



3521

CMOS IC

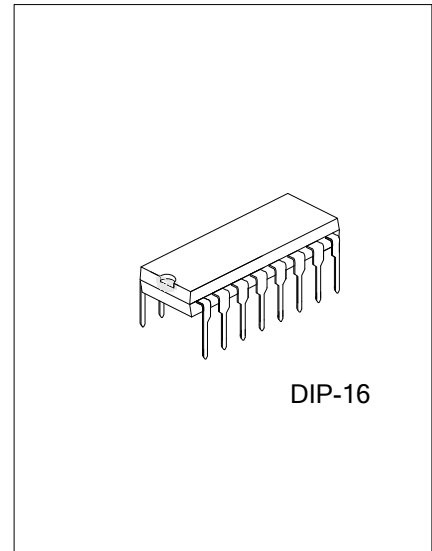
PWM CONTROLLER WITH SUPERVISORY CIRCUIT FOR SWITCHING POWER SUPPLY

■ 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

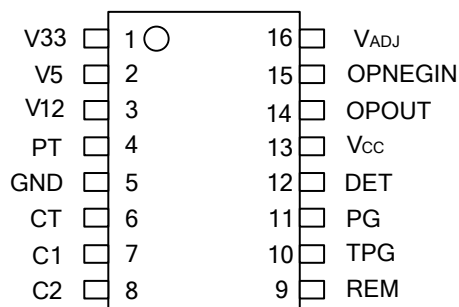


■ ORDERING INFORMATION

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
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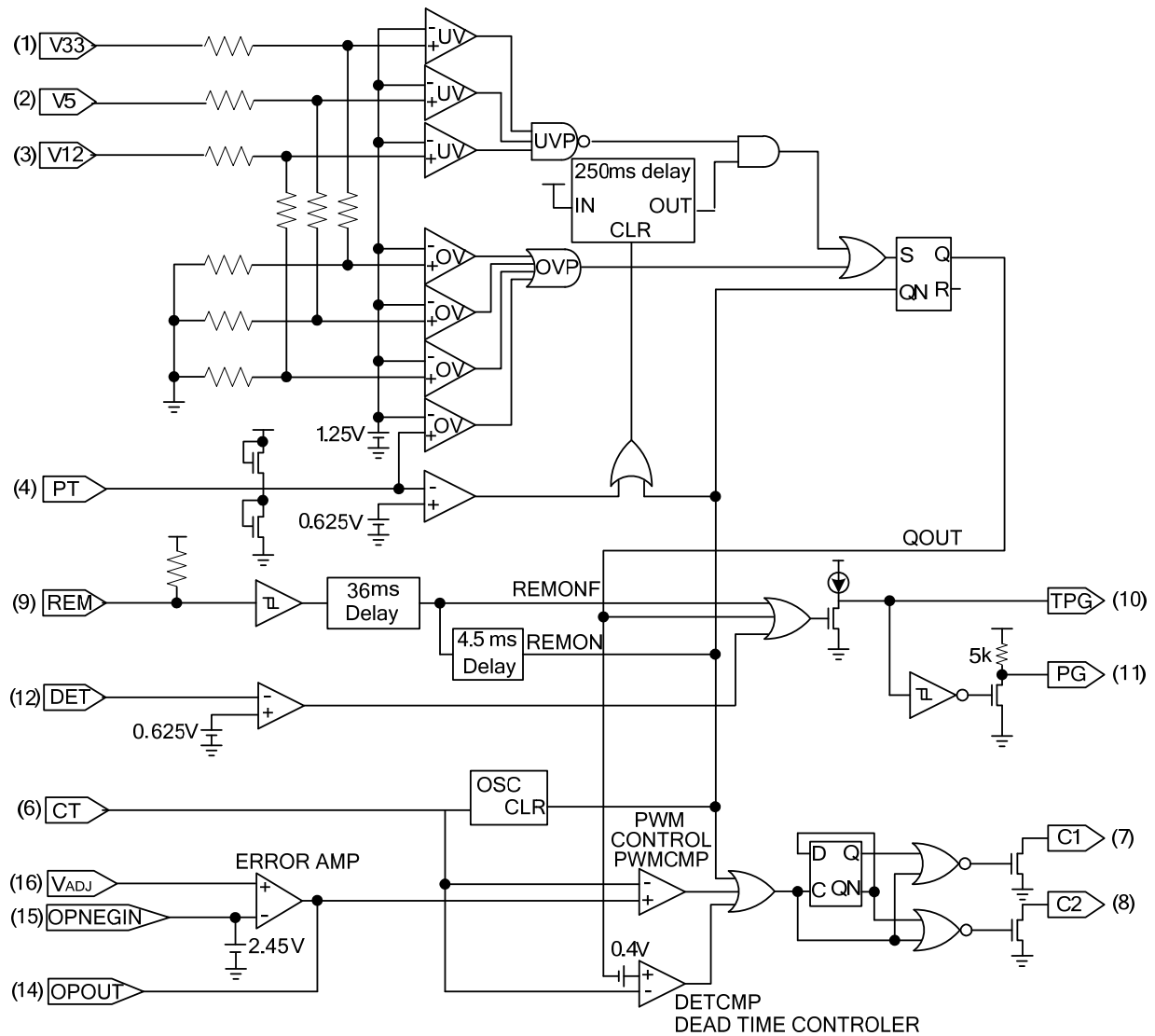
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	TYPE	FUNCTIONS
1	V33	I	OVP/UVI Input For 3.3V
2	V5	I	OVP/UVI Input For 5V
3	V12	I	OVP/UVI Input For 12V
4	PT	I	Additional OVP Protection
5	GND	P	Ground
6	CT		Cap FOR Oscillation 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_{CC1}, V_{CC2}	5.5	V
Drain Output Current	I_{CC1}, I_{CC2}	200	mA
Power Dissipation	P_D	200	mW
Operating Temperature	T_{OPR}	-10 ~ +70	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

