



## PIR CONTROLLER

### GENERAL DESCRIPTION

The M7612 is a PIR ( passive infra-red ) controller , using analog mixing digital design technique and manufactures by CMOS Process which can either drive TRIAC or RELAY depending on user's choice. With special noise immunity technique , M7612 is the most stable PIR controller you can find on the market. More than this , there are few components needed in its application circuit which can reduce material cost and increase competitive.

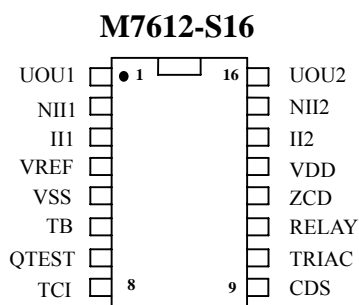
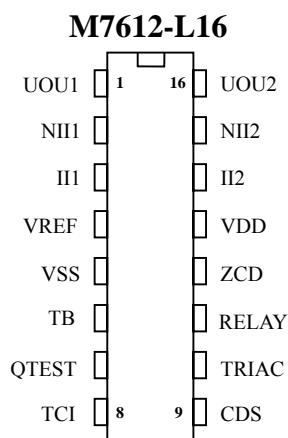
### FEATURES

- High noise immunity.
- Drive either RELAY or TRIAC.
- Adjustable light on duration.
- TRIAC can be either shunt or serial connected.
- PIR input.
- CDS input.
- Auto change on / auto mode by bonding option.
- 16 pin DIP or SOP package.

### APPLICATIONS

- PIR light controller, Motion Detector, Alarm system, Auto-door bell.

### PIN ASSIGNMENT





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PIN DESCRIPTION

| Pin No | Pin Name | Description   |
|--------|----------|---|
| 1      | UOU1     | First stage OP amp output.  |
| 2      | NII1     | First stage OP amp positive input.  |
| 3      | III1     | First stage OP amp negative input.  |
| 4      | VREF     | Stable reference voltage.   |
| 5      | VSS      | System ground.  |
| 6      | TB       | Time base for :<br>The delay time of receiving PIR signal to sent a pulse to trigger TRIAC or a high signal to trigger relay.<br>The delay time = $R * C * 32$ .<br>The PIR signal patented and accepted only if the signal cycle greater than $R * C * 768$ . When state of RELAY or TRIAC is changing form active into inactive mode. It takes more than $R * C * 4069$ , then system is able to receive PIR signal again.<br>$10K < R < 1M\Omega$<br>$100pF \leq C < 0.1\mu F$ ( Reference Diagram 1 ) |
| 7      | QTEST    | For testing only.   |
| 8      | TCI      | To set up the timing of how long TRIAC or RELAY is active.<br>During the period , if the system receives the PIR signal , then it restarts counting the timing again.<br>The flash cycle show the beginning of auto mode.<br>Note : width of TRIAC pulse = $R * C * 2$<br>Flash cycle : $R * C * 32768$<br>The range for R : $4.7K \leq R < 1M\Omega$<br>$C : 100pF < C < 0.1\mu F$ ( Reference Diagram 2 )   |
| 9      | CDS      | Connected to a CDS for inhibiting RELAY or TRIAC being triggered.<br>If TRIAC or RELAY has already being triggered by PIR signal and turned into active mode , then CDS can not inhibit PIR again.  |
| 10     | TRAIC    | To trigger TRIAC , active low.<br>Sink current : 15 mA max.   |
| 11     | RELAY    | To drive relay , active high.<br>Sink current : 10 mA max.<br>Source current : 10 mA max.   |
| 12     | ZCD      | Detect zero cross of AC line under remote mode function.  |
| 13     | VDD      | Operation voltage : 5V , stand by current : 0.5 mA  |
| 14     | II2      | 2 <sup>nd</sup> stage OP amp negative input.  |
| 15     | NII2     | 2 <sup>nd</sup> stage OP amp positive input.  |
| 16     | UOU2     | 2 <sup>nd</sup> stage OP amp output.  |



