AN8090, AN8090S

Overvoltage Protective Circuits Built-in Switching Power Supply

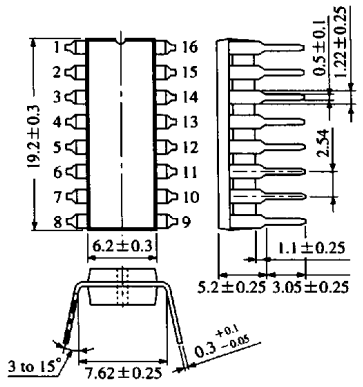
■ Overview

The AN8090 and the AN8090S enables high-speed control up to 500 kHz and have various protective functions for over-current, overvoltage, and thermal protection in order to improve reliability of the power supply.

■ Features

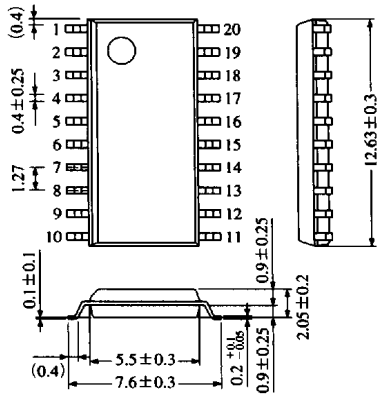
- 500 kHz PWM control frequency and miniaturized
- Capable of directly driving the large-capacity MOS FET
- Provided with 2-channel overcurrent protective function for positive side and negative side, and intermittent operating function as protection when an over-current state advanced further
- Provided with over-voltage protective and over-heat protective functions
- Provided with the ON/OFF function to start/stop operating the power supply with external signals and the error amlifier required for secondarry control
- 16-DIP package for the AN8090 and SONF-20D for the AN8090S

AN8090 Unit : mm



16-pin DIL Plastic Package (16-DIP (B)) (DIP016-P-0300D)

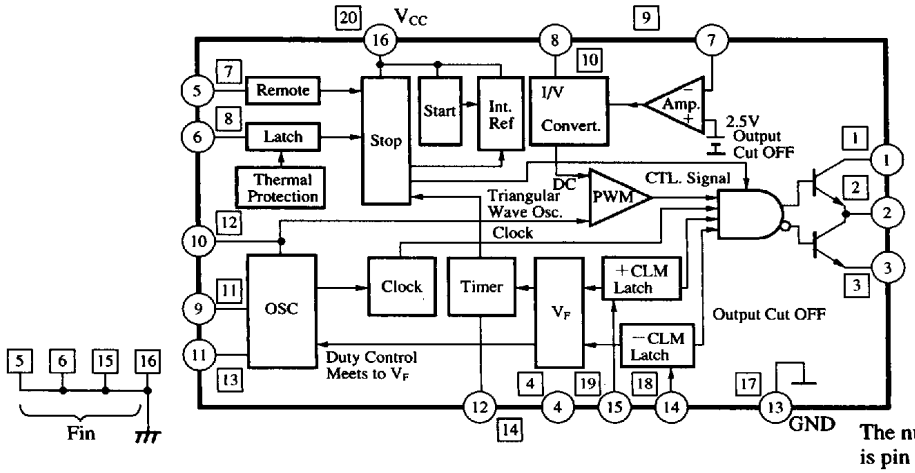
AN8090S Unit : mm



20-pin PANAFLAT Plastic Package (SONF-20D) (SOP020-P-0300A)

Voltage Regulators

■ Block Diagram



The number in square shape is pin number of AN8090S

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■ Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Supply voltage		V_{CC}	35	V
Peak output current		$I_{O(peak)}$	±2	A
Maximum continuous output current		$I_{O(max.)}$	±0.15	A
Power dissipation		P_D	1.5 *	W
Operationg ambient temperature		T_{opr}	−30 to +85	℃
Storage temperature	AN8090	T_{stg}	−55 to +150	℃
	AN8090S		−40 to +125	

