M51841P

SINGLE TIMER

DESCRIPTION

The M51841P monolithic timing circuit is highly stable controller capable of producing accurate time delays, or oscillation. Additional terminals are provided for two voltage comparators, triggering or resetting, if desired, applicable for a wide range of usage as monostable or astable multivibrators. The output can be directly connected to TTL or DTL circuits.

The M51841P is interchangeable with the Signetics NE555.

FEATURES

- Capable of forming a monostable multivibrator with one resistor and capacitor
- Capable of forming an astable multivibrator with two resistors and a capacitor
- Supply voltage rejection ratio ..... 0.01%V(typ.)
- Temperature coefficient ..... 50ppm/℃(typ.)
- High output current ..... 200mA(Typ.)

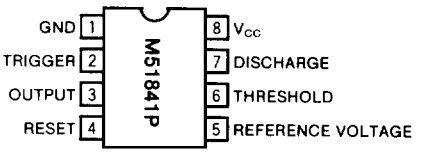
APPLICATION

Time-delay generator monostable multivibrator), pulse oscillator (astable multivibrator), pulsewidth modulation, pulse position modulation, sequential timer, DC-DC converter

RECOMMENDED OPERATING CONDITIONS

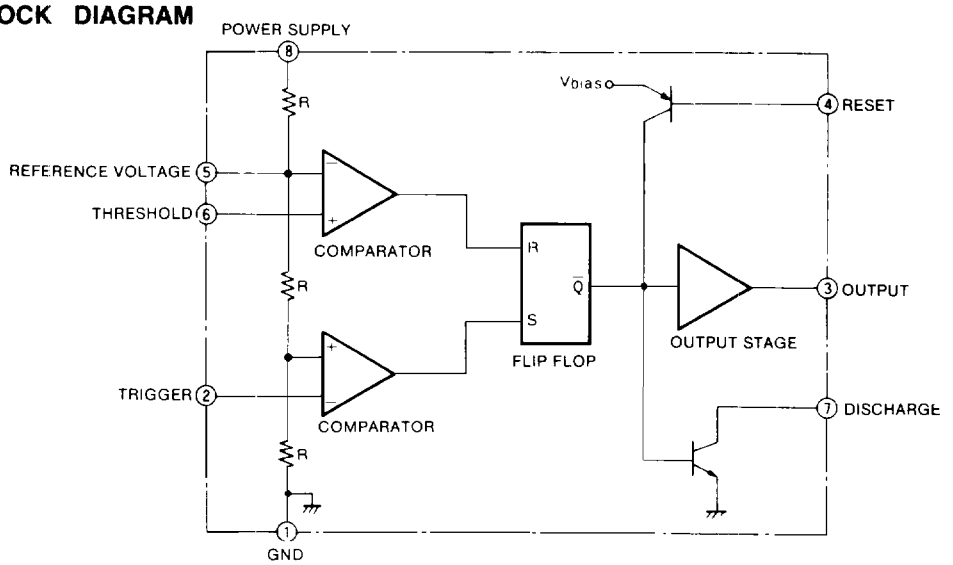
Supply voltage range ..... 4.5~16V
Rated supply voltage 5V, 12V, 15V

PIN CONFIGURATION (TOP VIEW)



Outline 8P4

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

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

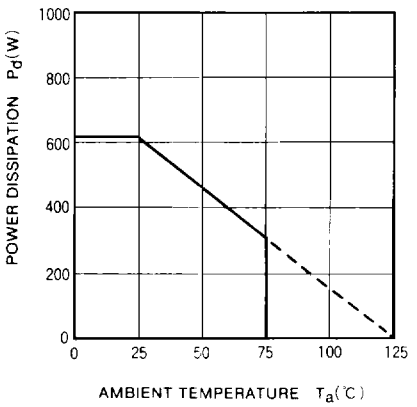
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		18	V
$I_{O(peak)}$	Output current		200	mA
P_d	Power dissipation		625	mW
K_θ	Thermal derating	$T_a \geq 25℃$	6.25	mW/℃
Topr	Operating ambient temperature		−20～+75	℃
Tstg	Storage temperature		−40～+125	℃

ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=5～15V, unless otherwise noted)

