

# CHT-555 DATASHEET

Version: 1.12  
20-Dec-23  
(Last Modification Date)

## HIGH TEMPERATURE 555 TIMER

### General Description

The CHT-555 is a high-temperature, low-power, highly stable device for generating accurate time delays or oscillation. It can be used as a high-temperature direct replacement of the standard 555. Because of its high input impedance, this device allows the use of smaller capacitors than those used by the standard 555, then providing more accurate time delays and oscillations, as well as cheaper BOM. The CHT-555 can be used throughout the -55°C to +225°C temperature range, though operation up to 250°C can be obtained with little degradation of performance.

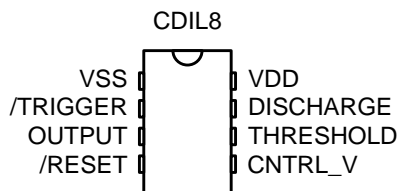
### Features

- Supply voltage 5V +/-10%
- Low supply current
- Operational up to 250°C (Tj)
- Timing from microseconds to hours
- Operates in both monostable and astable modes
- Highly stable timing characteristics with temperature and supply voltage
- Validated at 225°C for 30000 hours (and still on-going)
- Available in CDIL8 (other packages available upon request)

### Applications

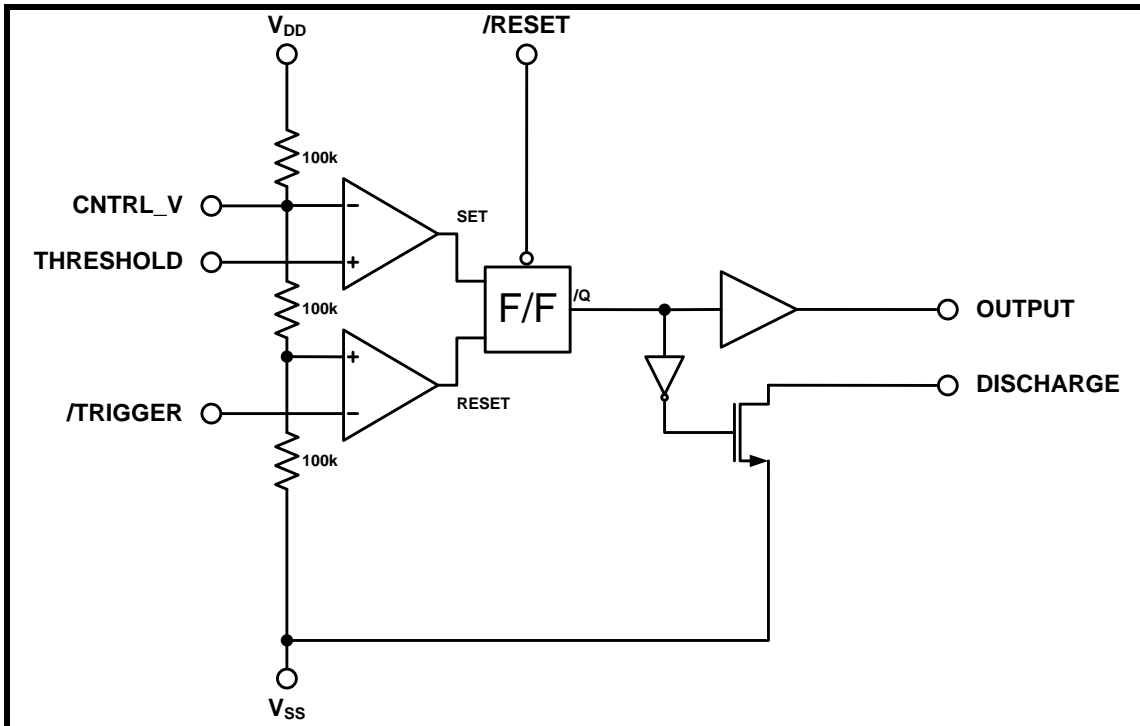
- Well logging, Automotive, Aeronautics & Aerospace
- Precision timing
- Pulse generation
- Pulse width and pulse position modulation

### Packaging and Pin Description



Pin #	Pin Name	Pin Description
1	VSS	Ground terminal.
2	/TRIGGER	Sets the output with a falling edge.
3	OUTPUT	Main output.
4	/RESET	Main reset. When LOW, inhibits response from all other inputs.
5	CNTRL_V	It can be forced to a given voltage to change the triggering thresholds.
6	THRESHOLD	Resets the output with a rising edge.
7	DISCHARGE	Open drain N-type output. Active when OUTPUT = LOW.
8	VDD	Power supply terminal.