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DIAGRAM 1 :

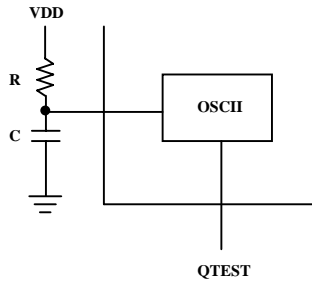
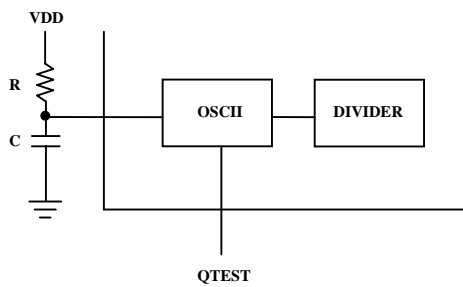
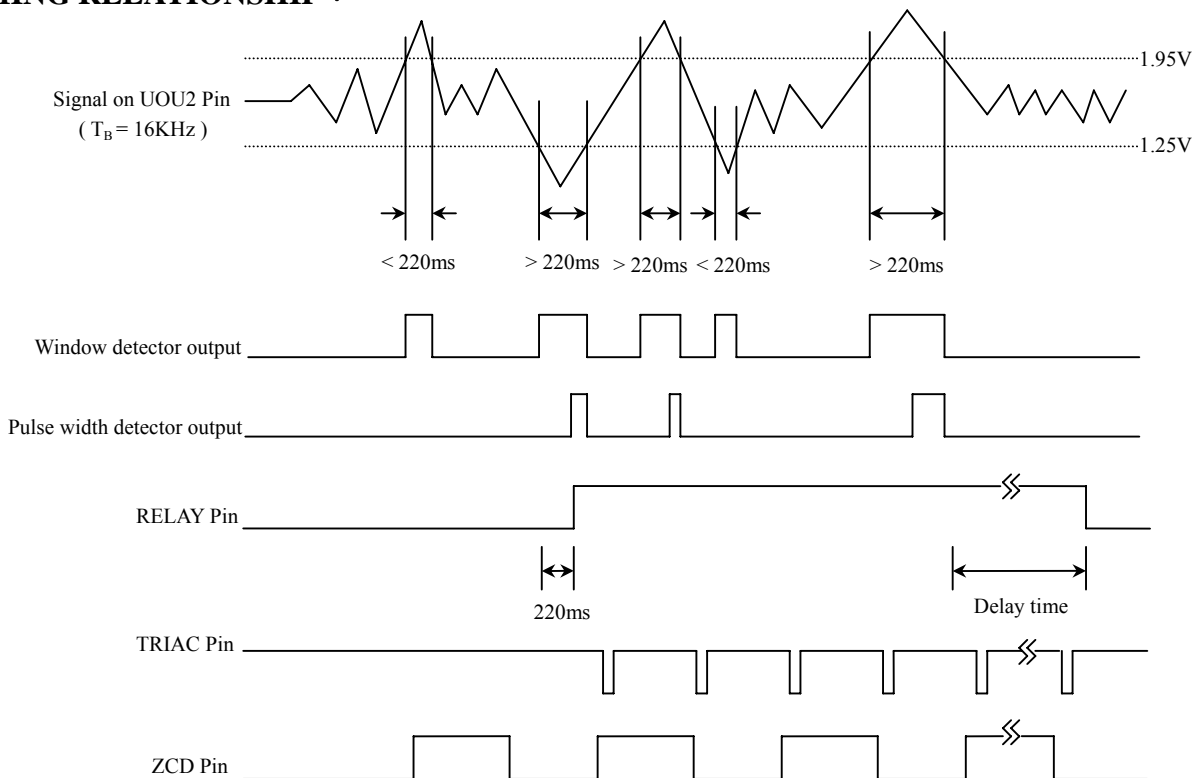


