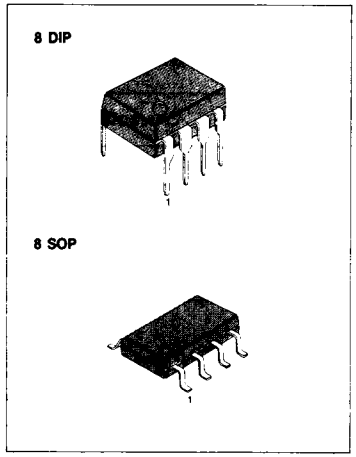
## CMOS SINGLE TIMER

The KS555 is a CMOS timer with improved performance over a standard bipolar one. Due to its high-impedance inputs, it is capable of producing accurate time delays and oscillations with less expensive (smaller) timing capacitors than a standard bipolar timer.

Its dramatic advantages over bipolar ones are very low power consumption and wide operating voltage range especially during stable low voltage operations.




## FEATURES

- **Low power consumption**
- **Pin to pin operation with bipolar timer in most cases**
- **Extremely low trigger, threshold, and reset pin current**
- **High-speed operation (500KHz)**
- **Stable low voltage operation (possible 1.5V operation with most samples)**
- **Wide operating voltage range: 2 to 18V**
- **High output source/sink driver meet TTL/CMOS**
- **Immunized to static charge with inner protection devices**



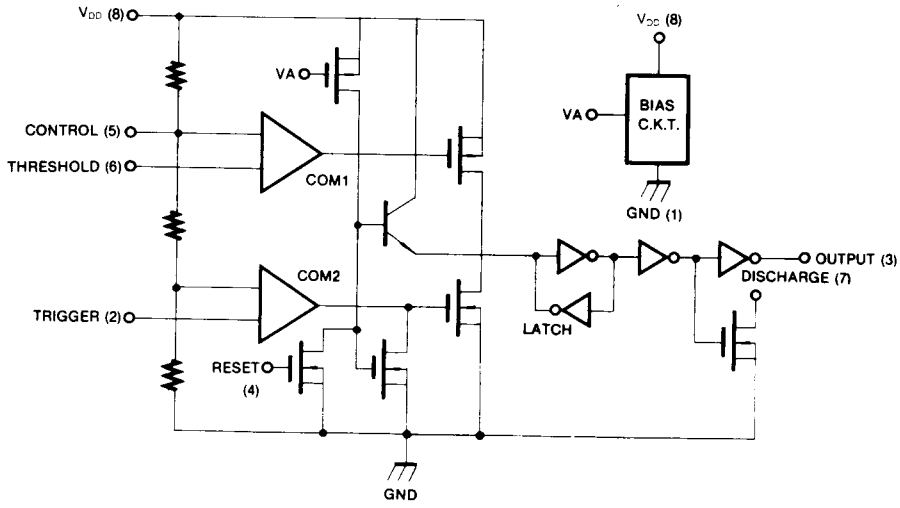
## APPLICATIONS

- Precision Timing
- Pulse Generation
- Sequential Timing
- Time Delay Generation
- Pulse Width Modulation
- Pulse Position Modulation
- Missing Pulse Detector

