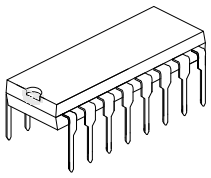
3521 CMOS IC

PWM CONTROLLER WITH SUPERVISORY CIRCUIT FOR SWITCHING POWER SUPPLY



DIP-16

■ DESCRIPTION

UTC **3521** 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.

■ FEATURES

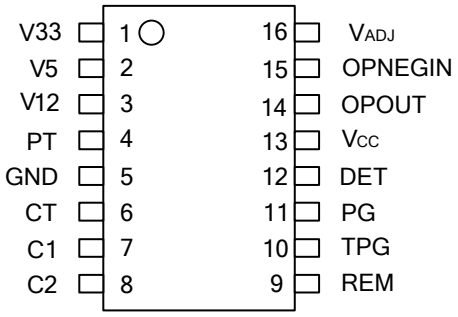
* Over-Voltage Protection for 3.3V, 5V and 12V
* Under-Voltage Detection for 3.3V, 5V and 12V
* Over-Power Protection
* Remote ON/OFF Function
* Power Good Circuitry
* Delay Time for PG Signal
* Delay Time for Over-Voltage and Under-Voltage Protection
* On-Chip Oscillator and Error Amplifier

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free Plating	Halogen Free		
3521L-D16-T	3521G-D16-T	DIP-16	Tube

3521L-D16-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube (2) D16: DIP-16 (3) L: Lead Free, G: Halogen Free

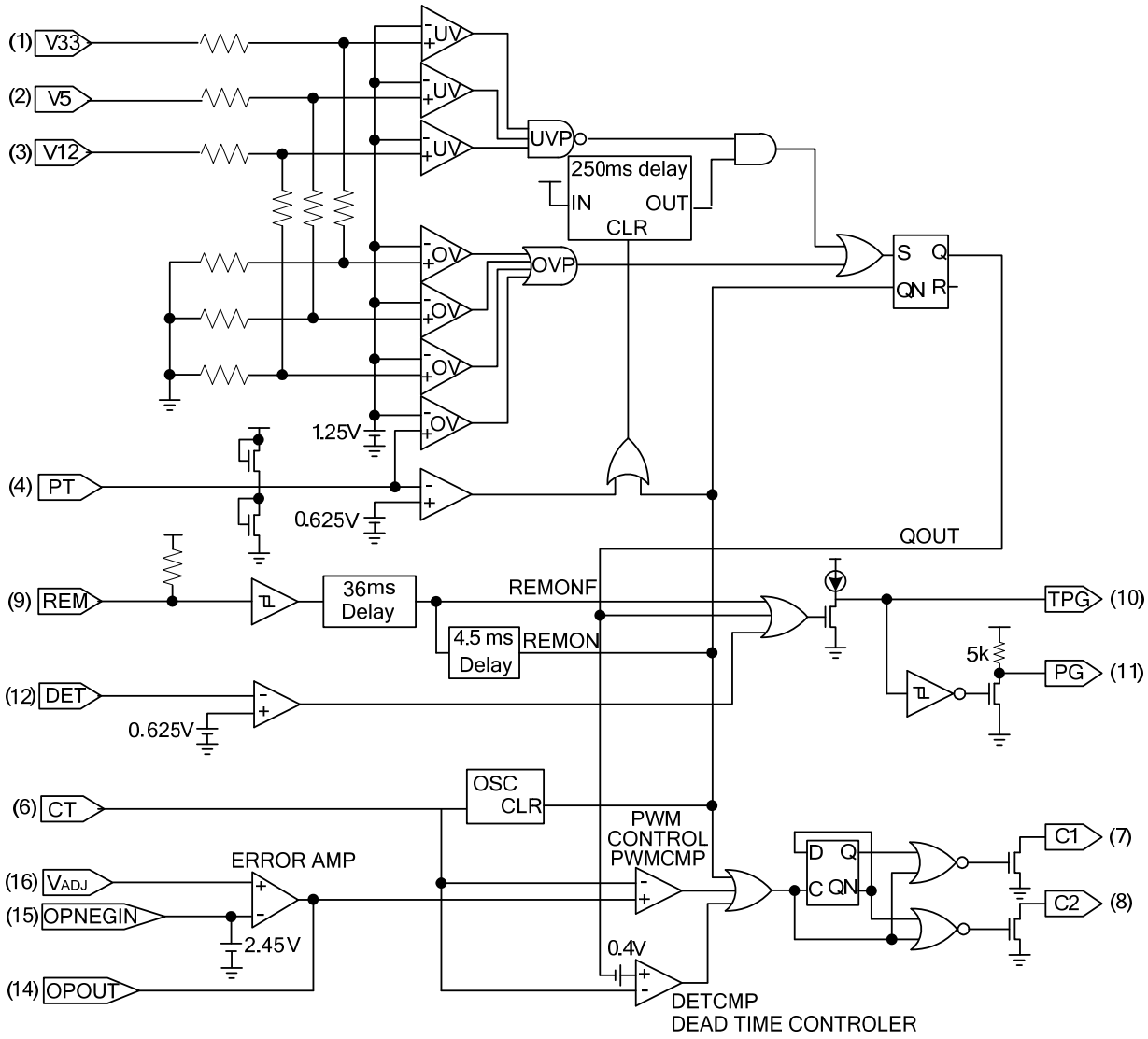
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	TYPE	FUNCTIONS
1	V33	I	OVP/UVP Input For 3.3V
2	V5	I	OVP/UVP Input For 5V
3	V12	I	OVP/UVP Input For 12V
4	PT	I	Additional OVP Protection
5	GND	P	Ground
6	CT		Cap FOR Osciilation Frequency
7	C1	O	Output 1
8	C2	O	Output 2
9	REM	I	Remote ON/OFF Pin.
10	TPG		Power Good Delay Time Setting
11	PG	O	Power Good Signal Out.
12	DET	I	Power Good Signal Detection Input
13	V_{CC}	P	Supply Voltage For IC
14	OPOUT	O	OP AMP Output
15	OPNEGIN	I	OP AMP Negative Input
16	V_{ADJ}	I	Voltage Adjust Pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (V_{CC}=5.5V, unless otherwise specified)

