CHT-555 DATASHEET

HIGH TEMPERATURE 555 TIMER

Revision: 1.11
Aug. 08, 2018

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.

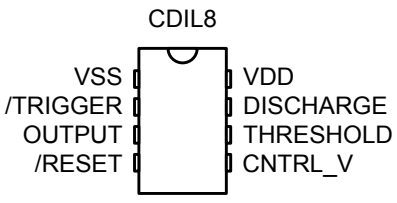
Features

- 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

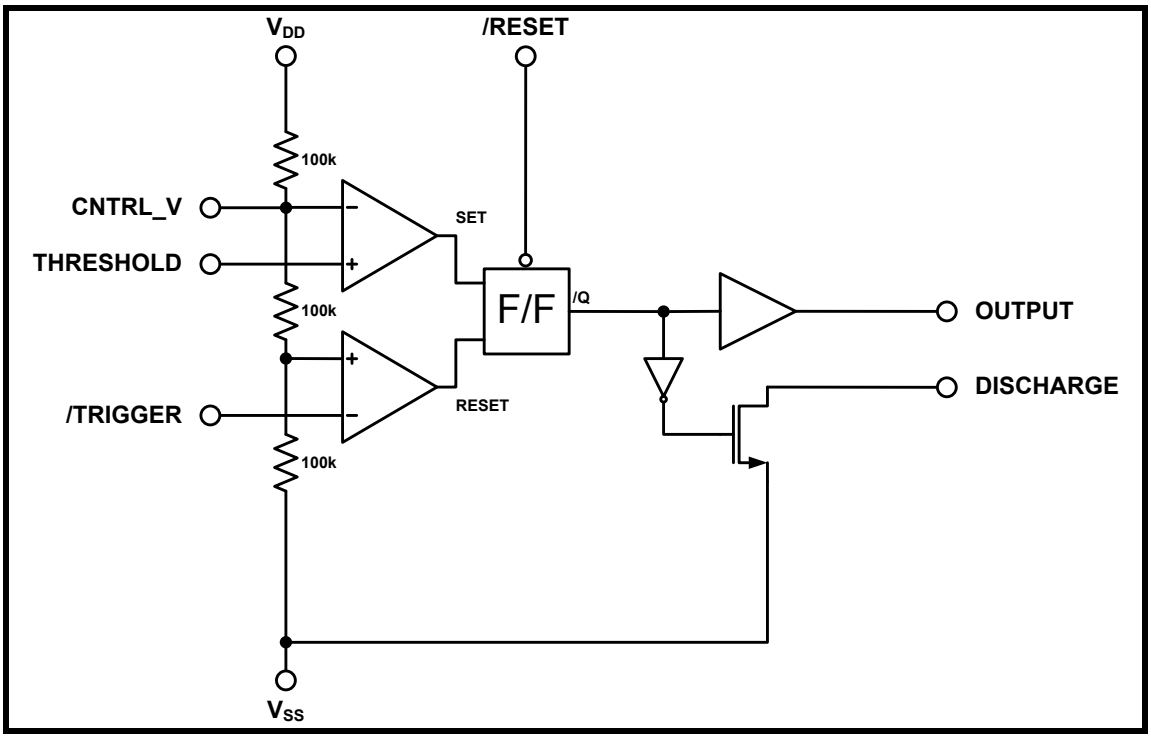
- Well logging, Automotive, Aeronautics & Aerospace
- Precision timing
- Pulse generation
- Pulse width and pulse position modulation

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

ESD Rating (expected)

Human Body Model	1kV

Operating Conditions

Supply Voltage V_{DD} to GND	5V ± 10%
Junction temperature	-55°C to +225°C

Thermal Characteristics

Parameter	Condition	Min	Typ	Max	Units
Thermal resistance Junction2Case (Θ_{JC})			25		°C/W
Thermal resistance Junction2Air (Θ_{JA})			80		°C/W

