

## LM556/LM556C Dual Timer

### General Description

The LM556 Dual timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. The 556 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 200 mA.

### Features

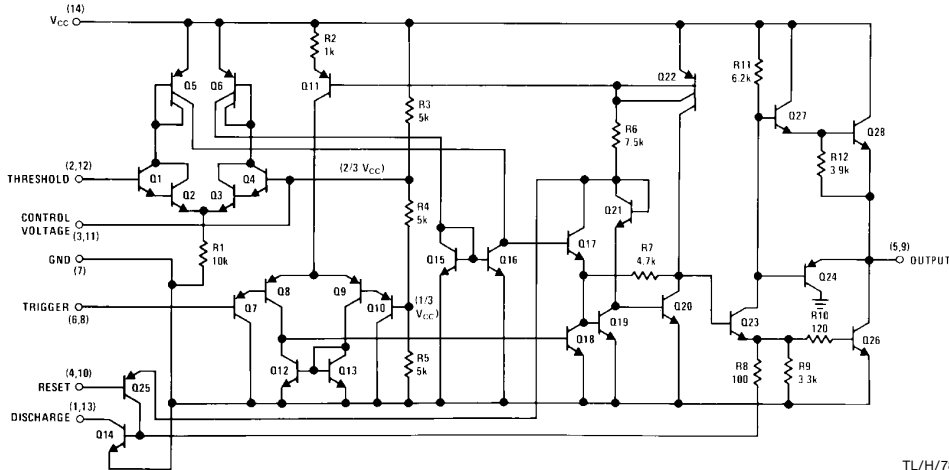
- Direct replacement for SE556/NE556
- Timing from microseconds through hours
- Operates in both astable and monostable modes
- Replaces two 555 timers

- Adjustable duty cycle
- Output can source or sink 200 mA
- Output and supply TTL compatible
- Temperature stability better than 0.005% per °C
- Normally on and normally off output

### Applications

- Precision timing
- Pulse generation
- Sequential timing
- Time delay generation
- Pulse width modulation
- Pulse position modulation
- Linear ramp generator

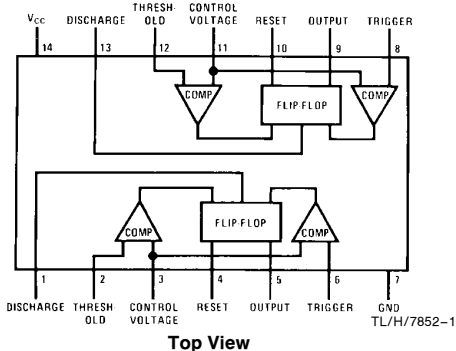
### Schematic Diagram



TL/H/7852-2

### Connection Diagram

#### Dual-In-Line and Small Outline Packages



Top View

TL/H/7852-1

Order Number LM556J or LM556CJ  
See NS Package Number J14A

Order Number LM556CM  
See NS Package Number M14A

Order Number LM556CN  
See NS Package Number N14A

## Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	+ 18V
Power Dissipation (Note 1)	
LM556J, LM556CJ	1785 mW
LM556CN	1620 mW
Operating Temperature Ranges	
LM556C	0°C to + 70°C
LM556	- 55°C to + 125°C

Storage Temperature Range - 65°C to + 150°C

Soldering Information	
Dual-In-Line Package	
Soldering (10 seconds)	260°C
Small Outline Package	
Vapor phase (60 seconds)	215°C
Infrared (15 seconds)	220°C

See AN-450 "Surface Mounting Methods and Their Effect on Product Reliability" for other methods of soldering surface mount devices.

## Electrical Characteristics (T<sub>A</sub> = 25°C, V<sub>CC</sub> = +5V to +15V, unless otherwise specified)

Parameter	Conditions	LM556			LM556C			Units
		Min	Typ	Max	Min	Typ	Max	
Supply Voltage		4.5		18	4.5		16	V
Supply Current (Each Timer Section)	V <sub>CC</sub> = 5V, R <sub>L</sub> = ∞ V <sub>CC</sub> = 15V, R <sub>L</sub> = ∞ (Low State) (Note 2)		3 10	5 11		3 10	6 14	mA mA
Timing Error, Monostable Initial Accuracy Drift with Temperature	R <sub>A</sub> = 1k to 100 kΩ, C = 0.1 μF, (Note 3)		0.5 30			0.75 50		% ppm/°C
Accuracy over Temperature Drift with Supply			1.5 0.05			1.5 0.1		% %/V
Timing Error, Astable Initial Accuracy Drift with Temperature Accuracy over Temperature Drift with Supply	R <sub>A</sub> , R <sub>B</sub> = 1k to 100 kΩ, C = 0.1 μF, (Note 3)		1.5 90 2.5 0.15			2.25 150 3.0 0.30		% ppm/°C % %/V
Trigger Voltage	V <sub>CC</sub> = 15V V <sub>CC</sub> = 5V	4.8 1.45	5 1.67	5.2 1.9	4.5 1.25	5 1.67	5.5 2.0	V V
Trigger Current			0.1	0.5		0.2	1.0	μA
Reset Voltage	(Note 4)	0.4	0.5	1	0.4	0.5	1	V
Reset Current			0.1	0.4		0.1	0.6	mA
Threshold Current	V <sub>TH</sub> = V-Control (Note 5) V <sub>TH</sub> = 11.2V		0.03	0.1		0.03	0.1	μA nA
Control Voltage Level and Threshold Voltage	V <sub>CC</sub> = 15V V <sub>CC</sub> = 5V	9.6 2.9	10 3.33	10.4 3.8	9 2.6	10 3.33	11 4	V V
Pin 1, 13 Leakage Output High			1	100		1	100	nA
Pin 1, 13 Sat Output Low Output Low	(Note 6) V <sub>CC</sub> = 15V, I = 15 mA V <sub>CC</sub> = 4.5V, I = 4.5 mA		150 70	240 100		180 80	300 200	mV mV

## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ , $V_{CC} = +5\text{V}$ to $+15\text{V}$ , unless otherwise specified) (Continued)

Parameter	Conditions	LM556			LM556C			Units
		Min	Typ	Max	Min	Typ	Max	
Output Voltage Drop (Low)	$V_{CC} = 15\text{V}$							
	$I_{\text{SINK}} = 10\text{ mA}$		0.1	0.15		0.1	0.25	V
	$I_{\text{SINK}} = 50\text{ mA}$		0.4	0.5		0.4	0.75	V
	$I_{\text{SINK}} = 100\text{ mA}$		2	2.25		2	2.75	V
	$I_{\text{SINK}} = 200\text{ mA}$		2.5			2.5		V
	$V_{CC} = 5\text{V}$							
Output Voltage Drop (High)	$I_{\text{SOURCE}} = 200\text{ mA}$ , $V_{CC} = 15\text{V}$		12.5			12.5		V
	$I_{\text{SOURCE}} = 100\text{ mA}$ , $V_{CC} = 15\text{V}$	13	13.3		12.75	13.3		V
	$V_{CC} = 5\text{V}$	3	3.3		2.75	3.3		V
Rise Time of Output			100			100		ns
Fall Time of Output			100			100		ns
Matching Characteristics	(Note 7)							
Initial Timing Accuracy			0.05	0.2		0.1	2.0	%
Timing Drift with Temperature			$\pm 10$			$\pm 10$		ppm/ $^\circ\text{C}$
Drift with Supply Voltage			0.1	0.2		0.2	0.5	%/V

**Note 1:** For operating at elevated temperatures the device must be derated based on a  $+150^\circ\text{C}$  maximum junction temperature and a thermal resistance of  $70^\circ\text{C}/\text{W}$  (Ceramic),  $77^\circ\text{C}/\text{W}$  (Plastic DIP) and  $110^\circ\text{C}/\text{W}$  (SO-14 Narrow).

**Note 2:** Supply current when output high typically 1 mA less at  $V_{CC} = 5\text{V}$ .

**Note 3:** Tested at  $V_{CC} = 5\text{V}$  and  $V_{CC} = 15\text{V}$ .

**Note 4:** As reset voltage lowers, timing is inhibited and then the output goes low.

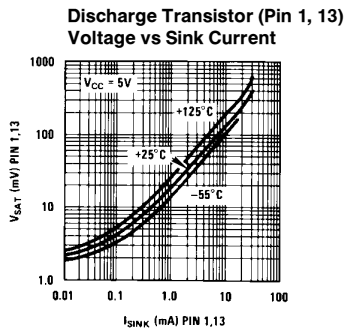
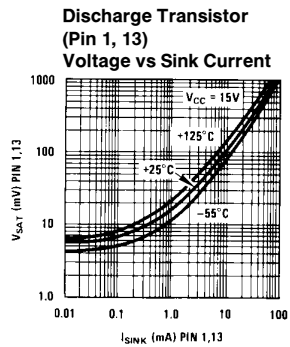
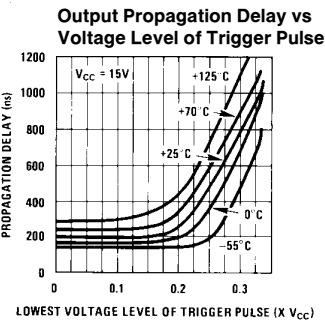
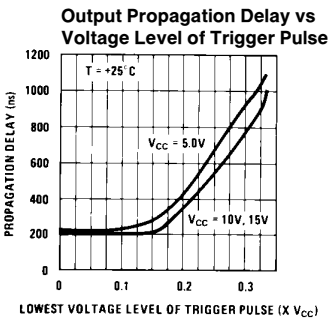
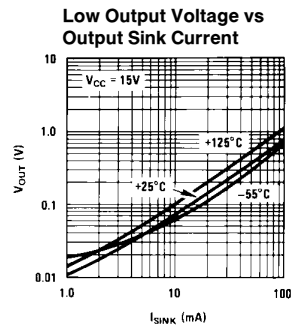
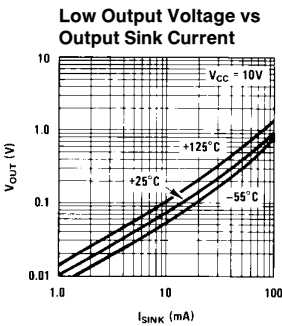
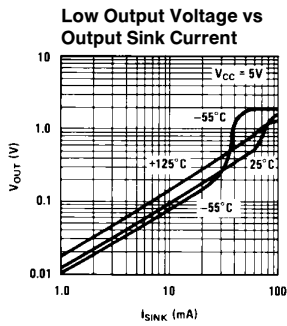
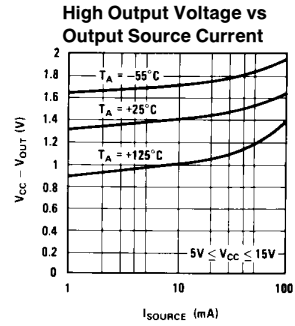
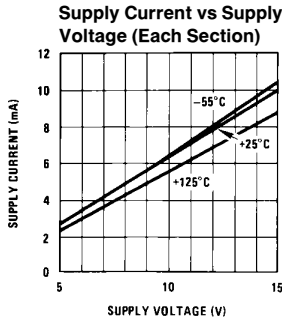
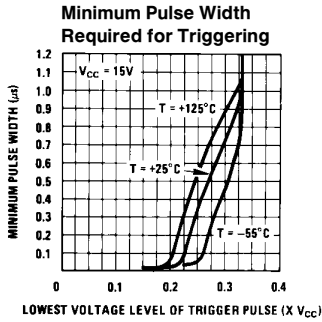
**Note 5:** This will determine the maximum value of  $R_A + R_B$  for 15V operation. The maximum total ( $R_A + R_B$ ) is 20 M $\Omega$ .

