# UNISONIC TECHNOLOGIES CO., LTD

PC POWER SUPPLY PWM SUPERVISOR

DIP-16

■ DESCRIPTION

The UTC **3520** PWM controller is designed for switching mode power supply for PCs. It provides all the functions necessary to monitor and control the output of the power supply. Remote ON/OFF control, power good circuitry, some protection features against over-voltage and over-power are implements.

It contains various functions, which are Over Voltage Protection (monitors 3.3V, 5V, 12V and PT input voltage level), Under Voltage Protection (monitors 3.3V, 5V and 12V input voltage level), Power Good Output (monitors the voltage level of power supply), Remote On/Off control and etc. It can minimize external components of switching power supply systems in personal computer.
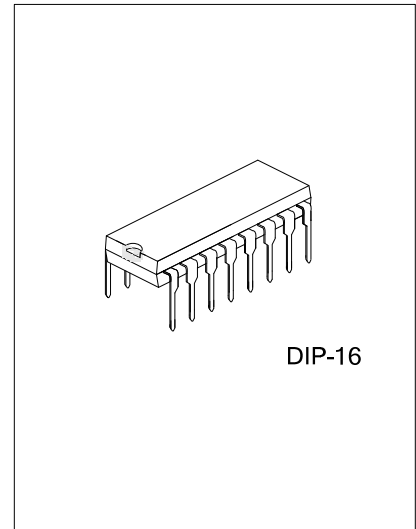
■ FEATURES

* Complete PWM control and protection circuitry
* Over voltage protection for 3.3V / 5V / 12V / PT
* Under voltage protection for 3.3V / 5V / 12V
* Power good output is open drain output
* PWM control output is open drain output
* Remote ON/OFF function De–bounce time
* 280ms UVP time delay
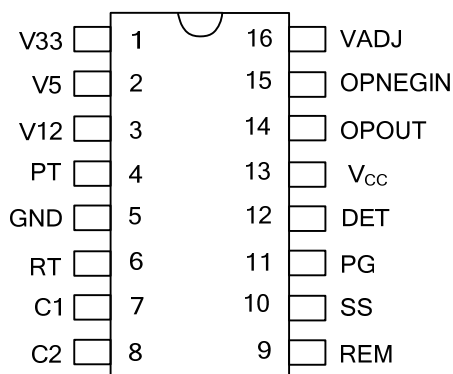* 280ms PG time delay
* Soft-Start function built-in

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
3520L-D16-T	3520G-D16-T	DIP-16	Tube

Note: xx: Output Voltage, refer to Marking Information.

3520L-D16-T		
—— (1)Packing Type	(1) T: Tube	
—— (2)Package Type	(2) D16: DIP-16	
—— (3)Lead Free	(3) L: Lead Free, G: Halogen Free	

■ **PIN CONFIGURATION**

```
        ┌──────┐
V33  ──┤ 1  16 ├── VADJ
V5   ──┤ 2  15 ├── OPNEGIN
V12  ──┤ 3  14 ├── OPOUT
PT   ──┤ 4  13 ├── Vcc
GND  ──┤ 5  12 ├── DET
RT   ──┤ 6  11 ├── PG
C1   ──┤ 7  10 ├── SS
C2   ──┤ 8   9 ├── REM
        └──────┘
```

■ **PIN DESCRIPTION**

PIN NO.	PIN NAME	DESCRIPTION
1	V33	3.3V OVP/UVP input
2	V5	5V OVP/UVP input
3	V12	12V OVP/UVP input
4	PT	Extra OVP protection input
5	GND	Gnd
6	RT	Oscillation frequency by setting external resistor
7	C1	PWM OUTPUT 1
8	C2	PWM OUTPUT 2
9	REM	Remote on/off input REM="low" means the main SMPS is turned-on REM="high" means the main SMPS is turned-off
10	SS	Soft start function by setting external capacitor
11	PG	Power good signal PG="high" means "power good" PG="low" means "power fail"
12	DET	Power Good Signal Detection Input
13	V_{CC}	Power
14	OPOUT	OP AMP OUTPUT
15	OPNEGIN	OP AMP NEGATIVE INPUT
16	VADJ	OP compensation positive input