DIAGRAM 2 :



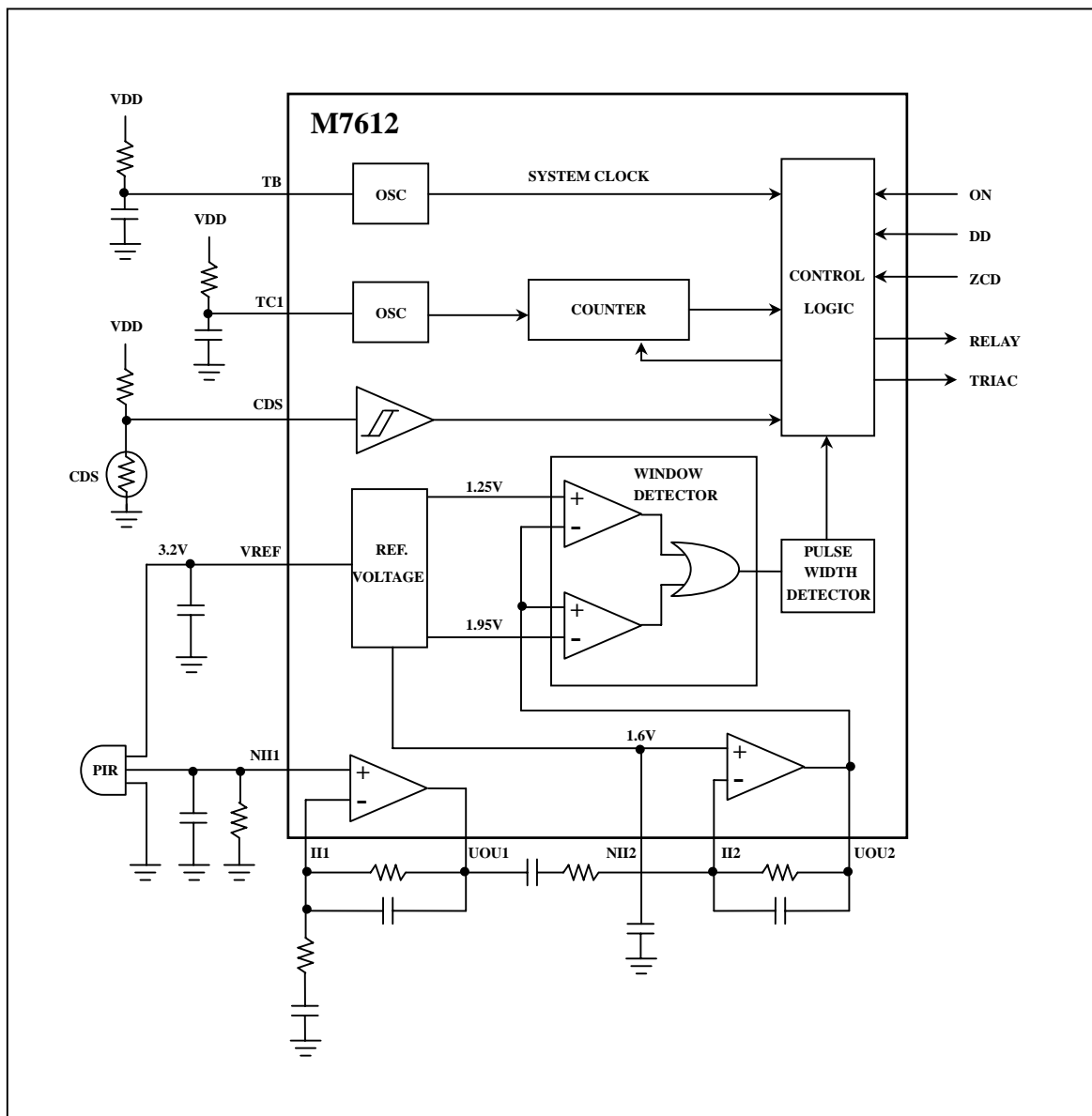
TIMING RELATIONSHIP :





