

## AN6780, AN6780S

### General Purpose Long Interval Timers

#### ■ Overview

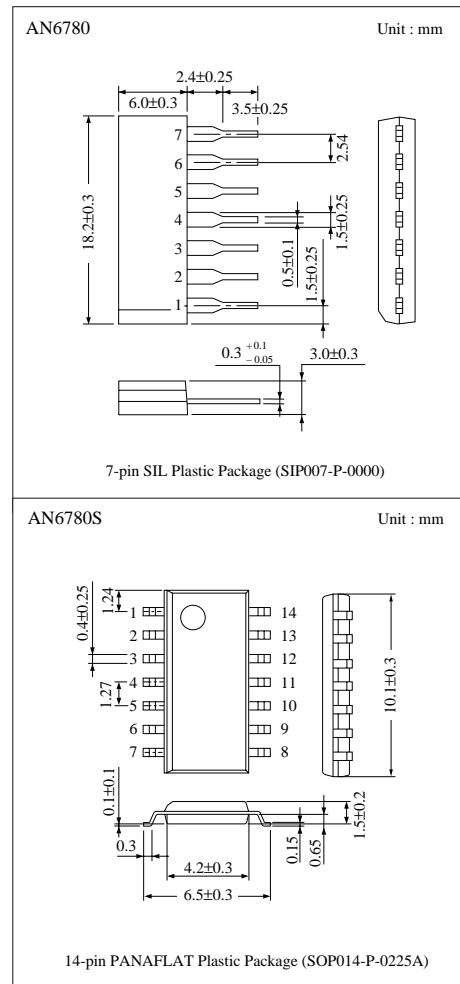
The AN6780 and AN6780S are ICs designed for general purpose long interval timers. They consists of an oscillator, frequency divider (flip-flop 15steps), output circuit, and power circuit. A cycle can be freely set with the external resistor ( $R_T$ ) and capacity ( $C_T$ ) of the oscillator.

#### ■ Features

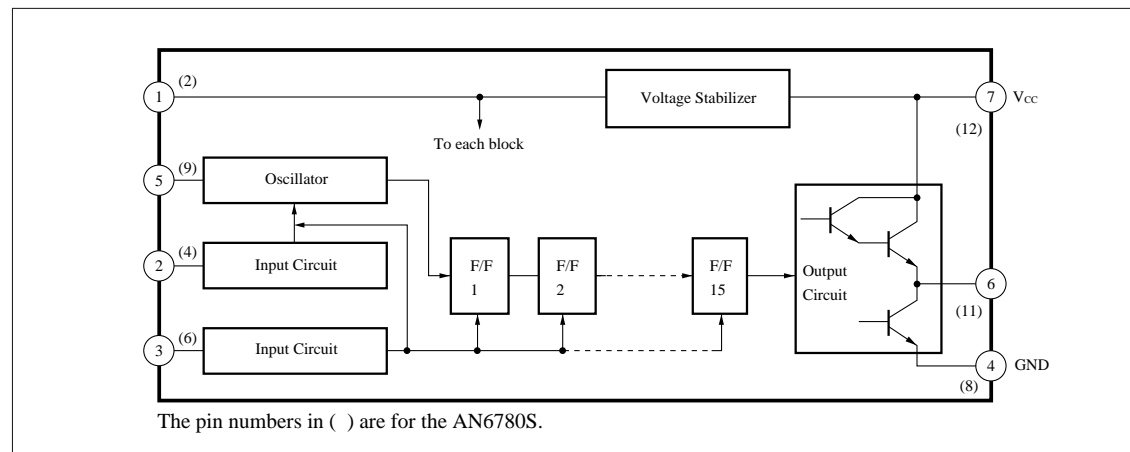
- High inflow and outflow current :  $I_O = \pm 15\text{mA}$  max
- Small variation of oscillations
- Long interval timer setting : max 1 week