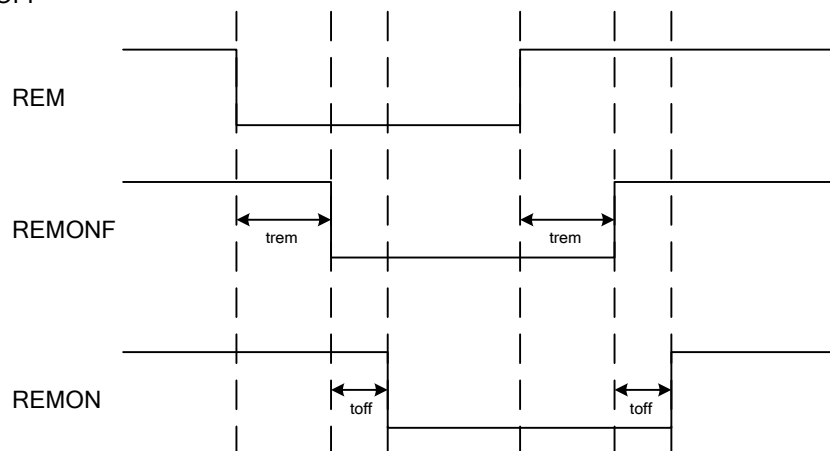
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ($T_a=25^{\circ}C$, $V_{CC}=5V$, unless otherwise specified)

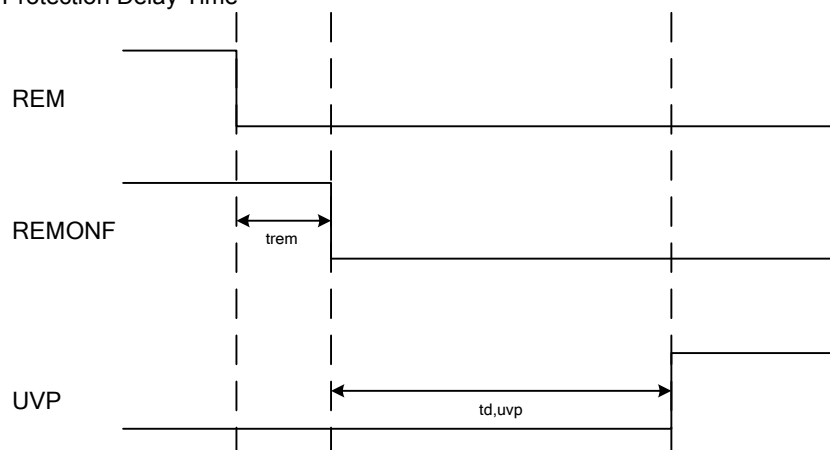
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DEAD TIME CONTROL SECTION						
Input Threshold Voltage	V _{I(THR)}	ZERO DUTY CYCLE		3.0	3.5	V
		MAX. DUTY CYCLE		0.1		
ERROR AMP SECTION						
Opneg Bias Voltage		OPNEG OPEN	2.35	2.45	2.55	V
Close Loop Voltage Gain	G _{VC}	0.5V ~ 3.5V		65		dB
Cross Over 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.

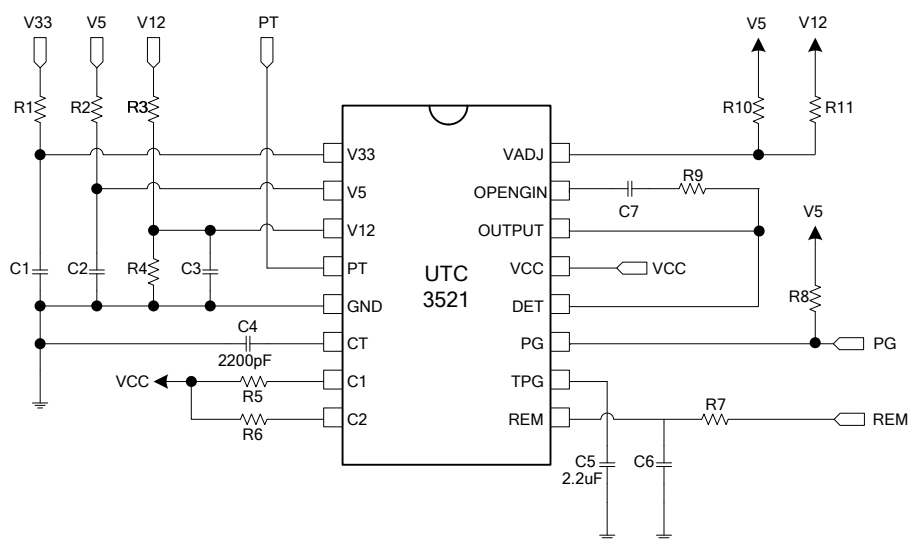
(4) Protection Control of the Soft-Start

The soft-start function is to reduce the large current surge during power-up or preventing the output voltages ($V_{33}/V_5/V_{12}$) 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



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