GENERAL DESCRIPTION

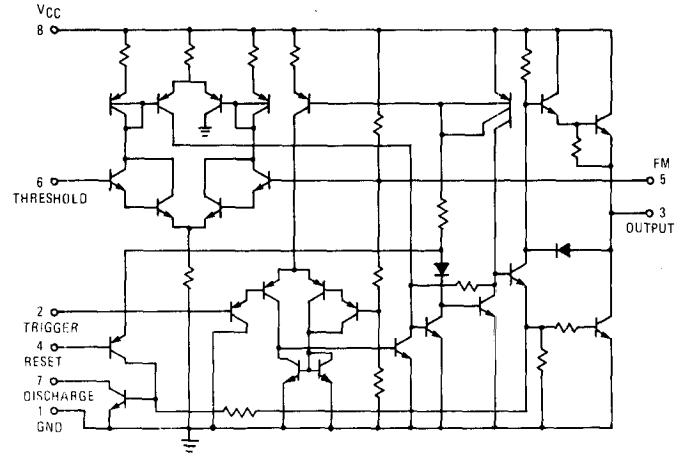
The RC555 and RM555 monolithic timing circuits are highly stable controllers capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts: a resistor and a capacitor. For operation as an oscillator, both the free running frequency and the duty cycle are accurately controlled by two external resistors and a capacitor.

Terminals are provided for triggering and resetting. The circuit will trigger and reset on falling waveforms. The output can source or sink up to 200mA or drive TTL circuits.

DESIGN FEATURES

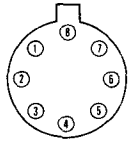
- Timing From Microseconds Through Hours
- Operates in Both Astable and Monostable Modes
- Adjustable Duty Cycle
- Output Drives TTL
- High Current Output Can Source or Sink 200mA
- Temperature Stability of 0.005%/°C
- Normally On and Normally Off Output

SCHEMATIC DIAGRAM



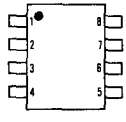
CONNECTION INFORMATION

TE Metal Can Package
(Top View)



Order Part Nos.:
RC555T, RM555T

DE and NB Dual In-line Packages
(Top View)



Order Part Nos.:
RC555NB, RV555NB
RC555DE, RV555DE, RM555DE

PIN	FUNCTION
1	GROUND
2	TRIGGER
3	OUTPUT
4	RESET
5	CONTROL VOLTAGE
6	THRESHOLD
7	DISCHARGE
8	V_{CC}

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ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... +18V	Operating Temperature Range
Power Dissipation 600mW	RC555 ..... 0°C to +70°C
Storage Temperature Range ..... −65°C to +150°C	RV555 ..... −40°C to +85°C
Lead Temperature (Soldering, 60s) ..... +300°C	RM555 ..... −55°C to +125°C

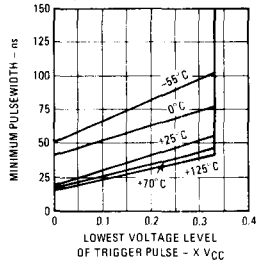
ELECTRICAL CHARACTERISTICS (V_{CC} = +5V to +15V, T_A = 25°C unless otherwise specified)

PARAMETER	CONDITIONS	RM555			RV/RC555			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Supply Voltage		4.5		18	4.5		16	V
Supply Current	V_{CC} = 5V, R_L = ∞		3	5		3	6	mA
	V_{CC} = 15V, R_L = ∞		10	12		10	15	mA
	Low State, (Note 1)							
Timing Error	R_A, R_B = 1kΩ to 100kΩ							
	C = 0.1μF (Note 2)							
Initial Accuracy			0.5	2		1		%
Drift with Temperature			30	100		50.1		ppm/°C
Drift with Supply Voltage			0.05	0.2		0.1		%/Volt
Threshold Voltage			2/3			2/3		x V_{CC}
Trigger Voltage	V_{CC} = 15V	4.8	5	5.2		5		V
	V_{CC} = 5V	1.45	1.67	1.9		1.67		V
Trigger Current			0.5			0.5		μA
Reset Voltage		0.4	0.7	1.0	0.4	0.7	1.0	V
Reset Current			0.1			0.1		mA
Threshold Current	(Note 3)		0.1	0.25		0.1	0.25	μA
Control Voltage Level	V_{CC} = 15V	9.6	10	10.4	9.0	10	11	V
	V_{CC} = 5V	2.9	3.33	3.8	2.6	3.33	4	V
Output Voltage Drop (low)	V_{CC} = 15V							
	I_{SINK} = 10mA		0.1	0.15		0.1	0.25	V
	I_{SINK} = 50mA		0.4	0.5		0.4	0.75	V
	I_{SINK} = 100mA		2	2.2		2	2.5	V
	I_{SINK} = 200mA		2.5			2.5		
	V_{CC} = 5V							
	I_{SINK} = 8mA		0.1	0.25				V
	I_{SINK} = 5mA					0.25	0.35	
Output Voltage Drop (high)	I_{SOURCE} = 200mA							
	V_{CC} = 15V		12.5			12.5		V
	I_{SOURCE} = 100mA							
	V_{CC} = 15V	13	13.3		12.75	13.3		V
	V_{CC} = 5V	3	3.3		2.75	3.3		V
Rise Time of Output			100			100		ns
Fall Time of Output			100			100		ns

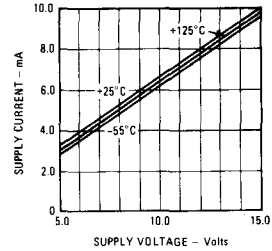
NOTES:
1. Supply current when output high typically 1mA less.
2. Tested at V_{CC} = 5V and V_{CC} = 15V.
3. This will determine the maximum value of R_A + R_B. For 15V operation, the max total R = 20 megohm.

