

# CR timer

## BA225/BA225F/BA235/BA226/BA226F/BA236

The BA225, BA225F, BA235, BA226, BA226F, and BA236 are monolithic ICs having independent mono and multi circuits which consume very low current (0.75mA typ.). Using external resistors and capacitors, the timing control time can be set within a range from 0.01ms to 100ms.

As the BA225, BA225F, and BA235 are triggered at the rising edge of the signal, they have no trigger input differentiating circuit and can be used in measuring instruments, control devices, digital data systems and other equipment as sub-compact attachments. The BA226, BA226F, and BA236 are available as falling edge trigger types.

### ● Applications

Delay timers

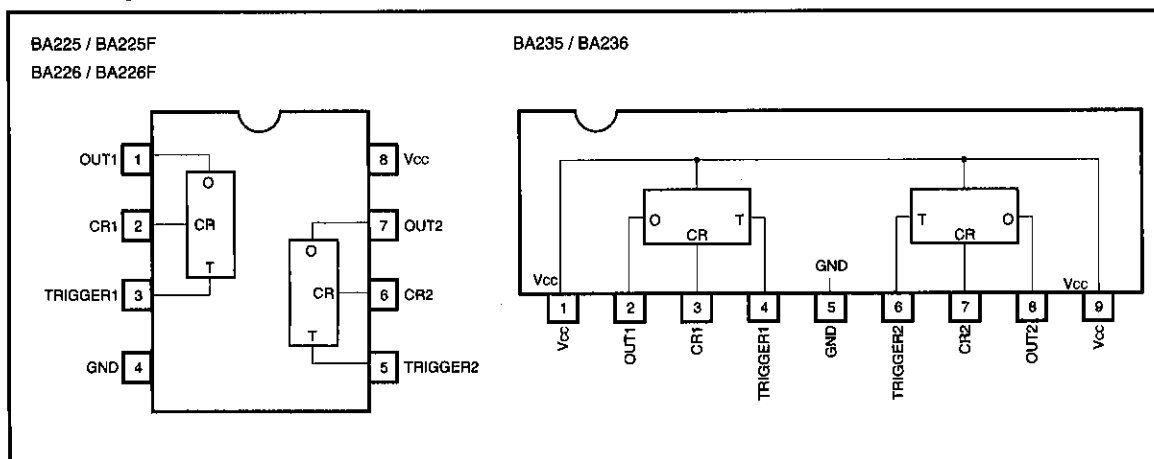
Mono / multi timing controllers (ideal for VTR system controllers)

Pulse generators

### ● Features

- 1) As these are edge trigger types (BA225/BA235 : rising edge trigger types, BA226/BA236 : falling edge trigger types), there is no need for an input differentiating circuit.
- 2) The dual type design enables delay timer configuration.
- 3) Fewer attachments are required.
- 4) Current consumption is as low as 0.75mA for each circuit.
- 5) Uniformity in the circuit current between high and low output states simplifies the design of the power supply section.
- 6) Wide operating power supply voltage range of 4.0V to 16V.
- 7) The BA235 and BA236 pin layouts are symmetrical, allowing reverse insertion.
- 8) Hysteresis in the input results in a high level of noise withstand resistance.

### ● Block diagram



CR timers

● Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	16	V
Power dissipation	BA225 / BA226	800 *1	mW
	BA235 / BA236	950 *2	mW
	BA225F / BA226F	450 *3	mW
Operating temperature	T <sub>opr</sub>	-20~75	°C
Storage temperature	T <sub>stg</sub>	-55~125	°C

\*1 Reduced by 8 mW for each increase in Ta of 1°C over 25°C.

\*2 Reduced by 9.5 mW for each increase in Ta of 1°C over 25°C.

\*3 Reduced by 4.5 mW for each increase in Ta of 1°C over 25°C.

