

DUAL TIMER

SA/SE/NE556/SA/SE/NE556-1/SE556-1C

DESCRIPTION

Both the 556 and 556-1 Dual Monolithic timing circuits are highly stable controllers capable of producing accurate time delays or oscillation. The 556 and 556-1 are 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 200 mA.

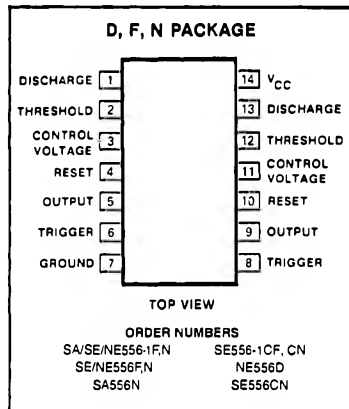
APPLICATIONS

- Precision timing
- Sequential timing
- Pulse shaping
- Pulse generator
- Missing pulse detector
- Tone burst generator
- Pulse width modulation
- Time delay generator
- Frequency division
- Industrial controls
- Pulse position modulation
- Appliance timing
- Traffic light control
- Touch tone encoder

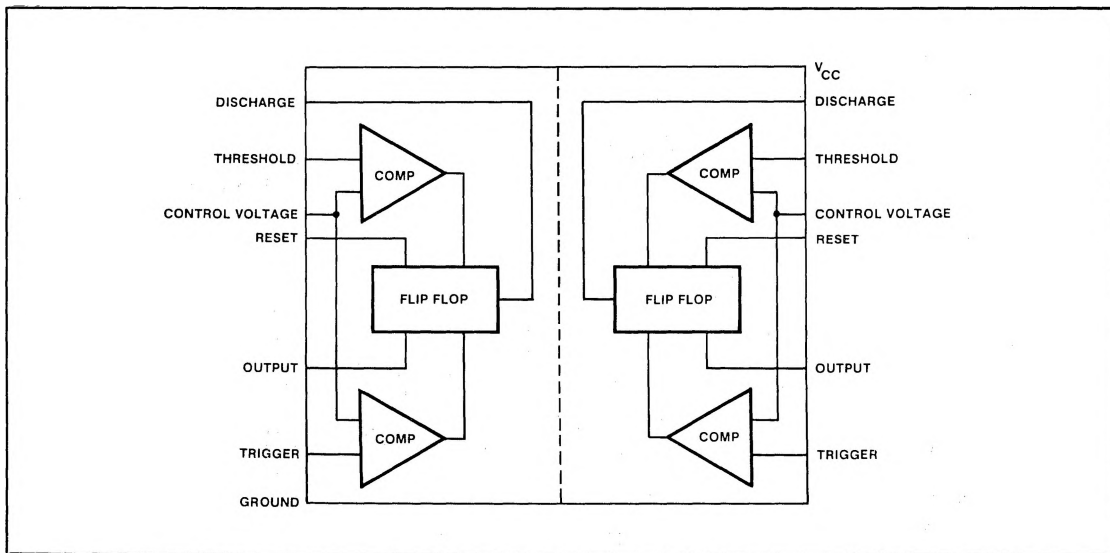
FEATURES

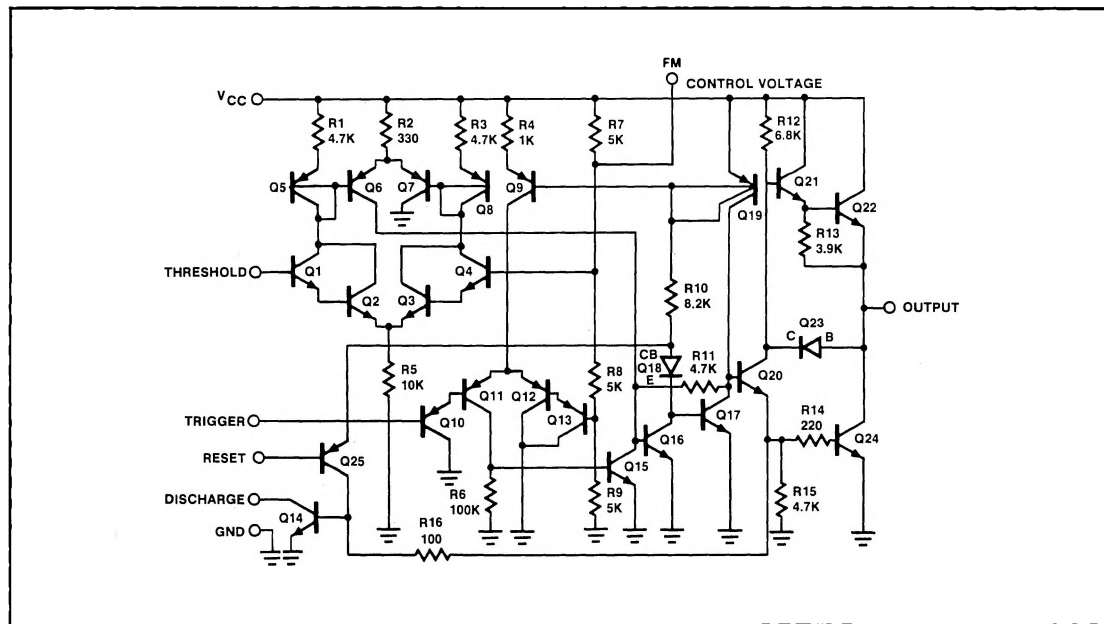
- Turn off time less than $2 \mu s$ (556-1, 1C)
- Maximum operating frequency greater than 500 kHz (556-1, 1C)
- Timing from microseconds to hours
- Replaces two 555 timers
- Operates in both astable and monostable modes
- High output current
- Adjustable duty cycle
- TTL compatible
- Temperature stability of 0.005% per $^{\circ}C$
- SE556 MIL-STD-883A, B, C available, N38510 (JAN planned, 38510 processing available)

PIN CONFIGURATION



BLOCK DIAGRAM



DUAL TIMER**SA/SE/NE555/SA/SE/NE555-1/SE555-1C****EQUIVALENT SCHEMATIC** (Shown for one circuit only)**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	RATING	UNIT
Supply voltage		
SA/NE555, 555-1, SE555C, 555-1C	+ 16	V
SE555-1, 555	+ 18	V
Power dissipation	600	mW
Operating temperature range		
NE/SA555-1, NE555	0 to + 70	°C
SA555-1, SA555	- 40 to + 85	°C
SE555-1, SE555-1C, SE555, 555C	- 55 to + 125	°C
Storage temperature range	- 65 to + 150	°C
Lead temperature (soldering, 60 sec)	+ 300	°C

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ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, $V_{CC} = +5\text{V}$ to $+15\text{V}$ unless otherwise specified