## Functional Block Diagram



## Function Table

/RESET	THRESHOLD	/TRIGGER	OUTPUT	DISCHARGE
L	X	X	L	ON
H	$> 2/3V_{DD}$	$> 1/3V_{DD}$	L	ON
H	$< 2/3V_{DD}$	$< 1/3V_{DD}$	H	OFF
H	$< 2/3V_{DD}$	$> 1/3V_{DD}$	Previous state	Previous state
H	$> 2/3V_{DD}$	$< 1/3V_{DD}$	L	ON

### Absolute Maximum Ratings

Supply Voltage  $V_{DD}$  to GND -0.5 to 6.0V  
Voltage on any Pin to GND -0.5 to  $V_{DD}+0.3V$

### Operating Conditions

Supply Voltage  $V_{DD}$  to GND  $5V \pm 10\%$   
Junction temperature  $-55^{\circ}C$  to  $+225^{\circ}C$

### ESD Rating (expected)

Human Body Model 1kV

### Thermal Characteristics

Parameter	Condition	Min	Typ	Max	Units
Thermal resistance Junction2Case ( $\Theta_{JC}$ )			25		$^{\circ}C/W$
Thermal resistance Junction2Air ( $\Theta_{JA}$ )			80		$^{\circ}C/W$

## Electrical Characteristics

Unless otherwise stated:  $V_{DD}=5V$ ,  $T_j=150^{\circ}C$ . **Bold underlined** values indicate values over the whole temperature range ( $-55^{\circ}C < T_j < +225^{\circ}C$ ).

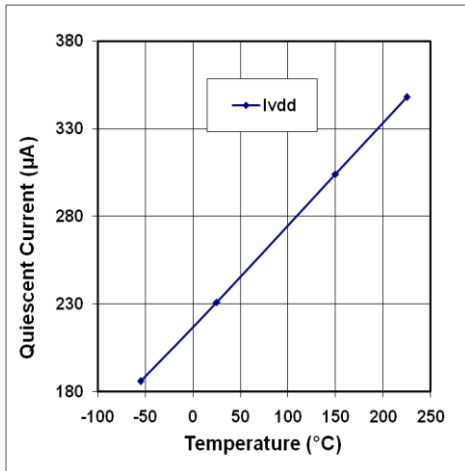
Parameter	Condition	Min	Typ	Max	Units
Supply voltage		4.5		5.5	V
Current consumption	$R_L = \infty; V_{THRESHOLD} < 2V_{DD}/3$ $R_L = \infty; V_{THRESHOLD} > 2V_{DD}/3$		280 350	<b>360</b> <b>480</b>	$\mu A$
OUTPUT Minimum HIGH level output voltage $V_{OH}$	$I_{OH} < 8mA$ (source)	<b>4.75</b>	4.8		V
OUTPUT Maximum LOW level output voltage $V_{OL}$	$I_{OL} < 8mA$ (sink)		0.25	<b>0.3</b>	V
Timing Error: Monostable <sup>1,2</sup>	(see Figure 1 and Figure 2)				
Initial accuracy	$R_a = 1k$ to $1MEG\Omega$ , $C = 10nF$		2.5 <b>3.5</b>		%
Drift with Temperature	$R_a = 1k$ to $100k\Omega$ , $C = 10nF$ $R_a = 1MEG\Omega$ , $C = 10nF$		7 <b>67</b>		ppm/ $^{\circ}C$
Drift with Supply Voltage	$R_a = 10k$ to $1MEG\Omega$ , $C = 10nF$ $R_a = 1k\Omega$ , $C = 10nF$		0.05 <b>0.2</b>		%/V
Timing Error: Astable <sup>3</sup>	(see Figure 5 and Figure 6)				
Initial accuracy	$R_a, R_b = 10k$ to $1MEG\Omega$ , $C = 10nF$ $R_a, R_b = 1k\Omega$ , $C = 10nF$		3 <b>5</b>		%
Drift with Temperature	$R_a, R_b = 1k$ to $100k\Omega$ , $C = 10nF$ $R_a, R_b = 1MEG\Omega$ , $C = 10nF$		20 <b>100</b>		ppm/ $^{\circ}C$
Drift with Supply Voltage	$R_a, R_b = 10k$ to $1MEG\Omega$ , $C = 10nF$ $R_a, R_b = 1k\Omega$ , $C = 10nF$		0.2 0.3		%/V
Threshold Voltage		<b>0.660</b>	<b>0.666</b>	<b>0.670</b>	$\times V_{DD}$
Trigger Voltage		<b>0.330</b>	<b>0.335</b>	<b>0.339</b>	$\times V_{DD}$
Control Voltage		<b>0.660</b>	<b>0.667</b>	<b>0.671</b>	$\times V_{DD}$
Discharge switch on-state voltage	$I_{DISCH} = 1mA; T_j = 150^{\circ}C$ $I_{DISCH} = 1mA; T_j = 225^{\circ}C$		21	25 <b>30</b>	mV
	$I_{DISCH} = 5mA; T_j = 150^{\circ}C$ $I_{DISCH} = 5mA; T_j = 225^{\circ}C$		105	120 <b>140</b>	mV
Discharge switch off-state leakage current	$V_{DISCH} = V_{DD}; T_j = 150^{\circ}C$ $V_{DISCH} = V_{DD}; T_j = 225^{\circ}C$		5	8 <b>1100</b>	nA
Maximum frequency in astable mode.			4.2		MHz
Output pulse rise time	$R_A = 1k$ to $1MEG\Omega$ , $C = 10nF$		2.2 <b>16.1</b>		ns
Output pulse fall time			3 <b>17.1</b>		ns

