

NE555

LINEAR INTEGRATED CIRCUIT

SINGLE TIMER

DESCRIPTION

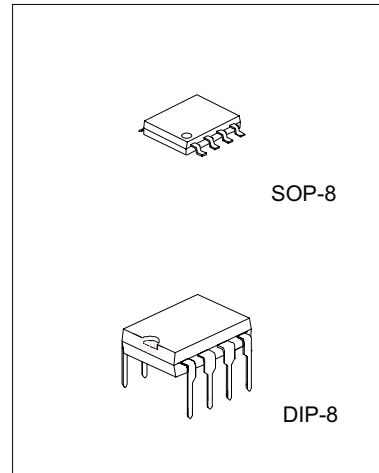
The Contek NE555 is a highly stable timer integrated circuit. It can be operated in Astable mode and Monostable mode. With monostable operation, the time delay is controlled by one external resistor and one capacitor. With a stable operation, the frequency and duty cycle are accurately controlled with two external resistors and one capacitor.

FEATURES

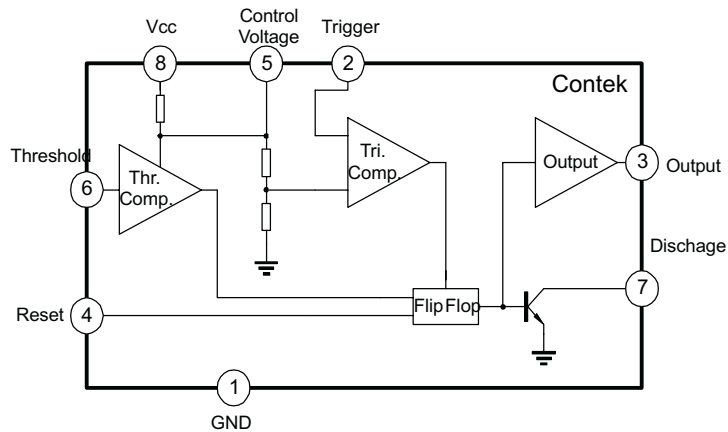
- *High current driver capability(=200mA)
- *Adjustable duty cycle
- *Timing from μSec to Hours
- *Turn off time less than $2\mu\text{Sec}$.

APPLICATIONS

- *Precision timing
- *Pulse generation
- *Time delay generation



BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS(Ta=25 C)

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	Vcc	16	V
Power Dissipation	Pd	600	mW
Lead Temperature	Tlead	300	C
Operating Temperature	Topr	0 to 70	C
Storage Temperature	Tstg	-65 to 150	C

ELECTRICAL CHARACTERISTICS(Ta=25 C ,Vcc=5 ~ 15V)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply voltage	Vcc		4.5		16	V
Supply Current (Note 1)	Icc	Vcc=5V,RL=		3	6	mA
		Vcc=15V,RL=		7.5	15	mA
Timing Error(monostable)						
Initial Accuracy(Note 2)	ACCUR	RA=1k to 100k $\mu\Omega$		1.0	3.0	%
Drift with Temperature	$\Delta t/\Delta T$	C=0.1 μF		50		ppm/ C
Drift with Supply Voltage	$\Delta t/\Delta V_{cc}$			0.1	0.5	%/V
Timing Error(astable)						
Initial Accuracy(Note 2)	ACCUR	RA=1k to 100k $\mu\Omega$		2.25		%
Drift with Temperature	$\Delta t/\Delta T$	C=0.1 μF		150		ppm/ C
Drift with Supply Voltage	$\Delta t/\Delta V_{cc}$			0.3		%/V
Control Voltage	Vc	Vcc=15V	9.0	10.0	11.0	V
		Vcc=5V	2.6	3.33	4.0	V
Threshold Voltage	VTH	Vcc=15V		10.0		V
		Vcc=5V		3.33		V
Threshold Current(Note 3)	ITH			0.1	0.25	μA
Trigger Voltage	Vtr	Vcc=5V	1.1	1.67	2.2	V
		Vcc=15V	4.5	5	5.6	V
Trigger Current	Itr	Vtr=0		0.01	2.0	μA
Reset Voltage	Vrst		0.4	0.7	1.0	V
Reset Current	Irst			0.1	0.4	mA
Low Output Voltage	VOL	Vcc=15V				
		Isink=10mA		0.06	0.25	V
		Isink=50mA		0.3	0.75	V
		Vcc=5V				
High Output Voltage	VOH	Isink=5mA		0.05	0.35	V
		Vcc=15V				
		Isource=200mA		12.5		V
		Isource=100mA	12.75	13.3		V
Discharge Leakage Current	ILKG	Vcc=5V				
		Isource=100mA	2.75	3.3		V
Rise Time of Output	tR			100		nSec
Fall Time of Output	tF			100		nSec

