Dual Timer

GENERAL DESCRIPTION

The XR-556 dual timing circuit contains two independent 555-type timers on a single monolithic chip. It is a direct, pin-for-pin replacement for the SE/NE 556 dual timer. Each timer section is a highly stable controller capable of producing accurate time delays or oscillations. Independent output and control terminals are provided for each section as shown in the functional block diagram.

In the monostable mode of operation, the time delay for each section is precisely controlled by one external resistor and one capacitor. For astable operation as an oscillator, the free-running frequency and the duty cycle of each section are accurately controlled with two external resistors and one capacitor.

The XR-556 may be triggered or reset on falling waveforms. Each output can source or sink up to 150 mA or drive TTL circuits. The matching and temperature tracking characteristics between each timer section of the XR-556 are superior to those available from two separate timer packages.

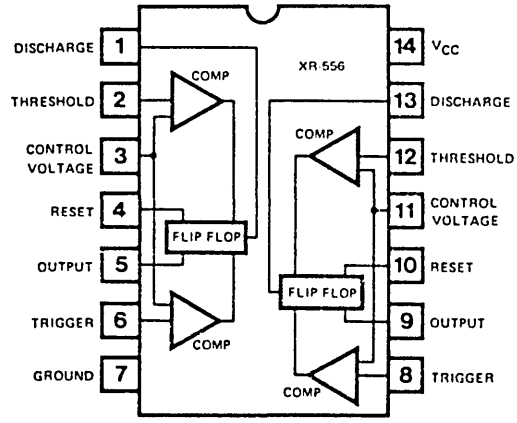
FEATURES

Direct Replacement for SE/NE 556
Replaces Two 555-Type Timers
TTL Compatible Pinouts
Timing from Microseconds Thru Hours
Excellent Matching Between Timer Sections
Operates in Both Monostable and Astable Modes
High Current Drive Capability (150 mA each output)
TTL and DTL Compatible Outputs
Adjustable Duty Cycle
Temperature Stability of 0.005%/°C

APPLICATIONS

Precision Timing
Pulse Generation
Sequential Timing
Pulse Shaping
Time Delay Generation
Clock Pattern Generation
Missing Pulse Detection
Pulse-Width Modulation
Frequency Division
Clock Synchronization
Pulse-Position Modulation
Appliance Timing

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

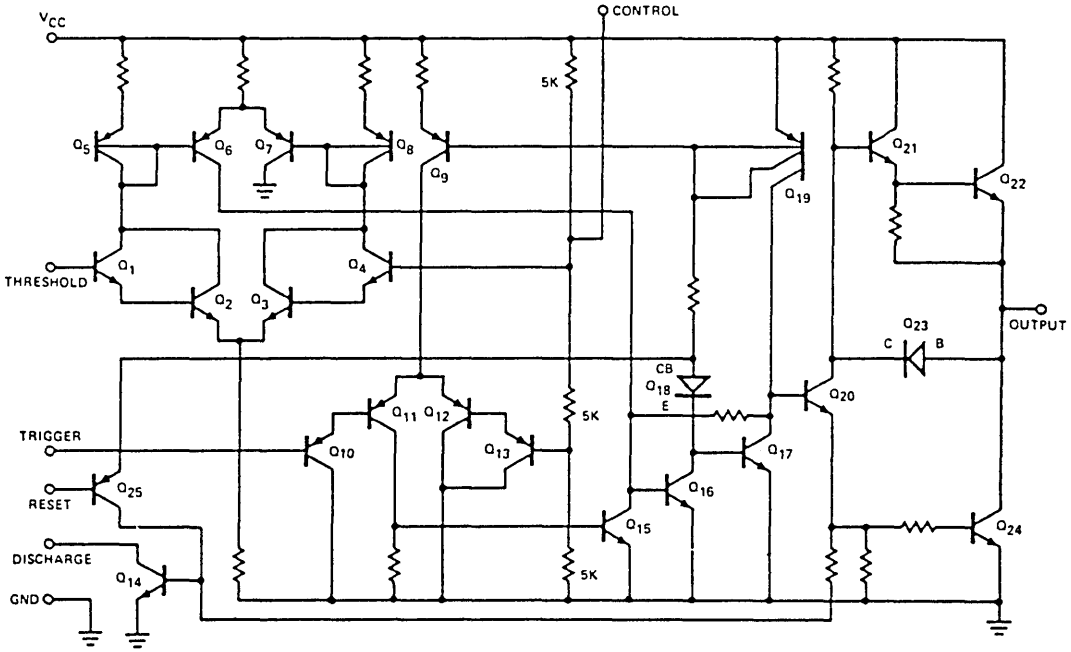
Power Supply	18V
Power Dissipation	
Ceramic Dual-In-Line	750 mW
Derate above T_A = 25°C	6 mW/°C
Plastic Dual-In-Line	625 mW
Derate above T_A = 25°C	5 mW/°C
Storage Temperature Range	−65°C to +150°C

ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-556M	Ceramic	−55°C to +125°C
XR-556CN	Ceramic	0°C to +70°C
XR-556CP	Plastic	0°C to +70°C

SYSTEM DESCRIPTION

The XR-556 is an industry standard dual timing circuit capable of both monostable and astable operation with timing intervals ranging from low microseconds up through several hours. Timing is independent of supply voltage, which may range from, 4.5 V to 18 V. The output stage can source or sink 150 mA. Each timer section is fully independent and similar to 555-type devices.



