



NE555

LINEAR INTEGRATED CIRCUIT

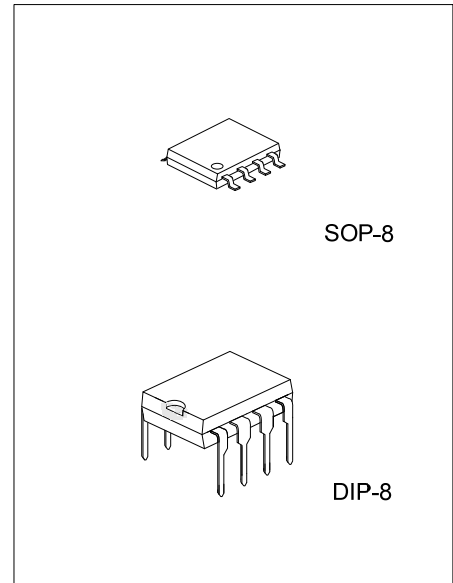
SINGLE TIMER

DESCRIPTION

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

FEATURES

- *High current driver capability(=200mA).
- *Adjustable duty cycle.
- *Timing from μs to hours.
- *Turn off time less than $2\mu\text{s}$.
- *Operates in both astable and monostable modes.

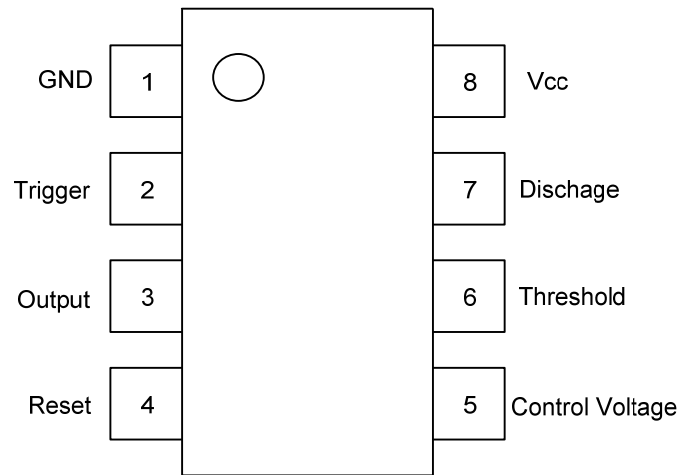


ORDERING INFORMATION

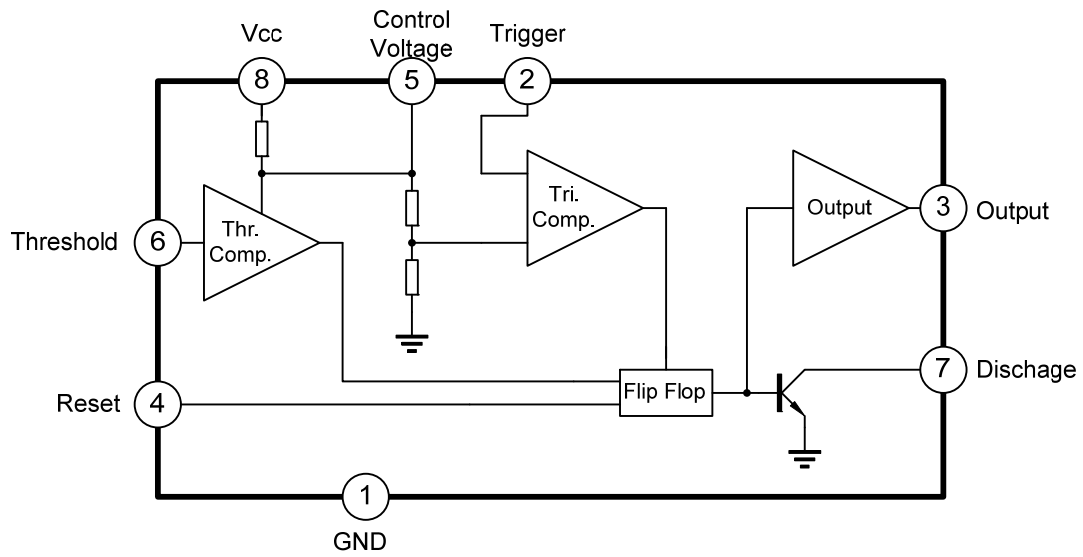
Ordering Number			Package	Packing
Normal	Lead Free	Halogen Free		
NE555-D08-T	NE555L-D08-T	NE555G-D08-T	DIP-8	Tube
NE555-S08-R	NE555L-S08-R	NE555G-S08-R	SOP-8	Tape Reel
NE555-S08-T	NE555L-S08-T	NE555G-S08-T	SOP-8	Tube