● Electrical characteristics (unless otherwise noted, Ta=25°C, V<sub>CC</sub>=5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Power supply voltage	V <sub>CC</sub>	4.0	5.0	16.0	V	—	Fig.7
Quiescent current	I <sub>Q</sub>	—	1.5	3.0	mA	—	Fig.7
Timing error	T <sub>ERR</sub>	—	1	10	%	R=100kΩ, C=0.1 μF *1	Fig.7
Timing change with power supply	T <sub>OS</sub>	—	0.5	3.0	%	5V→16V	Fig.7
Timing change with temperature	T <sub>OT</sub>	—	200	—	ppm/°C	—	Fig.7
Trigger voltage	V <sub>T</sub>	1.0	2.0	3.0	V	*2	Fig.7
		BA236 0.7	1.6	2.5			
Trigger current	I <sub>T</sub>	—	70	200	μA	V <sub>T</sub> =3.0V (BA225 / BA235) V <sub>T</sub> =2.5V (BA226 / BA226F / BA236)	Fig.7
"L" output voltage	V <sub>OL</sub>	—	0.5	1.0	V	I <sub>SINK</sub> =5mA	Fig.7
"H" output voltage	V <sub>OH</sub>	3.0	4.0	—	V	I <sub>SOURCE</sub> =5mA	Fig.7

\*1 One-shot cycle T= 0.5 CR

\*2 With input hysteresis (hysteresis width=200 to 600 mV)