■ BLOCK DIAGRAM
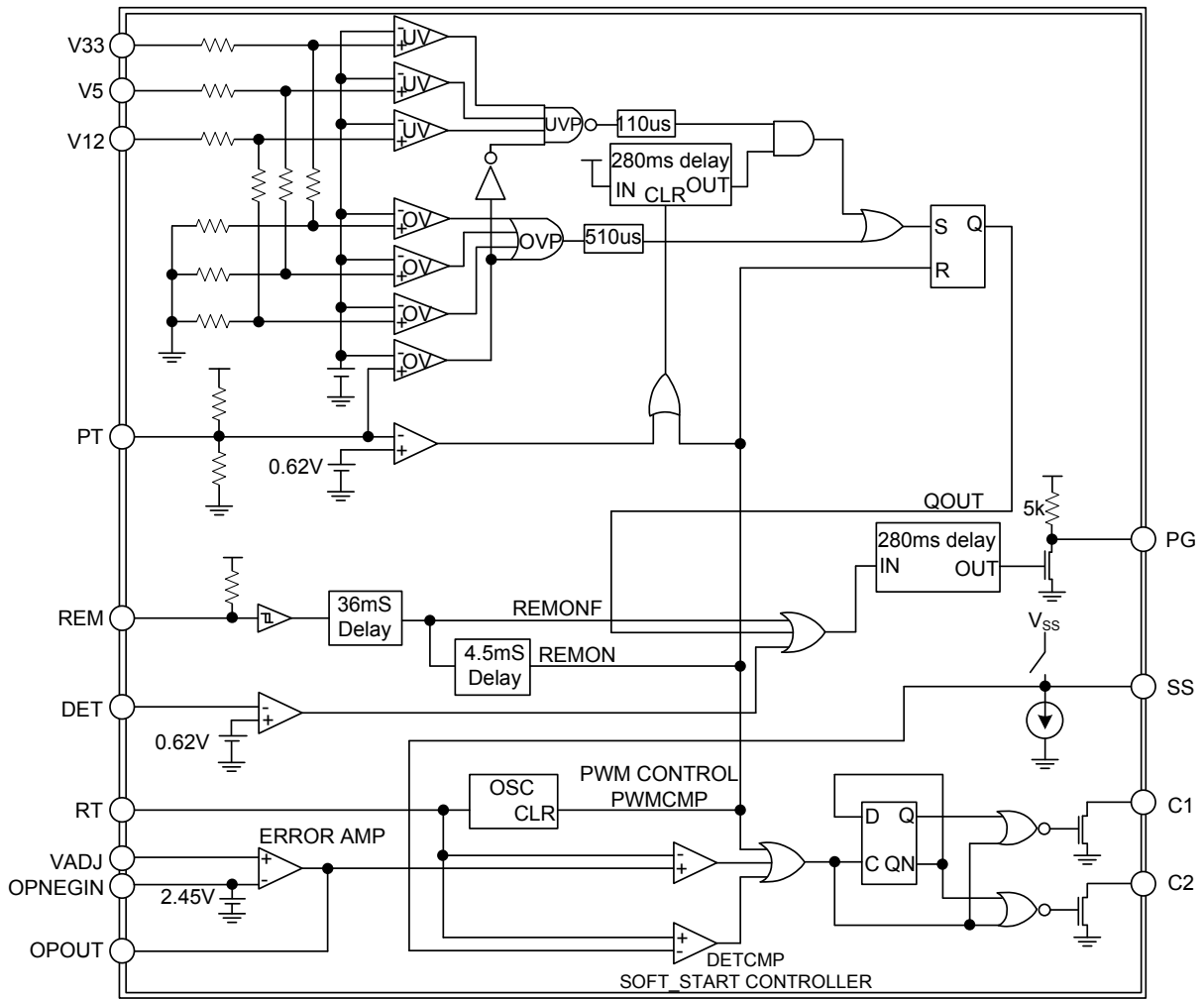
■ **ABSOLUTE MAXIMUM RATING** (V_{CC}=5.5V)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	5.5	V
Drain Output Voltage	$V_{CC}1, V_{CC}2$	5.5	V
Drain Output Current	$I_{CC}1, I_{CC}2$	200	mA
Power Dissipation	P_D	200	mW
Operating Temperature	T_{OPR}	-10~+70	°C
Storage Temperature	T_{STG}	-65~+150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
　　　 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **ELECTRICAL CHARACTERISTICS** (T_A=25°C, V_{CC}=5V)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DEAD TIME CONTROL SECTION						
Input Threshold Voltage	V_{THDT}	Zero. Duty Cycle		3.0	3.3	V
		MAX. Duty Cycle		0.1		V
ERROR AMP SECTION						
Close Loop Voltage Gain	G_{VC}	0.5V~3.5V		65		dB
Cross Over Point		0dB		320		KHZ
Opneg Bias Voltage		Opneg Open	2.38	2.45	2.52	V
OUTPUT SECTION						
Output Saturation Voltage	V_{DSSAT}	I_D=200mA		1.3	1.5	V
Drain Off-State Current	I_{DOFF}	V_{CC}=V_D=V_S=0V		2	10	µA
Rising Time	t_R			100	200	ns
Falling Time	t_F			50	200	ns
PROTECTION SECTION						
Over Voltage Protection (OVP)	V33		3.8	4.1	4.3	V
	V5		5.8	6.2	6.6	V
	V12		4.41	4.64	4.90	V
	PT		1.1	1.25	1.3	V
Under Voltage Protection (UVP)	V33		1.78	1.98	2.18	V
	V5		2.70	3.00	3.30	V
	V12		2.11	2.37	2.63	V
UVP Disable Voltage	PT		0.55	0.62	0.68	V
UVP Delay Time	t_{DLY}		100	280	500	ms
REMOTE ON/OFF SECTION						
REM High Input Voltage	V_{IH}		2.0			V
REM Low Input Voltage	V_{IL}				0.8	V
REM Pull High Voltage	$V_{H(PULL)}$		2.0		5.25	V
REM Delay Time	t_{DLY}		30	36	42	ms
REM Off Delay Time	$t_{DLY (OFF)}$		3.5	4.5	5.5	ms
POWER GOOD SECTION						
Detecting Input Voltage	$V_{I(DET)}$		0.55	0.62	0.68	V
PG Output Pull-Up Resistor	$R_{O(PULL-UP)}$			5		KΩ
PG Output Load Resistor	$R_{O(LOAD)}$		0.5	1	2	KΩ
PG Delay Time			150	280	350	ms
Output Saturation Voltage	$V_{O(SAT)}$	I_{PG}=10mA		0.2	0.4	V
SOFT START SECTION						
Source Current OF SS	I_{SS}		28	33	38	µA
TOTAL DEVICE						
Standby Supply Current	I_{CC}			10	20	mA
OSCILLATION SECTION						
Oscillation Frequency	F_{OSC}	RT=75KΩ	55	60	65	KHZ

