

SINGLE TIMER

DESCRIPTION

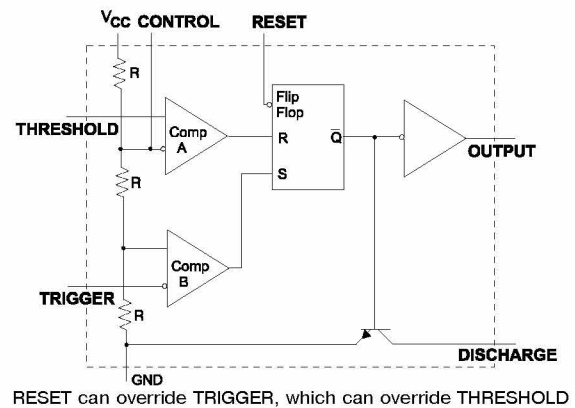
These devices are monolithic timing circuits capable of producing accurate time delays or oscillation. In the time delay mode of operation, the timed interval is controlled by a single external resistor and capacitor network. In the astable mode of operation, the frequency and duty cycle may be independently controlled with two external resistors and a single external capacitor.

FEATURES

- Timing from Microseconds to Hours
- Astable or Monostable Operation
- Adjustable Duty Cycle
- TTL - Compatible Output Can Sink or Source Up to 200 mA
- Temperature Stability of 0.005% per °C
- Direct Replacement for Signetics TK555 Timer

APPLICATIONS

- Precision timing
- Pulse generation
- Sequential timing
- Time delay generation
- Pulse width modulation
- Pulse position modulation
- Missing pulse detector



ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	MIN	MAX	UNITS
Supply Voltage, V_{CC}	4.5	16	V
Input Voltage (control, reset, threshold and trigger)		V_{CC}	
Output Current, I_o		± 200	mA
Operating Free-Air Temperature, T_A		70	$^\circ\text{C}$
Storage Temperature Range, T_{STG}	-65	+150	

FUNCTION TABLE

RESET	TRIGGER VOLTAGE *	THRESHOLD VOLTAGE *	OUTPUT	DISCHARGE SWITCH
Low	Irrelevant	Irrelevant	Low	On
High	$< 1/3 V_{CC}$	High	High	Off
High	$> 1/3 V_{CC}$	$> 2/3 V_{CC}$	Low	On
High	$> 1/3 V_{CC}$	$< 2/3 V_{CC}$		As previously established

* Voltage levels shown are nominal

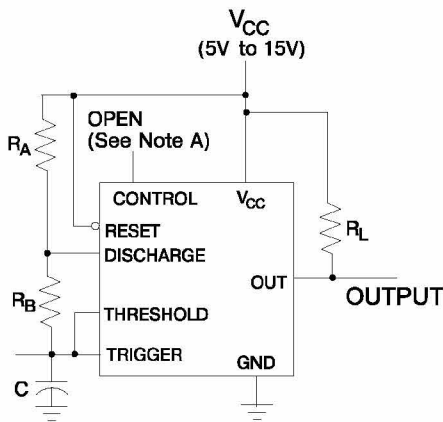
TYPICAL APPLICATION DATA


Fig. 1 Circuit for astable operation

NOTE A: Bypassing the control voltage input to ground with a capacitor may improve operation. This should be evaluated for individual applications.

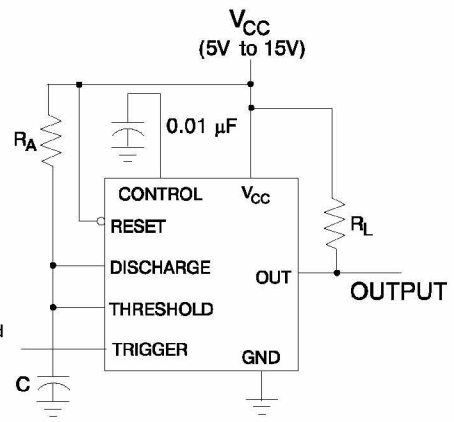
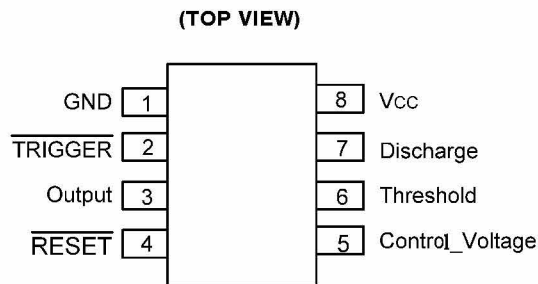


