HB100
MICROWAVE MOTION SENSOR MODULE

Installation Instruction

1. Set Up

Connect the +5V power supply, Ground and amplifier circuitry at the designed terminals. Designation of the connection terminals are silk screened on the PCB as shown in Diagram A. A ESD protective jumper which is installed to protect unit from ESD damage during transportation, handling and assembling. **The jumper must be removed before operation.**

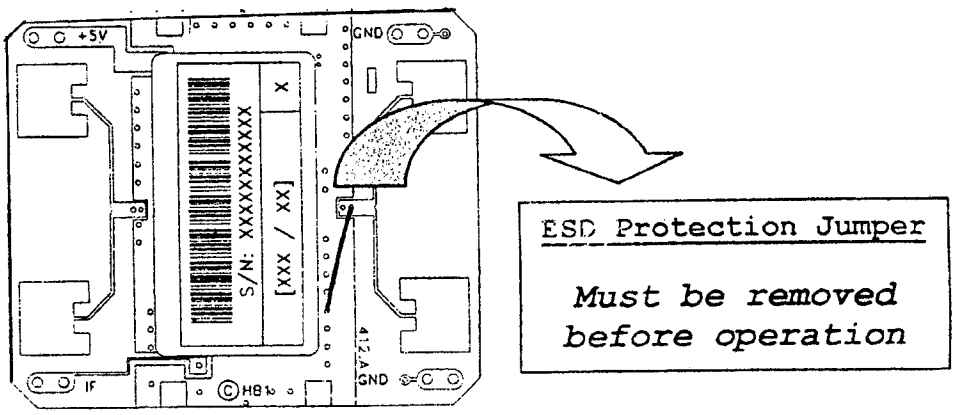


Diagram A

2. Transmit Frequency

The transmit frequency and power of the microwave motion sensor module is set by factory. There is no user adjustable part in this device.

3. Radiation Pattern

The module to be mounted with the antenna patches facing to the desired detection zone. The user may vary the orientation of the sensor to get the best coverage. The radiation patterns of the antenna and their half power beam width (HPBW) are shown in below diagram.

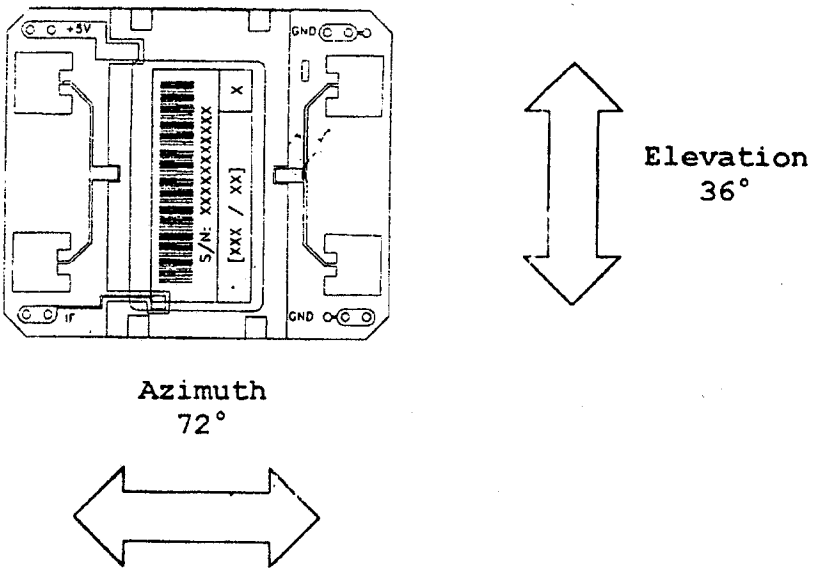


Diagram B

4. **Output Signal**

There are 3 types of signal at the IF terminal:

Doppler shift - Doppler shift output from IF terminal when movement is detected. The magnitude of the Doppler Shift is proportional to reflection of transmitted energy and is in the range of microvolts. A high gain low frequency amplifier is usually connected to the IF terminal in order to amplify the Doppler shift to a processable level. Frequency of Doppler shift is proportional to velocity of motion. Typical human walking generates Doppler shift below 100 Hz. The Doppler equation is included in Annex.

Noise - Noise generate from internal electronic components, as well as pick up from environment. Specially attention has to the interference pick up from fluorescent light, as the 100/120 Hz noise is closed to the Doppler frequency generated by human movement.

DC Level - A DC level (0.1 to 0.4 Vdc) exists at the IF terminal and its polarity can be positive and negative. AC coupling is recommended for IF terminal connection.

Mounting

Header Pins can be used to connected the terminals (+5V, IF, GND) to the amplifier circuit as well as mounting support. Other mounting methods may also be used.

Caution must be taken to avoid applying pressure or stresses to the chassis of the sensor. As it may cause performance deterioration.

