M51845L

COUNTER TIMER

DESCRIPTION

The M51845L is a semicoducor integrated circuit designed for controller of long time delay, consisting of 11 stage divider by IIL. The time base period of oscillator is extended by 1024 times, determined by the the 11 stage divider by IIL, and the maximum output period is 50 hours.

FEATURES

- Timing from 100ms through 50 hr
- Timing can be set by one resistor and capacitor
- Built-in IIL divider with low power dissipation
- Built-in stabilization zener
- Built-in power on reset
- Direct drive of TTL possible

APPLICATION

- Precision timer for consumer and home-use equipments, time delay generation for measuring instruments, Ultra-low-frequency oscillator

RECOMMENDED OPERATNG CONDITIONS

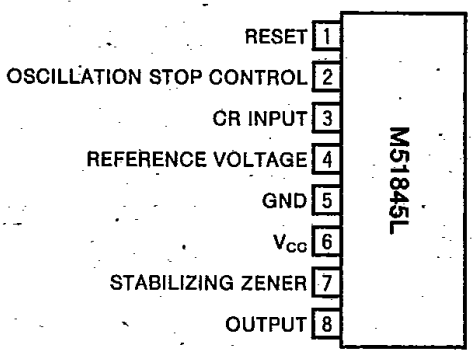
Supply voltage range

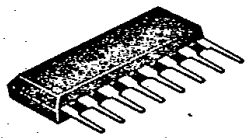
····· 4.5V~V_Z(V_Z=pin⑦ Zener voltage)

Rated supply voltage ··· 5V±10%(No zener diode used)

9V, 12V(Stabilization zener diode used)

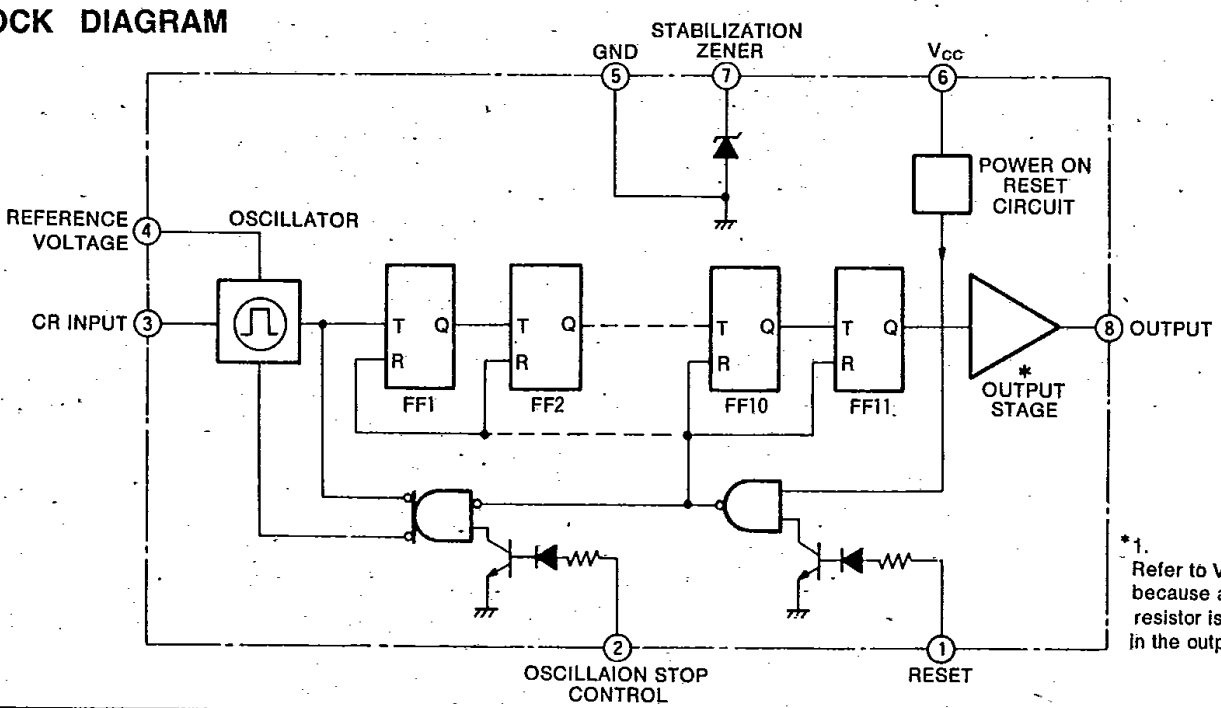
PIN CONFIGURATION





8-pin molded plastic SIP

BLOCK DIAGRAM



*1. Refer to V_{OH} because a control resistor is built-in in the output stage.

ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC⑥}$	Supply voltage		6.5	V
I_Z	Zener current		20	mA
I_O	Output sink current		15	mA
P_d	Power dissipation		360	mW
K_θ	Thermal derating	T_a≧25℃	3.6	mW/℃
Topr	Operating temperature		0～+60	℃
Tstr	Storage temperature		−40～+125	℃

ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=5V, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$I_{CC⑥}$	Circuit current at pin⑥	No load t_a pin⑧		6.5	9.0	mA
V_Z	Zener voltage	I_Z=1mA	5.3	5.8	6.3	V
$I_{IH①}$	Input current at pin①	Pin① voltage 1=3V		0.8	2.3	mA
$I_{IL①}$		Pin① voltage 1=0.4V			1.0	μA
$I_{IH②}$	Input current at pin②	Pin② voltage 2=3V		0.8	2.3	mA
$I_{IL②}$		Pin② voltage 2=0.4V			1.0	μA
V_{OH}	Output voltage	I_{SOURCE}=2mA	2.0	2.65		V
V_{OL}		I_{SINK}=5mA		0.1	0.4	V
f_{max}	Maximum oscillation frequency	CR oscillation part	10	100		kHz

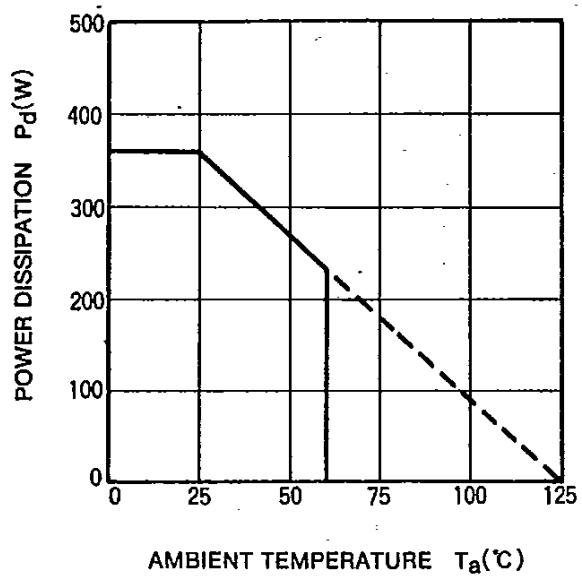
FUNCTION TABLE

Input conditions		Operating and output conditions		
RESET	OSCILLATION STOP CONTROL	OSCILLATOR	11 STAGE DIVIDER	OUTPUT
H	H	STOP	CLEAR (LOW LEVEL)	L
	L			
L	H	STOP	MAINTAIN PREVIOUS CONDITION	MAINTAIN PREVIOUS CONDITION
	L	OSCILLATION	COUNT	COUNT

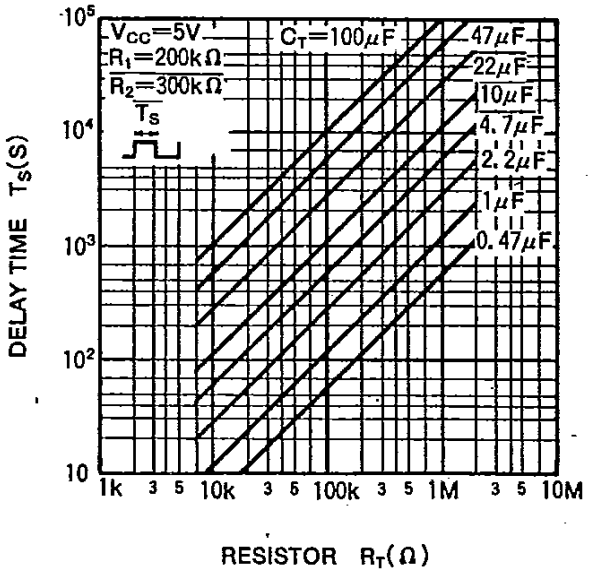
H≧1.4V, L≦0.4V

TYPICAL CHACTERICS (T_a=25℃, unless otherwise noted)

