HLF7555

CMOS Multifunctional time base circuit

1. Summary

HLF7555 RC time base circuit is a RC time base circuit designed and manufactured by CMOS technology. It has more important performance than the bipolar time base circuit (NE555). At the same time, it can directly replace NE555 in most applications; These improved parameters include low power consumption, wide power supply voltage range, low threshold voltage, low input current of trigger and reset port, no pulse current of NE555 in the process of output conversion, higher working frequency, and stable operation of voltage control (pin 5) without decoupling.

In particular, hlf7555 has the ability to generate precise time delay or frequency control. In the single trigger mode, the pulse width of the circuit is precisely controlled by a group of external resistors and capacitors. When used as an oscillator, the oscillation frequency and duty cycle of the oscillator can be precisely controlled by two external resistors and a capacitor. Unlike NE555, the voltage control terminal of hlf7555 does not need to be connected with capacitor to decouple. The trigger and reset of hlf7555 are both negative pulses. The input and output current of the inverter can directly drive the TTL load and CMOS load.

2. Characteristic

- It can replace NE555 in most applications and is fully compatible with hlf7555.
- Low power supply current: 60ua
- Very low input current
- High speed operation: 1MHz
- Power supply voltage range: 2 ~ 18V
- Temperature stability: 0.005 ‰ (25 ℃)
- Normal restart function: in the process of output conversion, there will be no peak of power supply current.
- The input impedance of NE555 is higher than that of NE555, so a larger RC constant can be used to obtain a longer time timing parameter.
- The timing ranges from milliseconds to hours.
- It can work in non steady state and monostable state.
- The duty cycle is adjustable.
- High output source / drain current to drive TTL / CMOS

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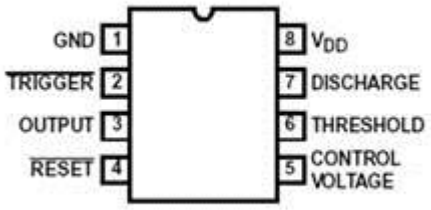
- The output only needs very low compensation, high level and low level
- Lead free (RoHS compliant)
- Package form: sop8, DIP8

3. Application

- Precise timer
- Pulse generator
- Continuous timer
- Time delay generator
- Pulse width modulator
- Pulse position modulator
- Pulse loss detector

4. Pin diagram



DIP8 / sop8 package

5. Limit parameter

Parameters	Numerical value	Company
Supply voltage	18	V
Input voltage (on, control voltage, limit, restart)	（V+）+0.3～GND-0.3	V
Output current	100	mA
Operating temperature range	-55～125	℃

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6. Electrical parameters

project	Symbol	Conditions	TA=25℃			-55~125℃			Company
			Minimum value	Typical value	Maximum	Minimum value	Typical value	Maximum	
Static power supply current	IDD	VDD=5V		40	200			300	uA
		VDD=15V		60	300			300	
Monostable timing accuracy		RA = 10k，C = 0.1uF ，VDD = 5V		2					%
						858		1161	us
Temperature drift		VDD = 5V					150		ppm/℃
		VDD = 10V					200		
		VDD = 15V					250		
Power drift		VDD = 5 ~ 15V		0.5			0.5		%/V
Threshold voltage	VTH	VDD = 15	62	67	71	61		72	%VDD
Trigger voltage	VTRIG	VDD = 15	28	32	36	27		37	%VDD
Trigger current	ITRIG	VDD = 15V			10			50	nA
Threshold current	ITH	VDD = 15V			10			50	nA
Control voltage	VCV	VDD = 15V	62	67	71	61		72	%VDD
Restart voltage	VRST	VDD = 2 ~ 15V	0.4		1.0	0.2		1.2	V

Restart current	IRST	VDD = 15V			10			50	nA
DISCHARGE Leakage current	IDIS	VDD = 15V			10			50	nA
Output voltage	VOL	VDD = 15V，ISINK = 20mA		0.4	1.0			1.25	V
		VDD = 5V，ISINK = 3.2mA		0.2	0.4			0.5	
	VOH	VDD = 15V，ISOURCE = 0.8mA	14.3	14.6		14.2			

