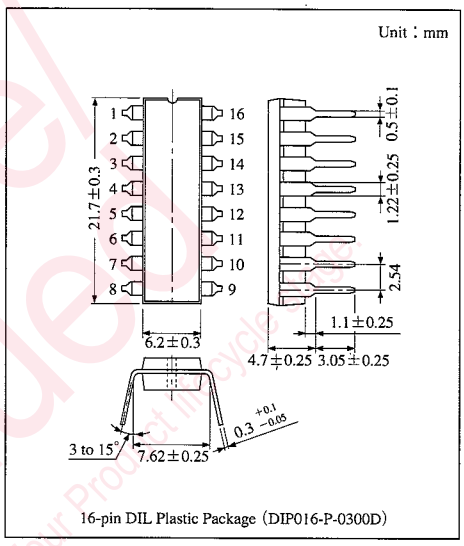
AN6781

Residual Time Indication Timer with LED Drivers

■ Overview

The AN6781 is an integrated circuit designed for timer. The lapse of time for setting time interval can be displayed with LED. It consists of an oscillator, divider, output circuit, LED driver and power circuit. Time can freely be set with external resistor (R_T) and capacitor (C_T) of oscillator.



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

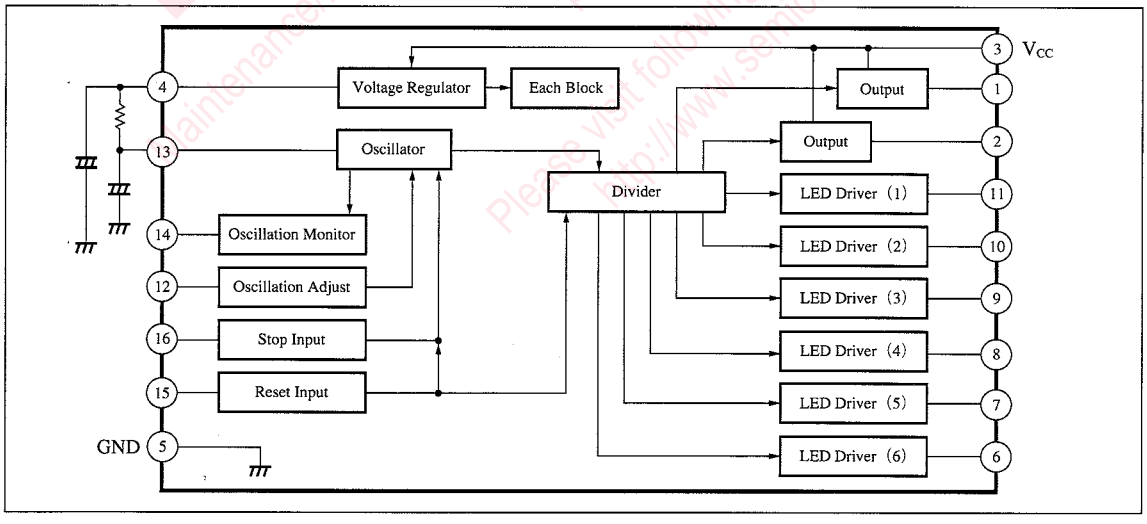
■ Features

- 5 LED drivers indicate residual time at identical.
- One LED driver for time-up indicator
- High LED drive current : 30mA
- Normally ON and OFF outputs are available
- TTL compatible outputs
- Power on reset
- Timer intervals from one second to one day

■ Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name
1	Output (1)	9	LED driver (3)
2	Output (2)	10	LED driver (2)
3	V_{CC}	11	LED driver (1)
4	Voltage stabilizer	12	Osc. adjustment
5	GND	13	CR connection
6	LED driver (6), time-up	14	Osc. monitor
7	LED driver (5)	15	Reset input
8	LED driver (4)	16	Stop input

■ Block Diagram



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■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating		Unit
Supply voltage	V_{CC}	13		V
Circuit voltage	V_{4-5}	0	4	V
	V_{12-5}	0	4	V
	V_{13-5}	0	4	V
Circuit current	I_1, I_2	−10	+10	mA
	$I_{6,7,8,9,10,11}$	0	+30	mA
Power dissipation	P_D	450		mW
Operating ambient temperature	T_{opr}	−20 to +75		℃
Storage temperature	T_{stg}	−55 to +125		℃

■ Electrical Characteristics (Ta=25℃)

