Dual timer

556-1

FEATURES

- Turn-off time less than 2µs
- Max. operating frequency greater than 500kHz
- Timing from microseconds to hours
- Replaces two 555 timers
- Operates in both astable and monostable modes
- High output current
- Adjustable duty cycle
- TTL compatible
- Temperature stability of 0.005% per °C

APPLICATIONS

- Precision timing
- Sequential timing
- Pulse shaping
- Pulse generator
- Missing pulse detector
- Tone burst generator
- Pulse width modulation
- Time delay generator
- Frequency division
- Pulse position modulation
- Touch tone encoder

DESCRIPTION

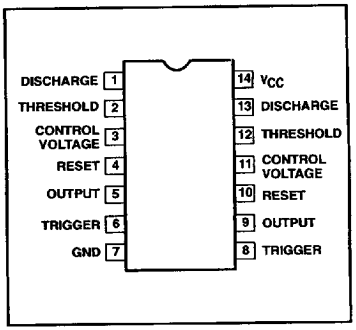
The 556-1 Dual Monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. The 556-1 is a dual 555. Timing is provided by an external resistor and capacitor for each timing function. The two timers operate independently of each other, sharing only V_{CC} and ground. The circuits may be triggered and reset on falling waveforms. The output structures may sink or source 200mA.

TYPICAL APPLICATIONS

One feature of the dual timer is that by utilizing both halves it is possible to obtain sequential timing. By connecting the output of the first half to the input of the second half via a 0.001µfd coupling capacitor sequential timing may be obtained. Delay t1 is determined by the first half and t2 by the second half delay.

The first half of the timer is started by momentarily connecting Pin 6 to ground. When it is timed out (determined by 1.1R1C1) the second half begins. Its duration is determined by 1.1R2C2.

PIN CONFIGURATION



ORDERING INFORMATION

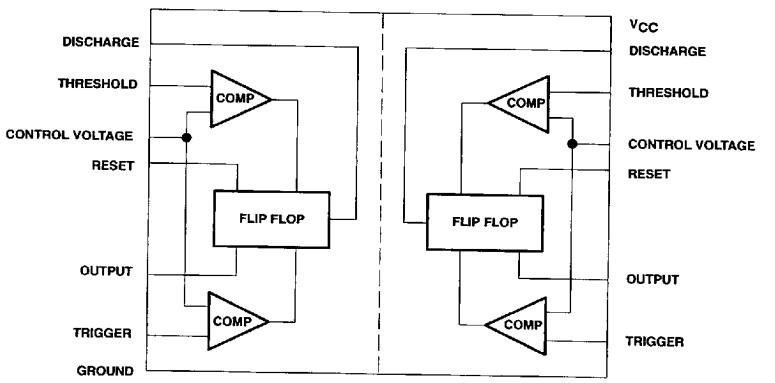
DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
14-Pin Ceramic DIP	556-1/BCA	GDIP1-T14

* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING[1]	UNIT
V_{CC}	Supply voltage	+18	V
P_D	Power dissipation	600	mW
T_{STG}	Storage temperature range	-65 to +150	°C

BLOCK DIAGRAM



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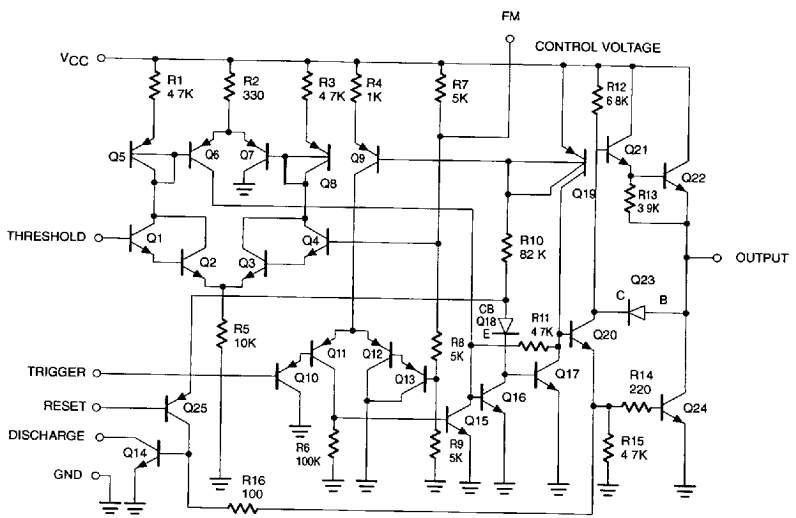
EQUIVALENT SCHEMATIC (Shown for One Circuit Only)



