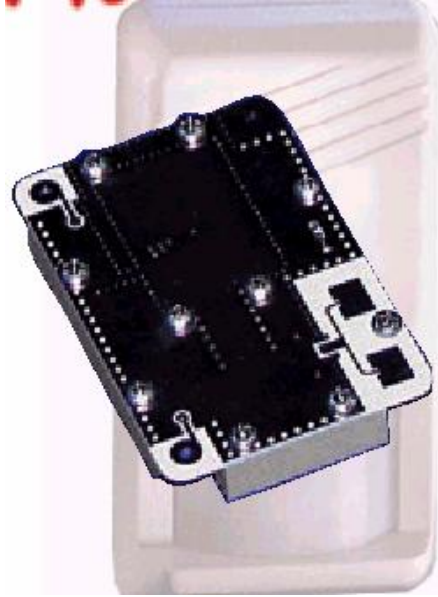


Microwave Oven



Apply

I. Automatic door activation



II. Vehicle and housing intrusion alarm



III. Collision Notice

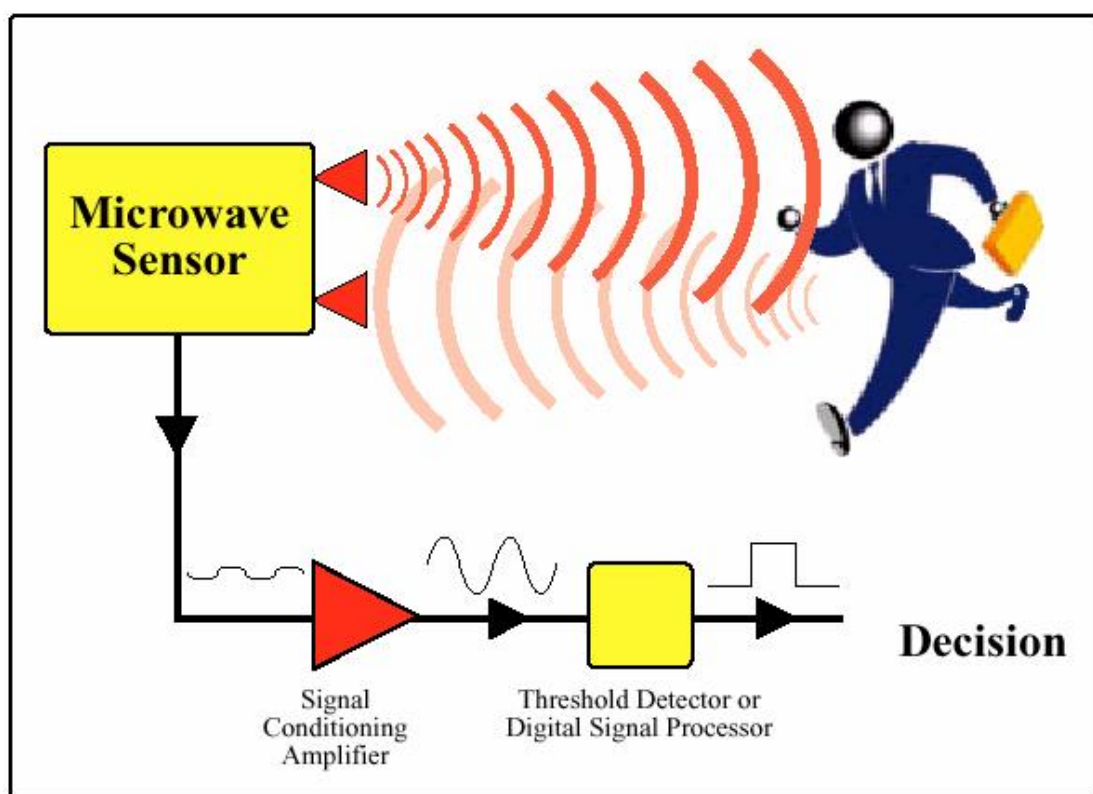


IV. Traffic and road surveillance



Introduction to microwave detection sensor

Microwave detection sensors operate on the Doppler radar principle, emitting low-power microwaves and detecting energy reflected from objects. When motion is detected, the emitted frequency is replaced by the reflected microwave frequency. The mixed signal combines the original and reflected frequencies, resulting in a low-frequency voltage output from the sensor. The schematic diagram is shown below:



Characteristics of microwave detection sensor:

1. **Non-contact.**
2. **Surrounding environment:** not affected by heat, throat, humidity, airflow, dust, etc., suitable for harsh environment.
3. **Anti-interference.**
4. **Safety.**
5. **Wide range.** Detection range 15-20 m. A wider range is possible.

Microwave motion sensor

characteristic :

The following parameters are measured at 5VDC, CW operating state, 12K Ω load, and +25°C.

parameter	remarks	least value	representative value	crest value	unit
frequency	1	10. 520	10. 525	10. 530	GHz
radiation power	1	12	15	20	dBm
Spurious Emission @ 3m	1			25	μ V/m
Settling Time			3	6	μ Sec
Received Signal Strength	2	100		250	μ Vp-p
Noise	3			5	μ Vrms
Supply Voltage		4.75	5.00	5.25	VDC
Current Consumption			30	40	mA
Pulse Repetition Frequency	4		2	3	KHz
Pulse Width	4	10			μ Sec
Operating Temp		-15		55	°C

Note1: The radiated emissions is designed to meet FCC rules.