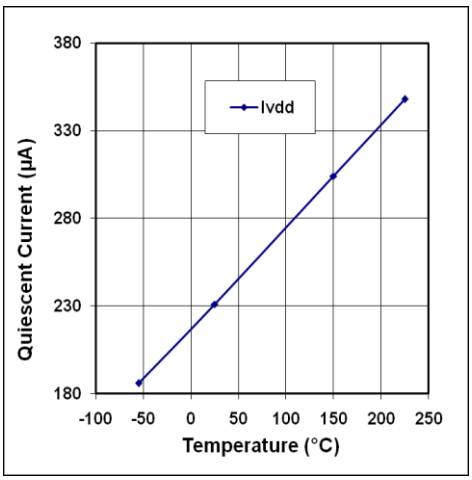
Electrical Characteristics

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

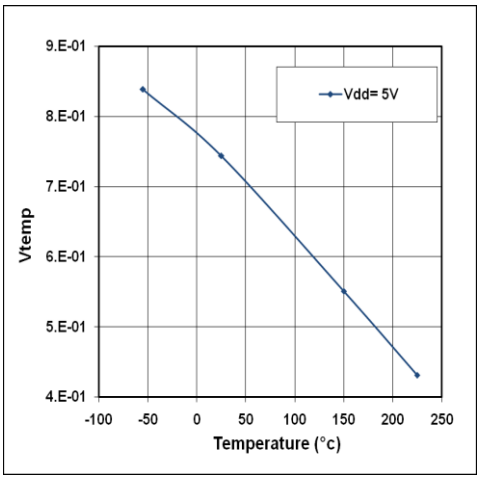
Parameter	Condition	Min	Typ	Max	Units
Supply voltage		4.5		5.5	V
Current consumption	R_L = ∞;$V_{THRESHOLD}$ < 2V_{DD}/3 R_L = ∞;$V_{THRESHOLD}$ > 2V_{DD}/3		280 350	**360** **480**	µA
OUTPUT Minimum HIGH level output voltage **V_{OH}**	I_{OH}<8mA (source)	**4.75**	4.8		V
OUTPUT Maximum LOW level output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

[1] 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.
[2] In the monostable configuration t_{pulse} = 1.1 R_a C. Assign the accuracy and drift errors to the "1.1" factor.
[3] 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.

