

### TIMER CIRCUIT

The NE555/SE555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillations. Additional terminals are provided for triggering or resetting if desired. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor.

For astable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor.

The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200 mA or drive TTL circuits.

- Timing from microseconds through hours.
- Operates in both astable and monostable modes.
- Adjustable duty cycle.
- High current output can source or sink 200 mA.
- Temperature stability of 0.005% per °C.

### TIMER CIRCUIT

#### CASES

CB-11



H SUFFIX  
METAL CAN

CB-98



DP SUFFIX  
PLASTIC PACKAGE  
DG SUFFIX  
CERDIP PACKAGE

CB-342



FP SUFFIX  
PLASTIC  
MICROPACKAGE

### ORDERING INFORMATION

Hi-Rel versions available - See chapter 14

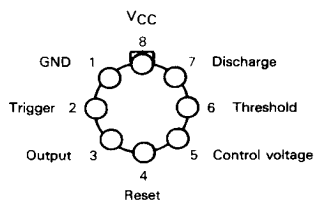
PART NUMBER	TEMPERATURE RANGE	PACKAGE			
		DP	DG	FP	H
NE555	0°C to + 70°C	•	•	•	•
SE555	-55°C to + 125°C	•	•	•	•
NE555I	-40°C to + 85°C	•	•	•	•

Examples : NE555DP, NE555IDG

### PIN ASSIGNMENTS

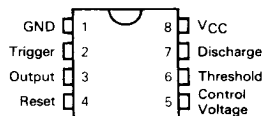
(Top views)

CB-11



CB-98

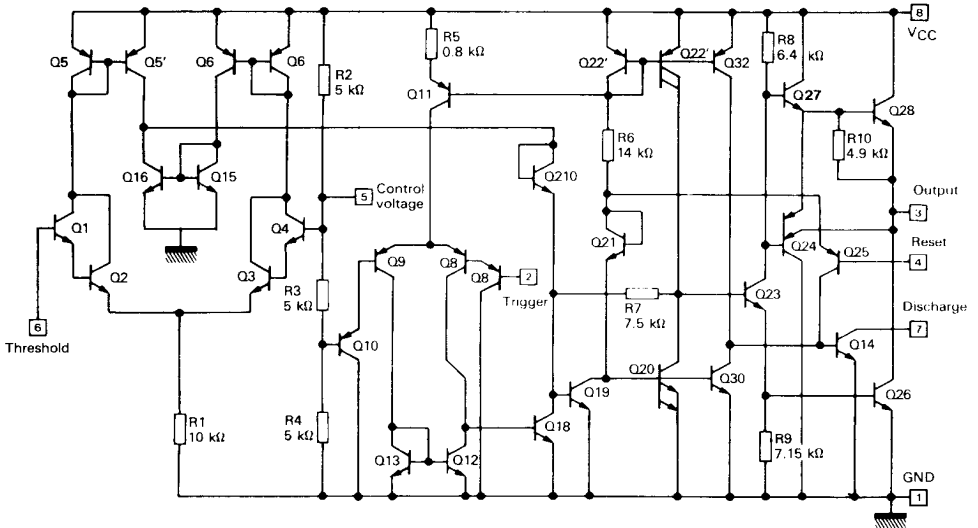
CB-342



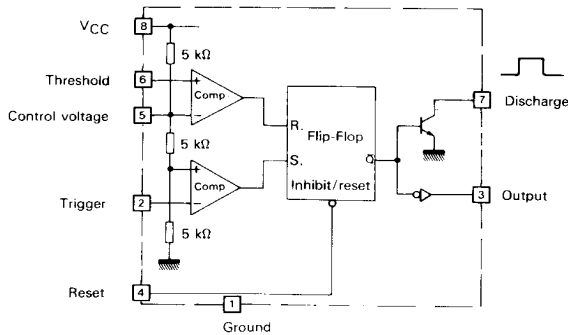
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Power supply voltage	V <sub>CC</sub>	18	V
Output current	I <sub>O</sub>	200	mA
Power dissipation	P <sub>tot</sub>	600	mW
Operating free-air temperature range	T <sub>oper</sub>	SE555	-55 to +125
		NE555	0 to +70
		NE555I	-40 to +85
Storage temperature range	T <sub>stg</sub>	-65 to +150	°C

**SCHEMATIC DIAGRAM**



**EQUIVALENT SCHEMATIC**



## ELECTRICAL CHARACTERISTICS

T<sub>amb</sub> = +25°C, V<sub>CC</sub> = +5 V to +15 V  
(Unless otherwise specified)