#### ■ Applications

Timers, integrating timers, superlow frequency oscillators



#### ■ Block Diagram



## ■ Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating		Unit
Voltage	Supply voltage	V <sub>CC</sub>	13		V
	Circuit voltage	V <sub>1-4 (2-8)</sub>	0	4	V
		V <sub>2,3-4 (4,6-8)</sub>	0	13	V
		V <sub>5-4 (9-8)</sub>	0	4	V
		V <sub>6-4 (11-8)</sub>	V <sub>CC</sub> *1		V
Current	Supply current	I <sub>CC</sub>	30		mA
	Circuit current	I <sub>6(11)</sub>	-15	15	mA
Power dissipation		P <sub>D</sub>	360		mW
Temperature	Operating ambient temperature	T <sub>opr</sub>	-20 to +75		°C
	Storage temperature	T <sub>stg</sub>	-55 to +125		°C

\*1 When output is at "H", the pin number are for the AN6780S

## ■ Recommended Operating Range (Ta=25°C)

Parameter	Symbol	Range
Operating supply voltage range	V <sub>CC</sub>	4.5V to 12V

## ■ Electrical Characteristics (Ta=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	I <sub>CC</sub>	V <sub>CC</sub> =12V	4	6.5	10	mA
Oscillator charging current	I <sub>1 (I<sub>2</sub>)</sub>	V <sub>CC</sub> =5V, R=10kΩ	0.26	0.3	0.35	mA
Input current high level	I <sub>IH</sub>	V <sub>CC</sub> =12V, V <sub>IH</sub> =12V	—	—	10	μA
Input current low level	I <sub>IL</sub>	V <sub>CC</sub> =4.5V, V <sub>IL</sub> =0V	—	—	500	μA
Output voltage high level	V <sub>OH1</sub>	V <sub>CC</sub> =5V, I <sub>OH</sub> =-1mA	3	—	—	V
Output voltage high level	V <sub>OH2</sub>	V <sub>CC</sub> =9V, I <sub>OH</sub> =-10mA	5	—	—	V
Output voltage low level	V <sub>OL1</sub>	V <sub>CC</sub> =5V, I <sub>OL</sub> =10mA	—	—	0.4	V
Output voltage low level	V <sub>OL2</sub>	V <sub>CC</sub> =9V, I <sub>OL</sub> =10mA	—	—	0.4	V
Input voltage high level	V <sub>IH</sub>		2	—	—	V
Input voltage low level	V <sub>IL</sub>		—	—	0.8	V

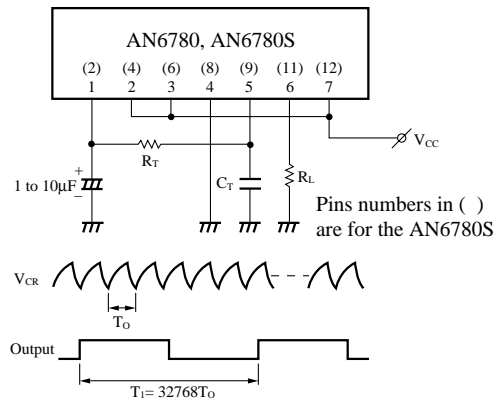
## ■ Pin Descriptions

Pin No.		Symbol	Description
AN6780	AN6780S		
1	2	V <sub>S</sub>	Internal stabilized power supply
2	4	Stop	Oscillation stop input
3	6	Reset	Reset input
4	8	GND	Ground
5	9	CR	C.R. connection
6	11	Output	Output
7	12	V <sub>CC</sub>	Supply voltage

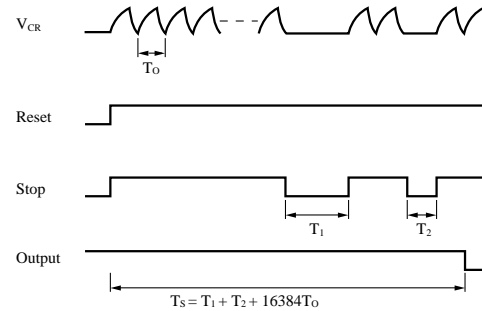
AN6780S : The Pins 1, 3, 5, 7, 10, 13 and 14 are non-contact.