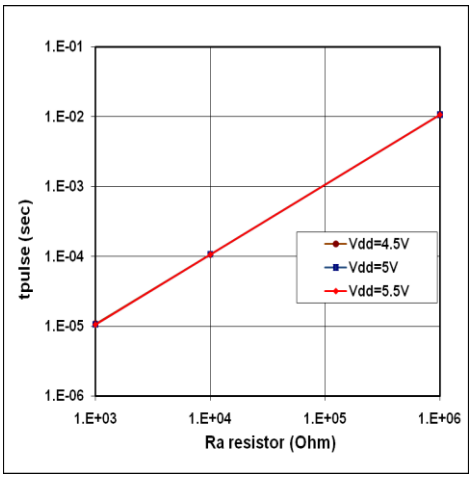
Typical Performance Characteristics



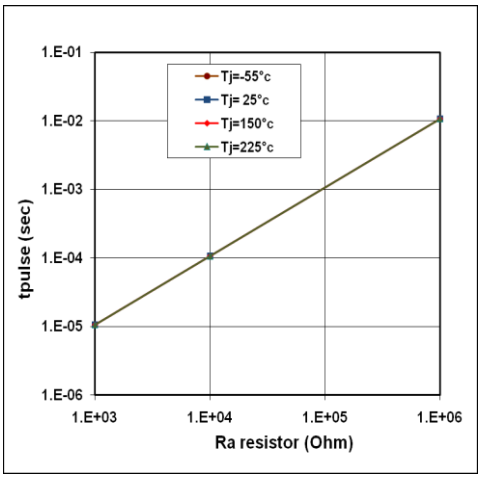
Current consumption, V_{DD} = 5V



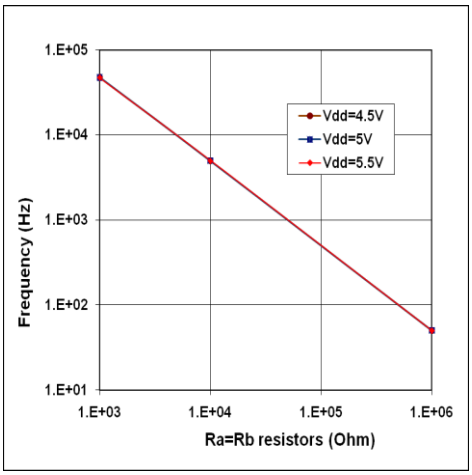
Vtemp, V_{DD} = 5V



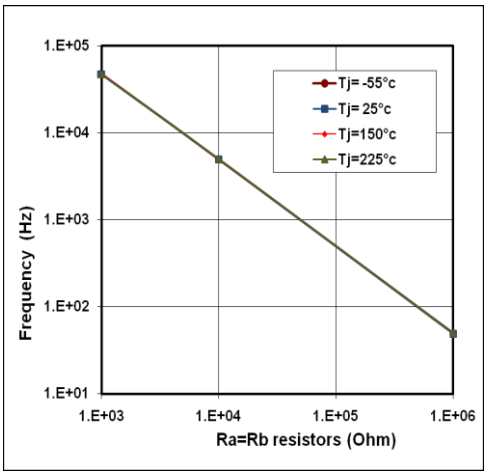
t_{pulse} Vs Resistor in monostable mode, C=10nF, Vdd=4.5 to 5.5V



t_{pulse} 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, T_j=-55 to +225°c

Typical Applications

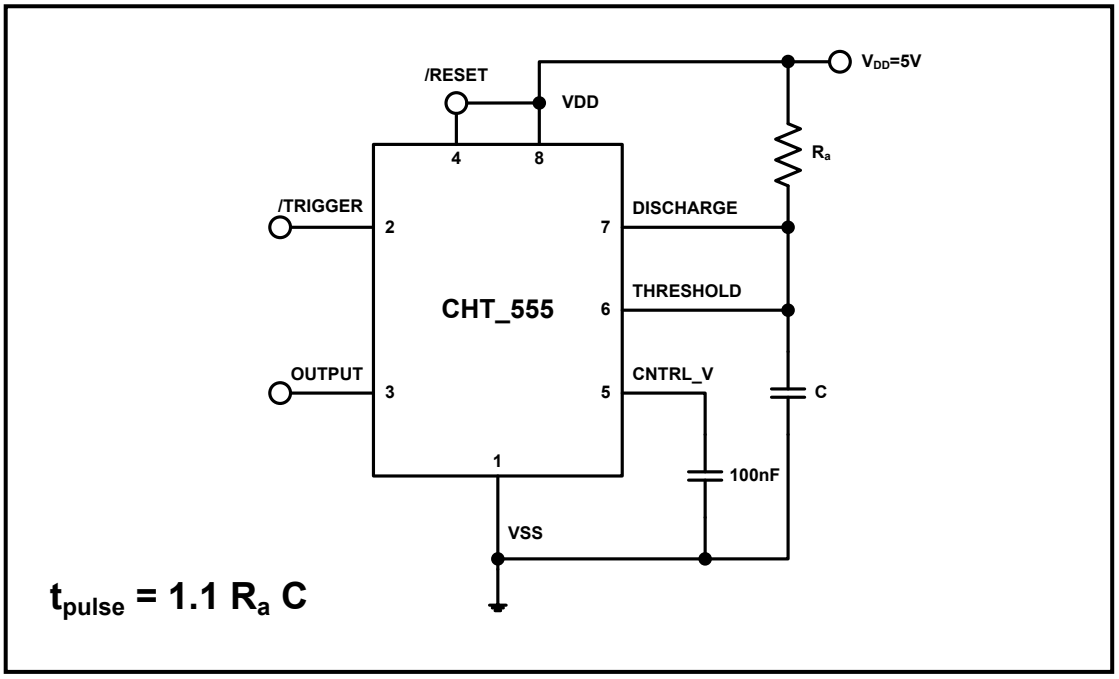


Figure 1. Monostable configuration.