Fig. 2 Circuit for monostable operation

PIN CONFIGURATION

■ PIN DESCRIPTION

PIN No.	PIN NAME	DESCRIPTION
1	GND	Ground
2	TRIGGER	Trigger voltage input
3	Output	Output
4	RESET	Direct reset low input
5	Control_Voltage	Control voltage
6	Threshold	Threshold voltage input
7	Discharge	Discharging when output is low
8	V _{CC}	Supply voltage

■ TRUTH TABLE

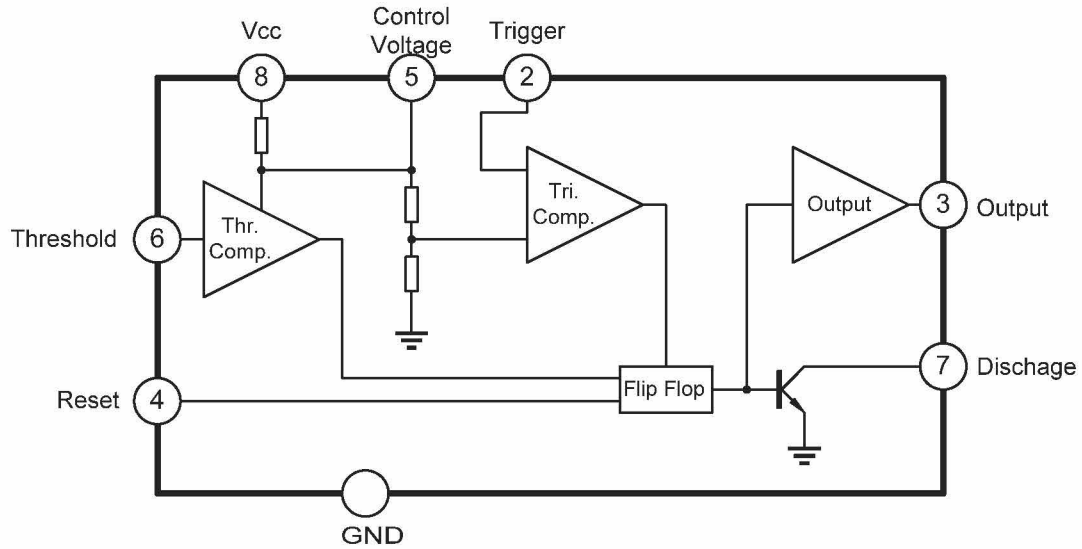
THRESHOLD	TRIGGER	RESET	OUTPUT	DISCHARGE
X		L	L	ON
$>2/3 \times V_{CC}$	$>1/3 \times V_{CC}$	H	L	ON
$<2/3 \times V_{CC}$	$>1/3 \times V_{CC}$	H	STABLE	STABLE
X	$<1/3 \times V_{CC}$	H	H	OFF

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, $V_{CC}=+5\text{V}$ to $+15\text{V}$, unless otherwise specified)