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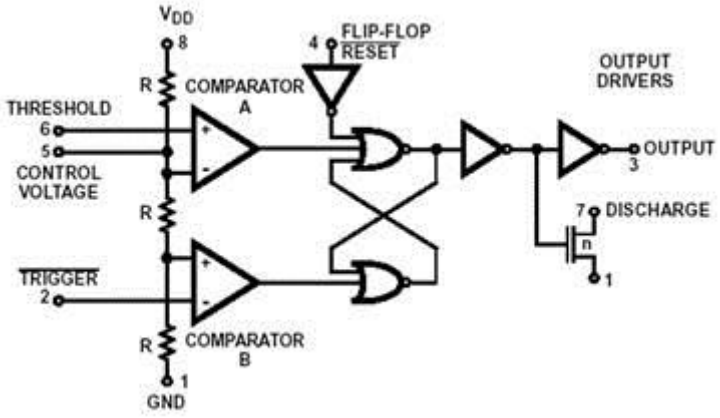
		VDD = 5V，ISOURCE = 0.8mA	4.0	4.3		3.8			
DISCHARGE Output voltage	VDIS	VDD = 5V，ISINK = 15mA		0.2	0.4			0.6	V
		VDD = 15V，ISINK = 15mA						0.4	
Supply voltage	VDD	Functional operation	2.0		18.0	3.0		16.0	V
Output rise time	tR	RL = 10M，CL =		75					ns

		10pF ， VDD = 5V							
Output down time	tF	RL = 10M ， CL = 10pF ， VDD = 5V		75					ns
Oscillator frequency	fMAX	VDD = 5V ， RA = 470Ω，RB = 270 Ω，C = 200pF		1					MHz

7. Logic diagram



This figure is a simplified one, all unused inputs are connected to low level.

8. Truth table

Threshold voltage	Trigger voltage	RESET	OUTPUT	Discharge switch
Don't think about it	Don’ t think about it	LOW	LOW	ON

>2/3(V+)	>1/3(V+)	HIGH	LOW	ON

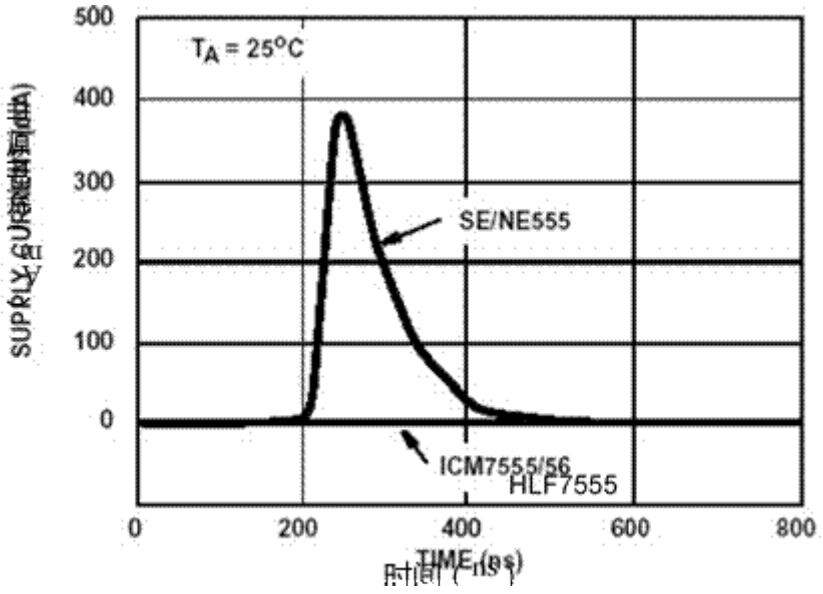
<2/3(V+)	>1/3(V+)	HIGH	Keep	Keep
Don’ t think about it	<1/3(V+)	HIGH	HIGH	OFF

Note: RESET will control all inputs; TRIGGER has higher priority than threshold.