<p>NE555L-D08-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) D08: DIP-8, S08: SOP-8 (3) G:Halogen Free, L: Lead Free Plating, Blank: Pb/Sn</p>
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■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	16	V
Power Dissipation	P_D	600	mW
Junction Temperature	T_J	+125	$^{\circ}\text{C}$
Operating Temperature	T_{OPR}	-20 ~ +85	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-40 ~ +150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ($V_{CC}=5 \sim 15\text{V}$, $T_a=25^{\circ}\text{C}$, unless otherwise specified.)

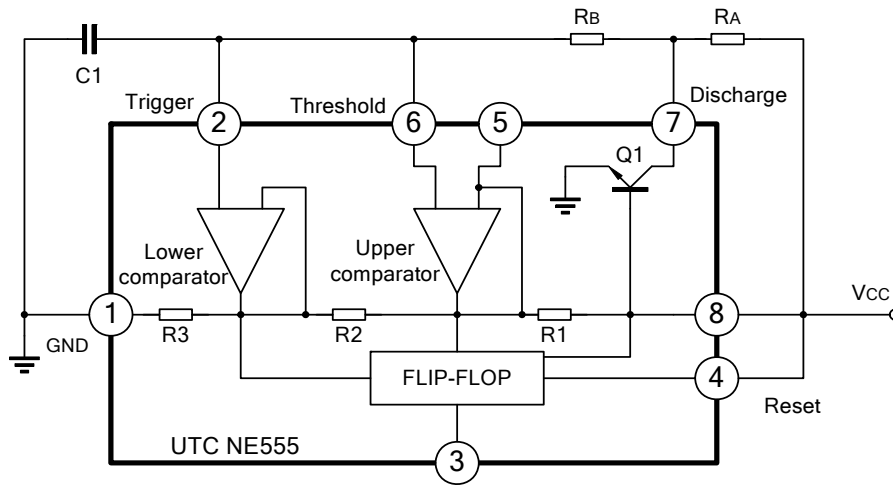
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		4.5		16	V
Supply Current (Note 1)	I_{CC}	$V_{CC}=5\text{V}$, $R_L=\infty$		3	6	mA
		$V_{CC}=15\text{V}$, $R_L=\infty$		7.5	15	mA
Initial Accuracy (Note 2)	Monostable	A_{CCUR}	$R_A=1\text{k} \sim 100\text{k}\Omega$	1.0	3.0	%
	Astable			2.25		%
Drift with Temperature	Monostable	$\Delta t/\Delta T$	$C=0.1\mu\text{F}$	50		ppm/ $^{\circ}\text{C}$
	Astable			150		ppm/ $^{\circ}\text{C}$
Drift with Supply Voltage	Monostable	$\Delta t/\Delta V_{CC}$		0.1	0.5	%/V
	Astable			0.3		%/V
Control Voltage	V_C	$V_{CC}=15\text{V}$	9.0	10.0	11.0	V
		$V_{CC}=5\text{V}$	2.6	3.33	4.0	V
Threshold Voltage	V_{TH}	$V_{CC}=15\text{V}$		10.0		V
		$V_{CC}=5\text{V}$		3.33		V
Threshold Current (Note 3)	I_{TH}			0.1	0.25	μA
Trigger Voltage	V_{TR}	$V_{CC}=5\text{V}$	1.1	1.67	2.2	V
		$V_{CC}=15\text{V}$	4.5	5	5.6	V
Trigger Current	I_{TR}	$V_{TR}=0$		0.01	2.0	μA
Reset Voltage	V_{RST}		0.4	0.7	1.0	V
Reset Current	I_{RST}			0.1	0.4	mA
Low Output Voltage	V_{OL}	$V_{CC}=15\text{V}$				
		$I_{SINK}=10\text{mA}$		0.06	0.25	V
		$I_{SINK}=50\text{mA}$		0.3	0.75	V
		$V_{CC}=5\text{V}$				
High Output Voltage	V_{OH}	$V_{CC}=15\text{V}$				
		$I_{SOURCE}=200\text{mA}$		12.5		V
		$I_{SOURCE}=100\text{mA}$	12.75	13.3		V
		$V_{CC}=5\text{V}$, $I_{SOURCE}=100\text{mA}$	2.75	3.3		V
Rise Time of Output	t_R			100		ns
Fall Time of Output	t_F			100		ns
Discharge Leakage Current	I_{LKG}			20	100	nA