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	℃
Storage Temperature	T_{STG}	-65 ~ +150	℃

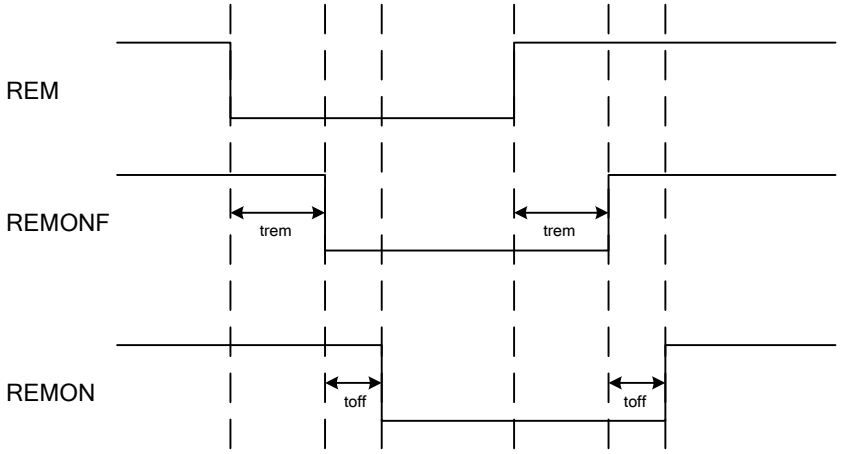
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (Ta=25℃, V_{CC} =5V, unless otherwise specified)

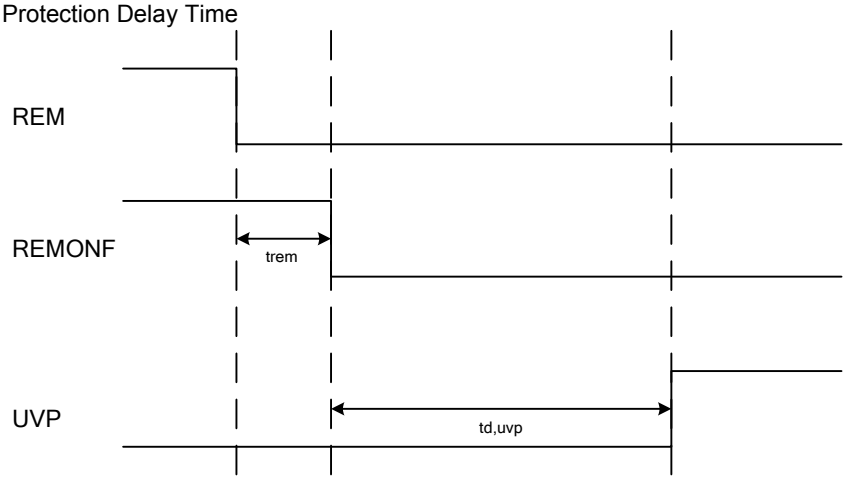
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DEAD TIME CONTROL SECTION						
Input Threshold Voltage	$V_{I(THR)}$	ZERO DUTY CYCLE		3.0	3.5	V
		MAX. DUTY CYCLE		0.1		
ERROR AMP SECTION						
Opneg Bias Voltage		OPNEG OPEN	2.35	2.45	2.55	V
Close Loop Voltage Gain	G_{VC}	0.5V ~ 3.5V		65		dB
Cross Over Point		0dB		320		KHz
OUTPUT SECTION						
Output Saturation Voltage	V_{DSSAT}	I_D=200mA		1.1	1.3	V
Drain Off-State Current	$I_{D(OFF)}$	V_{CC}=V_D=V_S=0V		2	10	μA
Rising Time	t_R	$R_{PULL-UP}$=1 KΩ		100	200	ns
Falling Time	t_F	$R_{PULL-UP}$=1 KΩ		50	200	ns
PROTECTION SECTION						
Over Voltage Protection (OVP)	V33		3.8	4.1	4.4	V
	V5		5.8	6.2	6.6	
	V12		4.38	4.64	4.90	
	P_T		1.2	1.25	1.3	
Under Voltage Protection (UVP)	V33		1.78	1.98	2.18	V
	V5		2.70	3.00	3.30	
	V12		2.11	2.37	2.63	
UVP Disable Voltage	P_T		0.54	0.62	0.70	V
UVP Delay Time	t_{DLY}		100	250	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	$V_{I(DET)}$		0.54	0.62	0.70	V
Output Saturation Voltage	$V_{O(SAT)}$	I_{PG}=10mA		0.2	0.4	V
Charging Current For TPG	I_{CHAR}			30		μA
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	t_{DLY}	C=2.2μF	100	250	500	ms
TOTAL DEVICE						
Standby Supply Current	I_{CC}			10	20	mA
OSCILLATION SECTION						
Oscillation Frequency	Fosc	C_T=2200P	50		70	KHz
Frequency Change With TEMP.	Fosc/T	C_T=2200P		2		%

■ FUNCTION DESCRIPTION

(1) REMOTE ON/OFF



(2) Under Voltage Protection Delay Time



(3) Pulse Width Modulation

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.

(4) 0Protection 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.

(5) 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).

■ APPLICATION CIRCUIT