Characteristic	Symbol	SE555			NE555, NE555I			Unit
		Min	Typ	Max	Min	Typ	Max	
Supply voltage	V <sub>CC</sub>	4.5	—	18	4.5	—	16	V
Supply current (R <sub>L</sub> = ∞) - Note 1	I <sub>CC</sub>	—	—	—	—	—	—	mA
Low state V <sub>CC</sub> = +5 V		—	3	5	—	3	6	
V <sub>CC</sub> = +15 V		—	10	12	—	10	15	
High state V <sub>CC</sub> = +5 V		—	2	—	—	2	—	
Timing error (monostable) (R <sub>A</sub> = 1 to 100 kΩ, C = 0.1 μF)	—	—	—	—	—	—	—	% ppm/°C %/V
— Initial accuracy (Note 2)		—	0.5	2	—	1	—	
— Drift with temperature		—	30	100	—	50	—	
— Drift with supply voltage		—	0.05	0.2	—	0.1	—	
Timing error (astable) (R <sub>A</sub> , R <sub>B</sub> = 1 kΩ to 100 kΩ, C = 0.1 μF, V <sub>CC</sub> = +15 V)	—	—	—	—	—	—	—	% ppm/°C %/V
— Initial accuracy (Note 2)		—	1.5	—	—	2.25	—	
— Drift with temperature		—	90	—	—	150	—	
— Drift with supply voltage		—	0.15	—	—	0.3	—	
Control voltage level V <sub>CC</sub> = +15 V V <sub>CC</sub> = +5 V	V <sub>CL</sub>	9.6 2.9	10 3.33	10.4 3.8	9 2.6	10 3.33	11 4	V
Threshold voltage V <sub>CC</sub> = +15 V V <sub>CC</sub> = +5 V	V <sub>th</sub>	9.4 2.7	10 3.33	10.6 4	8.8 2.4	10 3.33	11.2 4.2	V
Threshold current - (Note 3)	I <sub>th</sub>	—	0.1	0.25	—	0.1	0.25	μA
Trigger voltage V <sub>CC</sub> = +15 V V <sub>CC</sub> = +5 V	V <sub>trig</sub>	4.8 1.45	5 1.67	5.2 1.9	4.5 1.1	5 1.67	5.5 2.2	V
Trigger current (V <sub>trig</sub> = 0 V)	I <sub>trig</sub>	—	0.5	0.9	—	0.5	2.0	μA
Reset voltage - (Note 4)	V <sub>reset</sub>	0.4	0.7	1	0.4	0.7	1	V
Reset current V <sub>reset</sub> = +0.4 V V <sub>reset</sub> = 0 V	I <sub>reset</sub>	—	0.1 0.4	0.4 1	—	0.1 0.4	0.4 1.5	mA
Low level output voltage V <sub>CC</sub> = +15 V, I <sub>O(sink)</sub> = 10 mA I <sub>O(sink)</sub> = 50 mA I <sub>O(sink)</sub> = 100 mA I <sub>O(sink)</sub> = 200 mA V <sub>CC</sub> = +5 V, I <sub>O(sink)</sub> = 8 mA I <sub>O(sink)</sub> = 5 mA	V <sub>OL</sub>	— — — — — — —	0.1 0.4 2.0 2.5 — 0.1 0.05	0.15 0.5 2.2 — 0.25 0.2	— — — — — — —	0.1 0.4 2.0 2.5 — 0.3 0.25	0.25 0.75 2.5 — — 0.4 0.35	
High level output voltage V <sub>CC</sub> = +15 V, I <sub>O(source)</sub> = 200 mA I <sub>O(source)</sub> = 100 mA V <sub>CC</sub> = +5 V, I <sub>O(source)</sub> = 100 mA	V <sub>OH</sub>	— 13.0 3	12.5 13.3 3.3	— — —	— 12.75 2.75	12.5 13.3 3.3	— — —	V
Discharge pin leakage current (Output high)	I <sub>dis(off)</sub>	—	1	100	—	1	100	nA
Discharge pin saturation voltage (Output low) - Note 5 V <sub>CC</sub> = +15 V, I <sub>dis</sub> = 15 mA V <sub>CC</sub> = +4.5 V, I <sub>dis</sub> = 4.5 mA	V <sub>dis(sat)</sub>	—	150 70	— 100	— —	180 80	— 200	mV
Output rise time	t <sub>r</sub>	—	100	200	—	100	300	ns
Output fall time	t <sub>f</sub>	—	100	200	—	100	300	

**Note 1 :** Supply current when output is high is typically 1 mA less.

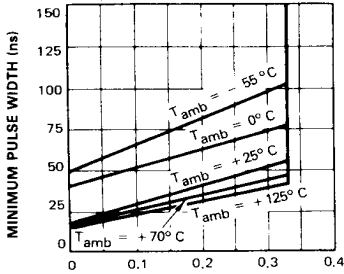
**Note 2 :** Tested at V<sub>CC</sub> = +5 V and V<sub>CC</sub> = +15 V.