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BLOCK DIAGRAM





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ABSOLUTE MAXIMUM RATING

(TA=25°C)

| Parameter                                      | Sym.              | Rating      | Unit |
|--|-------------------|-------------|------|
| Power Supply $V_{DD}$ With Respect to $V_{SS}$ | $V_{DD} - V_{SS}$ | 5.6         | V    |
| Voltage On Any Pin                             |                   | -0.3 to 5.6 | V    |
| Operating Temperature                          | Top               | -20 to 70   | °C   |
| Storage Temperature                            |                   | -65 to 150  | °C   |

ELECTRICAL CHARACTERISTICS

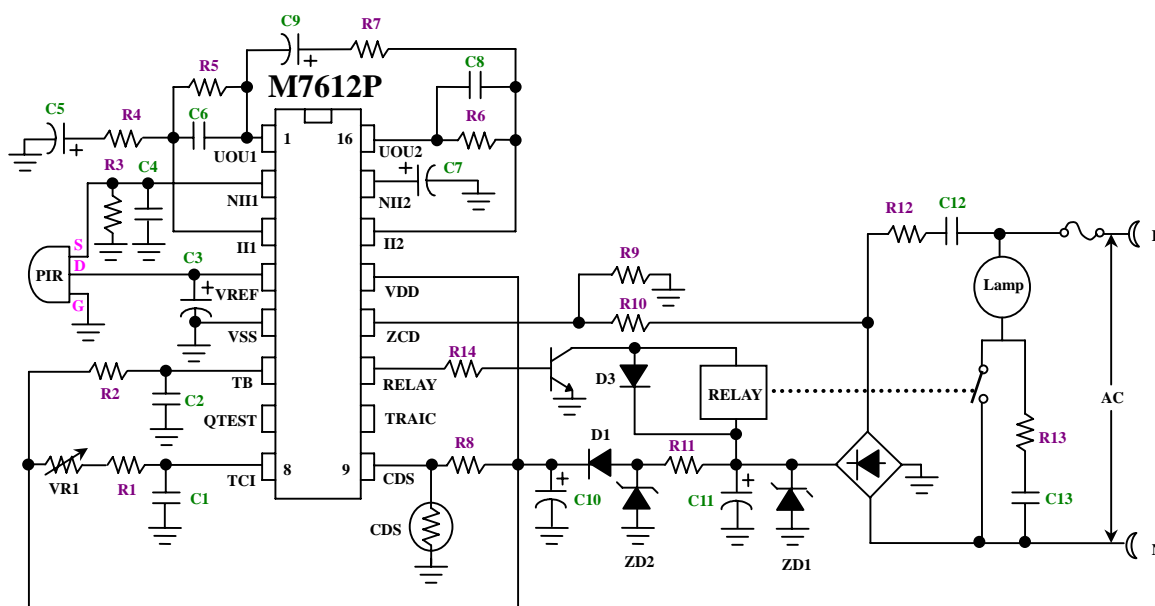
| Characteristics                          | Sym.          | Min. | Typ. | Max. | Unit | Conditions                    |
|--|---------------|------|------|------|------|-------------------------------|
| Supply Voltage                           | $V_{DD}$      | 4.2  | 5    | 5.5  | V    |                               |
| Stand by Current                         | $I_{ST}$      | 0.9  | 1.0  | 1.2  | mA   |                               |
| Operating Current                        | $I_{DD}$      | 1.8  | —    | 2.5  | mA   | 1.8mA , TRIAC / 2.5mA , RELAY |
| Stable Voltage                           | $V_{REF}$     | 3.0  | 3.2  | 3.4  | V    | $V_{DD} > 4.2V$               |
| Source Current of $V_{REF}$              | $I_{REF}$     | 200  | —    | —    | uA   |                               |
| Ripple of $V_{REF}$                      |               | —    | —    | 0.5  | mV   |                               |
| Input and Output Regulation of $V_{REF}$ |               | —    | —    | 0.3% |      |                               |
| Time Base Operating Frequency            | $F_{TB}$      | 15   | 16   | 17   | KHz  |                               |
| CDS Operating Trigger                    | $V_{T+}$      | 1.3  | 1.7  | 2.1  | V    |                               |
| CDS Operating Trigger                    | $V_{T-}$      | 0.6  | 0.9  | 1.1  | V    |                               |
| CDS Output Sink Current                  | $I_{SINK}$    | 11.6 | 13   | 21   | mA   |                               |
| Timer Duration of Out 1                  | $T_{OUT1}$    | 10   | —    | 1300 | SEC  | C=0.01uF , R=4.7K-1M          |
|  |               | 0.1  | —    | 13   |      | C=100pF , R=4.7K-1M           |
| Relay Source Current                     | $I_{RS}$      | —    | —    | 10   | mA   |                               |
| Relay Sink Current                       | $I_{RSINK}$   | —    | —    | 10   | mA   |                               |
| Relay Operating Voltage                  | $V_{RO}$      | 13.1 | —    | 18.8 | V    |                               |
| TRIAC Sink Current                       | $I_{TSINK}$   | —    | —    | 15   | mA   |                               |
| TRIAC Source Current                     | $I_{TSOURCE}$ | —    | —    | 50   | uA   |                               |