9. Application description

Hlf7555 driver can directly replace NE555 driver in most applications. However, when hlf7555 is used, the peripherals will not work

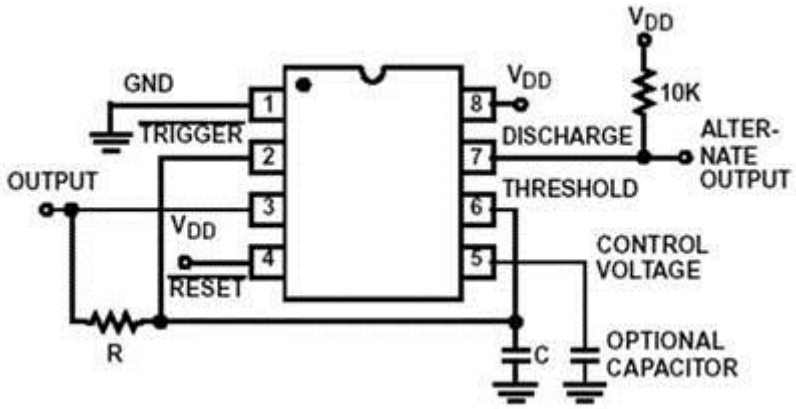
Because the NE555 driver with bipolar technology will produce large short-circuit power supply current when driving, which may reduce the linearity of power supply voltage, so a better capacitor must be used to improve it. The GC7555 driver will not produce this phenomenon. See the waveform diagram below for details.



The peak current of hlf7555 is only 2-3ma, not 300-400ma of NE555, so decoupling capacitor is not needed. In addition, in most applications, due to the large input impedance of the built-in CMOS comparator, the decoupling capacitor is not needed at the control voltage input. Therefore, in most applications, hlf7555 can save two capacitors.

10. Design of power supply

Although the power supply current consumed by hlf7555 is very small, the power supply current of the whole system may be very high, unless a timing element with high impedance is selected in the design. Therefore, in the case of a certain timing constant, high resistance and low capacitance should be selected. As shown in Fig. 2a and Fig. 2B.



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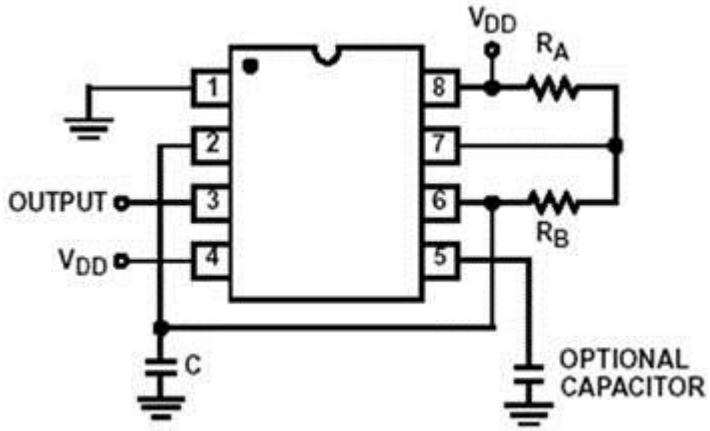
plication figure 2A



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plication figure 2B

- The output driver consists of a CMOS inverter, which can drive most TTL and CMOS logic circuits. If it is used to drive CMOS,

Within the allowable supply voltage range, the output voltage swing is equal to the supply voltage. When the power supply voltage is above 4.5V,

Hlf7555 can drive at least two standard TTL loads.

- No steady state operation

When the hlf755is connected to the multi frequency oscillator shown in Fig. 2a, the output swing can reach the whole supply voltage range, forming an accurate square wave with 50% duty cycle (the conversion point and output swing are symmetrical).In the range of 5 ~ 15V supply voltage, the frequency change rate is not more than 1%.

$f=1/1.4R_C$

The timer can also be connected as shown in Fig. 2B. In this circuit, the frequency is:

$f=1.44/(R+2R)C_{AB}$

The value of RA and Rb determines the output waveform

$D = (R+R)/(R+2R)_{ABAB}$

- Monostable operation

In this mode, the timer function is used according to the single pulse trigger mode, as shown in Figure 3.First, the external capacitor is forced to discharge by a transistor inside the timer. In the application, a negative pulse is added to the trigger pin (Pin2). At this time, the flip-flop inside the chip is set, causing the circuit short circuiting the external capacitor to be released, and driving the output pin (PIN3) to the high level.