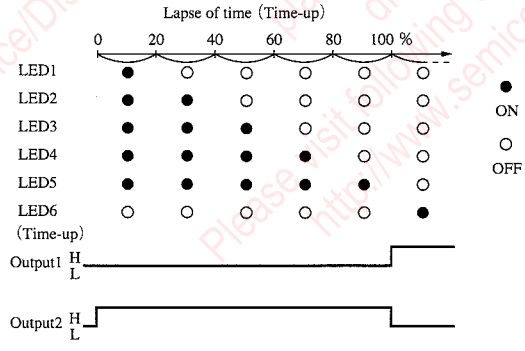
Parameter	Symbol	Condition	min	typ	max	Unit
Supply voltage	V_{CC}		4.5	—	12	V
Oscillator charging current	I_{CC}	V_{CC}=12V	—	—	30	mA
High level input voltage	V_{IH}		2	—	—	V
Low level input voltage	V_{IL}		—	—	0.8	V
High level output voltage	V_{OH}	V_{CC}=5V, I_{OH}=−10mA	2	—	—	V
Low level output voltage	V_{OL}	V_{CC}=12V, I_{OL}=10mA	—	—	0.4	V
LED ON voltage	V_{LED}	I_{LED}=30mA	—	—	0.4	V

■ Truth Value Table (Positive Logic)

Mode	Reset	Stop	Oscillator	Divider	Output1	Output2
1	L	*	Stop	Clear	L	H
2	H	H	Oscillation	Count operation	Count operation	Count operation
3	H	L	Stop	Previous state is retained	Previous state is retained	Previous state is retained

Note1) Either L or H is possible at *.
Note2) At power ON, the state in Model is moved to the state in mode2 or 3 according to the input state of reset/stop.

■ Timer Operation



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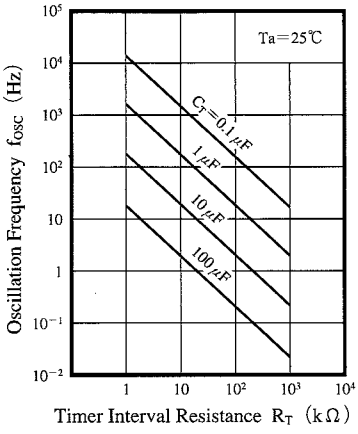
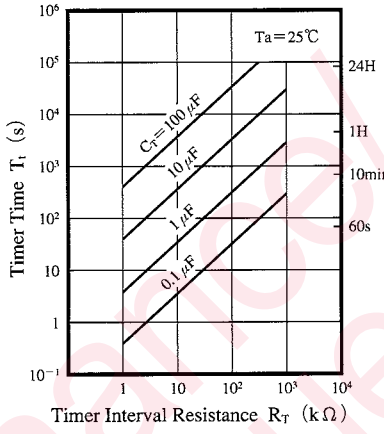
■ Characteristics Curve