**Note 3 :** This will determine the maximum value of R<sub>A</sub> + R<sub>B</sub> for +15 V operation, the max total is R = 20 MΩ.

**Note 4 :** Specified with trigger input high.

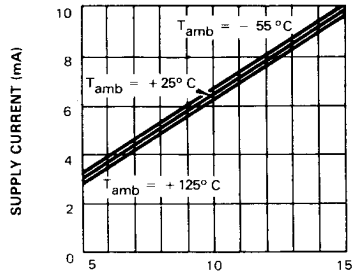
**Note 5 :** No protection against excessive pin 7 current is necessary, providing the package dissipation rating will not be exceeded.

**MINIMUM PULSE WIDTH REQUIRED FOR TRIGGERING**



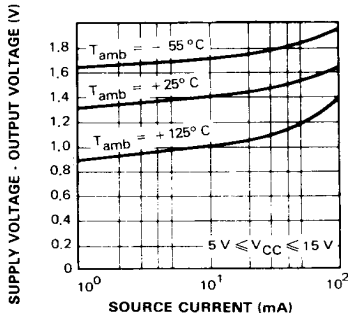
LOWEST VOLTAGE LEVEL OF TRIGGER PULSE (x V<sub>CC</sub>)

**SUPPLY CURRENT vs SUPPLY VOLTAGE**

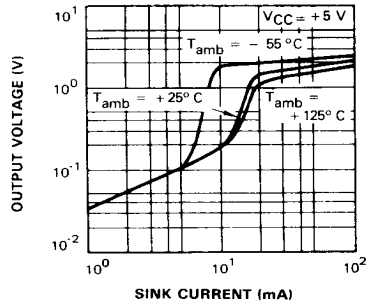


SUPPLY VOLTAGE (V)

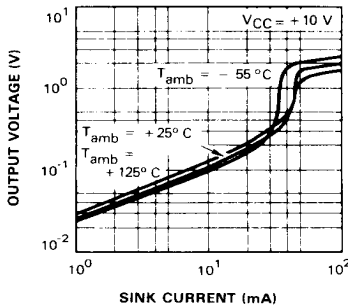
**HIGH OUTPUT VOLTAGE vs OUTPUT SINK CURRENT**



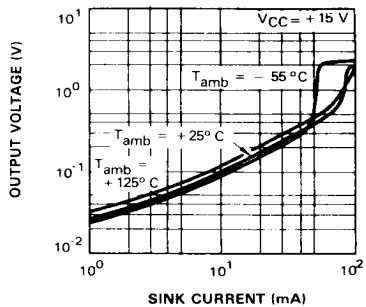
**LOW OUTPUT VOLTAGE vs OUTPUT SINK CURRENT**



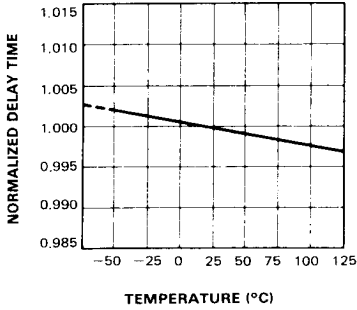
**LOW OUTPUT VOLTAGE vs OUTPUT SOURCE CURRENT**



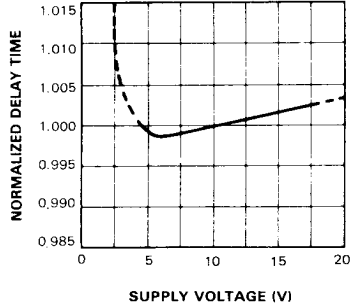
**LOW OUTPUT VOLTAGE vs OUTPUT SINK CURRENT**