<sup>1</sup> The timing accuracy, drift with temperature and supply voltage in monostable as in astable configurations are computed supposing passive components are error free and have no drift with temperature. Accuracy and drift values shown are due to the CHT-555 only.

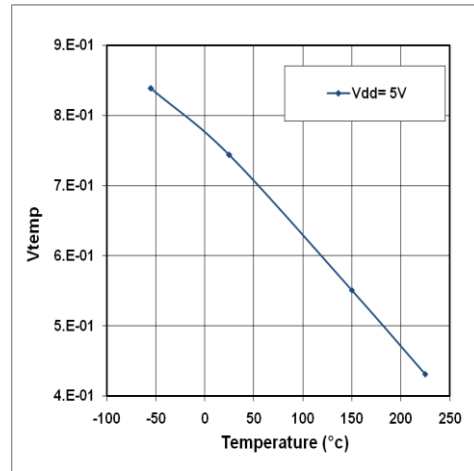
<sup>2</sup> In the monostable configuration  $t_{pulse} = 1.1 R_a C$ . Assign the accuracy and drift errors to the "1.1" factor.

<sup>3</sup> In the astable configuration  $f_{oscill} = 1.44 / [(R_a + 2 R_b) C]$ . Assign the accuracy and drift errors to the "1.44" factor.