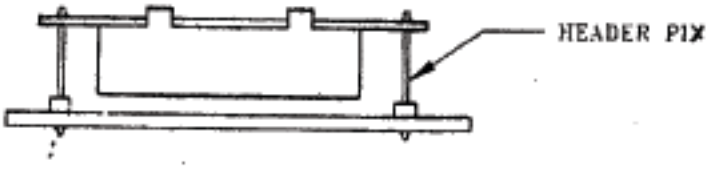


Diagram C

6. **Caution**

The module has been fully tested to specifications. Upon opening, tighten or loosen the chassis will cause performance deterioration.

The module is an electrostatic sensitive device (ESD) Precautions shall be observed for handling and assembly.

Technical Support

Please contact our application engineers in the factory for technical assistance whenever necessary.

Annex 1 : Doppler Equation

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

Where

F_d = Doppler frequency
V = Velocity of the target
F_t = Transmit frequency
c = Speed of light (3×10^8 m/sec)
θ = The angle between the target moving direction and the axis of the sensor.

If a target is moving straight toward or away from ACD2400-050 (F_t = 10.525 GHz) The formula is simplified to:

$$F_d = 19.49V \text{ (Velocity in km/hour)}$$

Characteristics

Unless noted otherwise, the specifications are measured with +5VDC, CW operation and at ambient temperature +25蚓.

Parameter	Notes	Min	Typ	Max	Units
Frequency	1	10.520	10.525	10.530	GHz
Radiated Power (EIRP)	1		15	20	dBm
Spurious Emission @ 3 m	1			25	猩/m
Settling Time			3	6	猶ec
Received Signal Strength	2	80		250	猩p-p
Noise	3			7	猩rms
Beam Width (3 dB)			40X80		°
Supply Voltage		4.75	5.00	5.25	VDC
Current Consumption			30	40	mA
Operating Temperature		-10		55	蚓
Weight			8		gm

Note 1: The radiated emissions of HB100 is designed to meet the requirements of Federal Communications Commission (FCC) rules, Part 15, Section 15.245 (use within a building or to open building door)

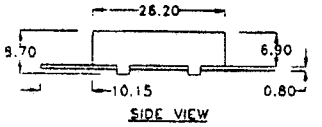
Note 2: The Received Signal Strength (RSS) is measured at the total 2 ways path loss of 90dB.

Note 3: The noise voltages are measured from 10 Hz to 100 Hz at the output port.

Note 4: The design, manufacturing process and specifications of this device are subject to change without notice.

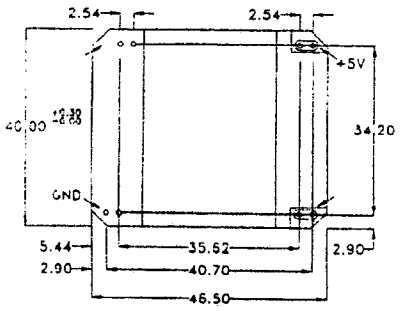
Note 5: CAUTION: ELECTROSTATIC SENSITIVE DEVICE. Observe precautions for handling and storage.

Outlines (all dimensions are in mm)

