UNISONIC TECHNOLOGIES CO., LTD

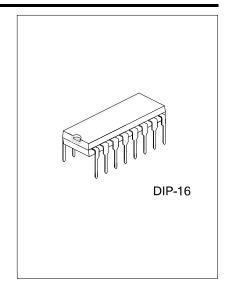
Preliminary CMOS IC

PC POWER SUPPLY PWM **SUPERVISOR**

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

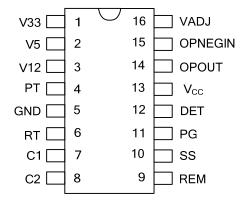
Ordering Number		Dookogo	Docking	
Lead Free	Halogen Free	Package	Packing	
3520L-D16-T	3520G-D16-T	DIP-16	Tube	

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



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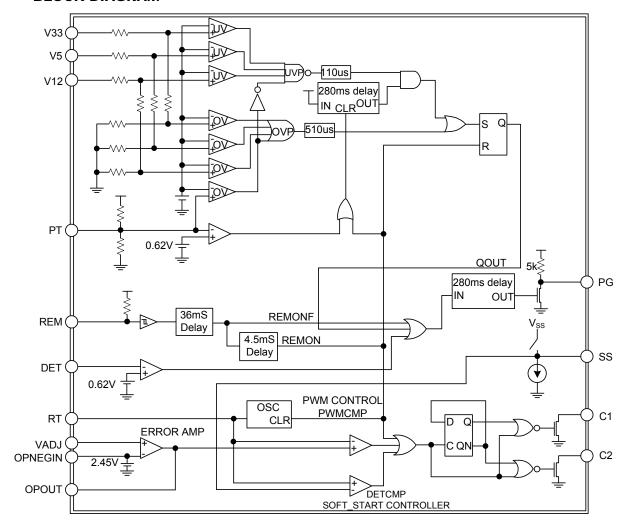
PIN CONFIGURATION



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
44	DO.	Power good signal
11	PG	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

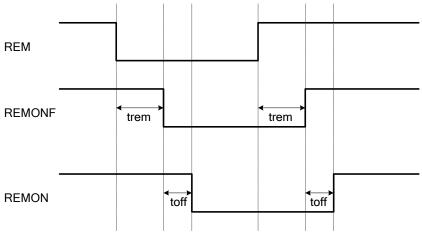
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

