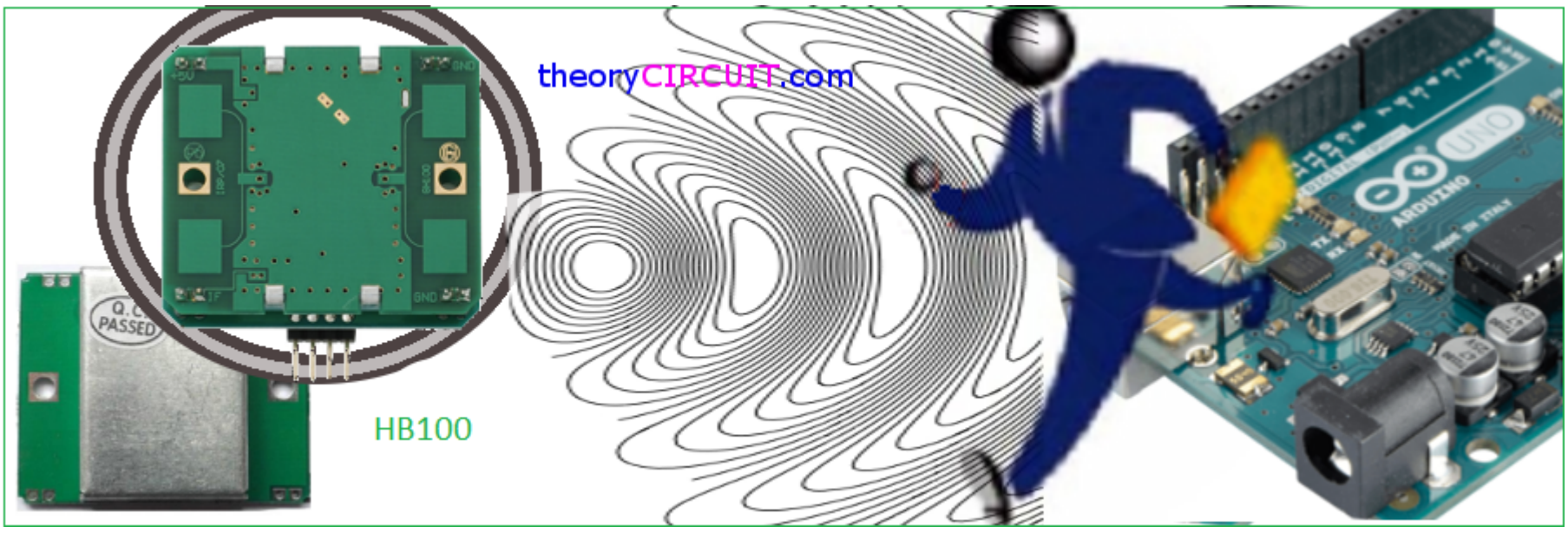
theoryCIRCUIT

HB100 Microwave Motion sensor Interfacing Arduino

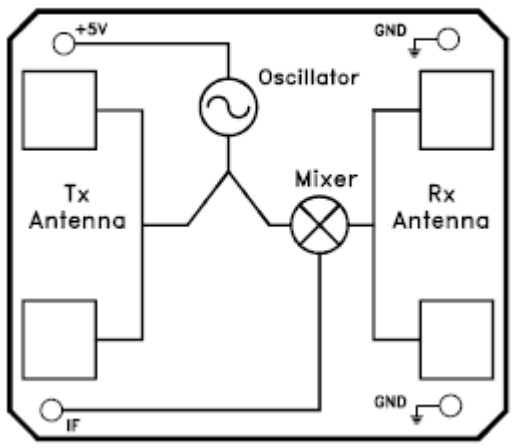


For Electronic Circuit designers, Makers and Hobbyists movement detection & Measurement of an object or person is simple task by using PIR sensor or Ultrasonic sensor but it is some what difficult to measure the movement speed. The HB100 Miniature Microwave motion sensor makes it easy to measure movement and speed.