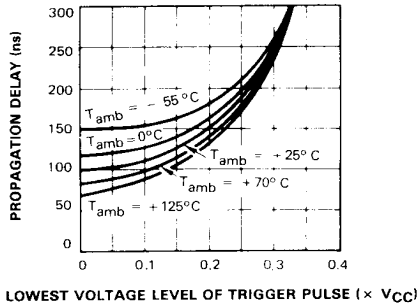
DELAY TIME vs TEMPERATURE



DELAY TIME vs SUPPLY VOLTAGE

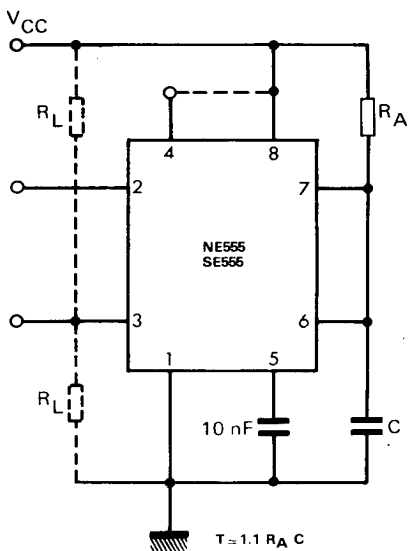


PROPAGATION DELAY vs VOLTAGE LEVEL OF TRIGGER PULSE

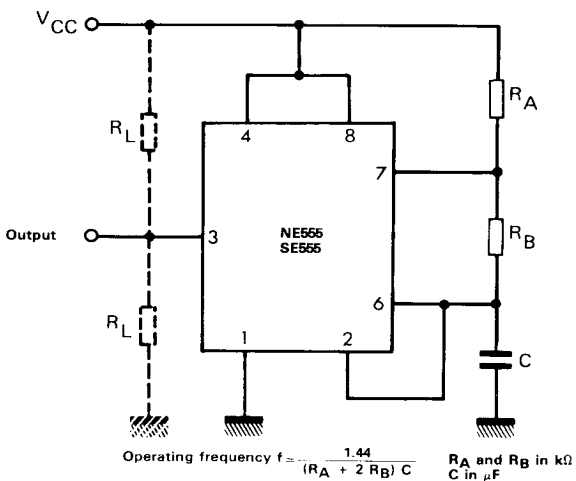


## TYPICAL CHARACTERISTICS

## MONOSTABLE OPERATION



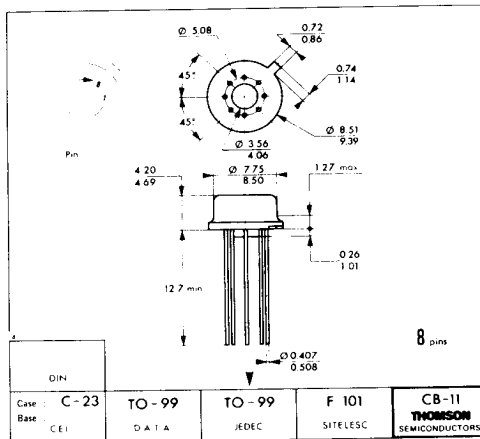
## ASTABLE OPERATION



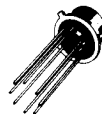
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**THOMSON SEMICONDUCTORS**

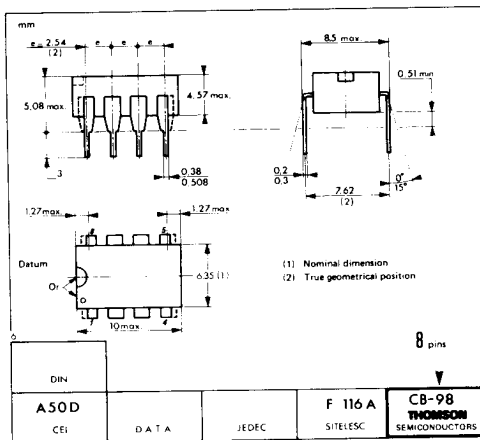
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CB-11  
(TO-99)



H SUFFIX  
METAL CAN



CB-98

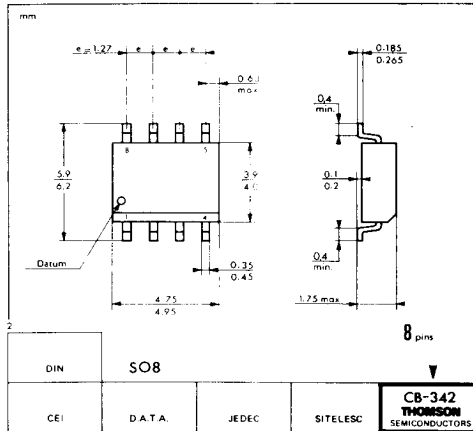


DP SUFFIX  
PLASTIC PACKAGE  
DG SUFFIX  
CERDIP PACKAGE

CB-342



FP SUFFIX  
PLASTIC  
MICROPACKAGE



These specifications are subject to change without notice.  
Please inquire with our sales offices about the availability of the different packages.