

# AN6780, AN6780S

## General Purpose Long Interval Timers

### ■ Overview

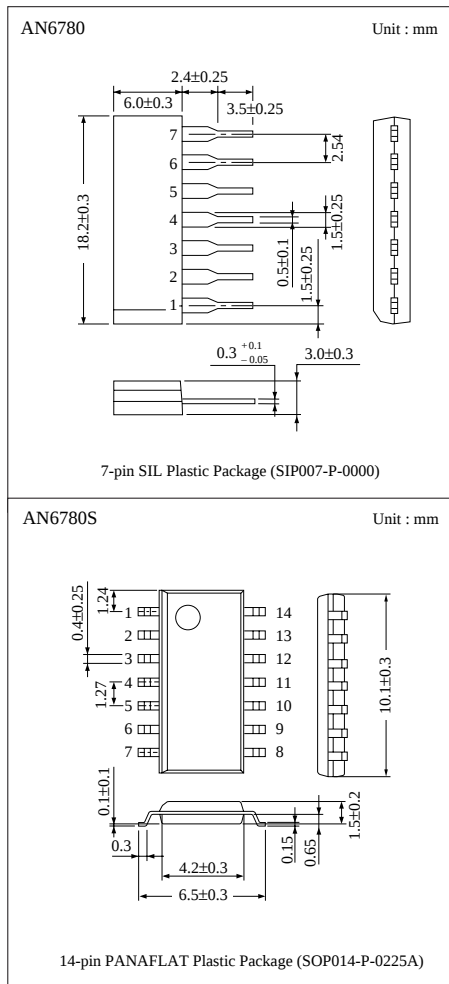
The AN6780 and AN6780S are ICs designed for general purpose long interval timers. They consists of an oscillator, frequency divider (flip-flop 15steps), output circuit, and power circuit. A cycle can be freely set with the external resistor ( $R_T$ ) and capacity ( $C_T$ ) of the oscillator.

### ■ Features

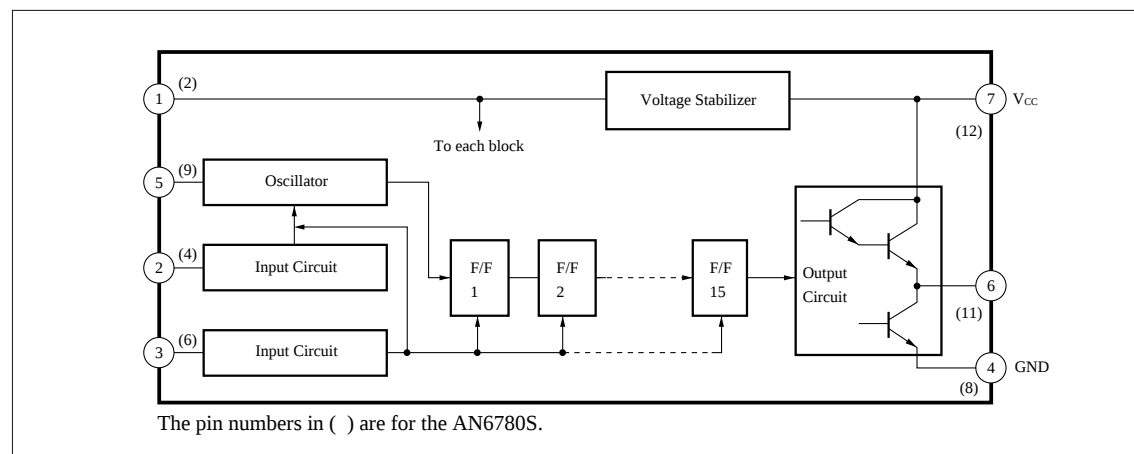
- High inflow and outflow current :  $I_O = \pm 15\text{mA}$  max
- Small variation of oscillations
- Long interval timer setting : max 1 week

### ■ 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</sub> (2-8)       | 0                  | 4  | V    |
|                   |                               | V <sub>2, 3-4</sub> (4, 6-8) | 0                  | 13 | V    |
|                   |                               | V <sub>5-4</sub> (9-8)       | 0                  | 4  | V    |
|                   |                               | V <sub>6-4</sub> (11-8)      | V <sub>CC</sub> *1 |    | V    |
| Current           | Supply current                | I <sub>CC</sub>              | 30                 |    | mA   |
|                   | Circuit current               | I <sub>6</sub> (11)          | -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</sub> (I <sub>2</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    |

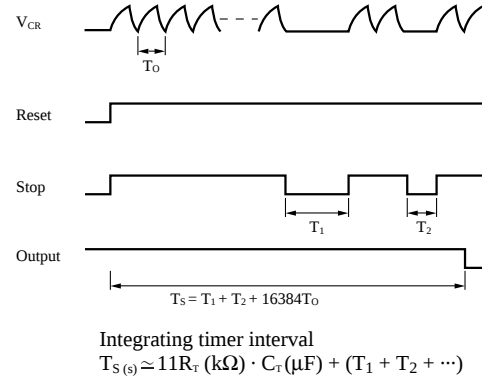
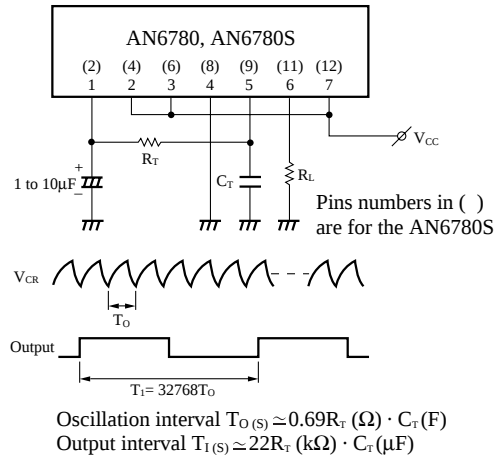
■ Pin Descriptions

| 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 Pins1, 3, 5, 7,10, 13 and 14 are non-contact.