● Electrical characteristic curves

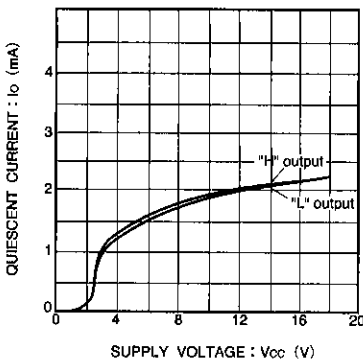


Fig. 1 Quiescent current - power supply voltage characteristic

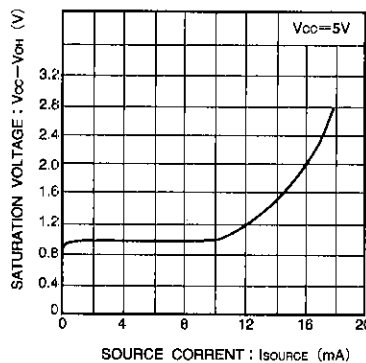


Fig. 2 Output voltage (logic 1 side) characteristic

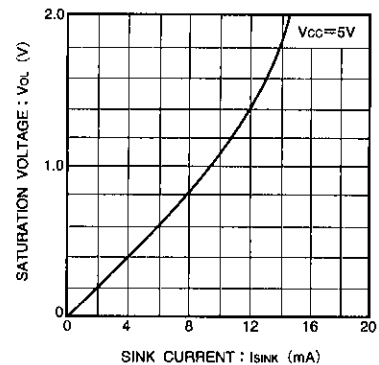


Fig. 3 Output voltage (logic 0 side) characteristic

●Electrical characteristic curves

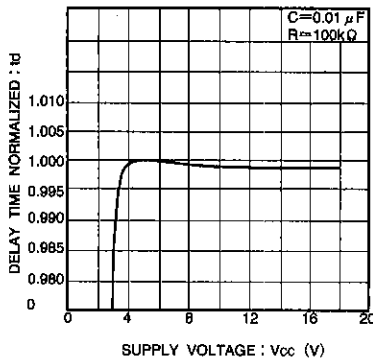


Fig. 4 Power supply voltage - delay time characteristic

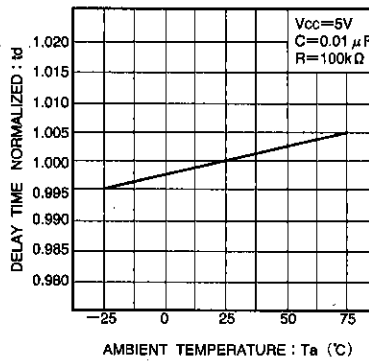


Fig. 5 Temperature - delay time characteristic

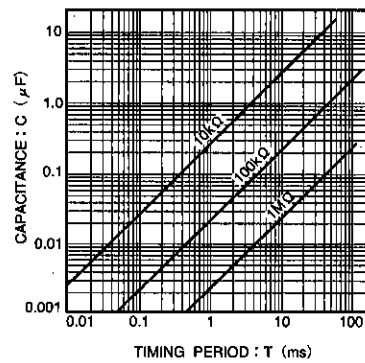


Fig. 6 One-shot time characteristic

●Measurement circuit

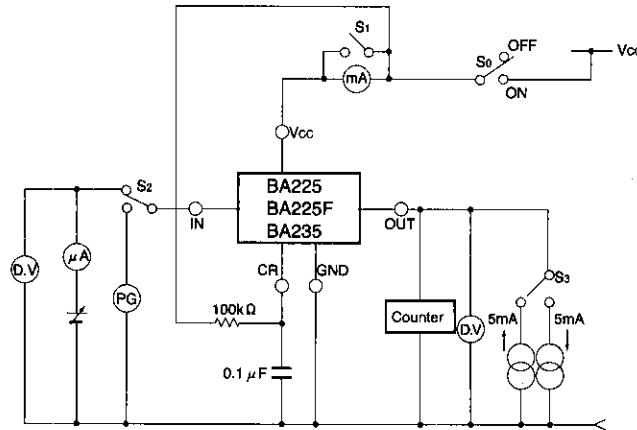


Fig.7

●Description of attachments

- (1) Timing capacitors (Pins 2 and 6)  
Connected between these pins and the ground (GND), this capacitor determines the one-shot period. We recommend using a capacitor with a value greater than 1000pF. The one-shot cycle is determined by  $T = 1/2 C \cdot R$ .
- (2) Timing resistor (Pins 2 and 6)  
Connected to the power supply line, these resistors determine the one-shot period. The timing capacitor is charged through this resistor. The recommended range for the timing resistor is 10kΩ to 1MΩ.

- (3) Power supply capacitor (Pin 8)  
Connect a 0.02 μF capacitor between the power supply pin and the ground (GND) so as to prevent malfunction resulting from a rise in the impedance of the power supply line.
- (4) Load (Pins 1 and 7)  
A load of up to 5mA can be accommodated for both the inflow current and the outflow current.

## ● Operation notes

## (1) Usage range for voltage

The recommended voltage range is 4.0V to 16V. Use of these ICs at 3.0V or lower voltage may cause the same mode as the input trigger signal to be output at around 2.6V.

## (2) Input trigger

The input trigger level is 2.0V. The LOW level is 1.0V or lower and the HIGH level is 3.0V or higher. Trigger signals of 10ms/V or lower should be used for both the rising and falling edges.

## (3) Time constant determining C·R

The recommended value for the timing capacitor is 1000pF or more and that for the timing resistor is from 10kΩ to 1MΩ.

## ● Application example

Figure 8 shows an example of the circuit including these ICs, while Figure 9 shows the basic operation timing chart. Figure 10 shows the basic operation timing chart of the falling edge trigger type IC. When no trigger signal is applied, the output is in the LOW state and the timing capacitor is in the discharged state. When a trigger signal is applied, its rising edge causes the output to become HIGH and the timing capacitor to be charged.

The charging time of this timing capacitor is determined by the time constants of the external timing resistor and the timing capacitor. When the charged voltage reaches  $0.4 \times V_{CC}$ , the flip-flop in the IC is reset and the output state changes from HIGH to LOW. At the same time, the timing capacitor is discharged to be ready for the next operation.