DC ELECTRICAL CHARACTERISTICS

T_{amb} = 25°C, V_{CC} = +5V to +15V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	T_{amb} = +25°C			T_{amb} = -55°C, +125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{CC}	Supply voltage		4.5		18	4.5		18	V
I_{CC}	Supply current (low state)[2]	V_{CC} = +5V, R_L = ∞ V_{CC} = +15V, R_L = ∞		6 20	10 24			12 28	mA mA
t_M $\Delta t_M/\Delta T$ $\Delta t_M/\Delta V_S$	Timing error (monostable) Initial accuracy[3] Drift with temperature[7, 10] Drift with supply voltage	R_A = 2KΩ to 100KΩ C = 0.1µF T = 1.1 RC		0.5 0.05	2.0 0.2			2.5 100 0.25	% ppm/°C %/V
t_A $\Delta t_A/\Delta T$ $\Delta t_A/\Delta V_S$	Timing error (astable) Initial accuracy[3] Drift with temperature[7] Drift with supply voltage[9]	R_A, R_B = 1kΩ to 100kΩ C = 0.1µF V_{CC} = +15V		4 0.15	6 0.6			10 500 1.5	% ppm/°C %/V
V_C	Control voltage level	V_{CC} = +15V V_{CC} = +5V	9.6 2.9	10.0 3.33	10.4 3.8	9.6 2.9		10.4 3.8	V V
V_{TH}	Threshold voltage	V_{CC} = +15V V_{CC} = +5V	9.4 2.7	10.0 3.33	10.6 4.0	9.4 2.7		10.6 4.0	V V
I_{TH}	Threshold current[4]	V_{TH} = 10.6V		0.03	0.25			0.35	µA
V_{TRIG} I_{TRIG}	Trigger voltage Trigger current	V_{CC} = +15V V_{CC} = +5V V_{TRIG} = 0V	4.8 1.45	5.0 1.67 0.5	5.2 1.9 0.9	4.5 1.5		5.5 2.2 2.0	V V µA
V_{RESET} I_{RESET}	Reset voltage[5] Reset current	 V_{RESET} = 0.4V	0.3	0.7 -0.1	1.0 -0.4	0.1		1.3 -1.6	V mA
V_{OL}	Output voltage (low)	V_{CC} = +15V I_{SINK} = 10mA I_{SINK} = 50mA I_{SINK} = 100mA		0.1 0.4 0.8	0.15 0.5 1.2			0.25 0.70 1.6	V V V
V_{OL}	Output voltage (low)	V_{CC} = +5V I_{SINK} = 8mA I_{SINK} = 5mA		0.1 0.05	0.2 0.15			0.30 0.20	V V
V_{OH}	Output voltage (high)	V_{CC} = +15V I_{SOURCE} = -100mA V_{CC} = +5V I_{SOURCE} = -100mA	13.0 3.0	13.3 3.3		12.5 2.6			V V
I_D	Discharge leakage current			20	100			500	nA
Δt_D $\Delta t_D/\Delta T$ $\Delta t_D/\Delta V_S$	Matching characteristics[7, 8] Initial accuracy[3, 7] Drift with temperature[7] Drift with supply voltage[7]			0.5 0.1	1.0 0.2		10		% ppm/°C %/V

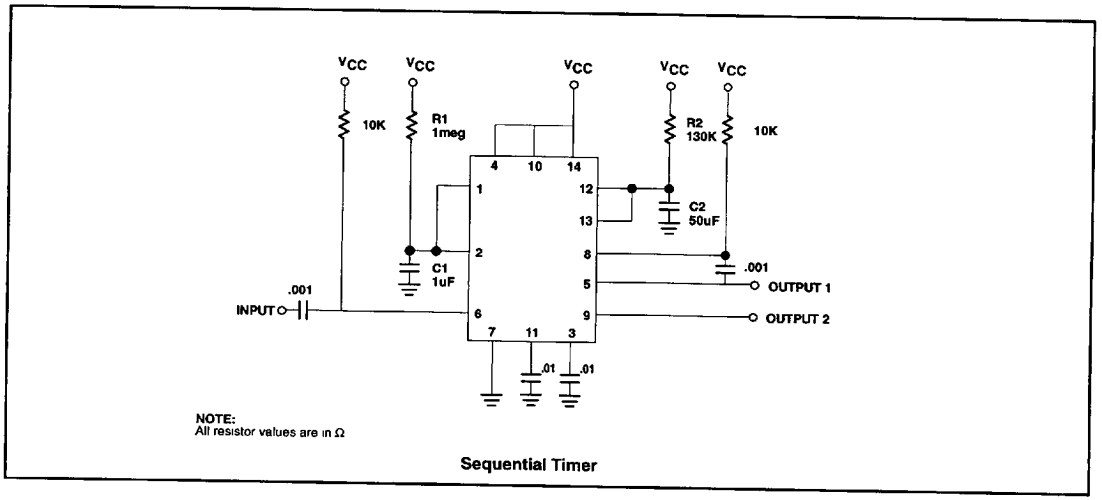
AC ELECTRICAL CHARACTERISTICS

V_{CC} = +5V to +15V, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	T_{amb} = +25°C			T_{amb} = -55°C, +125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t_{OFF}	Turn-off time[6, 7]	$V_{RESET} = V_{CC}$		0.5	2.0				µs
t_R t_F	Rise time of output[7] Fall time of output[7]			100 100	200 200				ns ns

NOTES:

1. Operation beyond the limits in this table may impair the useful life of the device.
2. Supply current when output is high is typically 1.0mA less.
3. Tested at V_{CC} = 5V and V_{CC} = 15V.
4. This will determine the max value of $R_A + R_B$. For 15V operation, the max total R = 10MΩ, and for 5V operation, the max total R = 3.4mΩ.
5. Specified with trigger input high.
6. Time measured from a positive going input pulse from 0 to 0.4 V_{CC} into the threshold to the drop from high to low of the output. Trigger is tied to threshold.
7. This parameter is guaranteed, but not tested.
8. Matching characteristics refer to the difference between performance characteristics for each timer section in the monostable mode.
9. Testing performed at $R_A = R_B = 100k\Omega$.
10. Testing performed at $R_A = 100k\Omega$ only.



Sequential Timer

TYPICAL PERFORMANCE CHARACTERISTICS