HB Series of microwave motion sensor module are X-Band Mono-static DRO Doppler transceiver front-end module. These modules are designed for movement detection, like intruder alarms, occupancy modules and other innovative ideas. The module consists of Dielectric Resonator Oscillator (DRO), microwave mixer and patch antenna

HB100 Sensor Pinout

HB100 pinout

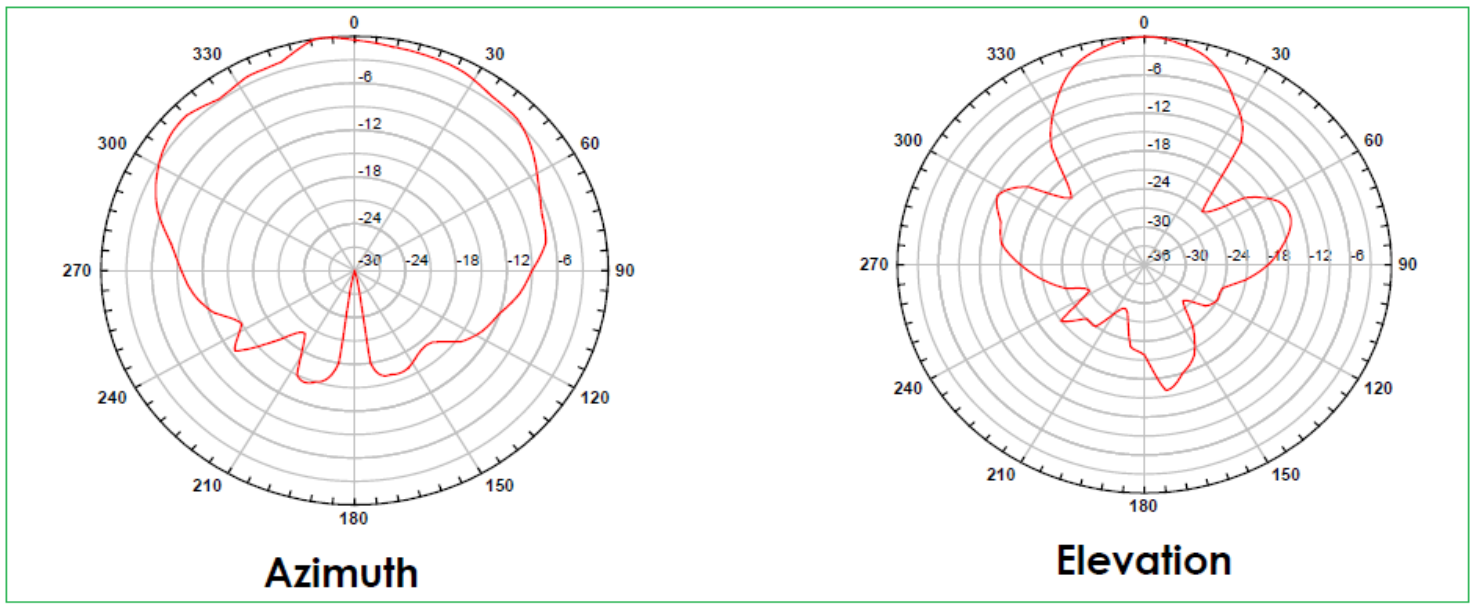


HB100 (Ft = 10.525 GHz))

Features

* Low current consumption
* CW or Pulse operation
* Flat profile
* Long detection range *
X-Band Frequency 10.5 GHz *
Operating Voltage 4.5V to 5.2V * DC
level (0.01 to 0.2 Vdc) * Fd= 19.49V
(Velocity in km/hour) or 31.36V (V in mile per hour) Fd=> Doppler
frequency (If a target is moving straight toward or away from