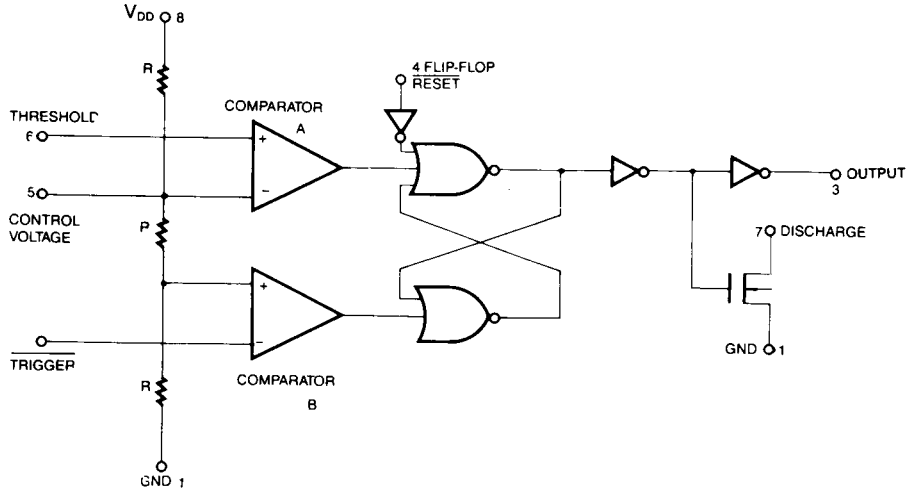
## ORDERING INFORMATION

| Device | Package | Operating Temperature |
|---|---|---|
| KS555 | 8 DIP | – 20 ~ + 85°C |
| KS555D | 8 SOP | |

## SCHEMATIC DIAGRAM



## BLOCK DIAGRAM




This block diagram reduces the circuitry down to its simplest equivalent components. Tie down unused inputs.
R = 100KΩ ± 20% Typ.

## TRUTH TABLE



| Threshold Voltage | Trigger Voltage | Reset | Output | Discharge Switch |
|---|---|---|---|---|
| Don't Care | Don't Care | Low | Low | On |
| > 2/3 ($V_{CC}$) | > 1/3 ($V_{CC}$) | High | Low | On |
| < 1/3($V_{CC}$) ~ 2/3($V_{CC}$) | > 1/3($V_{CC}$) ~ 2/3($V_{CC}$) | High | Stable | Stable |
| Don't Care | < 1/3 ($V_{CC}$) | High | High | Off |

Note: $\overline{\text{RESET}}$ will dominate all other input.$\overline{\text{TRIGGER}}$ will dominate over THRESHOLD.

## ABSOLUTE MAXIMUM RATINGS (Note 1)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 18 | V |
| Power Dissipation | $P_D$ | 200 | mW |
| Operating Temperature Range | $T_{OPR}$ | −20 ~ +85 | °C |
| Storage Temperature Range | $T_{STG}$ | −65 ~ +150 | °C |

Note 1: Stresses above those listed under absolute maximum rating may cause permanent damage to the device.

## ELECTRICAL CHARACTERISTICS

($T_A$ = 25°C, $V_{DD}$ = 2 to 15V, unless otherwise specified)