PARAMETER		TEST CONDITIONS (see Note 2)	MIN	TYP	MAX	UNITS	
Operating Supply Voltage Range			4.5		16	V	
Threshold Voltage Level		$V_{CC}=15\text{V}$	8.8	10	11.2	V	
		$V_{CC}=5\text{V}$	2.4	3.3	4.2		
Threshold Current (see Note 1)		(see Note 1)		30	250	nA	
Trigger Voltage Level		$V_{CC}=15\text{V}$	4.5	5	5.6	V	
		$V_{CC}=5\text{V}$	1.1	1.67	2.2		
Trigger Current		Trigger at 0V		0.5	2	μA	
Reset Voltage Level			0.3	0.7	1	V	
Reset Current		Reset at V_{CC}		0.1	0.4	mA	
		Reset at 0V		-0.4	-1.5		
Discharge Leakage Current				20	100	nA	
Control Voltage Level		$V_{CC}=15\text{V}$	9	10	11	V	
		$V_{CC}=5\text{V}$	2.6	3.3	4		
Low-level Output Voltage		$V_{CC}=15\text{V}$	$I_{OL}=10\text{mA}$		0.1	0.25	V
			$I_{OL}=50\text{mA}$		0.4	0.75	
			$I_{OL}=100\text{mA}$		2	2.5	
			$I_{OL}=200\text{mA}$		2.5		
		$V_{CC}=5\text{V}$	$I_{OL}=5\text{mA}$		0.25	0.35	
			$I_{OL}=8\text{mA}$		0.3	0.4	
High-level Output Voltage		$V_{CC}=15\text{V}$	$I_{OH}=-100\text{mA}$	12.75	13.3	V	
			$I_{OH}=-200\text{mA}$		12.5		
		$V_{CC}=5\text{V}$	$I_{OH}=-100\text{mA}$	2.75	3.3		
Supply Current		Output Low, No Load	$V_{CC}=15\text{V}$		10	15	mA
			$V_{CC}=5\text{V}$		3	6	
		Output High, No Load	$V_{CC}=15\text{V}$		9	13	
			$V_{CC}=5\text{V}$		2	5	
Initial Error of Timing Interval (see Note 3)		monostable (see Note 4)	$T_A=25^{\circ}\text{C}$		1	3	%
				astable (see Note 5)		5	
Temperature Coefficient of Timing Interval		monostable	$T_A=\text{MIN to MAX}$		50	150	ppm / $^{\circ}\text{C}$
				astable		150	
Supply Voltage Sensitivity of Timing Interval		monostable	$T_A=25^{\circ}\text{C}$		0.1	0.5	%/V
				astable		0.3	
Output Pulse Rise Time		$C_L=15\text{pF}$, $T_A=25^{\circ}\text{C}$		100	300	ns	
Output Pulse Fall Time				100	300		

Notes:

1. This parameter influences the maximum value of the timing resistors R_A and R_B in the circuit on Fig 1. For example, when $V_{CC}=5\text{V}$, the maximum value is $R=R_A+R_B=3.4\text{ M}\Omega$, and $V_{CC}=15\text{V}$, the maximum value is $10\text{ M}\Omega$.
2. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
3. Timing interval error is defined as the difference between the measured value and the average value of a random sample from each process run.
4. Values specified are for a device in a monostable circuit similar to Fig. 2, with component values as follow:
 $R_A=2\text{K}\Omega$ to $100\text{ K}\Omega$, $C=0.1\mu\text{F}$.
5. Values specified are for a device in an astable circuit similar to Fig. 1, with component values as follow: R_A , $R_B=1\text{K}\Omega$ to $100\text{ K}\Omega$, $C=0.1\mu\text{F}$.

BLOCK DIAGRAM

ORDERING INFORMATION

Part Number	Package	Packing	Temperature(TA)	Package Qty
TK555CA	SOIC-8	Reel	0°C ~ 70°C	2500
TK555CD	DIP-8	Tube	0°C ~ 70°C	1000
TK555IA	SOIC-8	Reel	-40°C ~ 85°C	2500
TK555ID	DIP-8	Tube	-40°C ~ 85°C	1000
TK555QA	SOIC-8	Reel	-40°C ~ 125°C	2500
TK555QD	DIP-8	Tube	-40°C ~ 125°C	1000