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ELECTRICAL CHARACTERISTICS

一. RELAY APPLICATION



TCI is connected to an external RC to set the delay time and frequency

|     |                  |     |           |     |            |
|-----|------------------|-----|-----------|-----|------------|
| C1  | 0.01uF           | VR1 | 1MΩ       | R13 | 100Ω/ 1/2W |
| C2  | 100pF            | R1  | 4.7KΩ     | R14 | 5.6KΩ      |
| C3  | 100uF            | R2  | 620KΩ     | D1  | 1N4001     |
| C4  | 0.01uF           | R3  | 47KΩ      | D3  | 1N4148     |
| C5  | 33uF             | R4  | 15KΩ      | ZD1 | 12V        |
| C6  | 0.1uF            | R5  | 820KΩ     | ZD2 | 5.6V       |
| C7  | 47uF             | R6  | 560KΩ     |     |            |
| C8  | 0.047uF          | R7  | 15KΩ      |     |            |
| C9  | 47uF             | R8  | 51KΩ      |     |            |
| C10 | 100uF/10V        | R9  | 470KΩ     |     |            |
| C11 | 220uF/25V        | R10 | 1MΩ       |     |            |
| C12 | 0.47uF/400~600V  | R11 | 2.4KΩ     |     |            |
| C13 | 0.047uF/400~600V | R12 | 47Ω/ 1/2W |     |            |

| Capacitor | Resistor | Frequency | Delay time(sec) |
|-----------|----------|-----------|-----------------|
| 103       | 4.7K     | 40KHz     | 10              |
| 103       | 10K      | 20KHz     | 16              |
| 103       | 20K      | 10KHz     | 28              |
| 103       | 100K     | 2KHz      | 130             |
| 103       | 200K     | 0.8KHz    | 260             |
| 103       | 1M       | 0.2KHz    | 1300            |

Note :