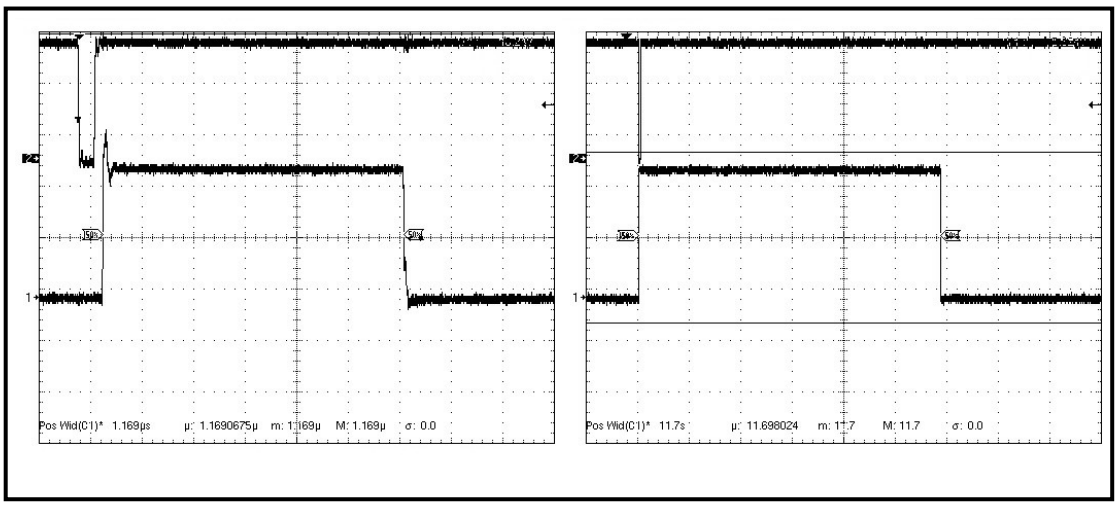


Figure 2. Monostable output waveforms: 1.17µsec (left) and 11.7sec (right).

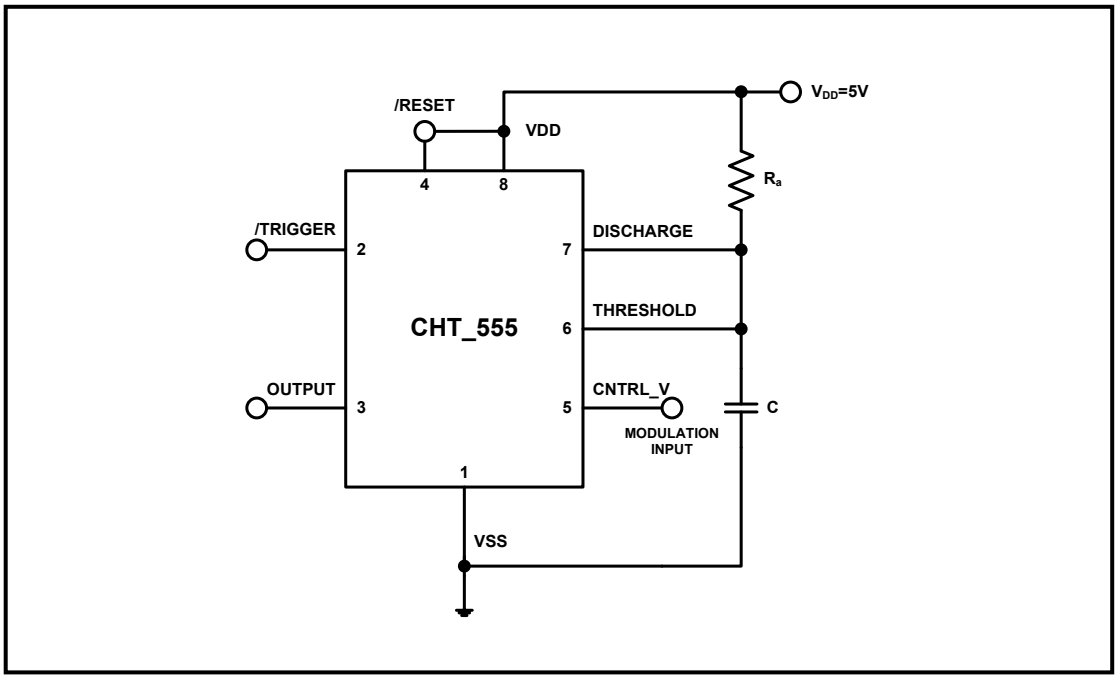


Figure 3. Pulse width modulator configuration.