* For the AN8090S, Ta≦25℃ when mounting onto the glass epoxy substrate (substrate size=5cm×5cm×0.45cm)

■ Recommended Operating Range (Ta=25℃)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	Stop voltage to 34V

■ Electrical Characteristics (Ta=25℃)

Parameter		Symbol	Condition	min	typ	max	Unit
Operating voltage renge		V_{CC}		—	—	34	V
Start voltage		$V_{CC(start)}$		15.2	16	17.2	V
Stop voltage		$V_{CC(stop)}$		9	10	10.9	V
Start/stop voltage difference		ΔV_{CC}	$\Delta V_{CC}=V_{CC(start)}-V_{CC(stop)}$	5	6	7	V
Prestart circuit current	AN8090	I_{CCL}	V_{CC}=14.5V Ta=25℃	50	80	120	μA
			V_{CC}=14.5V −30℃≦Ta≦85℃	40	80	160	μA
Circuit current		I_{CCO}	V_{CC}=30V	10	15	21	mA
ON/OFF pin H threshold voltage		$V_{TH\ ON/OFF}$		2.1	2.6	3.1	V
ON/OFF pin L threshold voltage		$V_{TL\ ON/OFF}$		1.9	2.4	2.9	V
ON/OFF pin hysteresis voltage		$\Delta V_{T\ ON/OFF}$		0.1	0.2	0.3	V
Oscillation frequency		fosc	R1=17kΩ, R2=22kΩ, CF=220pF	180	200	220	kHz
Duty ratio		Γ_{DUTY}	R1=17kΩ, R2=22kΩ, CF=220pF	45	48	51	%
Oscillation waveform upper limit voltage		V_{OSCH}		4	4.4	4.8	V
Oscillation waveform lower limit voltage		V_{OSCL}		1.8	2	2.2	V
Oscilation waveform upper/lower limit voltage difference		ΔV_{OSC}		2.1	2.4	2.7	V
Output low voltage		V_{OL1}	V_{CC}=18V, I_O=10mA	—	0.05	0.4	V
		V_{OL2}	V_{CC}=18V, I_O=100mA	—	0.7	1.4	V
		V_{OL3}	V_{CC}=5V, I_O=10mA	—	0.69	1	V
		V_{OL4}	V_{CC}=5V, I_O=100mA	—	1.3	2	V
Output high voltage		V_{OH1}	V_{CC}=18V, I_O=−10mA	16	16.5	—	V
		V_{OH2}	V_{CC}=18V, I_O=−100mA	15.5	16	—	V
Overheat protection operating temperature		T_{TS}		120	140	160	℃

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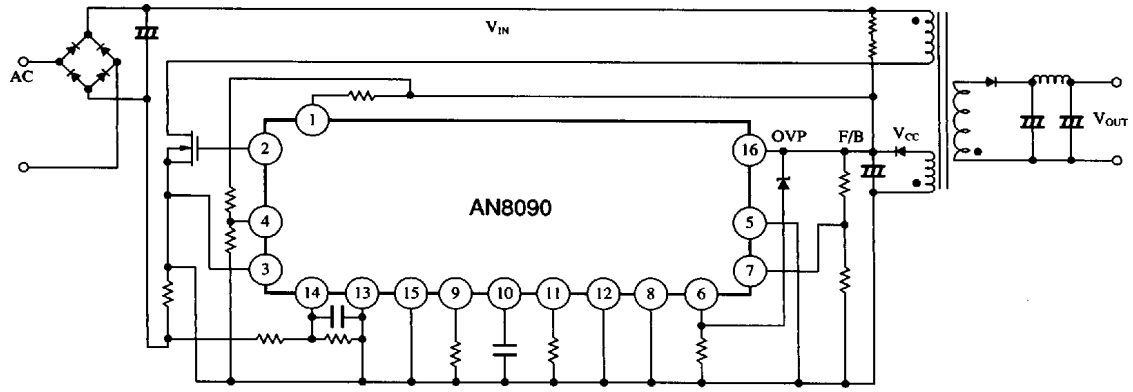
■ Pin Descriptions