Note 1: Supply current when output high typically 1mA less at $V_{CC}=5\text{V}$.

Note 2: Tested at $V_{CC}=5.0\text{V}$ and $V_{CC}=15\text{V}$.

Note 3: This will determine the maximum value of R_A+R_B for 15V operation, The maximum total is $R=20\text{M}\Omega$, and for 5V operation the maximum total is $R=6.7\text{M}\Omega$.

■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL 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 V_{CC} (Pin 8). The external capacitor C_1 of Pin 6 and Pin 2 charges through R_A , R_B and discharges through R_B only. In the internal circuit of UTC NE555, one input of the upper comparator is at voltage of $2/3V_{CC}$ ($R_1=R_2=R_3$), another input is connected to Pin 6. As soon as C_1 is charging to higher than $2/3V_{CC}$, transistor Q_1 is turned ON and discharge C_1 to collector voltage of transistor Q_1 . Therefore, the flip-flop circuit is reset and output is low. One input of lower comparator is at voltage of $1/3V_{CC}$, discharge transistor Q_1 turn off and C_1 charges through R_A and R_B . Therefore, the flip-flop circuit is set output high.

That is, when C_1 charges through R_A and R_B , output is high and when C_1 discharge through R_B , output is low. The charge time (output is high) t_1 is $0.693(R_A+R_B) C_1$ and the discharge time (output is low) T_2 is $0.693 R_B * C_1$.

$$\ln \left(\frac{V_{CC} - \frac{1}{3}V_{CC}}{V_{CC} - \frac{2}{3}V_{CC}} \right) = 0.693$$