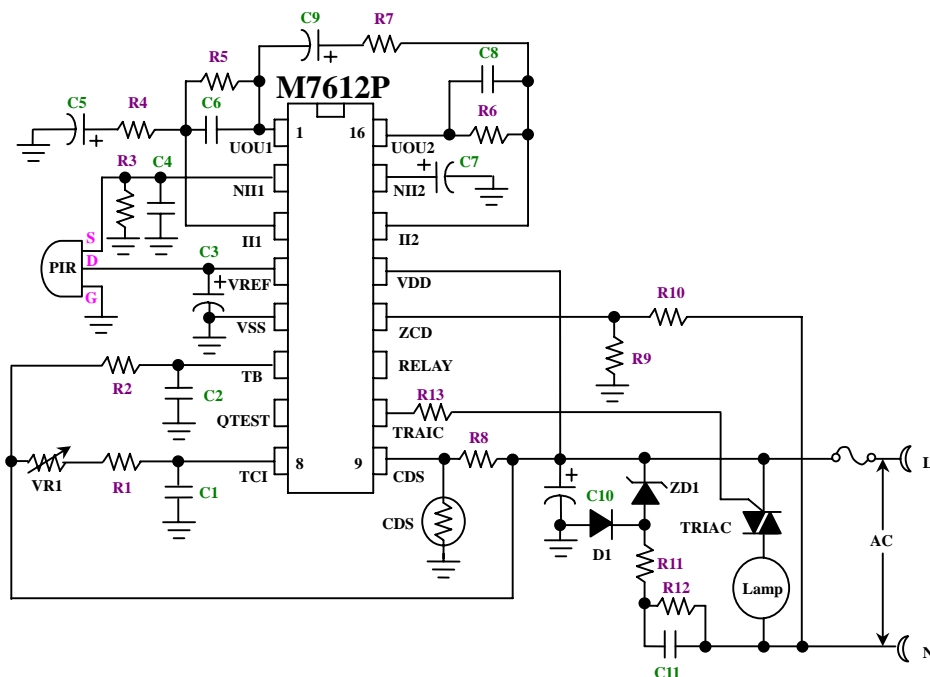
- (1) To adjust delay time , change VR1 value. ( VR1=1M , delay time is  $\geq 10$  sec )
- (2) For different CDS , R8 value should be adjusted.



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二. TRIAC APPLICATION

(A)



|     |                |     |           |
|-----|----------------|-----|-----------|
| C1  | 0.01uF         | R1  | 4.7KΩ     |
| C2  | 100pF          | R2  | 620KΩ     |
| C3  | 100uF          | R3  | 47KΩ      |
| C4  | 0.01uF         | R4  | 15KΩ      |
| C5  | 33uF           | R5  | 820KΩ     |
| C6  | 0.1uF          | R6  | 560KΩ     |
| C7  | 47uF           | R7  | 15KΩ      |
| C8  | 0.047uF        | R8  | 51KΩ      |
| C9  | 47uF           | R9  | 470KΩ     |
| C10 | 100uF/10V      | R10 | 1MΩ       |
| C11 | 0.1uF/400~600V | R11 | 47Ω/ 1/2W |
| D1  | 1N4004         | R12 | 100KΩ     |
| ZD1 | 5.6V           | R13 | 330Ω      |

TCI is connected to an external RC to set the delay time and frequency

| Capacitor | Resistor | Frequency | Delay time(sec) |
|-----------|----------|-----------|-----------------|
| 103       | 4.7K     | 40KHz     | 10              |
| 103       | 10K      | 20KHz     | 16              |
| 103       | 20K      | 10KHz     | 28              |
| 103       | 100K     | 2KHz      | 130             |
| 103       | 200K     | 0.8KHz    | 260             |
| 103       | 1M       | 0.2KHz    | 1300            |