## ■ Application Circuit

### 1) Superlow frequency oscillator

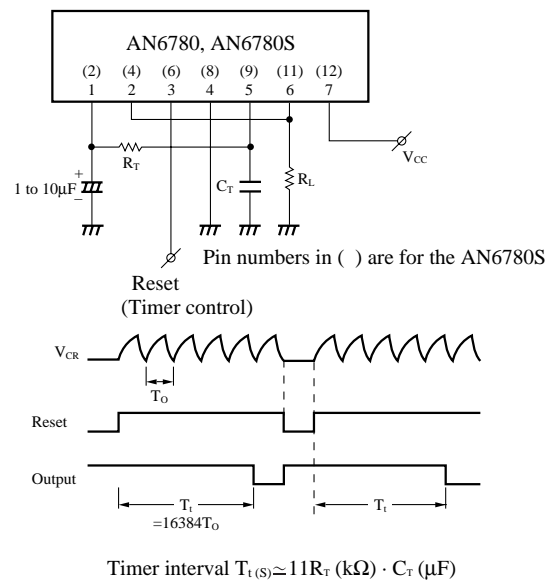


Oscillation interval  $T_{O(S)} \approx 0.69R_T (\Omega) \cdot C_T (F)$   
 Output interval  $T_{1(S)} \approx 22R_T (k\Omega) \cdot C_T (\mu F)$



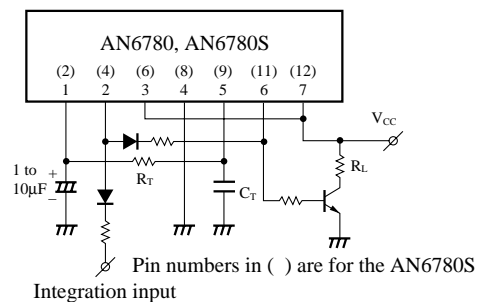
Integrating timer interval  
 $T_{S(S)} \approx 11R_T (k\Omega) \cdot C_T (\mu F) + (T_1 + T_2 + \dots)$

### 2) Timer



Timer interval  $T_{1(S)} \approx 11R_T (k\Omega) \cdot C_T (\mu F)$

### 3) Integrating timer



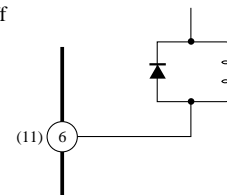
Integration input

## ■ Supplementary Descriptions

### • Precautions on Use

Observe the following in order to prevent destruction and reliability of the IC during its use.

- 1) For distribution of the oscillation frequency, take about 17% (IC alone) into account at the time of designing. When accuracy is requested, use a variable resistor as a timed resistor to make adjustment.
- 2) For the timed resistor, use a polyester capacitor with low  $\tan\delta$ , whose resistance is  $1k\Omega$  to  $1M\Omega$  and timed capacity of  $0.1\mu F$ .
- 3) The values obtained from the timer interval calculation expression, etc. in Application Circuit change depending on accuracy of the timed capacity in the actual set, etc.
- 4) Attach a capacity (1 to  $10\mu F$ ) to the Pin1 (2) in order to protect the IC against noises and stabilize its operation.
- 5) During normal operation, when you turn on the power after extremely short period of power-off, note that auto reset may not be applied due to residual potential of external capacity.
- 6) Take a proper countermeasure noises in order to prevent malfunctioning from being caused by external noises. Particularly, when setting a long interval, pay attention to the external noises.
- 7) When a plunger or relay is connected to the output circuit, connect diodes to both ends of the coil in order to protect the IC against counter electromotive power generated after power-off