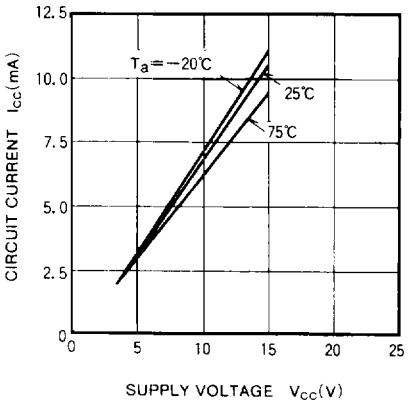
Symbol	Parameter	Test conditions		Limits			Unit
		V_{CC}(V)		Min	Typ	Max	
V_{CC}	Supply voltage			4.5		16	V
I_{CC}	Circuit current	5	$R_L=\infty$		3	6	mA
		15	$R_L=\infty$		10	15	
V_{REF}	Reference voltage	5		2.6	3.33	4.0	V
		15		9	10	11	
V_{TH}	Threshold voltage				$2/3V_{CC}$		V
I_{TH}	Threshold current				0.1	0.25	μA
V_T	Trigger voltage				$1/3V_{CC}$		V
I_T	Trigger current				0.5	1.0	μA
V_R	Reset voltage				0.7	1.0	V
I_R	Reset current				0.1		mA
V_{OL}	Low output voltage	5	I_{SINK}=5mA		0.25	0.35	V
		15	I_{SINK}=10mA		0.1	0.25	
		15	I_{SINK}=50mA		0.4	0.75	
		15	I_{SINK}=100mA		2.0	2.5	
V_{OH}	High output voltage	5	I_{SOURCE}=100mA	2.75	3.3		V
		15	I_{SOURCE}=100mA	12.75	13.3		
f_{max}	Maximum operating frequency			10			kHz
—	Timing error				0.5		%
—	Temperature coefficient				50		ppm/℃
—	Supply voltage rejection ratio				0.01		%/V
—	rise time				150		ns

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

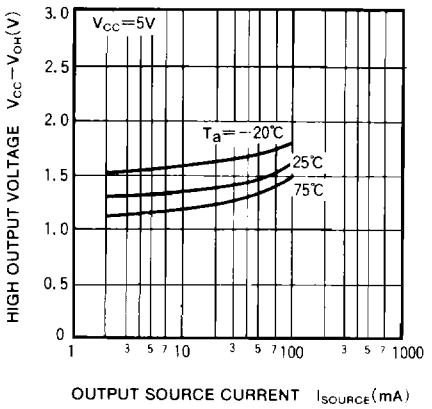
THERMAL DERATING
(MAXIMUM RATING)