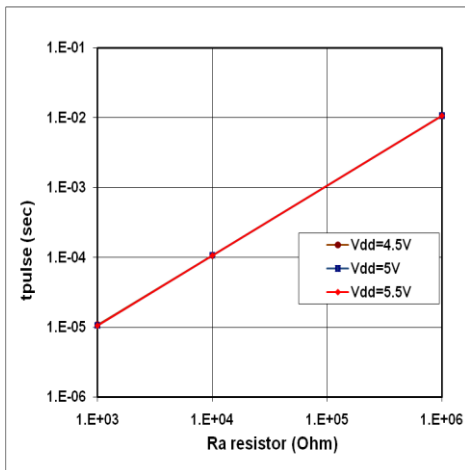
## Typical Performance Characteristics



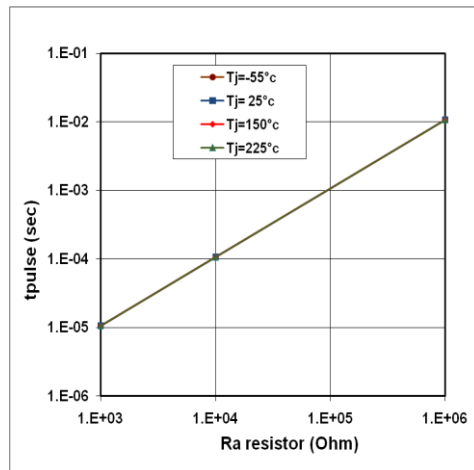
Current consumption,  $V_{DD} = 5V$



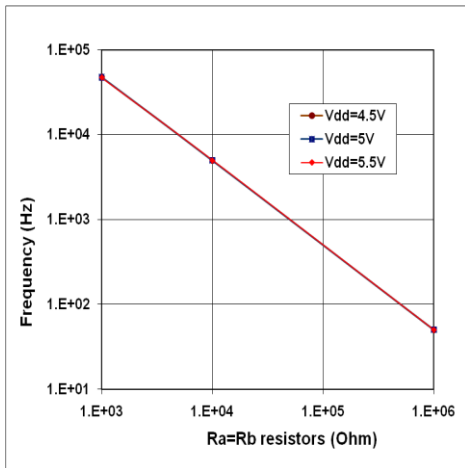
$V_{temp}$ ,  $V_{DD} = 5V$



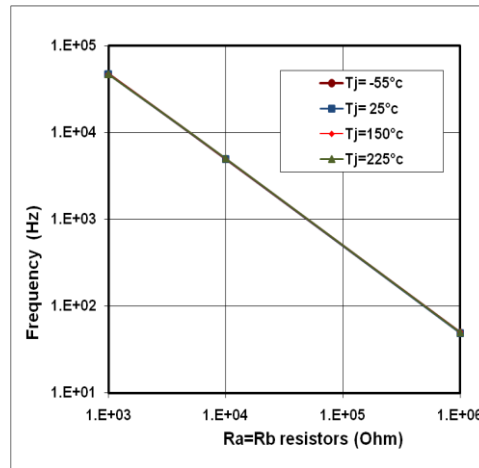
tpulse Vs Resistor in monostable mode,  
 $C=10nF$ ,  $V_{DD}=4.5$  to  $5.5V$