| Characteristic | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | $-20°C < T_A < +70°C$ | 2 | | 18 | V |
| Supply Current | $I_{DD}$ | $V_{DD}$ = 2V | | 30 | | μA |
| | | $V_{DD}$ = 18V | | 60 | | μA |
| Timing Error<br>Initial Accuracy | ACCUR | $R_A = R_B$ = 1KΩ to 100KΩ<br>C = 0.1μF,<br>$5V \geq V_{DD} \leq 15V$ | | 2.0 | 10.0 | % |
| Drift With Temperature | Δt/ΔT | $V_{DD}$ = 5V | | 50 | | ppm/°C |
| | | $V_{DD}$ = 10V | | 75 | | ppm/°C |
| | | $V_{DD}$ = 15V | | 100 | | ppm/°C |
| Drift With Supply Voltage | $\Delta t/\Delta V_{DD}$ | $V_{DD}$ = 5V | | 1.0 | 3.0 | %/V |
| Threshold Voltage | $V_{TH}$ | $V_{DD}$ = 5V | | 0.66 | | $V_{CC}$ |
| Trigger Voltage | $V_{TR}$ | $V_{DD}$ = 5V | | 0.33 | | $V_{CC}$ |
| Trigger Current | $I_{TR}$ | $V_{DD}$ = 18V | | 50 | | pA |
| | | $V_{DD}$ = 5V | | 10 | | pA |
| | | $V_{DD}$ = 2V | | 1 | | pA |
| Threshold Current | $I_{TH}$ | $V_{DD}$ = 18V | | 50 | | pA |
| | | $V_{DD}$ = 5V | | 10 | | pA |
| | | $V_{DD}$ = 2V | | 1 | | pA |
| Reset Current | $I_{RST}$ | $V_{RST}$ = GND $V_{DD}$ = 18V | | 100 | | pA |
| | | $V_{RST}$ = GND $V_{DD}$ = 5V | | 20 | | pA |
| Reset Voltage | $V_{RST}$ | $V_{DD}$ = 18V | 0.4 | 0.7 | 1.0 | V |
| | | $V_{DD}$ = 2V | 0.4 | 0.7 | 1.0 | V |
| Control Voltage | $V_C$ | $V_{DD}$ = 5V | | 0.66 | | $V_{CC}$ |
| Low Output Voltage | $V_{OL}$ | $V_{DD}$ = 18V, $I_{SINK}$ = 3.2mA | | 0.1 | 0.4 | V |
| | | $V_{DD}$ = 5V, $I_{SINK}$ = 3.2mA | | 0.15 | 0.4 | V |
| High Output Voltage | $V_{OH}$ | $V_{DD}$ = 18V, $I_{SOURCE}$ = 1.0mA | 17.25 | 17.8 | | V |
| | | $V_{DD}$ = 5V, $I_{SOURCE}$ = 1.0mA | 4.0 | 4.5 | | V |
| Rise Time of Output | $t_R$ | $R_L$ = 10MΩ, $C_L$ = 10pF, $V_{DD}$ = 5V | 35 | 40 | 75 | ns |
| Fall Time of Output | $t_F$ | | 35 | 40 | 75 | ns |
| Guaranteed Max Osc. Freq. | $f_{(MAX)}$ | Astable Operation | 500 | | | KHz |

## APPLICATION NOTES

### Astable Operation

The KS555 can free run as a multivibrator by triggering itself; refer to Fig. 2. The output can swing from $V_{DD}$ to GND and have 50% duty cycle square wave. Less than 1% frequency deviation can be observed, over a voltage range of 2 to 5 V. f = 1/1.4RC

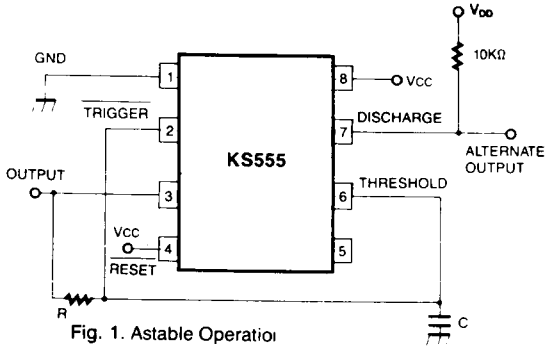



Fig. 1. Astable Operation



### Monostable Operation

The KS555 can be used as a one-shot, i.e. monostable multivibrator. Initially, because the inside discharge transistor is on state, external timing capacitor is held to GND potential. Upon application of a negative TRIGGER pulse to pin 2, the internal discharge transistor is off state and the voltage across the capacitor increases with time constant = $R_A$C and OUTPUT goes to high state. When the voltage across the capacitor equals 2/3 $V_{DD}$ the inner comparator is reset by THRESHOLD input and the discharge transistor goes to on state, which in turn discharges the capacitor rapidly and also drives the OUTPUT to its low state.

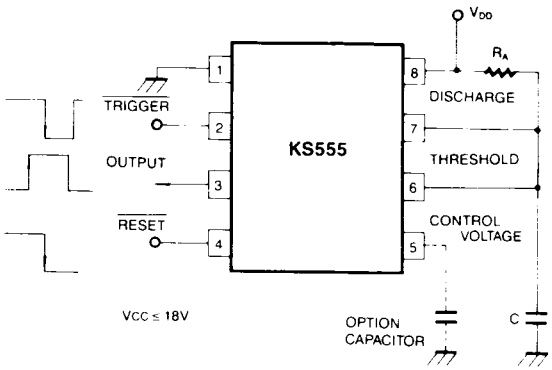



Fig. 2. monostable Operation