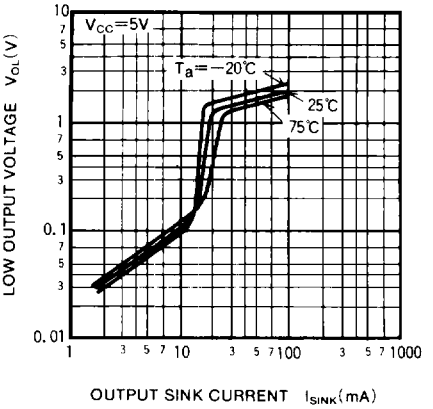
SUPPLY VOLTAGE
VS. CIRCUIT CURRENT



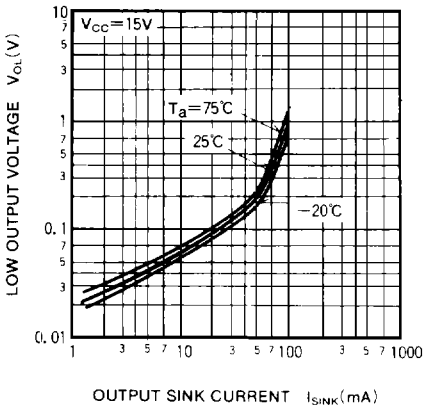
HIGH OUTPUT VOLAGE VS. OUTPUT SOURCE CURRENT



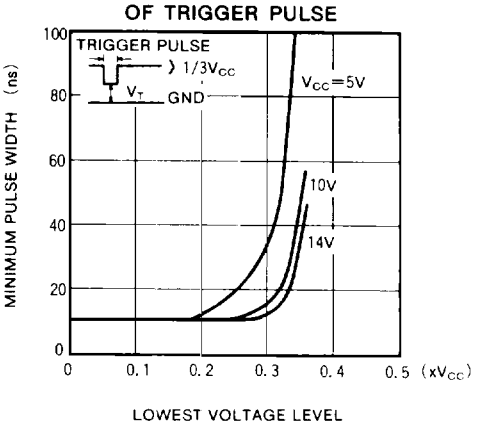
LOW OUTPUT VOLTAGE VS. OUTPUT SINK CURRENT



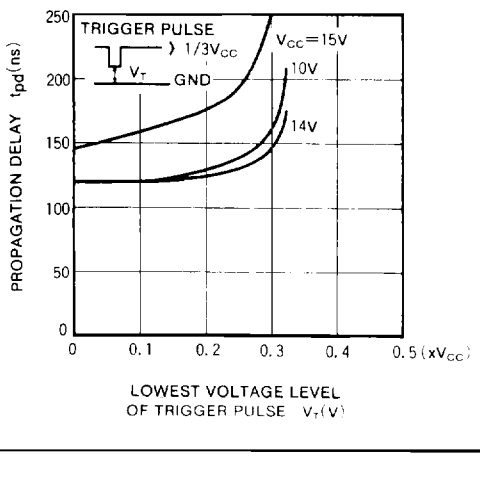
LOW OUTPUT VOLTAGE VS. OUTPUT SINK CURRENT



MINIMUM PULSE WIDTH VS. LOWEST VOLTAGE LEVEL OF TRIGGER PULSE



PROPAGATION DELAY VS. LOWEST VOLTAGE LEVEL OF TRIGGER PULSE

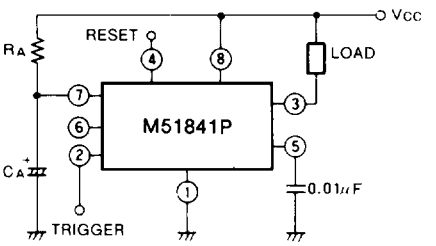


PIN DESCRIPTION

1. **Trigger pin (pin ②)**
   When the voltage at the trigger pin is reduced to lower than $1/3V_{CC}$, timing operation is started. Time of applying the trigger voltage "L" should be shorter than the time set by CR.
2. **Output pin (pin ③)**
   Logic output level is normally in the low state but is in the high state during timing operation. The output circuit is shaped like a totem-pole and withstands maximum load current of 200mA. The circuit can be directly connected to TTL or DTL circuits.
3. **Reset pin (pin ④)**
   Timing operation can be interrupted by applying the reset signal to a reset pin. (The voltage at this pin must be less than 1V.)
   If the reset signal is applied, the output is in the low state and the reset condition is maintained as long as the signal is applied. The output stays in the low state until the reset signal is replaced with the set signal (trigger signal at a trigger pin). Connect this pin to V_{CC} if not used.
4. **Reference voltage pin (pin ⑤)**
   The voltage at this pin is normally set at $2/3V_{CC}$. By applying reference voltage, delay-time or oscillation frequency can be changed. The control signal for pulse-width modulation is applied at this pin. Connect a capacitor of $0.01\mu F$ between this pin and GND as a noise filter, if the pin is not used.
5. **Threshold pin (pin ⑥)**
   The delay-time is determined by CR time constants connected to this pin. The delay-time of a monostable multivibrator t_d is expressed by the equation $t_d \fallingdotseq 1.1R_AC_A$.
6. **Discharge pin (pin ⑦)**
   The timed capacitor discharges at this pin. The discharge is enabled when a flip-flop in the device is ON and the reset signal is applied. In a monostable multivibrator, the capacitor is connected to pin ⑥

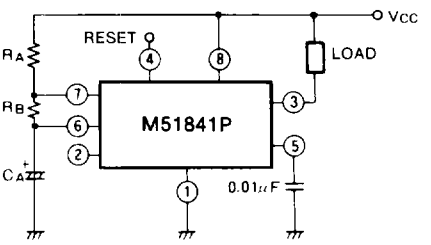
APPLICATION EXAMPLES

(1) Delay-timer
(monostable multivibrator)



DELAY-TIME
$t_d \fallingdotseq 1.1R_AC_A$

(2) Pulse oscillator
(astable multivibrator)



OSCILLATION FREQUENCY
$f \fallingdotseq 1.44/(R_A+2R_B)C_A$
duty cycle
$D = R_B/(R_A+2R_B)$

Precautions for use

1. Care must be taken not to connect the discharge pin (pin ⑦) directly to V_{CC}. Such connection causes a short circuit of V_{CC} and GND through a discharge transitor (built in to the device) and may destroy the integrated circuit.
2. Connect the reset pin (pin ④) to V_{CC}, if not used.
3. A capacitor connected to a reference voltage pin (pin ⑤) functions as a noise filter. Choose appropriate capacitance according to the noise induced. The M51843P is recommended for use in an environment where noise may cause misoperation.