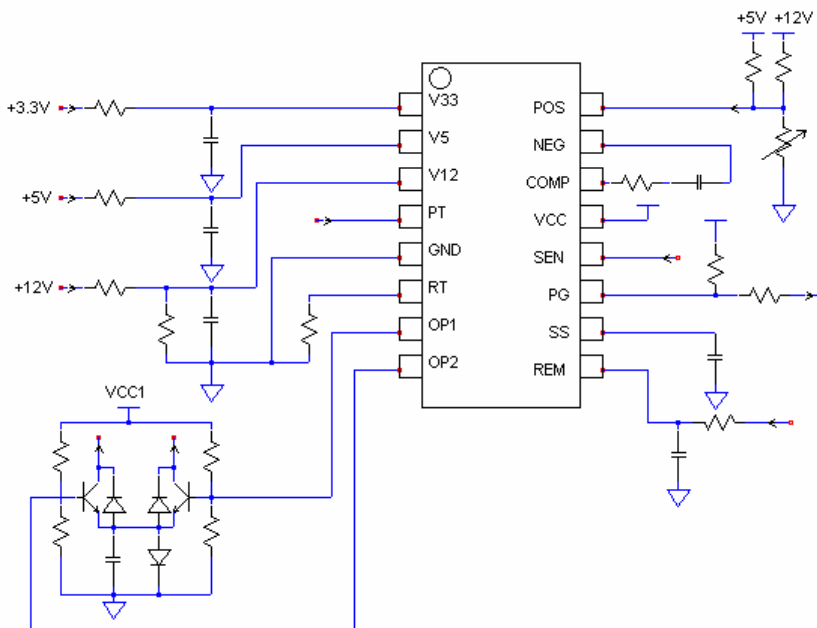
PIN CONFIGURATION (Top View)



ORDERING INFORMATION

ORDER NUMBER	Package	Shipping	Top Marking
LW4933	DIP-16 (Pb-free)	Tube	LW4933

REFERENCE APPLICATION CIRCUIT



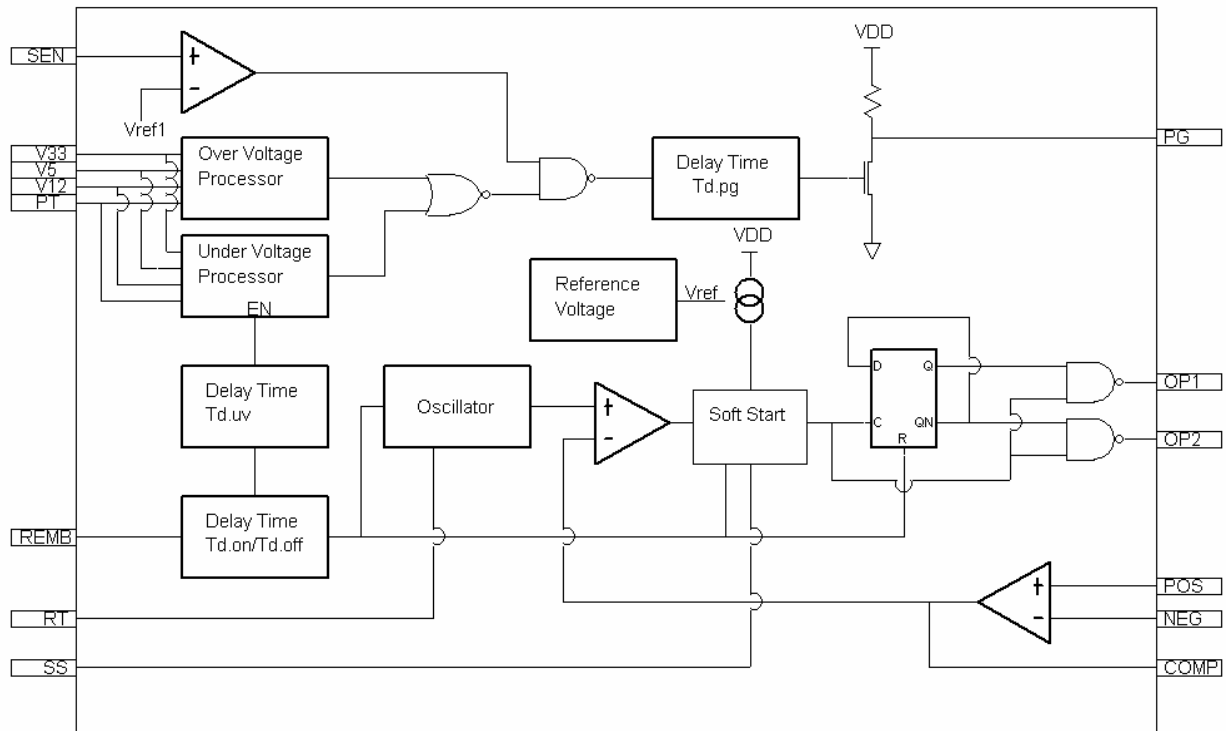
LW4933D/ LW4933S

POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

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 _O	-20	+85	°C
Storage Temperature Range	T _S	-65	150	°C