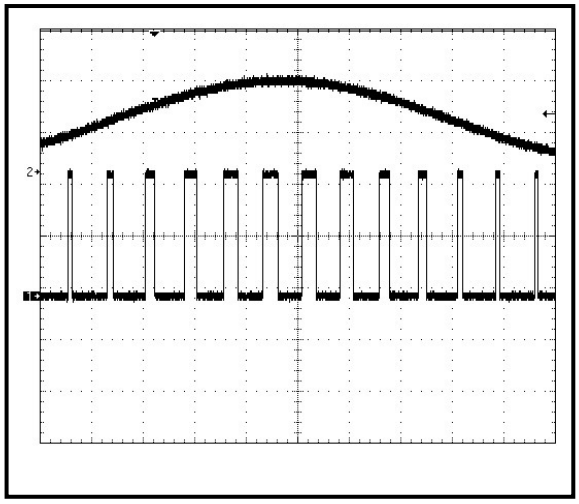


Figure 4. Pulse width modulator output waveforms: modulating signal (above) and output signal (below).

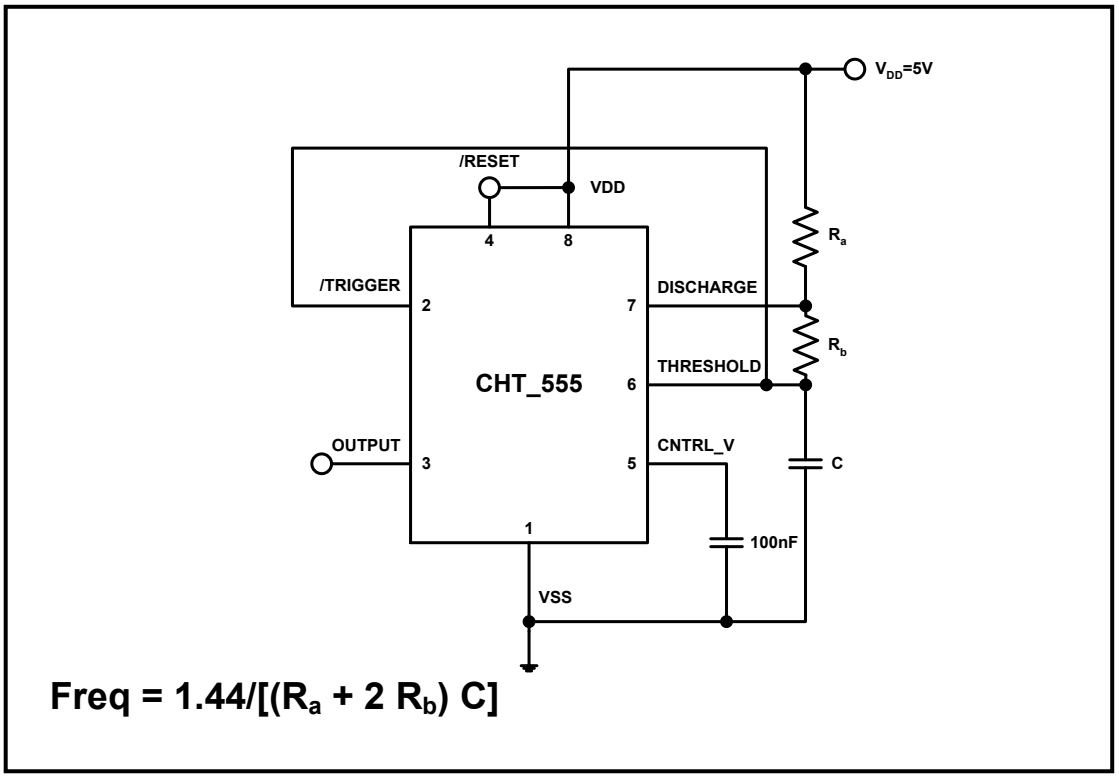


Figure 5. Astable configuration.