tpulse Vs Resistor in monostable mode,  
 $C=10nF$ ,  $T_j=-55$  to  $+225$



**Frequency Vs Resistors in astable mode,**  
**C=10nF, Vdd=4.5 to 5.5V**



**Frequency Vs Resistors in astable mode,**  
**C=10nF, Tj=-55 to +225°C**

## Typical Applications

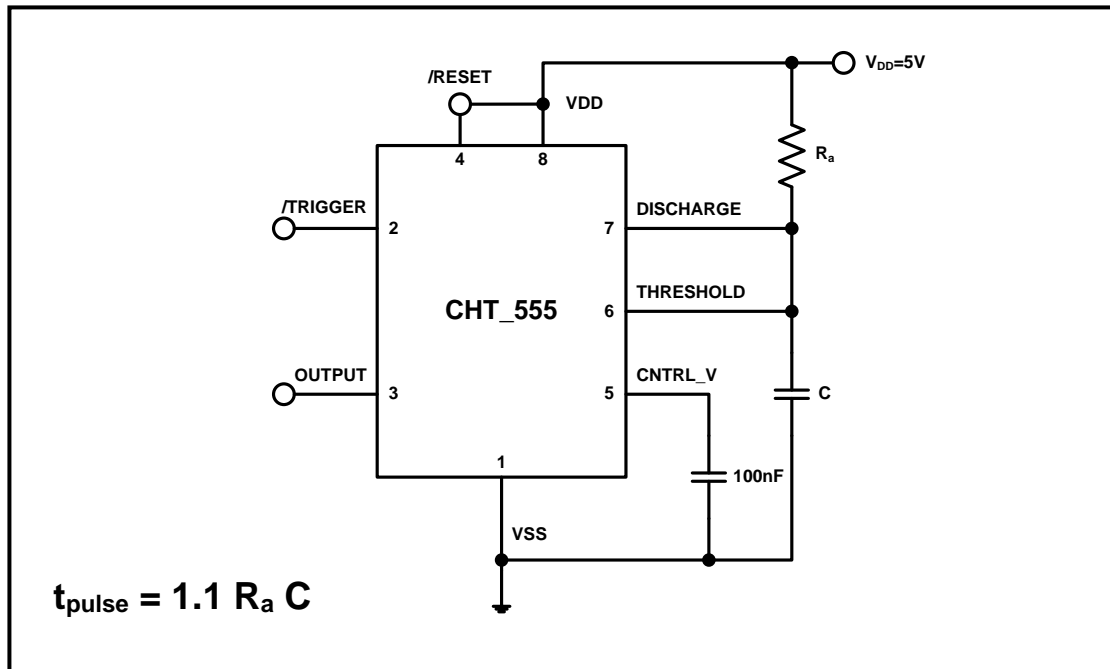


Figure 1. Monostable configuration.

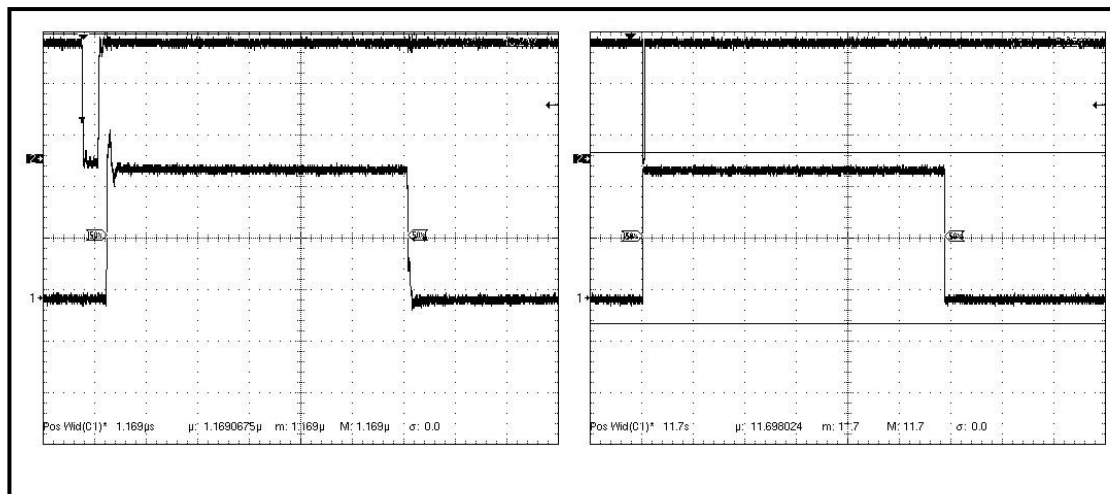


Figure 2. Monostable output waveforms: 1.17µsec (left) and 11.7sec (right).