The voltage, which is determined by comparison of discharge resistance and timing resistance in the IC, remains on the C and R pins. If timing resistance is set at 5kΩ or less, this voltage will reach threshold level ( $0.4 \times V_{CC}$ ), and operation will come to a halt. Also, when timing resistance is set to a low value, voltage remains on the C and R pins, which shortens the time constant. If timing resistance is set to 2MΩ or higher, the IC's internal comparator cannot be driven, which may bring operation to a halt.

(4) Note that pin connections and pin arrangements on the BA225 / BA226 (BA235F / BA226F) differ from those on the BA235 / BA236.

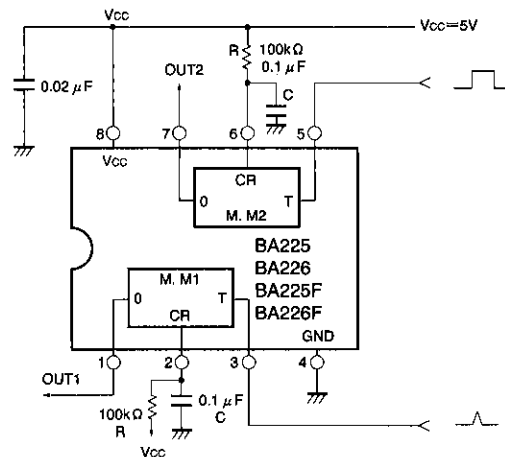


Fig.8

● Application examples

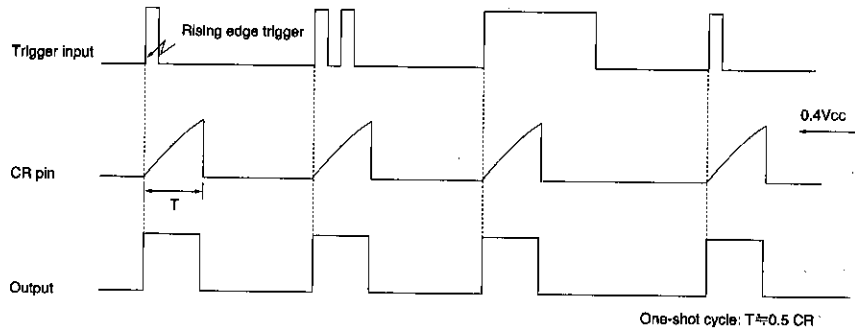


Fig. 9 Basic operation timing chart (Rising edge trigger)