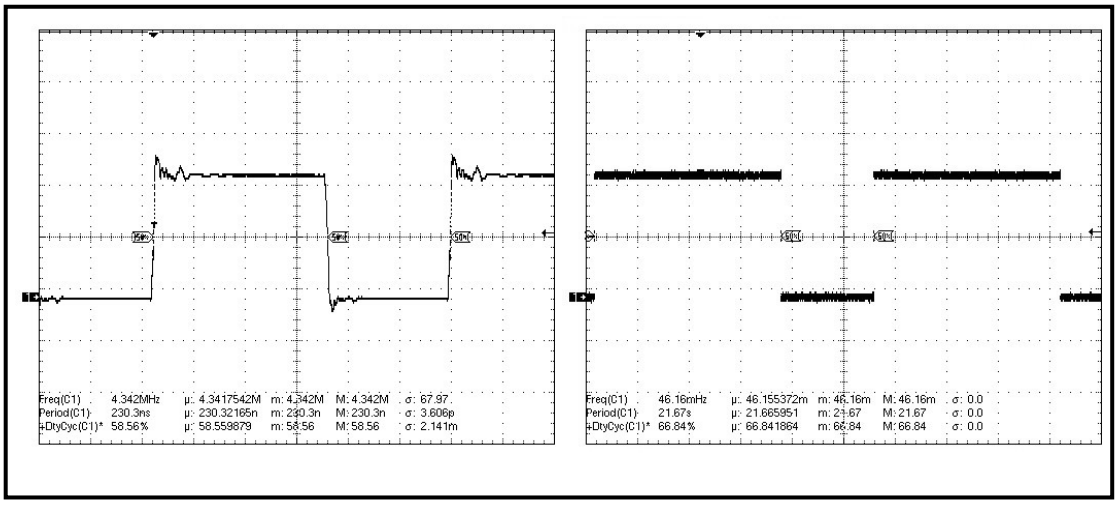


Figure 6. Astable output waveforms: 4.32MHz (left) and 46.2mHz (right).