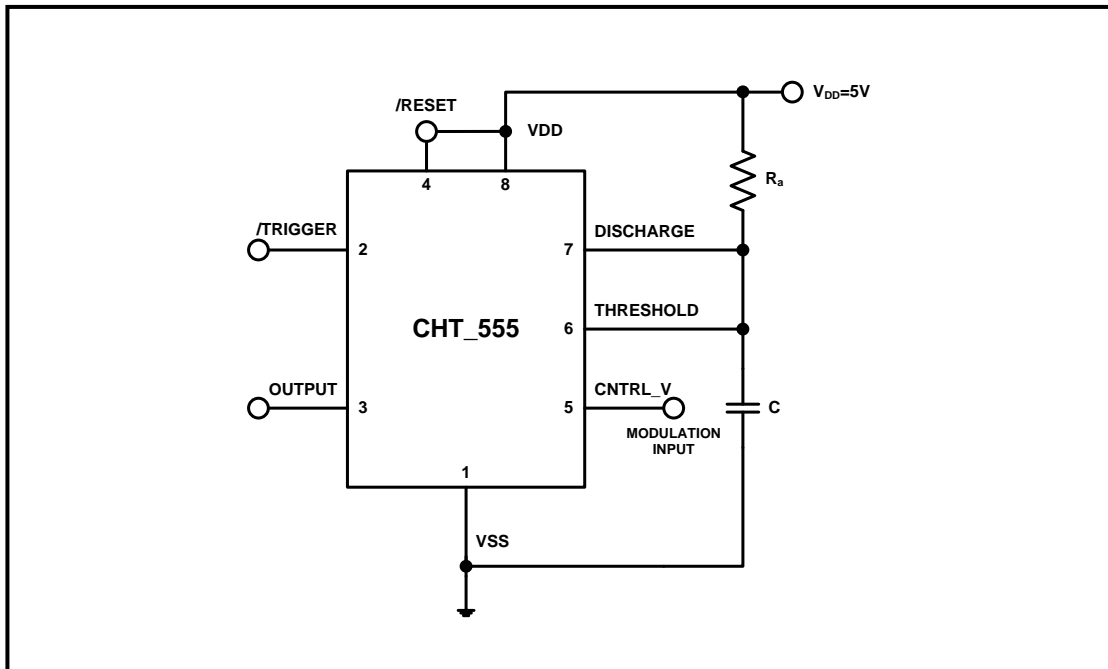


Figure 3. Pulse width modulator configuration.

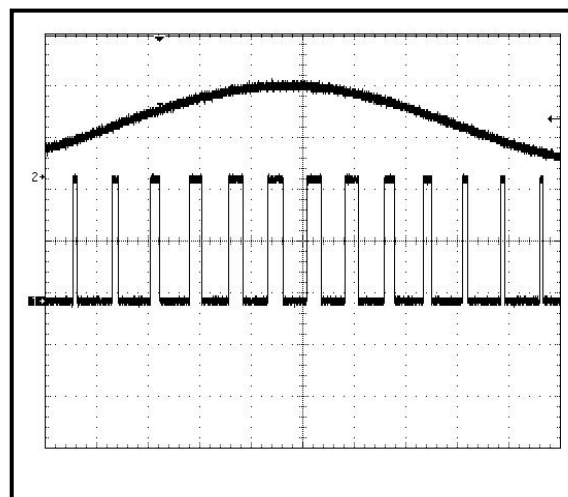


Figure 4. Pulse width modulator output waveforms: modulating signal (above) and output signal (below).