**Note 6:** No protection against excessive pin 1, 13 current is necessary providing the package dissipation rating will not be exceeded.

**Note 7:** Matching characteristics refer to the difference between performance characteristics of each timer section.

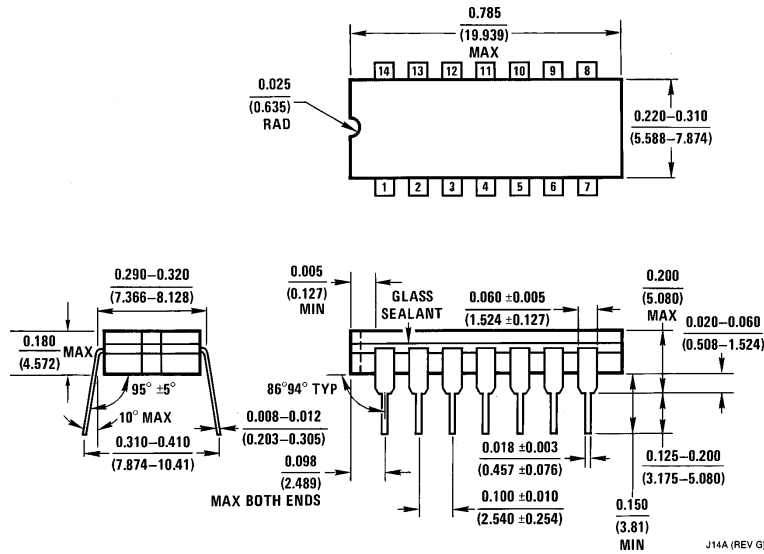
**Note 8:** Refer to RETS556X drawing for specifications of military LM556J version.

# Typical Performance Characteristics

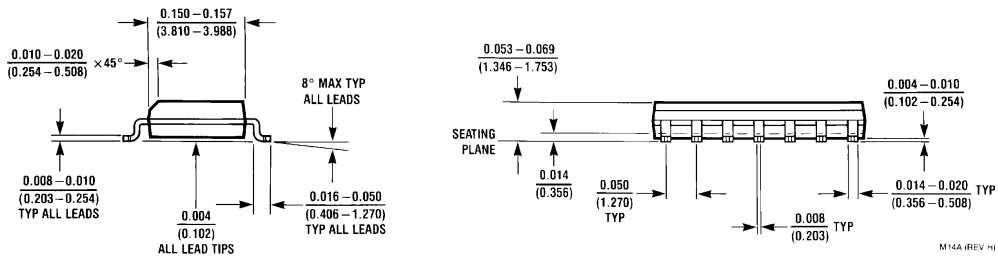
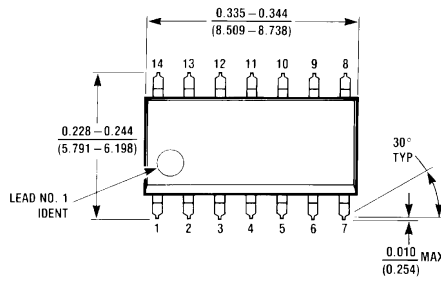


TL/H/7852-3

**Physical Dimensions** inches (millimeters)



**Ceramic Dual-In-Line Package (J)**  
**Order Number LM556J or LM556CJ**  
**NS Package Number J14A**



**S.O. Molded Package (M)**  
**Order Number LM556CM**  
**NS Package Number M14A**