## ■ Application Circuit

### 1) Superlow frequency oscillator

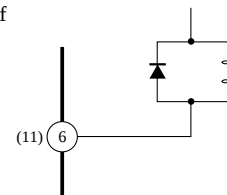


## ■ Supplementary Descriptions

### • Precautions on Use

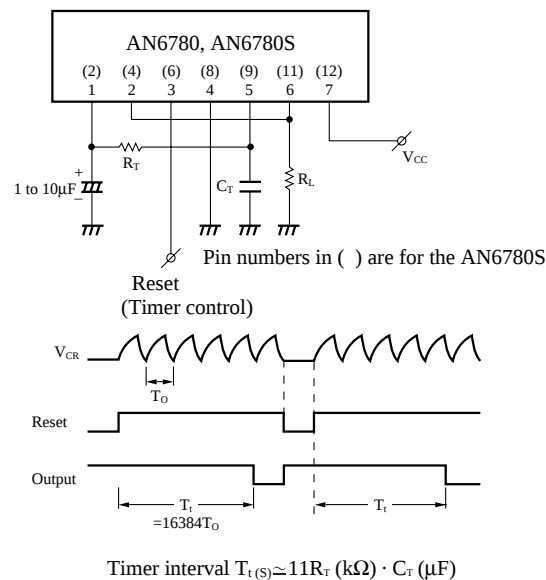
Observe the following in order to prevent destruction and reliability of the IC during its use.

- 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

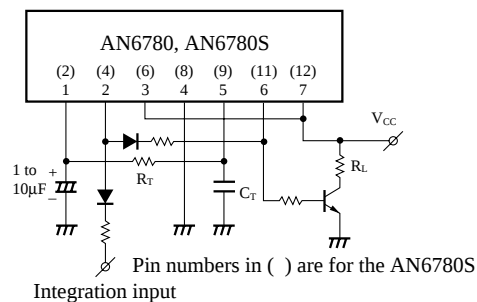


The pin numbers in ( ) are for the AN6780S

### 2) Timer



### 3) Integrating timer

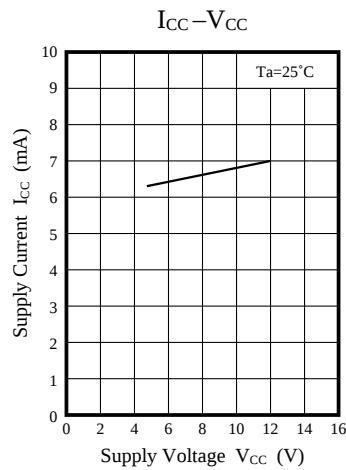
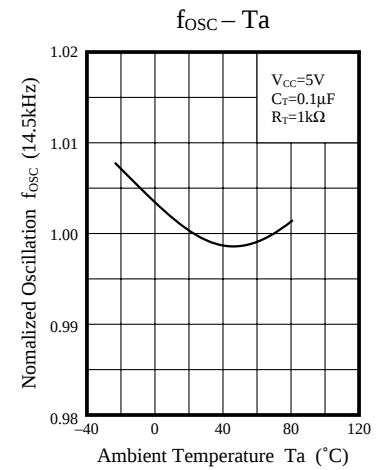
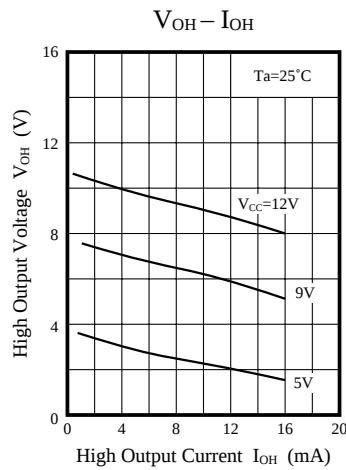
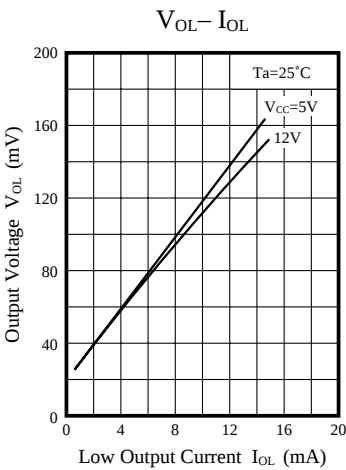
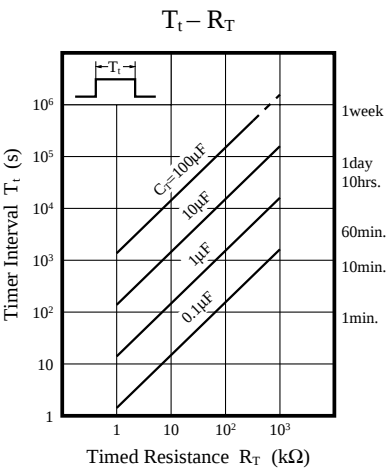
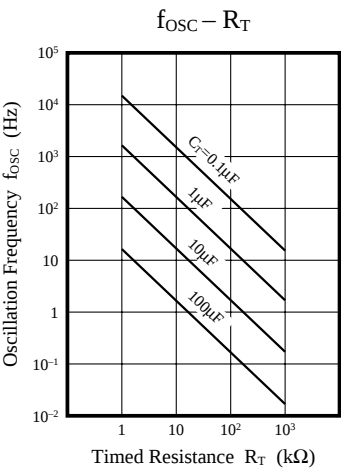


• Truth Table (Positive Logic)

| 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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