Pin No. DIL	Pin No. SO	Symbol	Description
1	1	V_C	Pin to apply the supply voltage to the output transistor
2	2	V_{OUT}	IC output pin. Drives the MOS-FET or bipolar transistor.
3	3	$V_{OUT\text{-}COM}$	Output transistor ground pin
4	4	V_F	Detects the mean level of output pulses and provides output duty control and timer control.
5	7	ON/OFF	Pin to turn on/off the IC. The IC stops at "H" (output = "L") and starts at "L".
6	8	OVP	Detects an over-voltage and stops the IC ; the stop state is held.
7	9	V_{IN}	Pin to feed back the output voltage of the power supply. It has internal gain.
8	10	I_{IN}	Pin to feed back the output voltage of the power supply.
9	11	T_{ON}	Pin to connect the resistor which determines the tilting of the charge period of an internally oscillated triangular wave.
10	12	C_F	Pin to connect the capacitance which determines the frequency of an internally oscillated triangular wave.
11	13	T_{OFF}	Pin to connect the resistor which determines the tilting of the discharge period of an internally oscillated triangular wave.
12	14	C_T	Pin to connect the capacitance which determines a timer control frequency.
13	17	GND	Ground pin for the system.
14	18	CLM^-	Overcurrent detection pin on the negative potential side.
15	19	CLM^+	Overcurrent detection pin on the positive potential side.
16	20	V_{CC}	Pin to apply the supply voltage. Detects the start and stop voltage.
—	5	FIN(GND)	Pin directly connected to the IC chip. Joint use for discharge and GND.
—	6	FIN(GND)	Pin directly connected to the IC chip. Joint use for discharge and GND.
—	15	FIN(GND)	Pin directly connected to the IC chip. Joint use for discharge and GND.
—	16	FIN(GND)	Pin directly connected to the IC chip. Joint use for discharge and GND.

Voltage Regulators

■ Application Circuit

1) AN8090 flyback application



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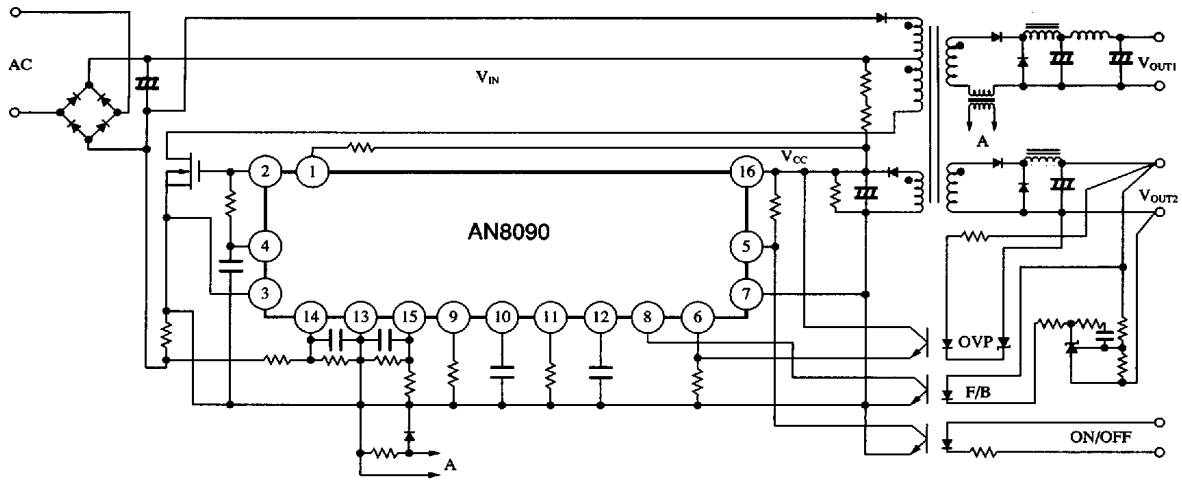
■ Application Circuit (cont.)