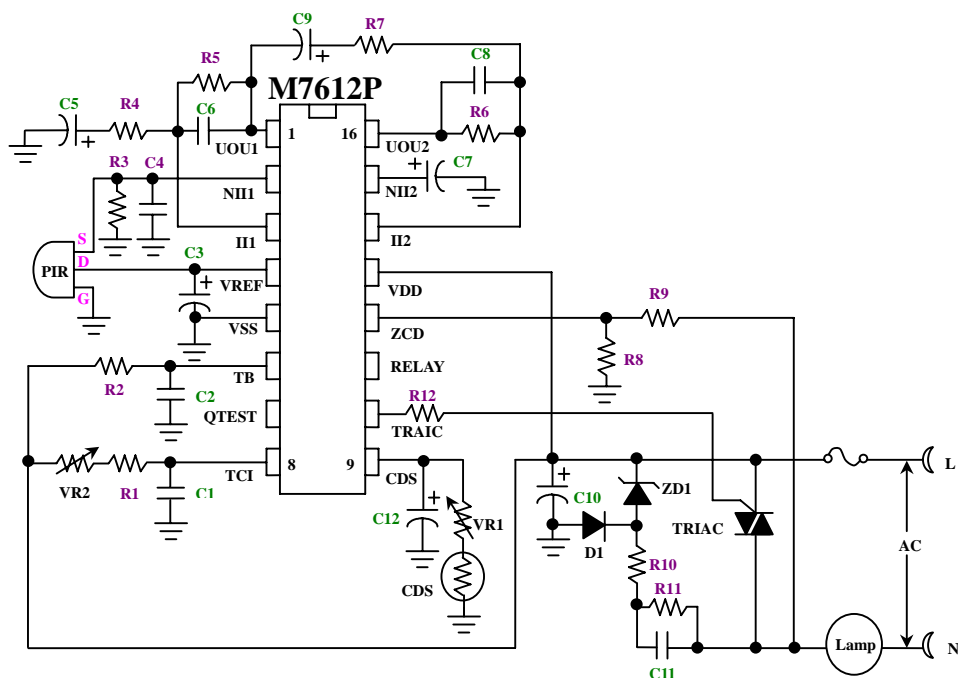
Note :

- (1) To adjust delay time , change R1 value. (Delay time is  $\geq 10$  sec )
- (2) For different CDS , R8 value should be adjusted.



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(B)



|     |                   |     |            |
|-----|-------------------|-----|------------|
| C1  | 0.01uF            | VR1 | 1MΩ        |
| C2  | 100pF             | VR2 | 1MΩ        |
| C3  | 100uF / 16V       | R1  | 4.7KΩ      |
| C4  | 0.01uF            | R2  | 620KΩ      |
| C5  | 220uF / 10V       | R3  | 47KΩ       |
| C6  | 0.1uF             | R4  | 47KΩ       |
| C7  | 22uF / 16V        | R5  | 220KΩ      |
| C8  | 683 pF            | R6  | 470KΩ      |
| C9  | 47uF / 16V        | R7  | 56KΩ       |
| C10 | 470uF / 16V       | R8  | 800KΩ      |
| C11 | 0.15uF / 400~600V | R9  | 720KΩ      |
| C12 | 1uF / 50V         | R10 | 47Ω / 1/2W |
| D1  | 1N4007            | R11 | 100KΩ      |
| ZD1 | 6.2V              | R12 | 100Ω       |

TCI is connected to an external RC to set the delay time and frequency

| Capacitor | Resistor | Frequency | Delay time(sec) |
|-----------|----------|-----------|-----------------|
| 103       | 4.7K     | 40KHz     | 10              |
| 103       | 10K      | 20KHz     | 16              |
| 103       | 20K      | 10KHz     | 28              |
| 103       | 100K     | 2KHz      | 130             |
| 103       | 200K     | 0.8KHz    | 260             |
| 103       | 1M       | 0.2KHz    | 1300            |