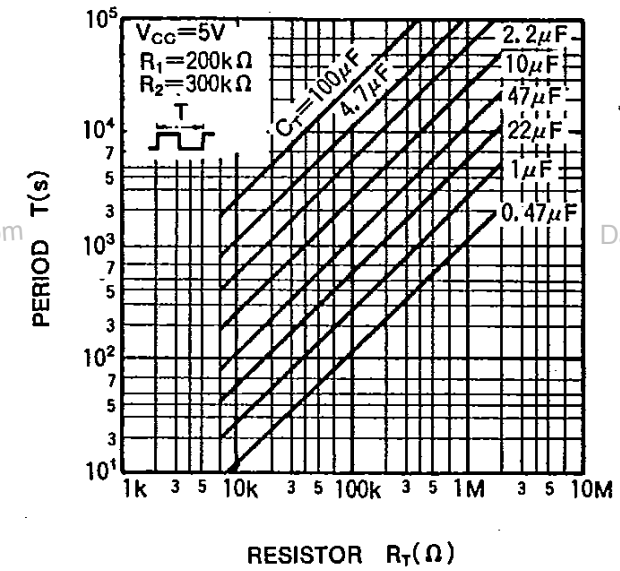
THERMAL DERATING (MAXIMUM RATING)



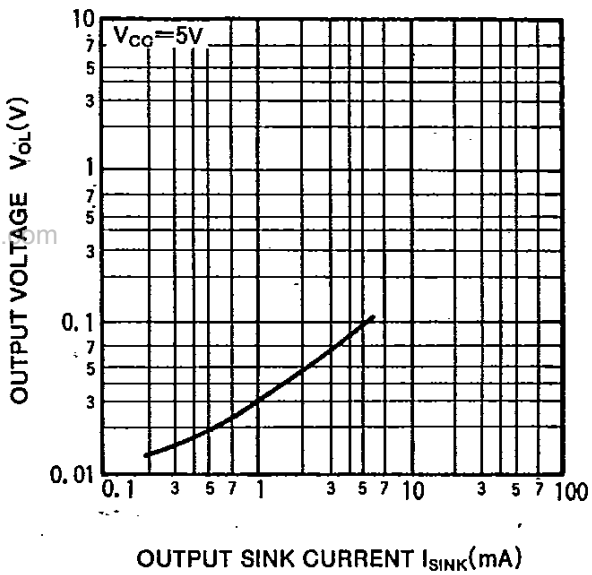
RESISTOR VS. DELAY TIME



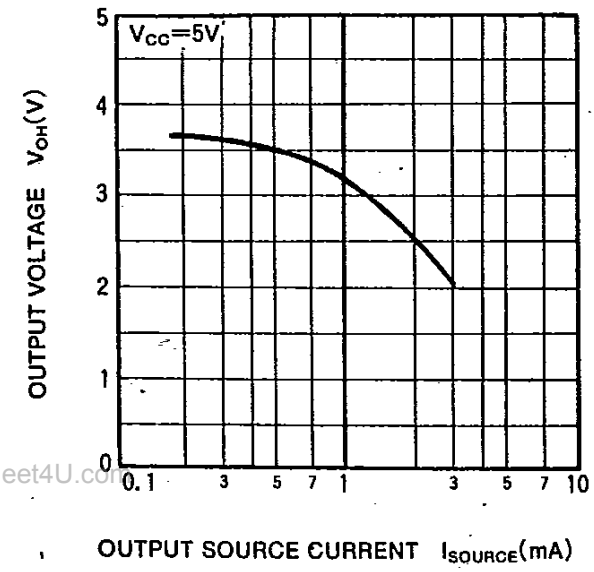
RESISTOR VS. PERIOD



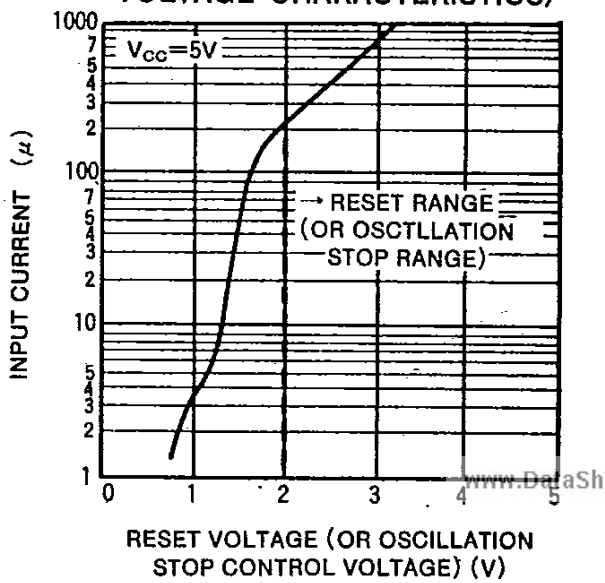
OUTPUT VOLTAGE VS. OUTPUT SINK CURRENT



OUTPUT VOTAGE VS. OUTPUT SOURCE CURRENT



INPUT CURRENT VS. RESET VOLAGE (OR OSCIIATION STOP CONTROL VOLTAGE CHARACTERISTICS)