Note 1:Supply current when output is high is typically 1mA less at Vcc 5V.

Note 2:Tested at Vcc=5.0V and Vcc=15V.

Note 3:this will determine the maximum value of RA+RB for 15V operation, The maximum total is R=20M Ω , and for 5V operation the maximum total is R=6.7M Ω .

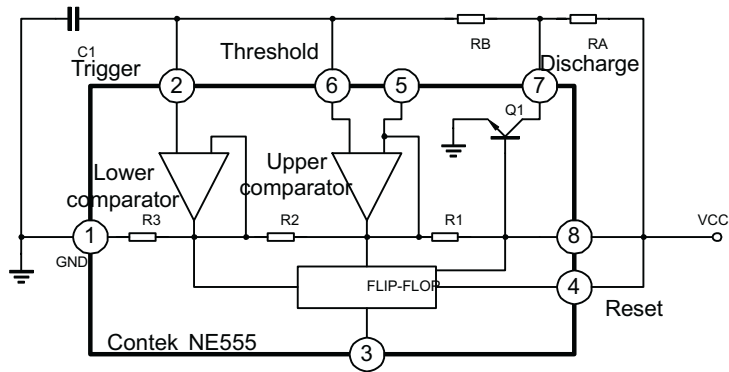


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APPLICATION CIRCUIT



APPLICATION NOTES

The application circuit shows astable mode configuration.

Pin 6 (Threshold) is tied to Pin 2 (Trigger) and Pin 4 (Reset) is tied to Vcc (Pin 8). The external capacitor C1 of Pin 6 and Pin 2 charges through RA, RB and discharges through RB only. In the internal circuit of Contek NE555, one input of the upper comparator is at voltage of $\frac{2}{3}V_{cc}$ ($R1=R2=R3$), another input is connected to Pin 6. As soon as C1 is charging to higher than $\frac{2}{3}V_{cc}$, transistor Q1 is turned ON and discharge C1 to collector voltage of transistor Q1. Therefore, the flip-flop circuit is reset and output is low. One input of lower comparator is at voltage of $\frac{1}{3}V_{cc}$, discharge transistor Q1 turn off and C1 charges through RA and RB. Therefore, the flip-flop circuit is set output high. That is, when C1 charges through RA and RB, output is high and when C1 discharge through RB, output is low. The charge time (output is high) t_1 is $0.693(RA+RB)C1$ and the discharge time (output is low) T_2 is $0.693RB \cdot C1$.

$$\ln \frac{V_{cc} - \frac{1}{3}V_{cc}}{V_{cc} - \frac{2}{3}V_{cc}} = 0.693$$

$$T_1 = 0.693(RA+RB) \cdot C1$$

$$T_2 = 0.693RB \cdot C1$$

Thus the total period time T is given by

$$T = T_1 + T_2 = 0.693(RA + 2RB) \cdot C1$$

Then the frequency of astable mode is given by

$$f = \frac{1}{T} = \frac{1.44}{(RA + RB) \cdot C1}$$

The duty cycle is given by

$$D.C. = \frac{T_2}{T} = \frac{RB}{RA + 2RB}$$