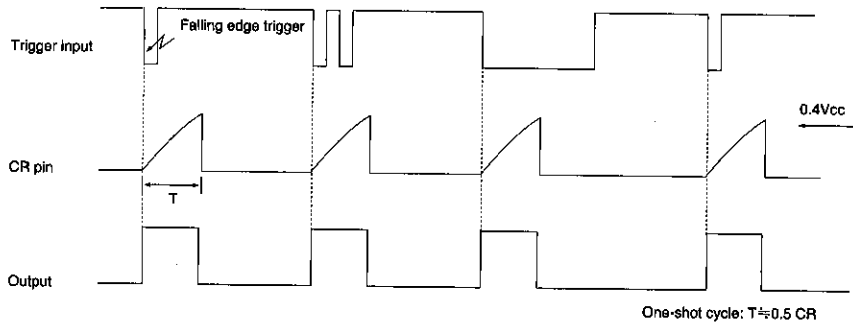
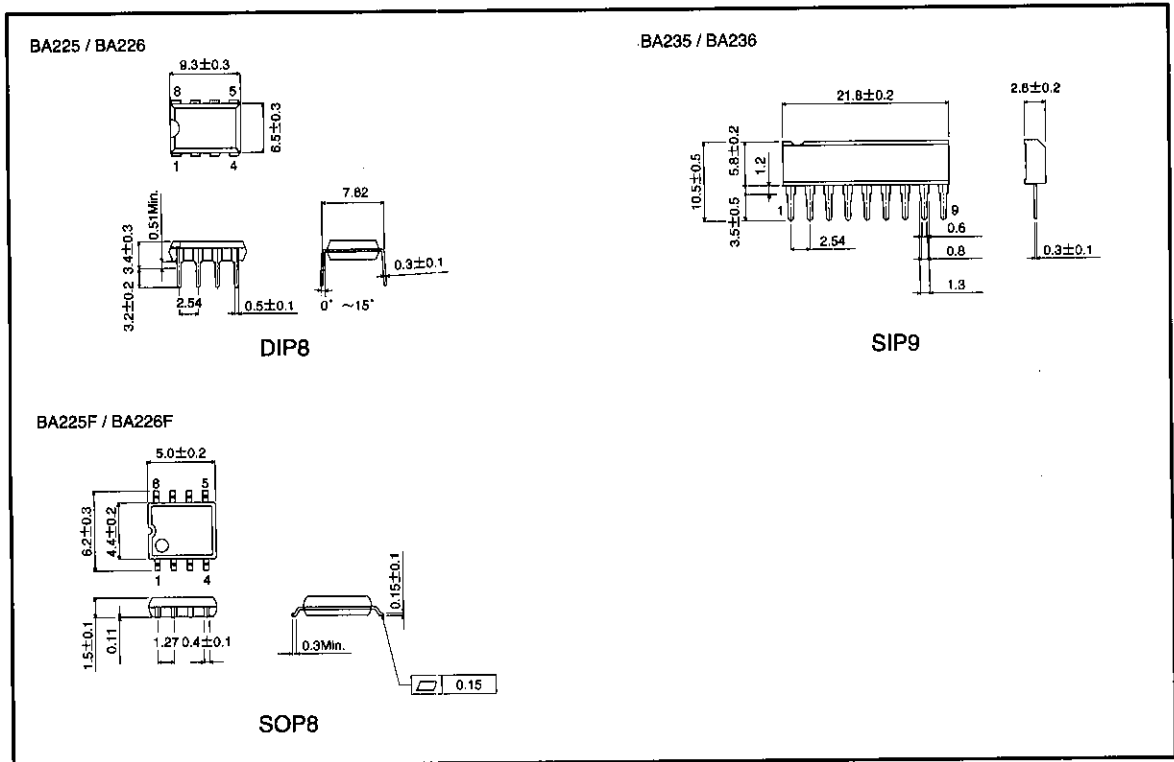


Fig. 10 Basic operation timing chart (Falling edge trigger)

● External dimensions (Units: mm)



## Notes

- The contents described in this catalogue are correct as of March 1997.
- No unauthorized transmission or reproduction of this book, either in whole or in part, is permitted.
- The contents of this book are subject to change without notice. Always verify before use that the contents are the latest specifications. If, by any chance, a defect should arise in the equipment as a result of use without verification of the specifications, ROHM CO., LTD., can bear no responsibility whatsoever.
- Application circuit diagrams and circuit constants contained in this data book are shown as examples of standard use and operation. When designing for mass production, please pay careful attention to peripheral conditions.
- Any and all data, including, but not limited to application circuit diagrams, information, and various data, described in this catalogue are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO., LTD., disclaims any warranty that any use of such device shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes absolutely no liability in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices; other than for the buyer's right to use such devices itself, resell or otherwise dispose of the same; no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by ROHM CO., LTD., is granted to any such buyer.
- The products in this manual are manufactured with silicon as the main material.
- The products in this manual are not of radiation resistant design.

The products listed in this catalogue are designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys). Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers, or other safety devices) please be sure to consult with our sales representatives in advance.

- Notes when exporting
  - It is essential to obtain export permission when exporting any of the above products when it falls under the category of strategic material (or labor) as determined by foreign exchange or foreign trade control laws.
  - Please be sure to consult with our sales representatives to ascertain whether any product is classified as a strategic material.