LW4933D/ LW4933S

POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

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

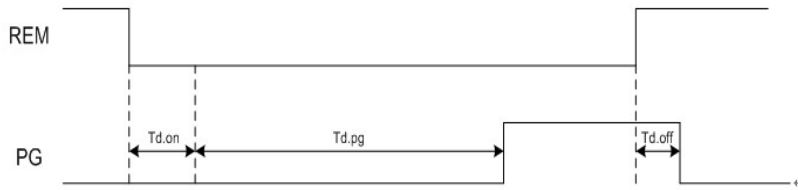
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
Over Voltage Protection (OVP- V33,V5,V12,PT)						
Over voltage threshold	OV33	3.8	4.1	4.4	V	
	OV5	5.8	6.2	6.6	V	
	OV12	4.4	4.6	4.9	V	
	PT	1.23	1.28	1.33	V	
Noise debounce time	Tg.ov		510		us	
Under Volatge Protection (UVP- V33,V5,V12)						
Under voltage threshold	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	
Soft Start (SS)						
Sink current	Isink	RT=100 KΩ	15		uA	
Source current	Isource		310		uA	
VCC Under Voltage Lockout (UVLO)						
Start-up voltage			4.2		V	
REM Input Pin (REM)						
High level input voltage	V _{IH}	1.8			V	
Low level input voltage	V _{IL}			0.7	V	
REM delay time	Td.on/off		40		ms	
Power Good (PG)						
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	
Oscillation Frequency						
PWM frequency	Fosc	RT=100 KΩ	70	75	80	KHz
Error Amplifier (POS,NEG,COMP)						
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
Total Device						
Supply current	I _{cc}	REM = 5V		6		mA

LW4933D/ LW4933S

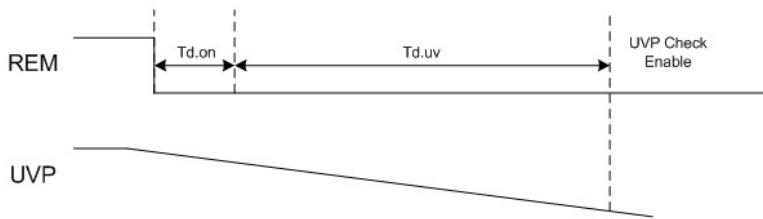
POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

TIMING DIAGRAM

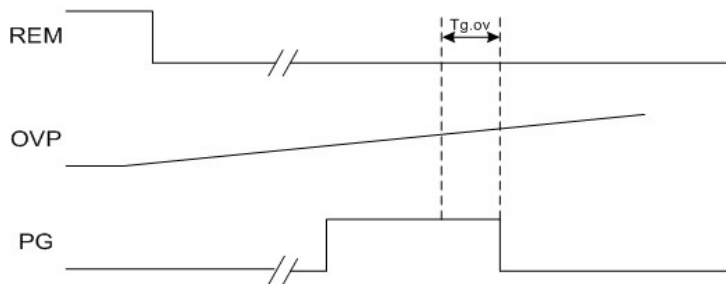
1. REM Turn ON(REM=0) , Turn OFF(REM=1) and PG



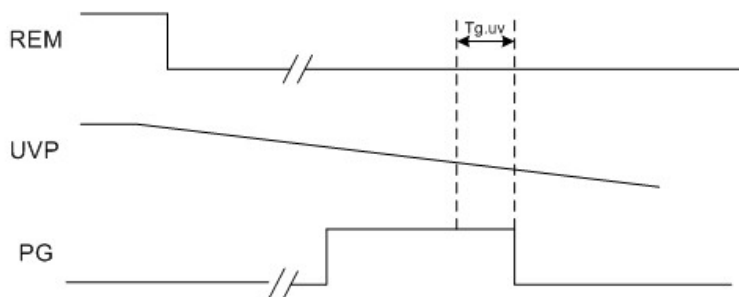
2. REM vs. Under Voltage Protection Delay time