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

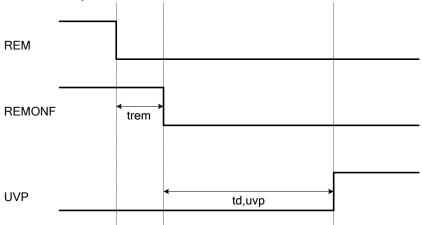
V33 3.8 4.1 4.3 V							
Input Threshold Voltage	PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Impur Infreshold Voltage	DEAD TIME CONTROL SECTION						
MAX. Duty Cycle 0.1 V V V V V V V V V	Input Threshold Voltage	\/			3.0	3.3	V
Close Loop Voltage Gain G _{VC} 0.5V~3.5V 65 dB Cross Over Point 0.0dB 3.20 KHZ Cross Over Point Opneg Gain Opneg Open 2.38 2.45 2.52 V OUTPUT SECTION	Input Theshold Voltage	V THDT	MAX. Duty Cycle		0.1		V
Odd	ERROR AMP SECTION						
Opneg Bias Voltage	Close Loop Voltage Gain	G _{VC}	0.5V~3.5V		65		dB
OUTPUT SECTION Output Saturation Voltage V _{DSSAT} I _b =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 V33 3.8 4.1 4.3 V Over Voltage Protection (OVP) V5 5.8 6.2 6.6 V V12 4.41 4.64 4.90 V PT 1.1 1.25 1.3 V UIVE Delay Time bbLy 5 2.70 3.00 3.0 V UVP Delay Time bbLy bbLy 100 280 500 ms REMOTE ON/OFF SECTION REM High Input Voltage V _H 2.0 5.25 V REM Pull High Voltage V _H 2.0 5.25 V <	Cross Over Point		0dB		320		KHZ
Output Saturation Voltage VDSSAT IDDOFF IDDOFF VCC=VD=VS=0V 1.3 1.5 V DAID DIAD OFF STATE CUrrent VDSSAT IDDOFF VCC=VD=VS=0V 2 10 μA μA LDDOFF VCC=VD=VS=0V 2 10 μA μA LDDOFF VCC=VD=VS=0V 2 10 μA μA LDDOFF VCC=VD=VS=0V LDDOFF VCC=VD=VS=0V LDDOFF VCC=VD=VS=0V LDDOFF VCC=VD=VS=0V LDDOFF VCC=VD=VS=0V LDDOFF LDDOFF LDDOFF VCC=VD=VS=0V LDDOFF LDDOFF VCC=VD=VS=0V LDDOFF	Opneg Bias Voltage		Opneg Open	2.38	2.45	2.52	V
Drain Off-State Current IDOFF VCC=VD=VS=0V 2 10 μA	OUTPUT SECTION						
Rising Time t _R 100 200 ns	Output Saturation Voltage	V_{DSSAT}	I _D =200mA		1.3	1.5	V
Falling Time t _F 50 200 ns PROTECTION SECTION V33 3.8 4.1 4.3 V V5 5.8 6.2 6.6 V V12 4.4.1 4.64 4.90 V PT 1.1 1.25 1.3 V V33 1.78 1.98 2.18 V Under Voltage Protection (UVP) 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 10LY 100 280 500 ms REMOTE ON/OFF SECTION REM High Input Voltage V _{IL} 2.0 V REM Low Input Voltage V _{IL} 2.0 5.25 V REM Delay Time 10LY 30 36 42 ms REM Off Delay Time 10LY 30 36 42 ms REM Off Delay Time 10LY 30 36 42 ms REM Off Delay Time 10LY 5.5 0.62 0.68 V PG Output Pull-Up Resistor RO(PULL-UP) 5 KΩ PG Output Load Resistor RO(LOAD) 0.55 0.62 0.68 V PG 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 OSCILLATION SECTION 100 20 mA OSCILLATION SECTION 100 100 20 mA OSCILLATION SECTION 100 100 20 mA OSCILLATION SECTION 100	Drain Off-State Current	I _{DOFF}	$V_{CC}=V_{D}=V_{S}=0V$		2	10	μΑ
V33 3.8 4.1 4.3 V	Rising Time	t _R			100	200	ns
V33 S.8 4.1 4.3 V	Falling Time	t _F			50	200	ns
Over Voltage Protection (OVP) 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 Delay Time toLy 100 280 500 ms REMOTE ON/OFF SECTION REM High Input Voltage VIH 2.0 V V REM Low Input Voltage VIL 0.8 V REM Delay Time toLY 30 36 42 ms REM Delay Time toLY (OFF) 3.5 4.5 5.5 ms POWER GOOD SECTION Detecting Input Voltage V _{I(DET)} 5 KΩ PG Output Pull-Up Resistor R _{O(POLL-UP)} 5 KΩ PG Output Saturation Voltage V _{O(SAT)}	PROTECTION SECTION						
Over Voltage Protection (OVP) V12 4.41 4.64 4.90 V PT 1.1 1.25 1.3 V Under Voltage Protection (UVP) V5 2.70 3.00 3.30 V UVP Disable Voltage PT 0.55 0.62 0.68 V UVP Delay Time tolly 100 280 500 ms REMOTE ON/OFF SECTION VIH 2.0 V V REM High Input Voltage VIH 2.0 V V REM Low Input Voltage VIL 2.0 5.25 V REM Delay Time tolly 30 36 42 ms REM Off Delay Time tolly (OFF) 3.5 4.5 5.5 ms POWER GOOD SECTION Detecting Input Voltage VI(DET) 0.55 0.62 0.68 V PG Output Pull-Up Resistor RO(PULL-UP) 5 KΩ PG Output Load Resistor RO(FULL-UP) 5 KΩ PG		V33		3.8	4.1	4.3	V
V12	Over Veltage Protection (OVP)	V5		5.8	6.2	6.6	V
V33	Over voltage Protection (OVP)	V12		4.41	4.64	4.90	V
Under Voltage Protection (UVP)		PT		1.1	1.25	1.3	V
V12		V33		1.78	1.98	2.18	V
UVP Disable Voltage	Under Voltage Protection (UVP)	V5		2.70	3.00	3.30	V
UVP Delay Time toly 100 280 500 ms		V12		2.11	2.37	2.63	V
REMOTE ON/OFF SECTION	UVP Disable Voltage	PT		0.55	0.62	0.68	V
REM High Input Voltage VIH 2.0 V	UVP Delay Time	t _{DLY}		100	280	500	ms
REM Low Input Voltage V _{IL}	REMOTE ON/OFF SECTION						
REM Pull High Voltage VH(PULL) 2.0 5.25 V REM Delay Time tolly 30 36 42 ms REM Off Delay Time tolly (OFF) 3.5 4.5 5.5 ms POWER GOOD SECTION Detecting Input Voltage VI(DET) 0.55 0.62 0.68 V PG Output Pull-Up Resistor RO(PULL-UP)) 5 KΩ PG Output Load Resistor RO(LOAD) 0.5 1 2 KΩ PG Delay Time 150 280 350 ms Output Saturation Voltage VO(SAT) IPG=10mA 0.2 0.4 V SOFT START SECTION Source Current OF SS ISS 28 33 38 μA TOTAL DEVICE Standby Supply Current ICC 10 20 mA OSCILLATION SECTION	REM High Input Voltage	V _{IH}		2.0			V
REM Delay Time t_{DLY} 303642msREM Off Delay Time $t_{DLY (OFF)}$ 3.54.55.5msPOWER GOOD SECTIONDetecting Input Voltage $V_{I(DET)}$ 0.550.620.68VPG Output Pull-Up Resistor $R_{O(PULL-UP)}$ 5 $K\Omega$ PG Output Load Resistor $R_{O(LOAD)}$ 0.512 $K\Omega$ PG Delay Time 150 280350msOutput Saturation Voltage $V_{O(SAT)}$ I_{PG} =10mA0.20.4VSOFT START SECTIONSource Current OF SS I_{SS} 283338 μ ATOTAL DEVICEStandby Supply Current I_{CC} 1020mAOSCILLATION SECTION	REM Low Input Voltage	V _{IL}				0.8	V
REM Off Delay Time Tolly (OFF) 3.5 4.5 5.5 ms	REM Pull High Voltage	V _{H(PULL)}		2.0		5.25	V
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	REM Delay Time	toly		30	36	42	ms
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	REM Off Delay Time	t _{DLY} (OFF)		3.5	4.5	5.5	ms
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	POWER GOOD SECTION						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Detecting Input Voltage	$V_{I(DET)}$		0.55	0.62	0.68	V
PG Output Load Resistor R _{O(LOAD)} 0.5 1 2 ΚΩ 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	PG Output Pull-Up Resistor	R _{O(PULL-UP))}			5		ΚΩ
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	PG Output Load Resistor			0.5	1	2	ΚΩ
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	PG Delay Time			150	280	350	ms
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	Output Saturation Voltage	V _{O(SAT)}		·O///	0.2	0.4	V
TOTAL DEVICE Standby Supply Current Icc 10 20 mA OSCILLATION SECTION Incompany of the control of th	SOFT START SECTION		1 10 08.				
TOTAL DEVICE Standby Supply Current Icc 10 20 mA OSCILLATION SECTION	Source Current OF SS	I _{SS}	4年1760	28	33	38	μA
OSCILLATION SECTION	TOTAL DEVICE		4 64 100				
OSCILLATION SECTION	Standby Supply Current	Icc _	10 CIVIII		10	20	mA
		FI.	"N.11"				
	Oscillation Frequency	Fosc	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).