$$T_1 = 0.693 * (R_A + R_B) * C_1$$

$$T_2 = 0.693 * R_B * C_1$$

Thus the total period time T is given by

$$T = T_1 + T_2 = 0.693(R_A + 2R_B) * C_1$$

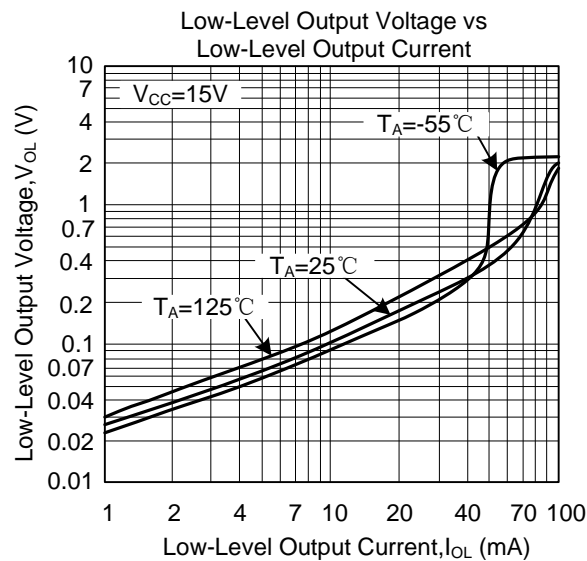
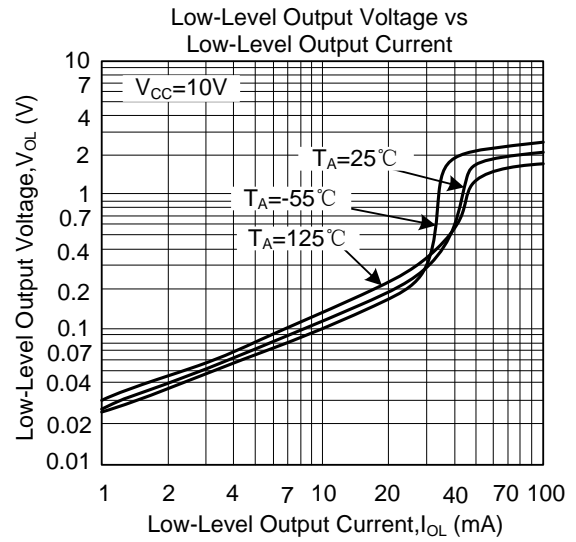
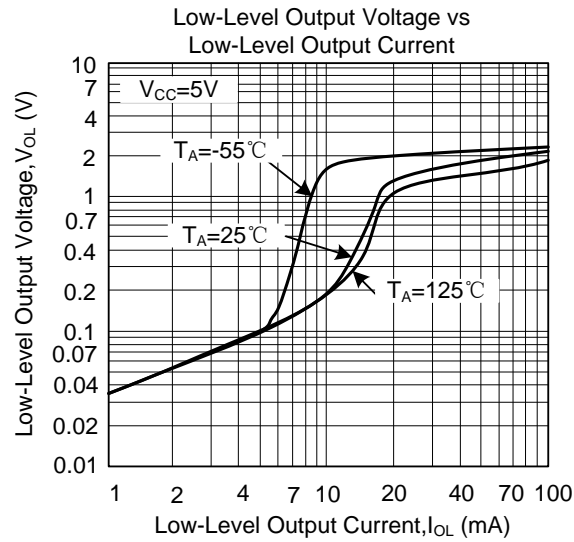
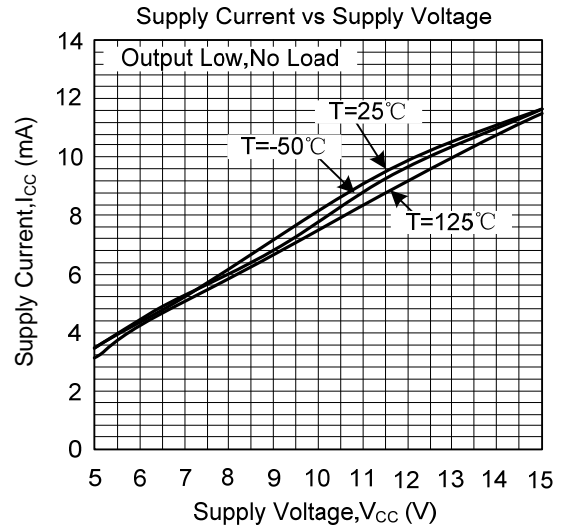
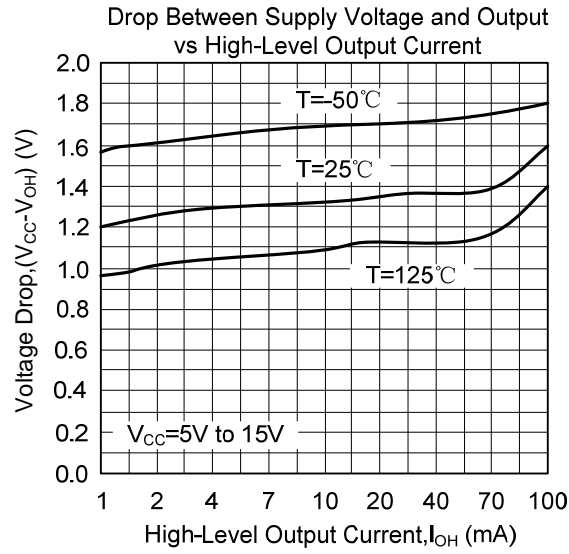
Then the frequency of astable mode is given by

$$f = \frac{1}{T} = \frac{1.44}{(R_A + 2R_B) * C_1}$$

The duty cycle is given by

$$D.C. = \frac{T_2}{T} = \frac{R_B}{R_A + 2R_B}$$

TYPICAL CHARACTERISTICS



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