The voltage at both ends of the capacitor begins to increase exponentially according to the time constant T = RC. When the voltage at both ends of the capacitor reaches 2 / 3V +, the comparator resets the internal trigger, causing the capacitor to be quickly

discharged and the driver output to return to the low level state. Before the output changes back to the low level, the trigger must first change back to the high level.

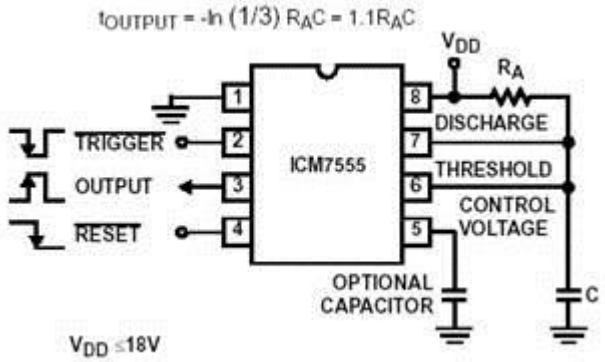

Figure 3

- CONTROL VOLTAGE

The control voltage port allows the control of two jump voltages to control the comparators in the threshold and trigger terminals. This provides the possibility to modulate the frequency of the oscillator or even disable the operation of the oscillator by applying a voltage to the control voltage port in the non steady state mode. In monostable mode, the delay time can be changed by changing the voltage of the control voltage pin.

- RESET

The input jump voltage of reset pin is basically the same as that of standard bipolar circuit NE555, i.e. 0.6 ~ 0.7V. It shows very high input impedance in the whole working range of power supply voltage.Hlf7555 is much better than NE555 in reset operation mode improvement.

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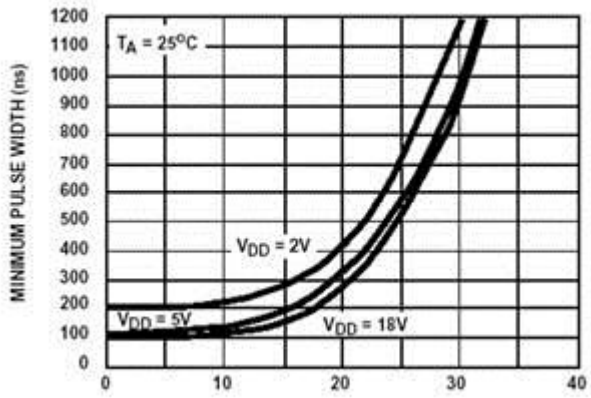
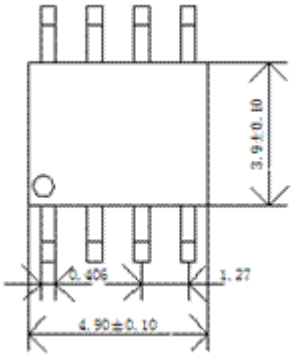
11. Typical waveform

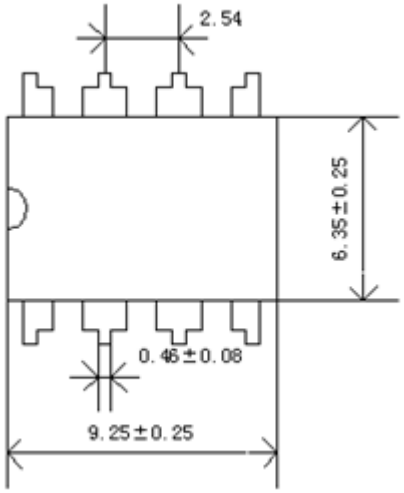


12. Package dimension drawing

Sop8l package dimension drawing:



Dip8l package dimension drawing:



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13. Ordering Information

Product model	Mode of supply
7555	Dip 8-pin package, plastic tube, 50 pieces per tube
7555	Sop8 pin package, plastic tube, 100 pieces per tube

14. Document modification record

Change version	Change content (one item per line)	Change date & changed by
V11	Standard text format	Edited by anyh
V12	Add order information item	20130416 by anyh

15. document information

Created on: May 25, 2006