TYPICAL ELECTRICAL DATA

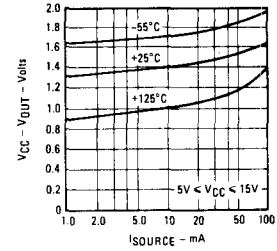
Minimum Pulse Width Required for Triggering



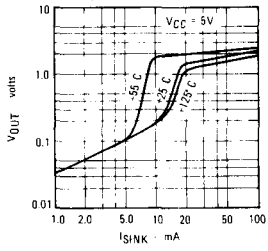
Supply Current vs Supply Voltage



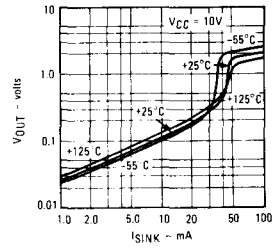
High Output Voltage vs Output Source Current



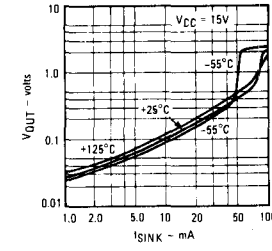
Low Output Voltage vs Output Sink Current



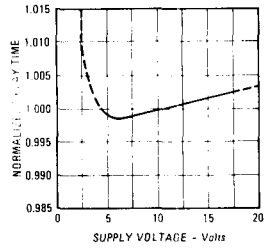
Low Output Voltage vs Output Sink Current



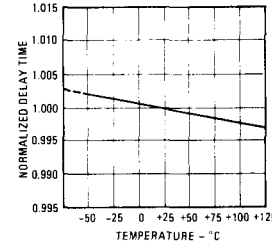
Low Output Voltage vs Output Sink Current



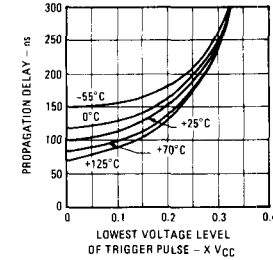
Delay Time vs Supply Voltage



Delay Time vs Temperature



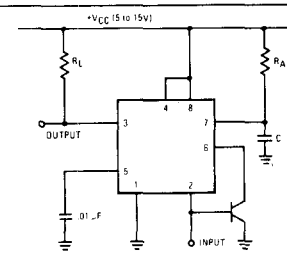
Propagation Delay vs Voltage Level of Trigger Pulse



TYPICAL APPLICATIONS

Missing Pulse Detector

With the RC555/RM555 connected as shown, the timing cycle will be continuously reset by the input pulse train. A change in frequency, or a missing pulse, allows the timing cycle to go to completion and change the output level. For proper operation the time delay should be set slightly longer than the normal time between pulses.



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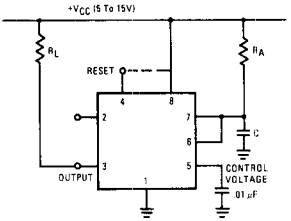
TYPICAL APPLICATIONS (Cont.)

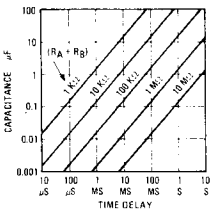
Monostable Operation

In this mode, the timer functions as a one-shot. The external capacitor is initially held discharged by a transistor internal to the timer. Applying a negative trigger pulse to Pin 2 sets the flip-flop, driving the output high and releasing the short-circuit across the external capacitor. The voltage across the capacitor increases with time constant $r = R_AC$ to 2/3 V_{CC}, where the comparator resets the flip-flop and discharges the external capacitor. The output is now in the low state.



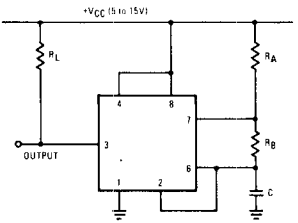
Circuit triggering takes place when the negative-going trigger pulse reaches 1/3V_{CC} and the circuit stays in the output high state until the set time elapses. The time the output remains in the high state is $1.1R_AC$ and can be determined by the graph. A negative pulse applied to Pin 4 (reset) during the timing cycle will discharge the external capacitor and start the cycle over again beginning on the positive-going edge of the reset pulse. If reset function is not used, Pin 4 should be connected to V_{CC} to avoid false resetting.

Time Delay vs R_A, R_B and C



Free Running Operation

With the circuit connected as shown, it will trigger itself and free run as a multivibrator. The external capacitor charges through R_A and R_B and discharges through R_B only. Thus the duty cycle is set by the ratio of these two resistors, and the capacitor charges and discharges between 1/3V_{CC} and 2/3V_{CC}. Charge and discharge times, and therefore frequency, are independent of supply voltage. The free running frequency versus R_A, R_B, and C is shown in the graph.



Free Running Frequency vs R_A, R_B and C