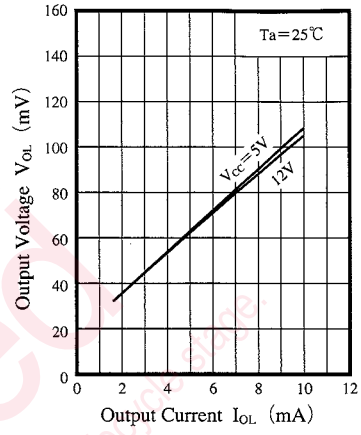
$f_{OSC} - R_T$



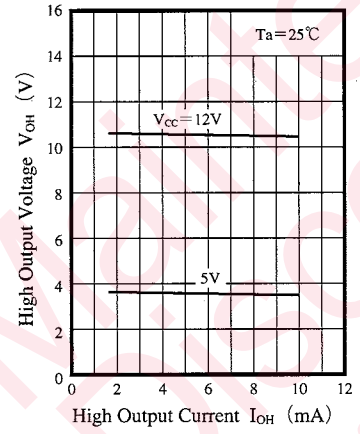
$T_t - R_T$



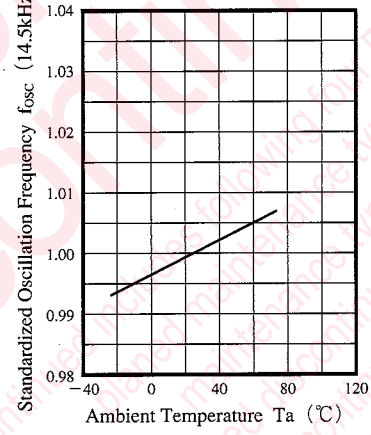
$V_{OL} - I_{OL}$



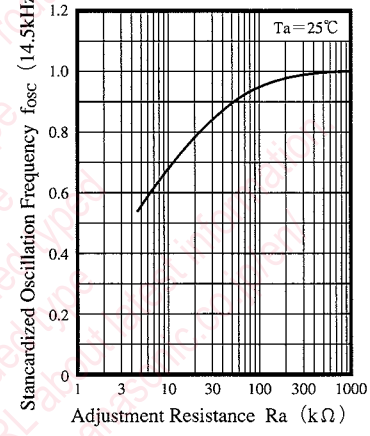
$V_{OH} - I_{OH}$



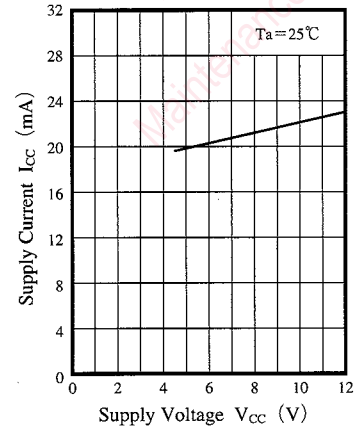
$f_{OSC} - Ta$



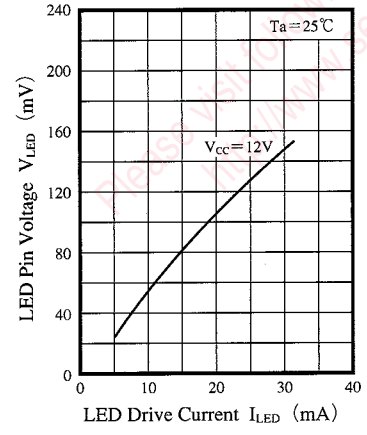
$f_{OSC} - Ra$



$I_{CC} - V_{CC}$



$V_{LED} - I_{LED}$



Use the oscillation resistor (R_T) of 1kΩ to 1MΩ and the capacitor (C_T) such as a ceramic capacitor or Mylar capacitor which is small serial resistance at the capacitance value of 0.1 μF or more.

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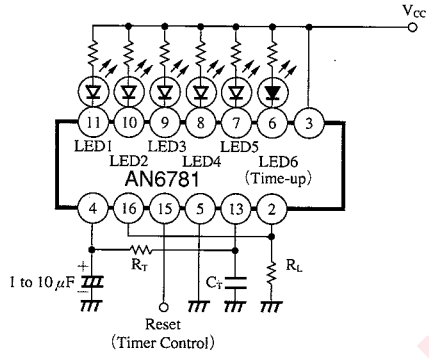
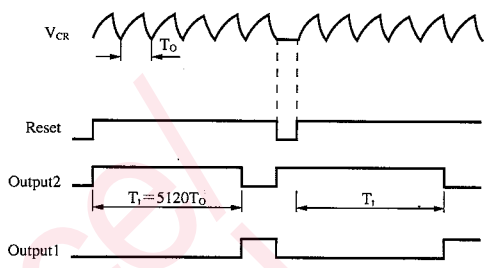
■ Application Circuit

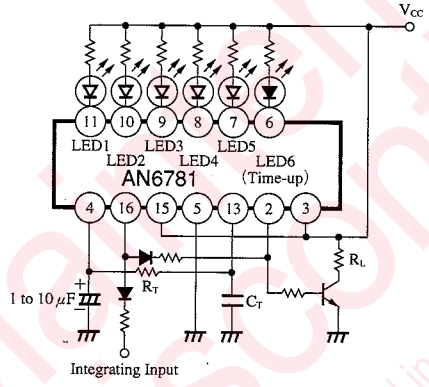
(1) Timer Basic Application

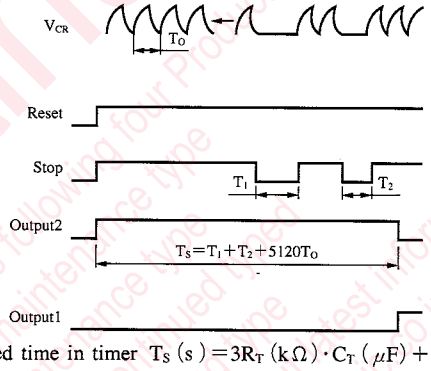




Time in timer $T_{t\,(S)} \simeq 3R_T\,(k\Omega) \cdot C_T\,(\mu F)$

(2) Intergrating Timer



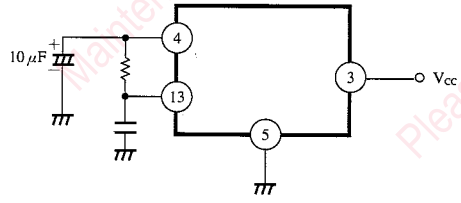


Integrated time in timer $T_S\,(s) = 3R_T\,(k\Omega) \cdot C_T\,(\mu F) + (T_1 + T_2 + \cdots)$

■ Precaution on Use

Attention should be given to the following items for preventing breakage during operation as well as improving reliability.

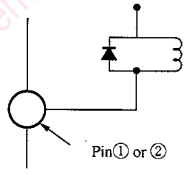
1) To protect and stabilize the operation of IC from external noise, insert the capacitance (1 to 10 μF) into Pin④



2) During normal operation, when power supply is turned ON after power-OFF state for an extremely short time, the auto reset may not be applied due to residual electric potential of external capacitance.

3) Countermeasure against noise. Especially, attention should be paid to external noise for long-hour setting.

4) When the plunger, relay, etc. are connected to the output circuit, connect the diode to both ends of coil to protect IC from reverse electromotive force.



5) When using the oscillation frequency fine-adjusting pin Pin⑫, insert the adjusting resistor Ra of 5kΩ or more between Pins④ and ⑫ of constant voltage.

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