Note2: The Received Signal Strength(RSS) is measured at the total 2 Ways path loss of 93dB.

Note3: The noise voltages are measured from 10Hz to 100Hz at the Output port, inside an Anechoic chamber.

Note4: Pulse operation

Features and applications: low power consumption //; CW or Pulse operation; long detection range;

Used for: microwave infrared motion detection; automatic door; light control; speed test.

HB100 Microwave Mobile Sensor User Manual

instruction for installation

1、 linkage 。

The ports marked on the receiving module: +5V GND (ground), IF (signal) are welded respectively, as shown in Figure A, on the module. There is a bare wire to prevent it from being damaged by static electricity during transportation. Remove it before starting work.

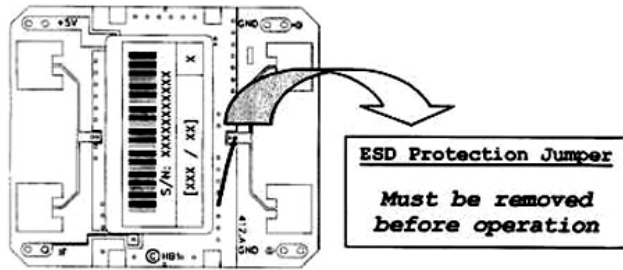


Diagram A

2、 emission frequency

The frequency and function of the microwave module are adjusted when it leaves the factory; please do not adjust it casually. Otherwise, the function will be affected.

3、 Beam Angle

The installation module must have its antenna facing the area to be inspected. Users can change its direction to achieve the best coverage area, as shown in the figure below. The radiation angle of the module antenna and their half-power width (HPBW).

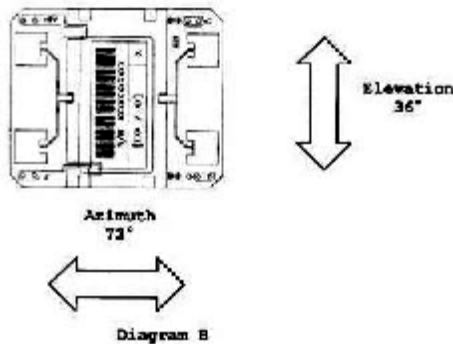


Diagram B

4、 output signal 。

There are three types of signal outputs at the signal output end (IF)

Doppler Shift — When an object moves across a coverage area, the signal output at the Intermediate Frequency (IF) stage generates a Doppler-shifted signal whose intensity correlates with the reflected energy of the transmitted power. Typically operating at the suppression level, this requires a high-gain low-frequency amplifier to process the signal for processor processing. The frequency of the Doppler-shifted signal is proportional to both the object's motion and velocity. Generally, the Doppler-shifted frequency of human walking signals remains below 100 Hz.

Noise signals — noise generated inside the components and environmental protection, especially the lighting (mainly in 100/120HE) is very close to the multi-spectral signal frequency generated by human movement.

The true current signal with a DC voltage —approximately 0.1 volts exists at the IF output terminal, which can be either positive or negative in polarity. Therefore, it is recommended to use an AC coupling method to connect the signal output (IF) to the low-frequency amplifier.

- 5、 It is recommended to use a single terminal (Header Pins) to solder the module onto the motherboard (amplifier circuit). Specifically, install the +5V, IF, and GND terminals on the module separately. This configuration ensures a balanced and secure installation. Other methods are also acceptable. The module must be protected from pressure-induced deformation, as this could compromise other performance parameters. Please refer to Figure C below for reference.

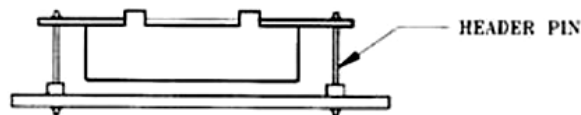


Diagram C

HB100 Microwave Module

The HB100 microwave mobile sensor is an X-band mobile sensing Doppler module with low power consumption, high sensitivity, and compact size, making it an ideal low-cost mobile detector. Its fundamental vibration is achieved using a GAS FET dielectric, and the resonant vibrator (DRO) does not generate radiated harmonics.

The module adopts surface-mounted components, small size, high reliability, the module and infrared sensor to form a ratio detection, usually used in the anti-theft system, the module and infrared sensor to form a ratio detection, can effectively reduce false alarm.

function
 Low current consumption
 Its wave pulse works
 Longest detectable distance

apply
 Microwave infrared mobile detector
 Automatic door controller
 Light control switch
 velocity measurement

The Doppler equation

$$F_d = 2v (F_t/c) \cos\theta$$

where

F_d = Doppler frequency

V = target speed

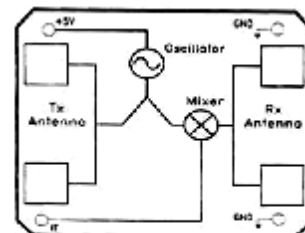
F_t = emission frequency

C = speed of light (3×10^8 m/s)

θ = The Angle between the direction of object movement and the sensor generation marker. For example, if an object is moving straight toward ACD2400-050.

$$(F_t = 10.525 \text{ GHz})$$

$$F_d = 19.49 \text{ V (km/h)}$$



Functional Block and Connection