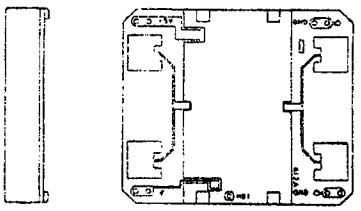


SIDE VIEW

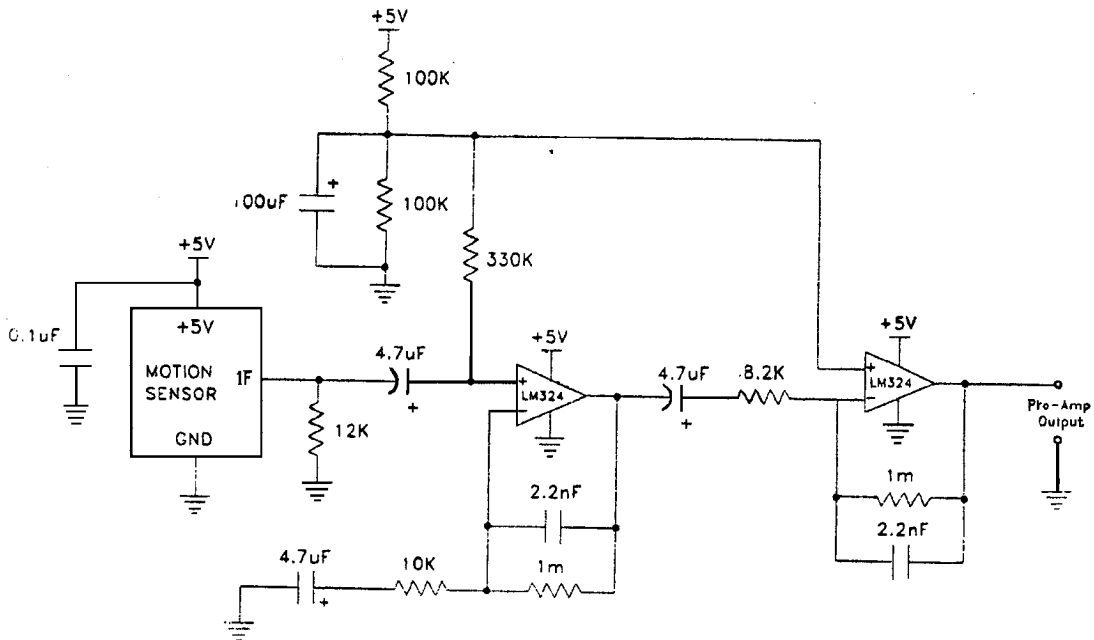
CONNECTION HOLE CHART		
DIAMETER	QTY	PLATED THRU
1.0	8	YES



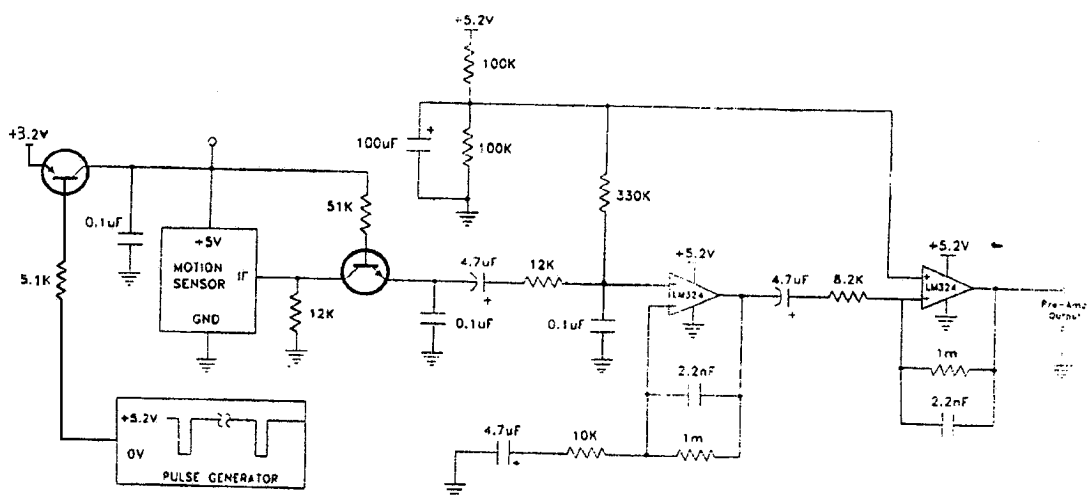
TOP VIEW


BOTTOM VIEW

Annex 2: Amplifier Circuit (CW operation)



Annex 3: Amplifier Circuit (Pulse operation, PRF =2 KHz, Duty Cycle = 4%)



HB100

10.525 GHz MINIATURE MICROWAVE MOTION SENSOR

General Description

HB100 Miniature Microwave Motion Sensor is a X-Band Doppler module. The low current consumption, high sensitivity and flat profile features make it ideal for use in low cost motion detection equipment. Fundamental oscillation is generated by GaAs FET Dielectric Resonator Oscillator (DRO) to eliminate non-harmonic spurious emission. By using flat profile microstrip patch antennas, the module can be integrated to other circuitry easily.

The sensor is built with Surface Mounted Technologies (SMT) to achieve minimization and high reliability.

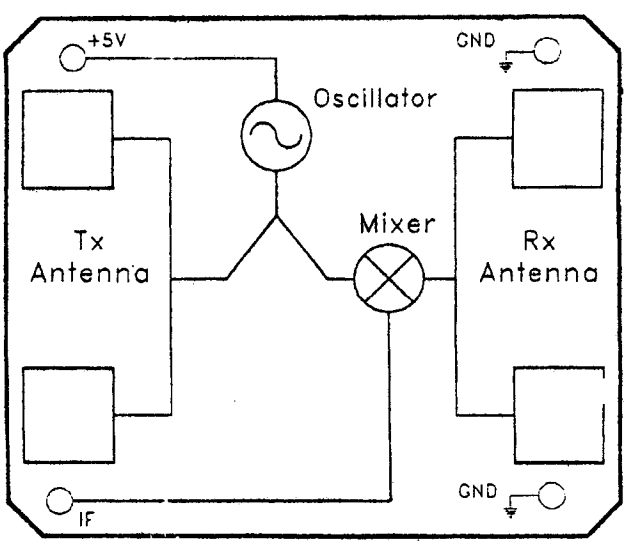
This module is ideally suitable for false alarms reduction in intruder detectors when work together with Passive Infrared (PIR) sensor. It can also be used for auto-door opening and vehicle speed measurement.

Features

* Low current consumption
* CW or Pulse operation
* Long detection range
* Flat profile

Applications

* Microwave-PIR motion detector
* Automatic door opener
* Lighting control
* Speed measurement



Functional Block and Connection

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