EQUIVALENT SCHEMATIC DIAGRAM

SYSTEM DESCRIPTION (continued)

In the monostable (one shot) mode, timing is determined by one resistor and capacitor. Astable operation (oscillation) requires an additional resistor, which controls duty cycle. An internal resistive divider provides a reference voltage of 2/3 V_{CC}, which produces a timing interval of 1.1 RC. As the reference is related to V_{CC}, the interval is independent of supply voltage; however, for maximum accuracy, the user should ensure V_{CC} does not vary during timing.

The output of the XR-556 is high during the timing interval, and pulls low at timeout. It is triggered and reset on falling waveforms. The control voltage inputs (Pins 3 and 11) may serve as pulse width modulation points. Matching between sections is typically better than 0.05% initially, with temperature drift tracking to ±10 ppm/°C and supply voltage drift tracking to 0.1%/V. For low voltage and/or low power drain applications, consider the XR-L556.

XR-556

ELECTRICAL CHARACTERISTICS

Test Conditions: (Each timer section, T_A = 25°C, V_{CC} = +5V to +15V, unless otherwise specified.)

PARAMETERS	XR-556M			XR-556C			UNITS	CONDITIONS
	MIN	TYP	MAX	MIN	TYP	MAX		
Supply Voltage	4.5		18	4.5		16	V	
Supply Current (Each Timer Section)								Low State Output, Note 1
		3	5		3	6	mA	V_{CC} = 5V, R_L = ∞
		10	11		10	14	mA	V_{CC} = 15V, R_L = ∞
Total Supply Current (Both Timer Sections)								Low State Output, Note 1
		6	10		6	12	mA	V_{CC} = 5V, R_L = ∞
		20	22		20	28	mA	V_{CC} = 15V, R_L = ∞
Timing Error (Monostable)								Timing, R = 1 KΩ to 100 KΩ
Initial Accuracy		0.5	1.5		.75	3	%	Note 2, C = 1.0 μF
Drift with Temperature		30	100		50		ppm/°C	0°C ≤ T_A ≤ 75°C
Drift with Supply Voltage		0.05	0.2		0.1	0.5	%/V	
Timing Error (Astable)								R_A, R_B = 1 KΩ to 100 KΩ
Initial Accuracy (Note 2)		1.5			2.25		%	C = 0.1 μF
Drift with Temperature		90			150		ppm/°C	V_{CC} = 15V
Drift with Supply Voltage		0.15			0.3		%/V	
Threshold Voltage	9.4	10.0	10.6	8.8	10.0	11.2	V	V_{CC} = 15V
	2.7	3.33	4.0	2.4	3.33	4.2	V	V_{CC} = 5V
Trigger Voltage								
	1.45	1.67	1.9		1.67		V	V_{CC} = 5V
	4.8	5.0	5.2	4.5	5.0	5.6	V	V_{CC} = 15V
Trigger Current		0.5	0.9		0.5	2	μA	V_{TRIG} = 0V
Reset Voltage	0.4	0.7	1.0	0.4	0.7	1.0	V	V_{TRIG} High
Reset Current		0.4	1		0.4	1.5	mA	V_{RESET} = 0V
Threshold Current		0.03	0.1		0.03	0.1	μA	Note 3
Control Voltage Level								
	2.90	3.33	3.80	2.60	3.33	4.00		V_{CC} = 5V
	9.6	10.0	10.4	9.0	10.0	11.0		V_{CC} = 15V
Output Voltage Drop (Low)								V_{CC} = 5V
		0.10	0.25		0.3		V	I_{sink} = 8.0 mA
		0.05	0.20		0.25	0.35	V	I_{sink} = 5.0 mA
								V_{CC} = 15V
		0.1	0.15		0.1	0.25	V	I_{sink} = 10 mA
		0.4	0.5		0.4	0.75	V	I_{sink} = 50 mA
		2.0	2.25		2.0	2.75	V	I_{sink} = 100 mA
		2.5			2.5		V	I_{sink} = 200 mA
Output Voltage Drop (High)								I_{source} = 100 mA
	3.0	3.3		2.75	3.3		V	V_{CC} = 5V
	13	13.3		12.75	13.3		V	V_{CC} = 15V
								I_{source} = 200 mA
		12.5			12.5		V	V_{CC} = 15V
Rise Time of Output		100	200		100	300	nsec	
Fall Time of Output		100	200		100	300	nsec	
Matching Characteristic								Note 4
Initial Timing Accuracy		0.05	0.1		0.1	0.2	%	
Timing Drift with Temperature		±10			±10		ppm/°C	
Drift with Supply Voltage		0.1	0.2		0.2	0.5	%/V	

Note 1: Supply current when output is high is typically 1.0 mA less.
Note 2: Tested at V_{CC} = 5V and V_{CC} = 15V.
Note 3: This will determine the maximum value of R_A + R_B for 15V operation. The maximum total R = 10 megohms, and for 5V operation, the maximum R = 3.4 megohms.
Note 4: Matching characteristics refer to the difference between performance characteristics of each timer section.