**Note :**

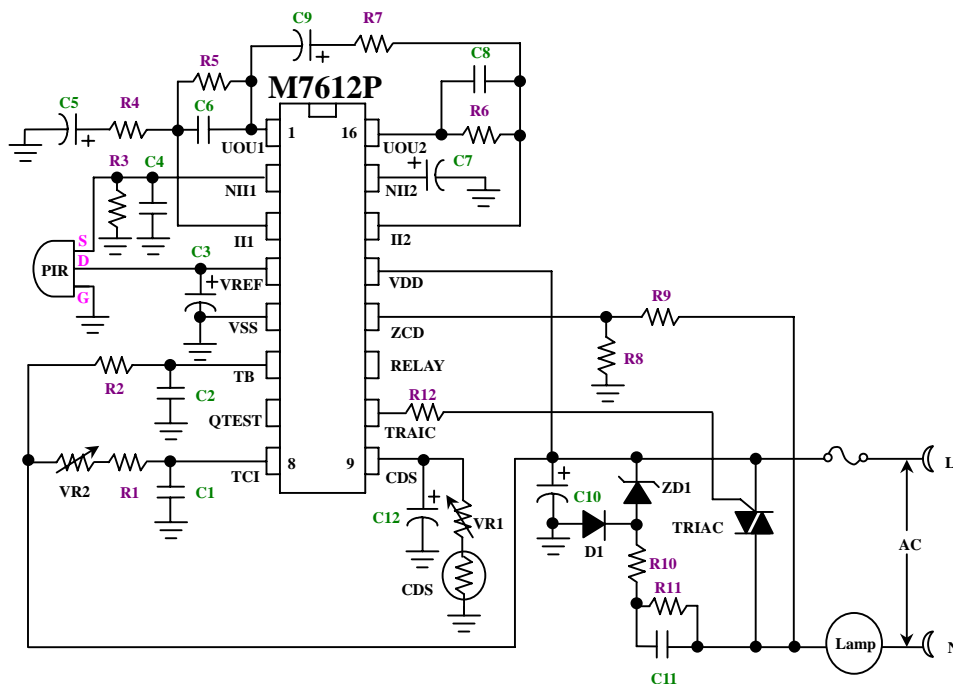
- (1) To adjust delay time , change VR2 value. ( VR2=1M , delay time is  $\geq 10$  sec )
- (2) For different CDS , VR1 value should be adjusted.
- (3) Distance = 4m.





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(C)



|     |                   |     |            |
|-----|-------------------|-----|------------|
| C1  | 0.01uF            | VR1 | 1MΩ        |
| C2  | 100pF             | VR2 | 1MΩ        |
| C3  | 100uF / 16V       | R1  | 4.7KΩ      |
| C4  | 0.01uF            | R2  | 620KΩ      |
| C5  | 33uF / 16V        | R3  | 47KΩ       |
| C6  | 0.033uF           | R4  | 15KΩ       |
| C7  | 22uF / 16V        | R5  | 820KΩ      |
| C8  | 0.033 uF          | R6  | 820KΩ      |
| C9  | 33uF / 16V        | R7  | 15KΩ       |
| C10 | 470uF / 16V       | R8  | 800KΩ      |
| C11 | 0.33uF / 400~600V | R9  | 720KΩ      |
| C12 | 1uF / 50V         | R10 | 47Ω / 1/2W |
| D1  | 1N4007            | R11 | 100KΩ      |
| ZD1 | 6.2V              | R12 | 100Ω       |

TCI is connected to an external RC to set the delay time and frequency

| Capacitor | Resistor | Frequency | Delay time(sec) |
|-----------|----------|-----------|-----------------|
| 103       | 4.7K     | 40KHz     | 10              |
| 103       | 10K      | 20KHz     | 16              |
| 103       | 20K      | 10KHz     | 28              |
| 103       | 100K     | 2KHz      | 130             |
| 103       | 200K     | 0.8KHz    | 260             |
| 103       | 1M       | 0.2KHz    | 1300            |

**Note :**

- (1) To adjust delay time , change VR2 value. ( VR2=1M , delay time is  $\geq 10$  sec )
- (2) For different CDS , VR1 value should be adjusted.
- (3) Distance = 8m.

\* All specs and applications shown above subject to change without prior notice.