Introduction

Development of motion detector with two technologies of motion detection: any object (including human body) emits infra red radiation depending on the object temperature. We can sense this radiation with special pyro-electric sensor (P.I.R) from a distance.

Using the “Doppler effect” by which a moving object in a microwave field changes the doppler frequency, we build a receiver/transmitter microwave unit, transmit a signal, receive a signal and compare them. The P.I.R and MW technologies, when combined in a single detector, complement each other to assure the most reliable detection and immunity to false alarms.

FEATURES

- Cylindrical optics improves detection and false alarm immunity.
- Programmable motion event counter (1 or 2 events).
- Simple-to-use, two-position vertical adjustment
- TEST input to enable/disable the walk test LED remotely (per new European standard)
- Open collector trouble output
- Anti-masking protection
- White light protection.
- DRO-stabilized MW microstrip technology.
- **MW Motion Simulator** simulates the effect of a human body moving in the MW field (for MW self-test - patent pending).
- Range control for adjusting the MW coverage
- **True Motion Recognition™ (TMR)** algorithm (patented) distinguishes between the true motion of a human body and other disturbances, which invariably cause false alarms.
- Sealed chamber protects the pyroelectric element from insects.
- PIR self-test by applying a short heat pulse.
- Free terminal for connecting an E.O.L. resistor
Specifications

Input Voltage: 9 to 16 VDC  
Current Drain: About 28 mA at 12 VDC  
Detector: Low noise dual-element pyroelectric sensor  
Tripping Indication: LED flashes green for up to 5 seconds  
Motion Event Verification Counter: Selectable, 1 or 2 events

Lens Data:
No. of Beams: 36 in two layers (curtain beams in bottom layer)  
Max. Coverage: 15 x 15 m / 90° field of view

Vertical Adjustment: FAR and NEAR, by sliding the circuit board along a two-position scale.

MW SECTION
Oscillator: Microstrip DRO-stabilized Doppler module  
Frequency: 2.45 GHz  
Detection Range: Adjustable from 20% to 100% (3 m to 15 m)  
Tripping Indication: LED glows green for up to 5 seconds

ALARM, TAMPER & TROUBLE DATA
Alarm Indication: LED glows red for 1.3 to 5 seconds if both detectors trip  
Relay Contacts: N.C., rated at 0.1 A resistive / 30 VDC; 18 Ω resistor in series with contacts  
Alarm Duration: 1.3 to 5 seconds  
Tamper Switch: N.C., rated at 50 mA resistive / 30 VDC  
Trouble Output: Open collector, 100 mA max., with 18 Ω resistor in series  
Masking Detection Delay: About 60 seconds  
Trouble/ Masking Indication: LED alternately flashes green and red and TRB output pulls LOW until the detector is reset.

ENVIRONMENTAL
RFI Protection: 30< V/m up to 1000 MHz.  
Operating Temperatures: -10 °C to 50°C (14°F to 122°F)  
Storage Temperatures: -20 °C to 60°C (-4°F to 140°F)
General Description

Block diagram

1. Optical unit
2. Pyro sensor
3. Amp + filters
4. Stabilization pyro voltage
5. Sensor heat resistor
6. Pyro urging stabilization
7. Microwave sensor
8. First amp + anti mask
9. M.V timing unit
10. Second amp + filters
11. Environment temp measure
12. Microcontroller
13. Alarm unit
14. Trouble unit
15. Display unit
16. Test unit
17. Dip switch unit
18. Power supply
The detector is microcomputer controlled that receive signals from the P.I.R unit and the MW unit, and with a special algorithm process the signals to determine the motion detection. In addition there is an algorithm that perform a self-testing based on a simulation of human body movement to assure that the detector operates properly, and if not a trouble alert is initiated.

The microcomputer in use is pic16lc711 from Microchip, 8 bit CMOS microcontroller with A/D converter, 8 levels of stack, 1K of program memory, 13 I/O pins, 4 interrupt sources.

Pin diagram

Each sensor output goes to amplifier unit to fit is low signal to the microcontroller. The microcontroller control all the units in the detector. We can see that in the block diagram.