Radiation Pattern



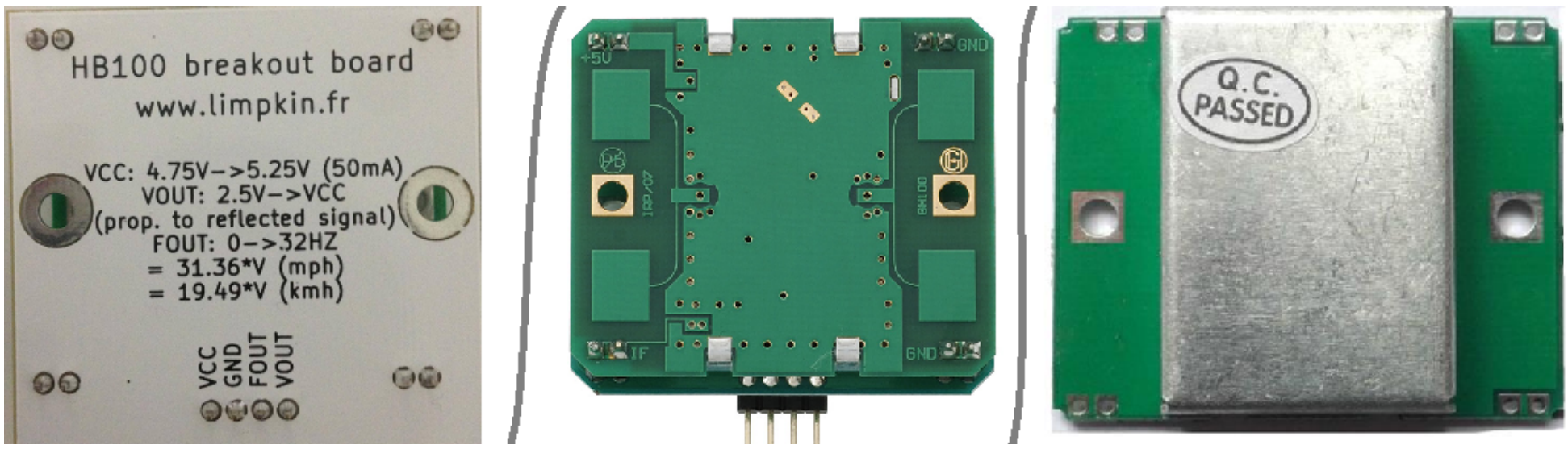
The radiation patterns of the antenna and their half power beam width (HPBW)

The module to be mounted with the antenna patches facing to the desired detection zone. The user may vary the orientation of the module to get the best coverage.

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 (μV). 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. (hb100_microwave_sensor_datasheet)