PIN DESCRIPTION

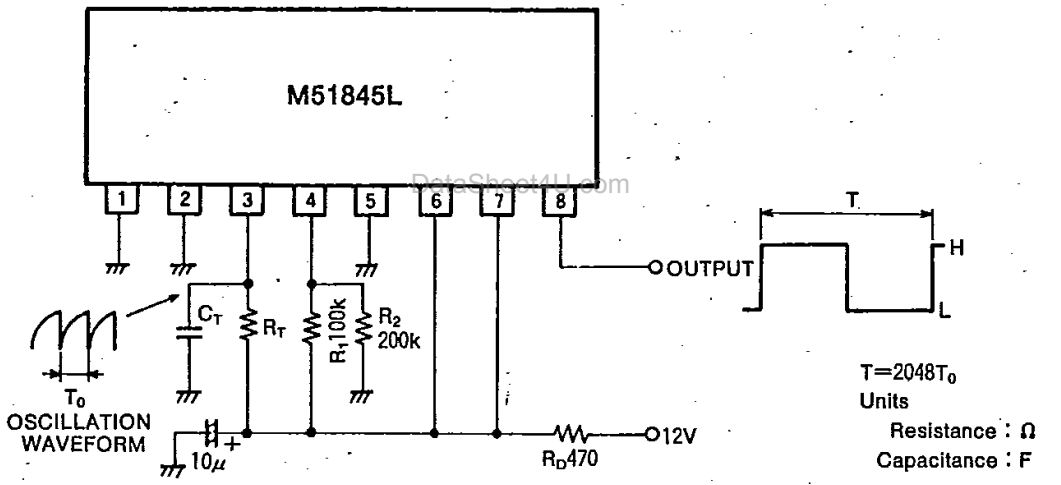
1. Reset pin (pin ①)
   This pin is used to stop counter operation. If the pin is in the high state, the counter is cleared and oscillation is stopped. Connect this pin to GND, if not used.
2. Oscillation stop control pin (Pin ②)
   If the pin is in the low state, oscillation is enabled and if the pin is in the high state, oscillation stops. If the feedback is applied to this pin from the output, the output stays in the high state, when it changes from the low to high state. (The function of monostable multivibrator is obtained.) Connect this pin to GND, if not used.
3. CR input pin (pin ③)
   The capacitor C_T and resistor R_T are connected to this pin.
   The oscillator period To is given in the following equation.

$$To \fallingdotseq -C_T R_T \ln \frac{R_1 V_{CC} - 0.6(R_1 + R_2)}{(V_{CC} - 1.2)(R_1 + R_2)}$$

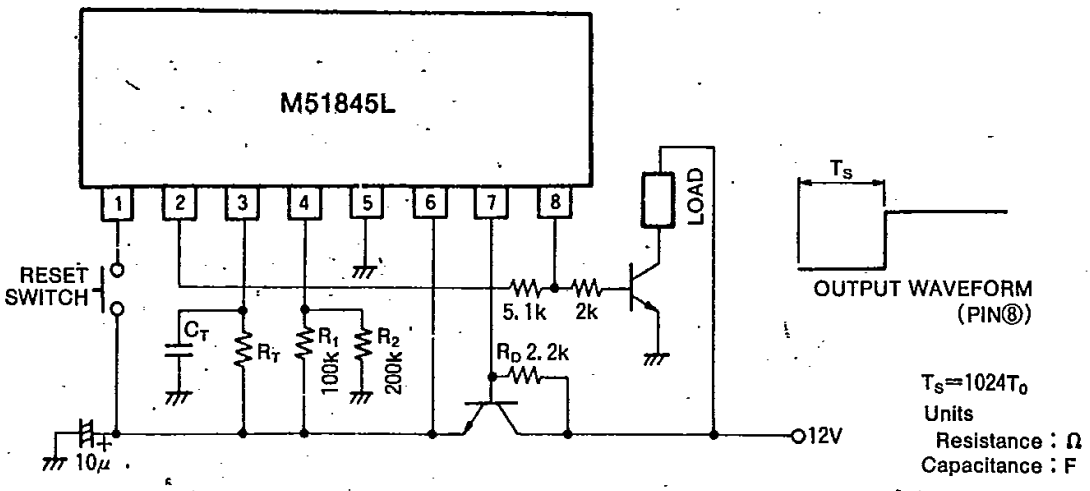
   (The V_{CC} is pin 6 voltage.)
   The period To given in the equation changes depending on the elements. Therefore, a resistor R_T must be connected in serial for fine adjustment if the required setting accuracy is ±25%.
4. Reference voltage pin (pin ④)
   The highest voltage for the oscillation level is supplied at this pin. The voltage should be set at approximately 2/3 V_{CC} by a variable resistor or resistor division (R_1, R_2) The capcitor C_T is corrected by minutely adjusting this voltage by a variable resistor.
5. Supply voltage pin (pin ⑥)
   Connect a capacitor (0.1μ to 10μF depending on the noise) between this pin and GND to avoid external noise from the power supply. The internal power on reset circuit resets the device whenever power is turned on.
6. Stabilization zener pin (pin ⑦)
   A zener diode of approximately 5.8V is connected between this pin and pin ⑤ (GND). Connection of this pin to pin ⑥ stabilizes power supply of the device and forms 5V supply voltage regulator with externally connected transistors.
7. Output pin (pin ⑧)
   The output voltage changes from the low state to high state when oscillation period is 1024 times To, and the voltage returns from the high state to the low state when the period is 2048 times for one cycle. Use oscillation stop control pin ② to form a monostable multivibrator.