3. Over Voltage Protection



4. Under Voltage Protection



LW4933D/ LW4933S

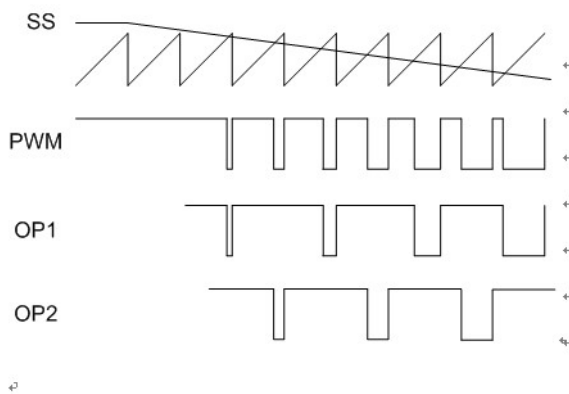
POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

APPLICATION HINTS

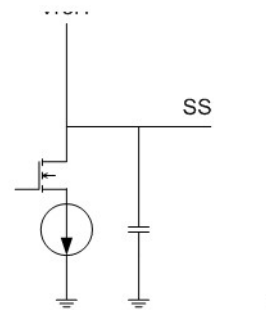
1. Input Impedence

Pin Name	Input Impedence
V33	52KΩ
V5	81KΩ
V12	52KΩ
PT	Pull-high to VCC= 24 KΩ Pull-low to GND=4.7 KΩ

2. Soft Start



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



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 < 0.62V	Disable under voltage check function

5. REM

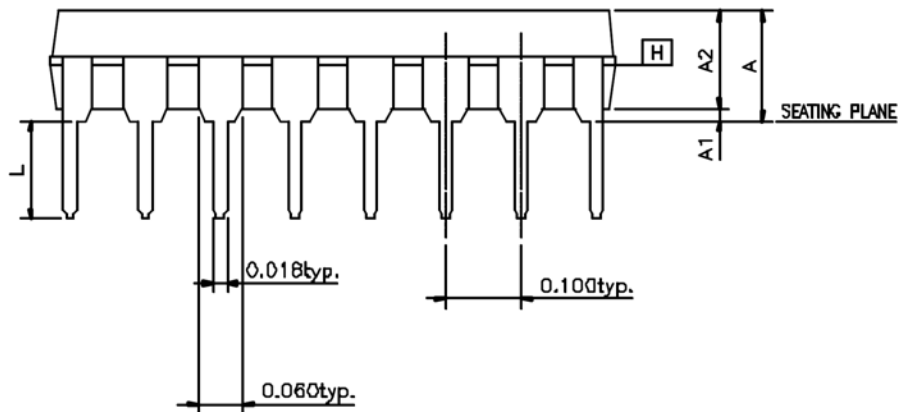
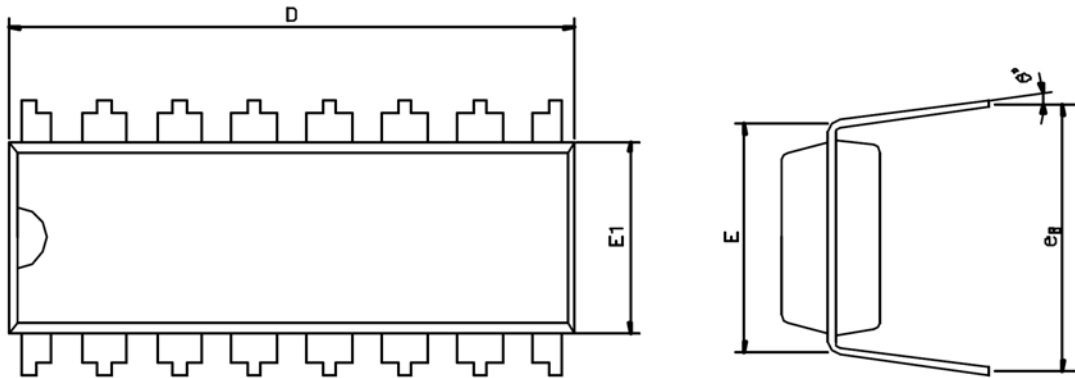
In some application circuits, adding a resistor in series with the REM pin could reduce the noise spike and avoid the pin from damage.

LW4933D/ LW4933S

POWER SUPPLY SUPERVISOR WITH PWM CONTROLLER

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°