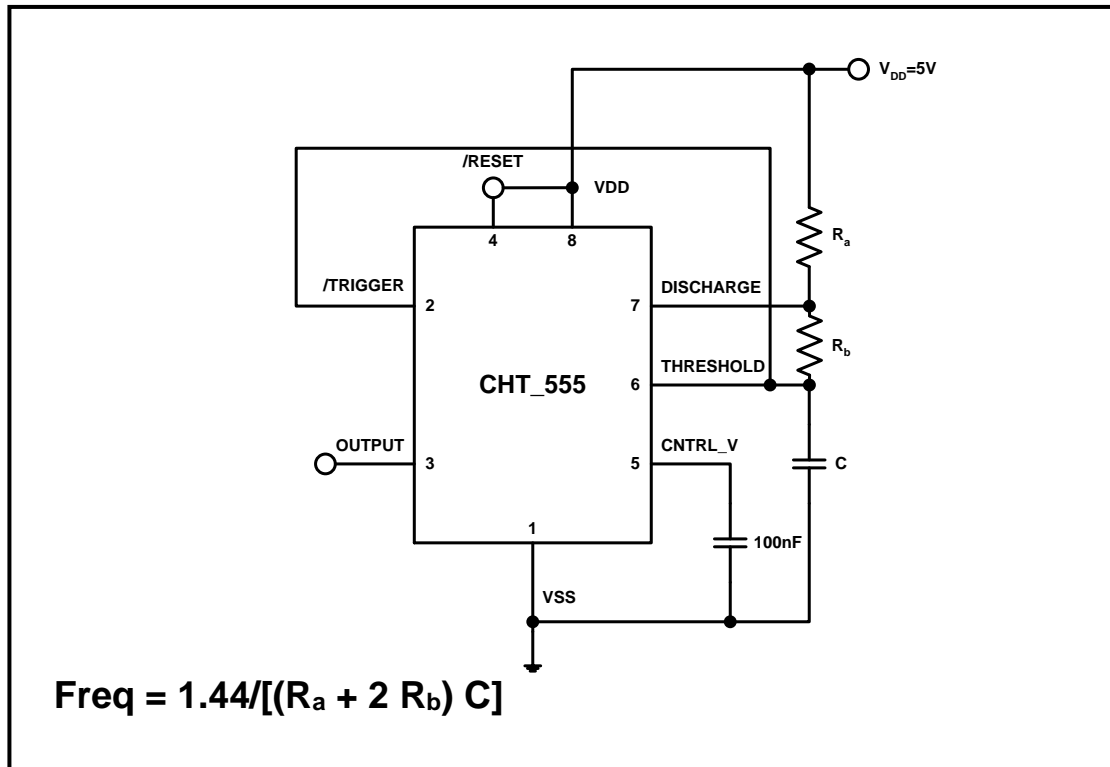


Figure 5. Astable configuration.

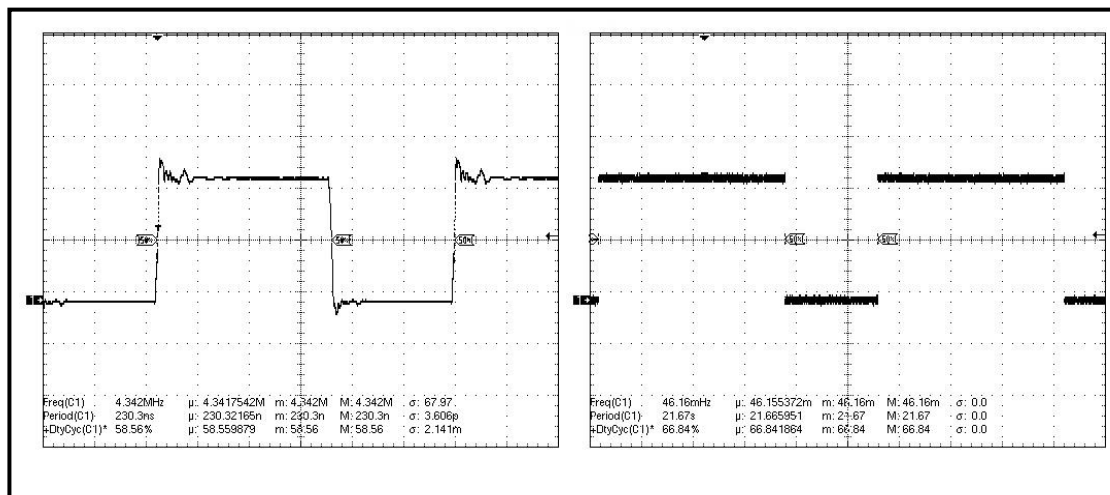


Figure 6. Astable output waveforms: 4.32MHz (left) and 46.2mHz (right).