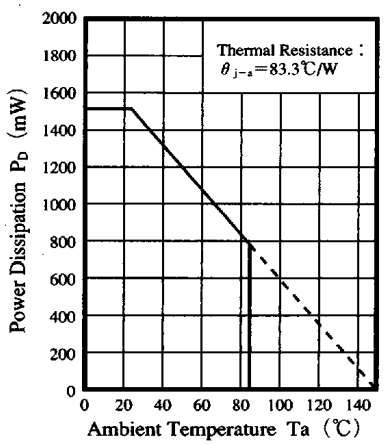
2) AN8090 feed-forward application



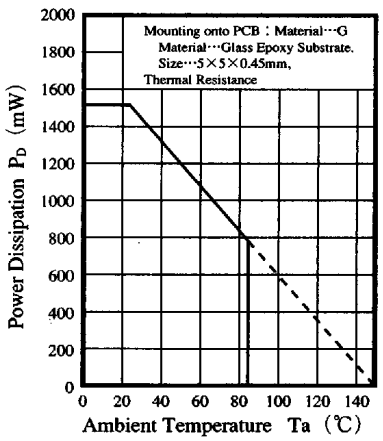
■ Supplementary Descriptions

● Characteristic Charts

AN8090 P_D − Ta



AN8090S P_D − Ta



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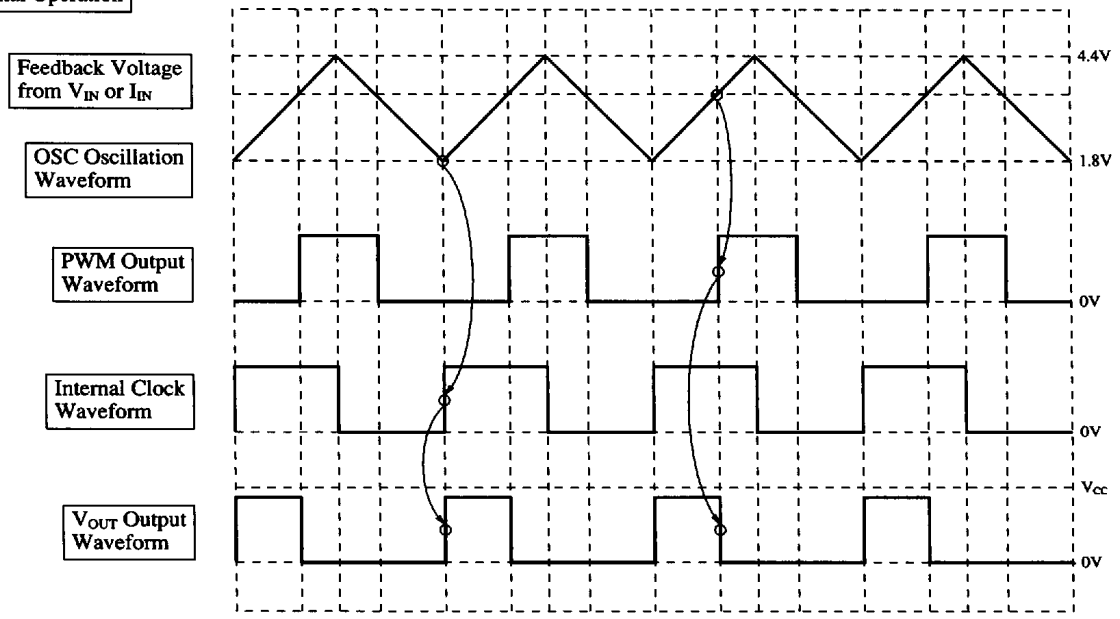
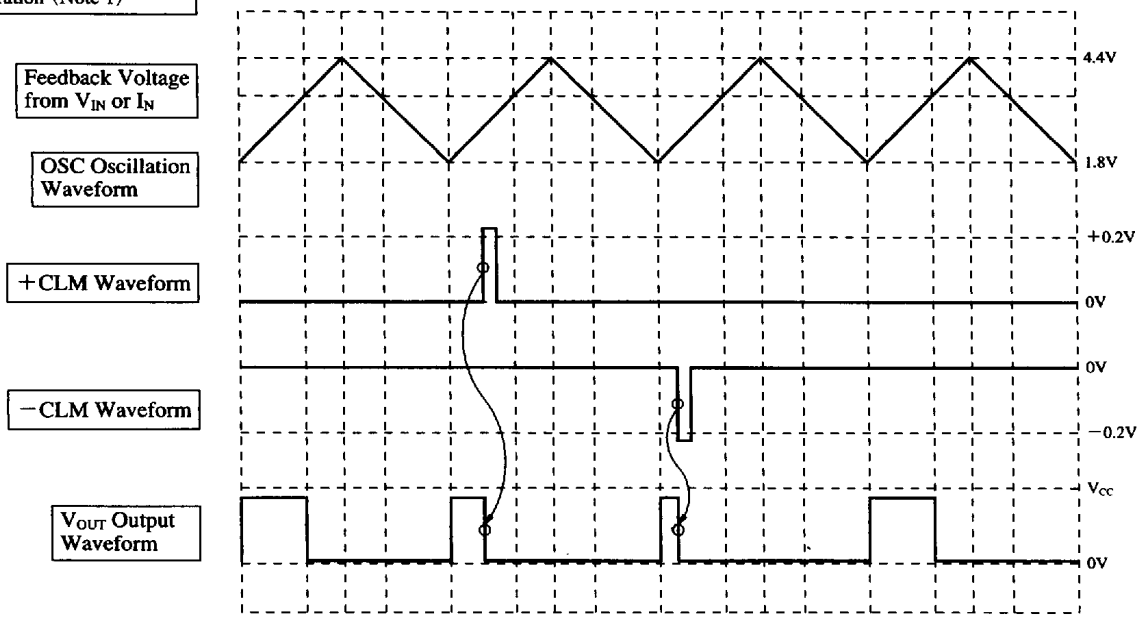
■ Supplementary Descriptions (cont.)