■ **FUNCTION DESCRIPTION**

(1) REMOTE ON/OFF
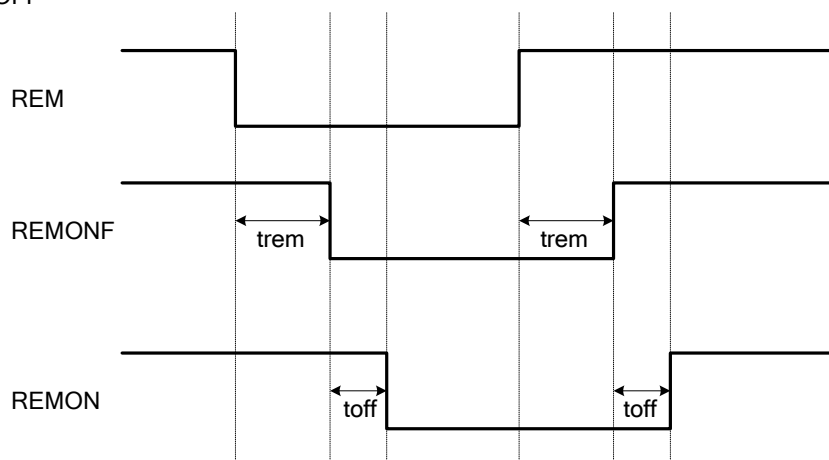
(2) Under Voltage Protection Delay Time
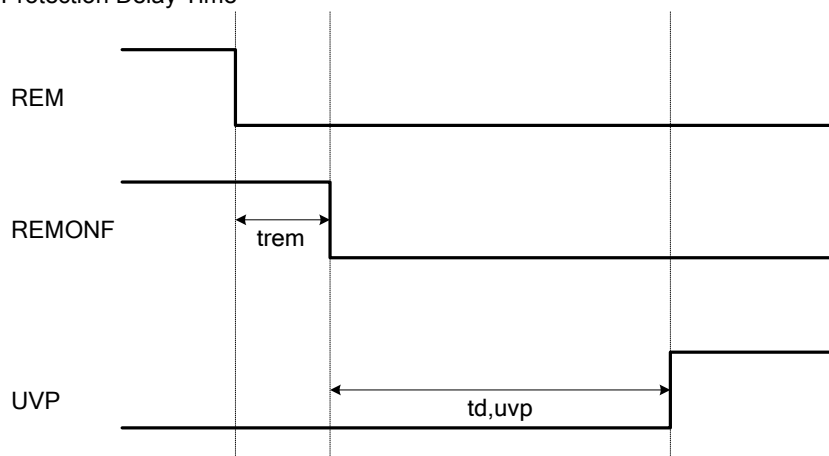
(3) Protection Control of the Soft-Start