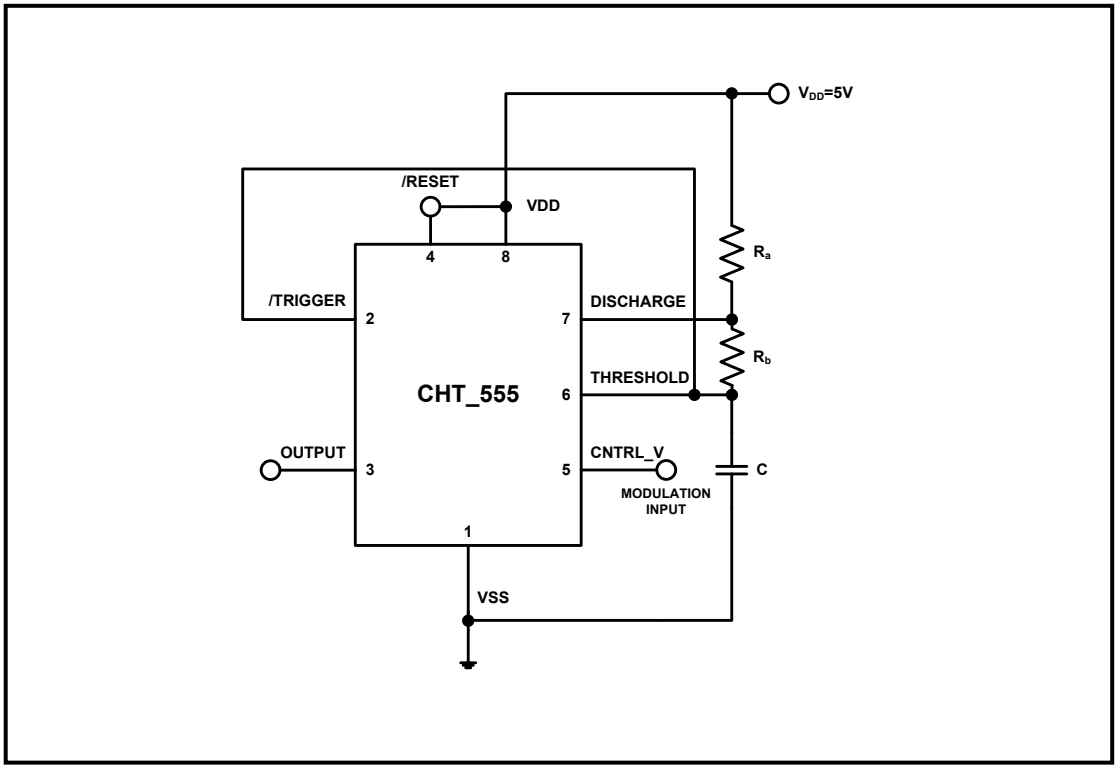


Figure 7. Pulse position modulator configuration.

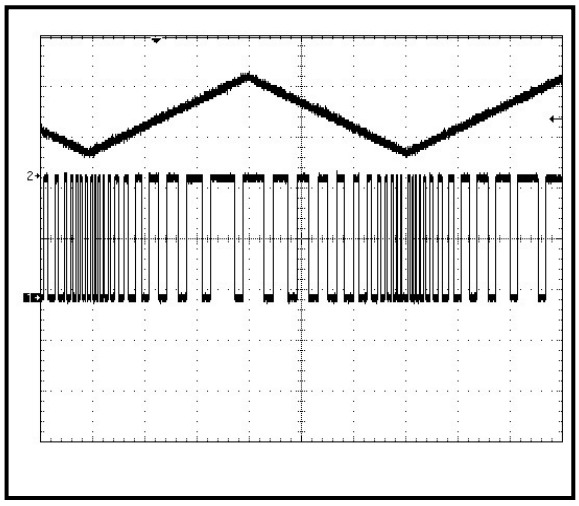
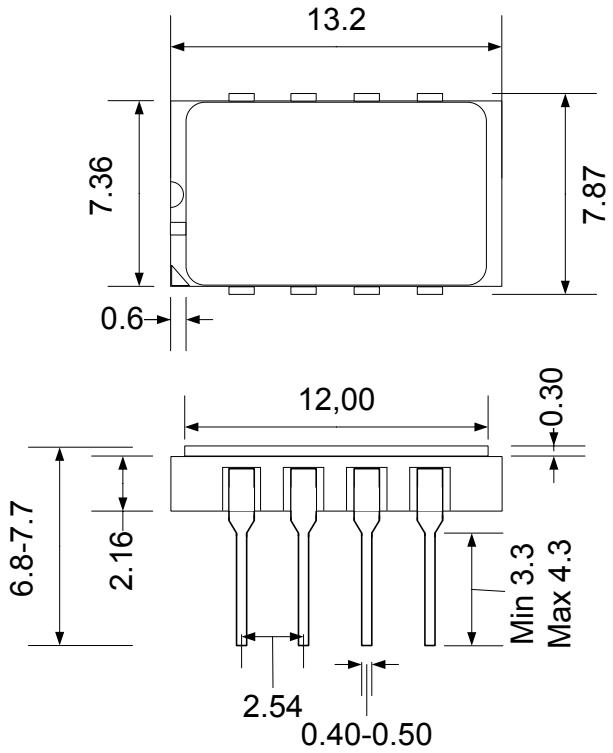


Figure 8. Pulse position modulator output waveforms: modulating signal (above) and output signal (below).

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.

Headquarters and contact EMEA:	CISSOID S.A. – Rue Francqui, 3 – 1435 Mont Saint Guibert - Belgium T : +32 10 48 92 10 – F : +32 10 88 98 75 Email : sales@cissoid.com
Sales Representatives:	**Visit our website: http://www.cissoid.com**

Disclaimer

Neither CISSOID, nor any of its directors, employees or affiliates make any representations or extend any warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, and the absence of latent or other defects, whether or not discoverable. In no event shall CISSOID, its directors, employees and affiliates be liable for direct, indirect, special, incidental or consequential damages of any kind arising out of the use of its circuits and their documentation, even if they have been advised of the possibility of such a damage. The circuits are provided "as is". CISSOID has no obligation to provide maintenance, support, updates, or modifications.