● Timing Charts

In Case of Normal Operation



In Case of Current Limiting Operation (Note 1)



Note 1) The V_F pin voltage should be higher than the $T_{OFF\ (max.)}$ control start voltage (≦4V).

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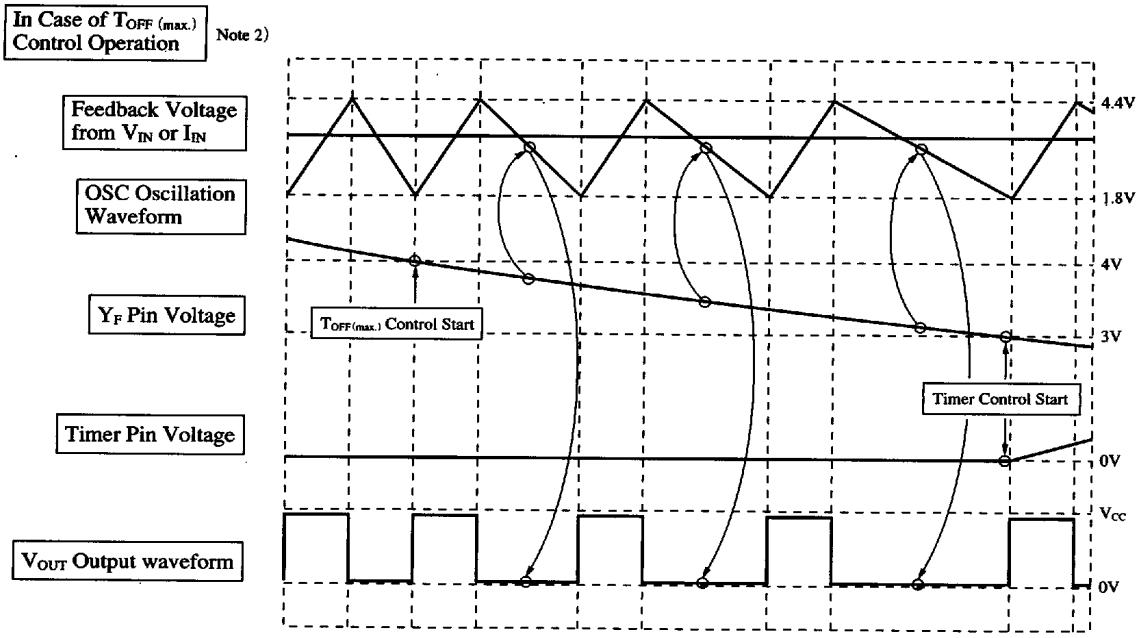
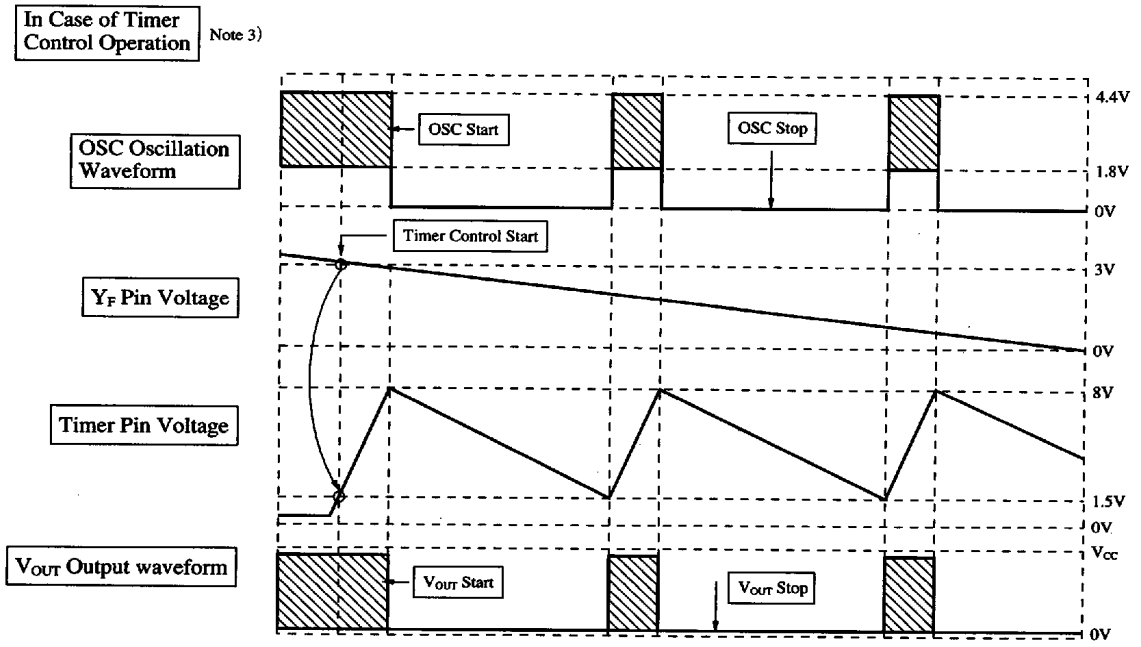
■ Supplementary Descriptions (cont.)

● Timing Charts (cont.)





Note 2) In case of current limiting operation (CLM+ ≧0.2V and CLM− ≦ −0.2V), $T_{OFF\ (max.)}$ control and timer control work.
Note 3) Even during timer control operation, the OFF period of OSC (V_{OUT}) is controlled by $T_{OFF\ (max.)}$ control.

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