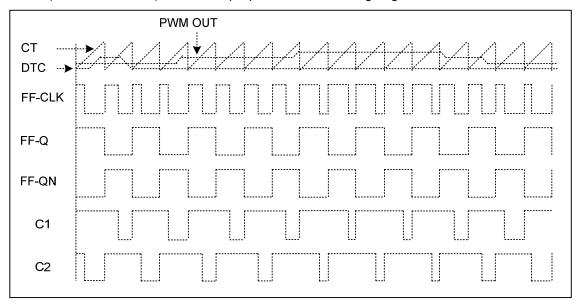


■ FUNCTION DESCRIPTION(Cont.)

(5) Pulse Width Modulation Block:

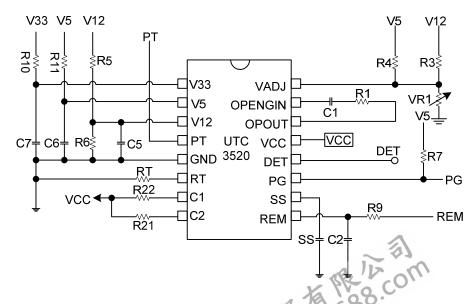
The output pulse width modulation is generated by comparison of the saw-tooth waveform from the capacitor C_T to the feedback of the voltage.

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



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