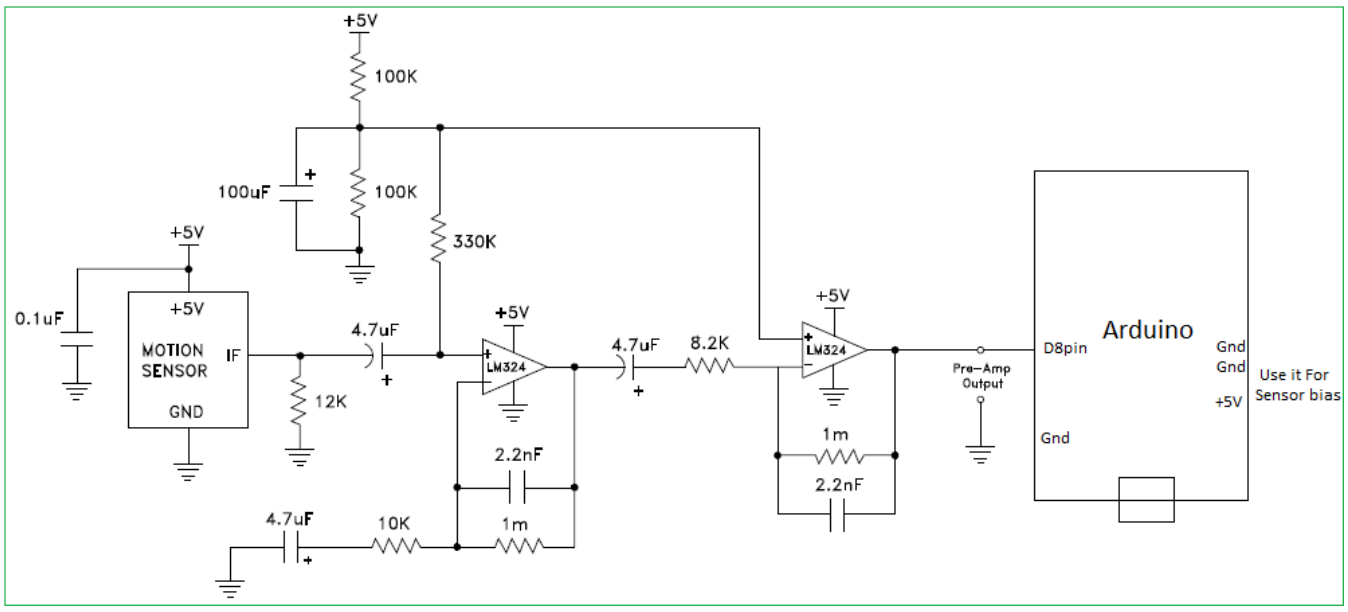
HB100 Sensor Breakout board



Note

- 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)
- The Received Signal Strength (RSS) is measured at the total 2 ways path loss of 93dB.
- The noise voltages are measured from 10 Hz to 100 Hz at the output port, inside an Anechoic chamber.
- CAUTION: ELECTROSTATIC SENSITIVE DEVICE. Observe precautions for handling and storage. (hb100_microwave_sensor)

Interfacing HB100 with Arduino



Arduino Code

```
#include “FreqPeriod.h”

double lfrq;
long int pp;

void setup() {
Serial.begin(9600);
  FreqPeriod::begin();
  Serial.println(“FreqPeriod Library Test”);
}

void loop() {
  pp = FreqPeriod::getPeriod();
  if (pp) {
    Serial.print (“period: “);
    Serial.print(pp);
    Serial.print(“ 1/16us / frequency: “);

  lfrq = 16000400.0 /pp;
  Serial.print(lfrq);
  Serial.print(“ Hz “);
  Serial.print(lfrq/31.36);
  Serial.println( “ Mph “);
}
}
```

For more about code and library : https://docs.google.com/document/d/1CVdH3UVTROaJ4_Bgsx_-hyg5_LvoNxYiB13pPRN9gzU/edit

Reference

1. https://www.youtube.com/watch?v=PpU7R5LMUs4

hb100_microwave_sensor_datasheet

hb100_microwave_sensor

going further (Interesting)

https://atap.google.com/soli/

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31 thoughts on “HB100 Microwave Motion sensor Interfacing Arduino”

ijon says:
February 2, 2017 at 10:13 am

where i can get the HB100 Sensor Breakout board ?

admin says:
February 5, 2017 at 8:23 am

Hi ijon you can get here.
https://www.amazon.com/SMAKN-Microwave-10-525GHz-Doppler-Detector/dp/B00FFW4AZ4

Daniel Zinner says:
April 21, 2017 at 12:44 pm

There is only one guy making them. I have seen guys use a bread board and got it working.
Alternatively just design your own.
If you can’t the only place to buy from is here:

https://www.tindie.com/products/limpkin/hb100-doppler-speed-sensor-arduino-compatible/

DeepDIY says:
May 23, 2017 at 7:06 pm

Microwave boards are available cheaply, however the interface would have to be worked on.
http://www.ebay.co.uk/itm/291982694120?_trksid=p2057872.m2749.l2649&ssPageName=STRK%3AMEBIDX%3AIT

Bernie says:
July 11, 2017 at 12:55 pm

The “FreqPeriod Library Test” code requires the IF to be connected to the pin 7 of the Ard UNO not the pin 8, careful with that.

Dr. S. Dheenadayalan says:
July 18, 2017 at 4:25 am

very much thankful for the pin suggestions. Is it possible to use lcd keypad shield where pin 8 and 7 are used by lcd. The pin in the IDE is (8, 9, 4, 5, 6, 7). kindly suggest.

Paul Morrison says:
May 8, 2023 at 9:31 pm

Lifesaver man, Thanks a lot. Set everything up and could not figure out what was wrong until I saw your comment here.

Lucas says:
November 1, 2017 at 12:08 pm

hi! this post was really useful to me, but how can I regulate the distance?
because I want to detect objects within a range of 3 meters or less

Phil says:
November 2, 2017 at 11:51 pm

In the amplifier schematic, is the small m in the 1m resistor for mili or mega and just not capitalized?

Albert Tomimbang says:
March 17, 2021 at 3:07 pm