PARAMETER	TEST CONDITIONS	SE555/555-1			SA/NE555/SE555C NE555-1/SE555-1C			UNITS
		Min	Typ	Max	Min	Typ	Max	
Supply voltage		4.5		18	4.5		16	V
Supply current (low state) ¹	$V_{CC} = 5\text{V}$, $R_L = \infty$ $V_{CC} = 15\text{V}$, $R_L = \infty$		6 20	10 24		6 20	12 30	mA mA
Timing error (monostable) Initial accuracy ² Drift with temperature Drift with supply voltage	$R_A = 2\text{k}\Omega$ to $100\text{k}\Omega$ $C = 0.1\mu\text{F}$ $T = 1.1\text{RC}$		0.5 30 0.05			0.75 50 0.1	3.0 150 0.5	% ppm/ $^\circ\text{C}$ %/V
Timing error (astable) Initial accuracy ² Drift with temperature Drift with supply voltage	$R_A, R_B = 1\text{k}\Omega$ to $100\text{k}\Omega$ $C = 0.1\mu\text{F}$ $V_{CC} = 15\text{V}$		4 400 0.15	6 500 0.6		5 400 0.3	13 500 1	% ppm/ $^\circ\text{C}$ %/V
Control voltage level	$V_{CC} = 15\text{V}$ $V_{CC} = 5\text{V}$	9.6 2.9	10.0 3.33	10.4 3.8	9.0 2.6	10.0 3.33	11.0 4.0	V V
Threshold voltage	$V_{CC} = 15\text{V}$ $V_{CC} = 5\text{V}$	9.4 2.7	10.0 3.33	10.6 4.0	8.8 2.4	10.0 3.33	11.2 4.2	V V
Threshold current ³			30	250		30	250	nA
Trigger voltage	$V_{CC} = 15\text{V}$ $V_{CC} = 5\text{V}$	4.8 1.45	5.0 1.67	5.2 1.9	4.5 1.1	5.0 1.67	5.6 2.2	V V
Trigger current	$V_{TRIG} = 0\text{V}$		0.5	0.9		0.5	2.0	μA
Reset voltage ⁵ Reset current Reset current	$V_{RESET} = 0\text{V}$	0.3	0.7 0.1 0.4	1.0 0.4 1.0	0.3	0.7 0.1 0.4	1.0 0.6 1.5	V mA mA
Output voltage (low)	$V_{CC} = 15\text{V}$ $I_{SINK} = 10\text{mA}$ $I_{SINK} = 50\text{mA}$		0.1 0.4	0.15 0.5		0.1 0.4	0.25 0.75	V V
SE555 SE555-1 NE/SA555/SE555C NE555-1/SE555-1C	$I_{SINK} = 100\text{mA}$		2.0 0.8	2.25 1.2		2.0 2.0	3.2 2.5	V V V V
	$I_{SINK} = 200\text{mA}$ $V_{CC} = 5\text{V}$ $I_{SINK} = 8\text{mA}$ $I_{SINK} = 5\text{mA}$		2.5 0.1 0.05			2.5 0.25 0.15		V V V V
Output voltage (high)	$V_{CC} = 15\text{V}$ $I_{SOURCE} = 200\text{mA}$ $I_{SOURCE} = 100\text{mA}$ $V_{CC} = 5\text{V}$ $I_{SOURCE} = 100\text{mA}$	13.0 3.0	12.5 13.3 3.3		12.75 2.75	12.5 13.3 3.3		V V V
Turn off time ⁶ NE555-1/SE555-1/SE555-1C	$V_{RESET} = V_{CC}$		0.5	2.0		0.5		μs μs
Rise time of output Fall time of output			100 100	200 200		100 100	300 300	ns ns
Discharge leakage current			20	100		20	100	nA
Matching characteristics ⁴ Initial accuracy ² Drift with temperature Drift with supply voltage			0.5 10 0.1	1.0 0.2		1.0 ± 10 0.2	2.0 0.5	% ppm/ $^\circ\text{C}$ %/V

NOTES

- Supply current when output is high is typically 1.0mA less.
- Tested at $V_{CC} = 5\text{V}$ and $V_{CC} = 15\text{V}$.
- This will determine maximum value of $R_A + R_B$. For 15V operation, the maximum total $R = 10$ megohms, and for 5V operation, the max. total $R = 3.4$ megohms.

- Matching characteristics refer to the difference between performance characteristics for each timer section in the monostable mode.

- Specified with trigger input high.

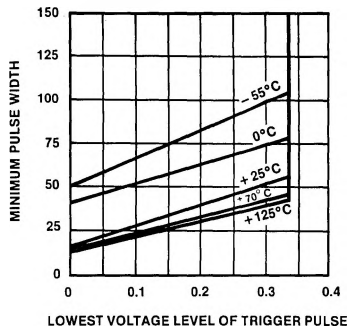
- Time measured from a positive going input pulse from 0 to $0.4 V_{CC}$ into the threshold to the drop from high to low of the output. Trigger is tied to threshold.