The soft-start function is to reduce the large current surge during power-up or preventing the output voltages (V33/V5/V12) reaches the Over Voltage Protection level.

(4) The function of PT

This signal is prepared for extra Over Voltage Protection Input (V_{PT}>1.25V) or another Disable Under Voltage Protection function (V_{PT}<0.62V).

■ **FUNCTION DESCRIPTION(Cont.)**

(5) Pulse Width Modulation Block：

  The output pulse width modulation is generated by comparison of the saw-tooth waveform from the capacitor C_T to the feedback of the voltage.

  Therefore, an increase in feedback control signal amplitude causes a linear decrease of the output pulse width. Also, the SS (DTC and Soft-Start) limits the output pulse width. The timing diagram is shown as below:
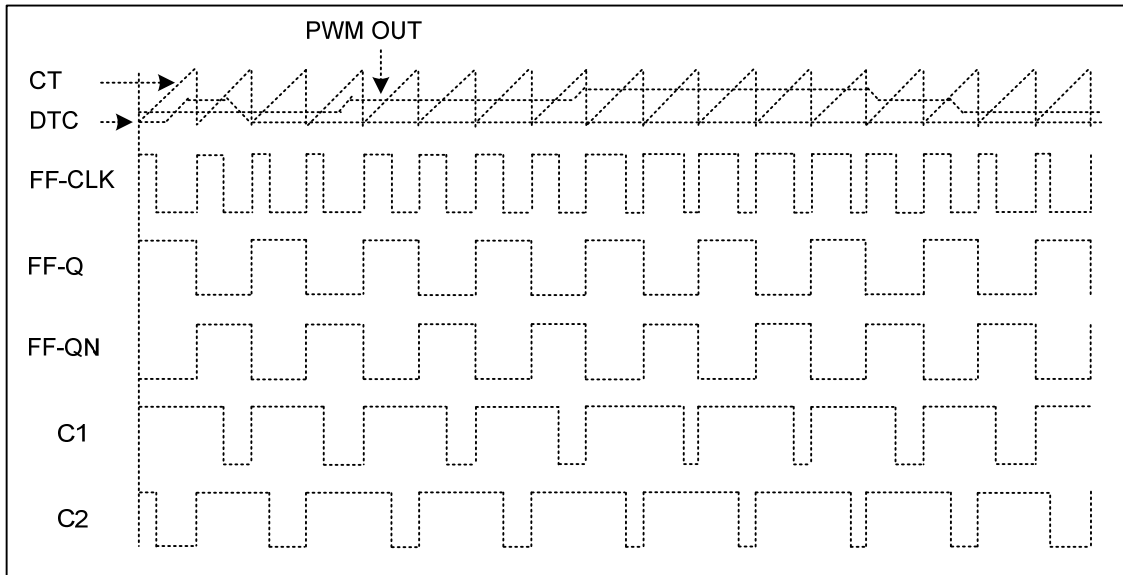
(6) In some application power system, adding an external resistor (R9) could reduce the peak value spike from the environments to pin 9 (REM) and avoid pin 9 (REM) damaged by the external noise.

■ **TYPICAL APPLICATION CIRCUIT**