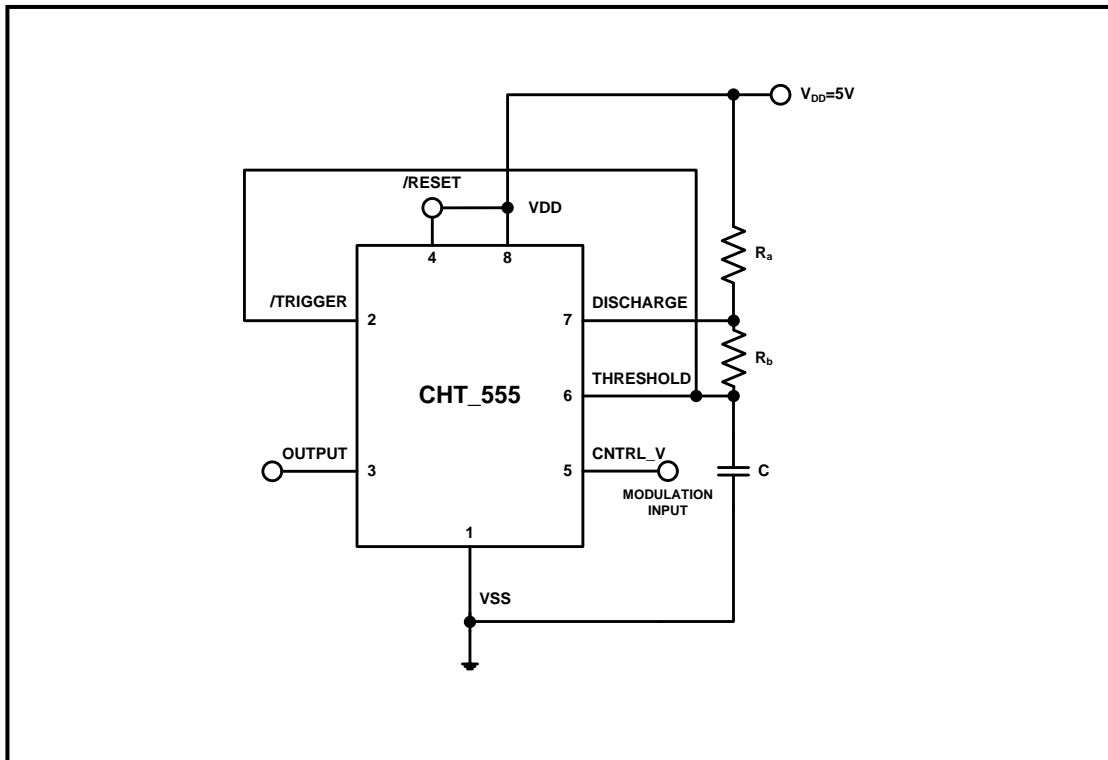


Figure 7. Pulse position modulator configuration.

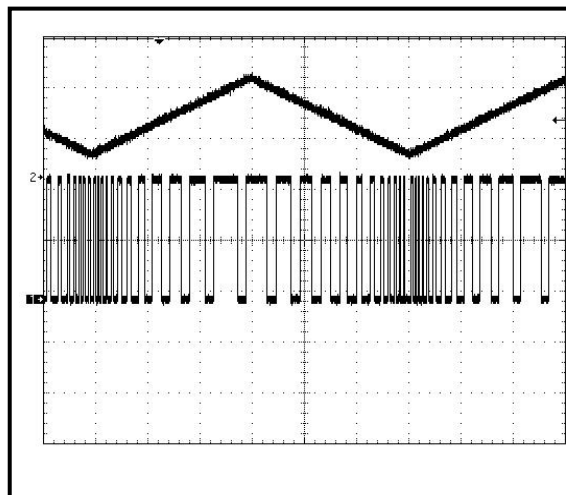
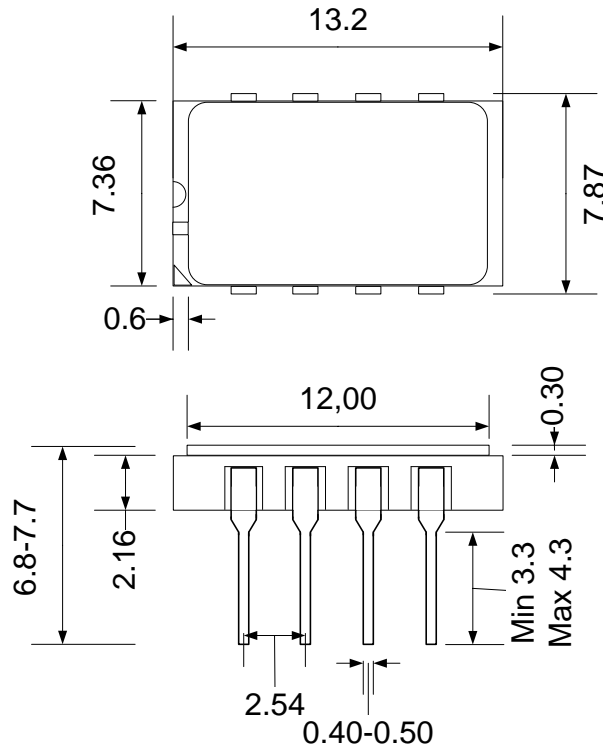


Figure 8. Pulse position modulator output waveforms: modulating signal (above) and output signal (below).

## Package Dimensions



*Drawing CDIL8 (mm +/- 10%)*

## Ordering Information

Ordering Reference	Package	Temperature Range	Marking
CHT-555-CDIL8-T	Ceramic DIL8	-55°C to +225°C	CHT-555

## Contact & Ordering

### CISSOID S.A.

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