DUAL TIMER

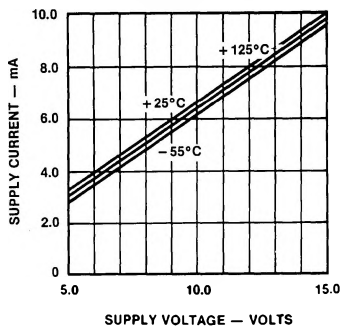
SA/SE/NE556/SA/SE/NE556-1/SE556-1C

TYPICAL PERFORMANCE CHARACTERISTICS

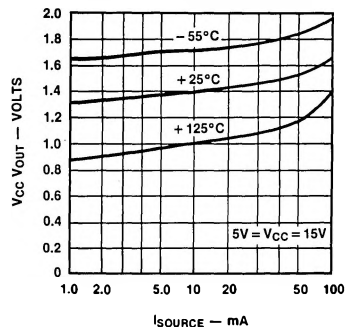
**MINIMUM PULSE WIDTH
REQUIRED FOR TRIGGERING**



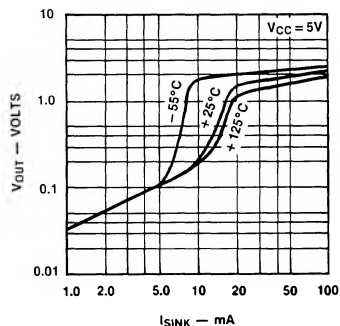
**SUPPLY CURRENT
vs SUPPLY VOLTAGE**



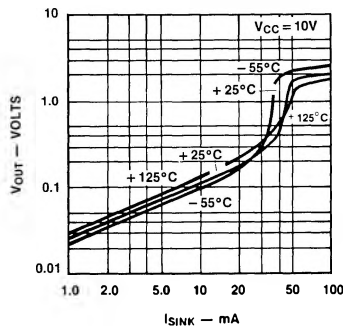
**HIGH OUTPUT VOLTAGE DROP
vs OUTPUT SOURCE CURRENT**



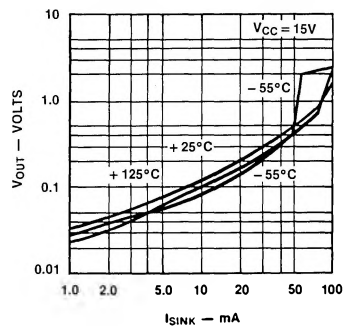
**LOW OUTPUT VOLTAGE
vs OUTPUT SINK CURRENT**



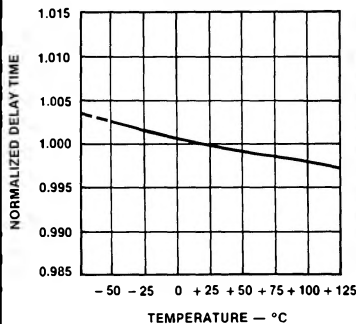
**LOW OUTPUT VOLTAGE
vs OUTPUT SINK CURRENT**



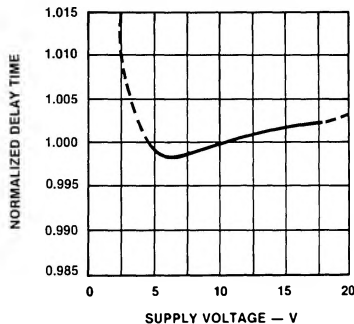
**LOW OUTPUT VOLTAGE
vs OUTPUT SINK CURRENT**



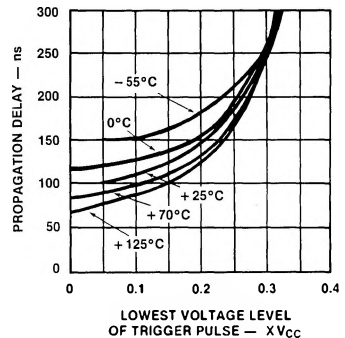
**DELAY TIME
vs TEMPERATURE**



**DELAY TIME vs
SUPPLY VOLTAGE**



**PROPAGATION DELAY
vs VOLTAGE LEVEL
OF TRIGGER PULSE**



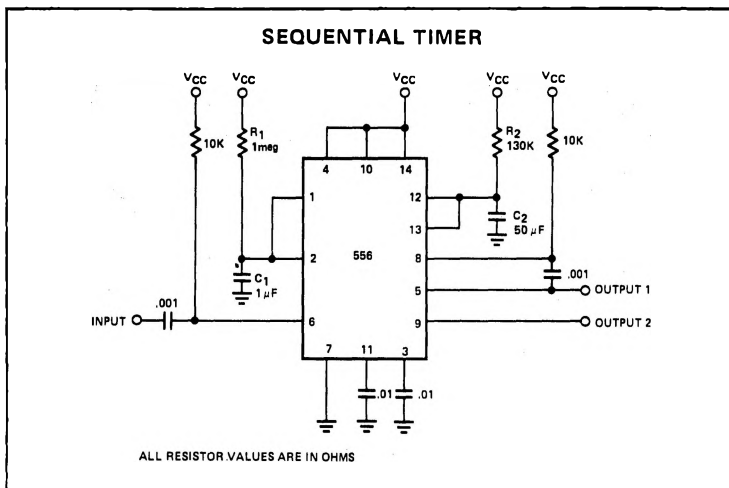
DUAL TIMER

SA/SE/NE556/SA/SE/NE556-1/SE556-1 C

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 .001 μ f coupling capacitor sequential timing may be obtained. Delay t_1 is determined by the first half and t_2 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 $1.1R_1C_1$) the second half begins. Its duration is determined by $1.1R_2C_2$.



*For additional information, consult the Applications Section.