APPLICATION EXAMPLES

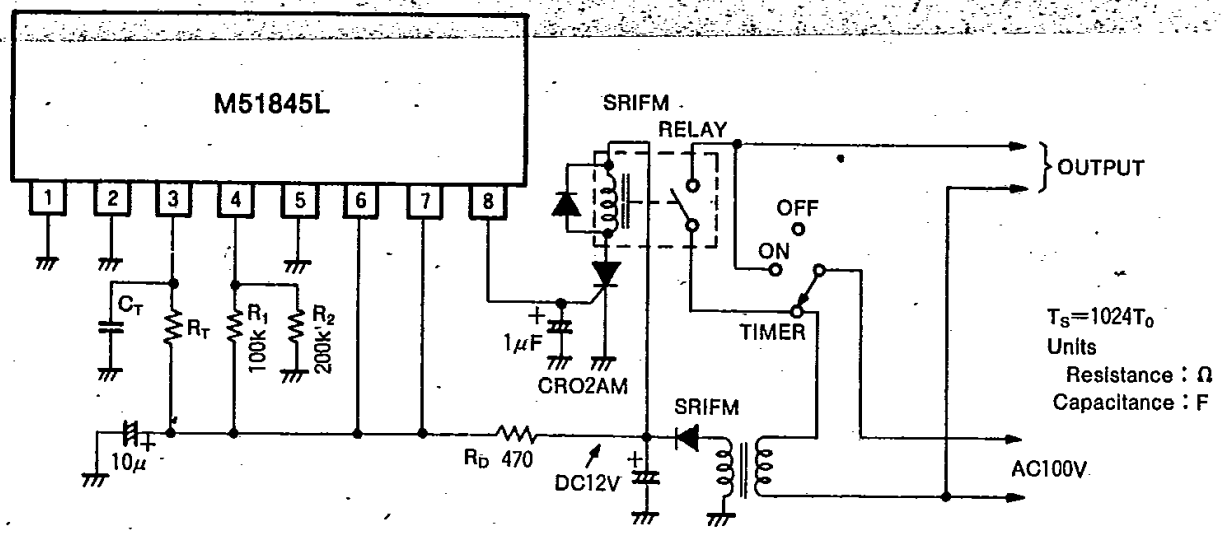
(1) Ultra-low-frequency oscillator



(2) Self-preserving timer



(3) Sleep timer



Precautions for use

1. CR input pin (pin③) must not be directly connected to V_{CC} to avoid destruction of the integrated circuit.
2. The voltage at the reference voltage pin (pin④) should be set to less than 3.5V. If it reaches 3.5V or above, the oscillator may not function.
3. This integrated circuit consisting of a divider by IIL and gate circuit operates at low supply voltages.
   Therefore it is extremely sensitive to external noise and is subject to misoperation. Care should be taken to the following items.
   1) Place the device away from any electromagnetic noise generaor or protect it with a shield wire.
   2) A capacitor must be connected near the V_{CC} pin (pin ⑥) to avoid noise.
4. V_{OH} changes according to load because output current control resistor varies depending on the load. Therefore, if the high output current is required, an external output transistor or the M51849L must be used.
5. The minimum resistance for timing resistor R_T is 7kΩ Use the M51849L to have a wide variable range of the timing resistor.
   As an improved version of the M51845L, the M51849L has superior characteristics in following.
   (compatible in pin configuration)
   1. Large output current (I_{OH} is approximately $10mA_{max}$)
   2. A timing resistor can be set by a wide range of resistance. ($R_{Tmin}=1k\Omega$)
   3. Excellent temperature stability for timer setting