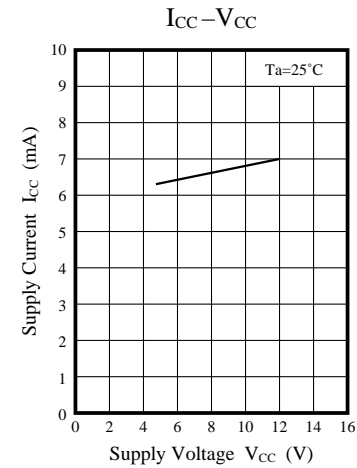
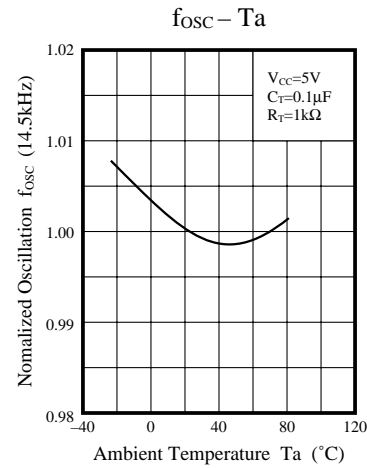
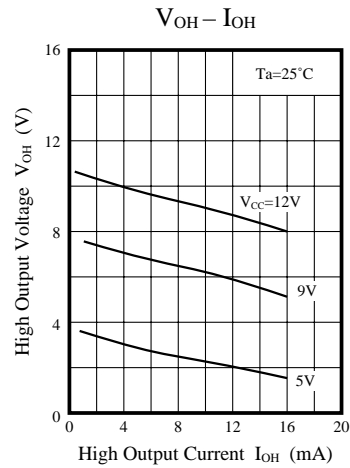
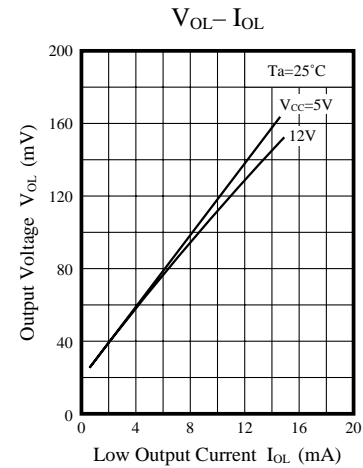
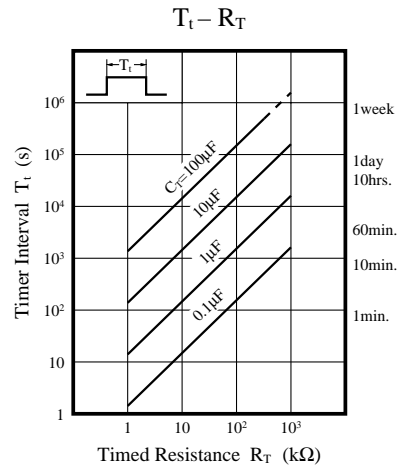
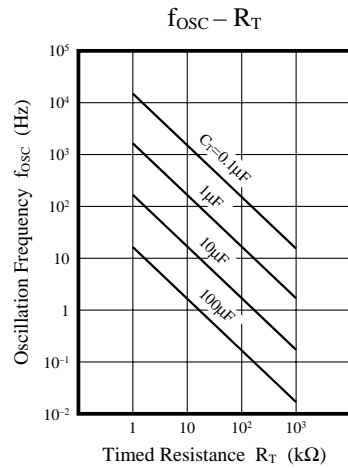
The pin numbers in ( ) are for the AN6780S

• Truth Table (Positive Logic)

Mode	Reset	Stop	Oscillator	Frequency divider	Output
1	L	*	Stop	Clear	H
2	H	H	Start	Counting	Counting
3	H	L	Stop	Stop Holds the previous state	Stop Holds the previous state

(Note) \*Either L or H will do. When the power is turned on, control proceeds to the mode 2 or mode 3 from the mode 1, depending on the reset/stop input state.

■ Characteristics Curve



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