W5HN

North Texas NTMS Microwave Society

HB100 Microwave Doppler Sensor

N5BRG

October 2, 2021

Virtual Meeting

Ebay Find

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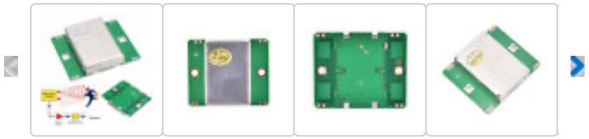

HB100 Microwave Motion Sensor 10.525GHz Doppler Radar Detector for Arduino And

Condition: **New**

Quantity: 1 More than 10 available / 6 sold

Price: **C $3.56**

Approximately **US $2.81**

Add to cart

♡ Add to Watchlist

A seller you've bought from | Free shipping | 30-day returns

Shipping: **FREE** Economy Shipping from Greater China to worldwide | See details

International shipment of items may be subject to customs processing and additional charges.

Located in: shanghai, China

Delivery: Estimated between **Tue. Nov. 30 and Tue. Jan. 25**

This item has an extended handling time and a delivery estimate **greater than 38 business days.** Please allow additional time if international delivery is subject to customs processing.

Returns: 30 days, buyer pays return shipping | See details

User Comment on Detection Range from Amazon

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Question: What is the detection range of this sensor in terms of meters or feet?

Answer: Depends on the size and speed of your target. With an added microwave horn (made from aluminum foil), a preamp circuit (1 opamp), and a Arduino-type controller (Teensy T3.2) doing a FFT on the signal, I was able to detect a person walking at 2.2 mph out to 80 feet. I saw a pickup truck about 500 feet away (big flat metal things kick back a big radar signal). There's more info online, search for: HB100 teensy doppler radar processing see less

By Amazon Customer on August 8, 2017

Ebay Discription

Description

Description:

100% brand new and high quality
Material: Electrical components
Color: See pictures
Features:
1. Type: Microwave Sensor.
2. Chip: HB100.
3. Frequency: 10.525GHz.
4. Voltage: DC 5V±0.25V.
5. Current: 40mA.
7. Application: Automatic door startup, Car, House intrusion alarm, Collision warning.
Traffic monitoring.
Note:
Please pay attention to the Voltage/Current/Power of your own devices. To ensure product safety,check whether this item is compliant with your own devices before you buy it!
Size: See the picture
No retail package
Quantity: 1Pc
Note: Due to the difference between different monitors, the picture may not reflect the actual color of the item. Thank you!!
Package includes:

1Pc x HD100 Module

Maybe these folks are the original designers.

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ST Engineering Electronics Ltd
ST Engineering Hub, 1 Ang Mo Kio Electronics Park Road
#06-02
Singapore 567710

Tel: (+65) 6521 7948 / (+65) 6521 7933
Fax: (+65) 6521 7801
Email : info@agilsense.com

Ap Note By ST Electronics

- http://www.limpkin.fr/public/HB100/HB100_Microwave_Sensor_Application_Note.pdf
- Search for “HB100 teensy doppler radar processing” to learn more.

Board Top View Can Removed

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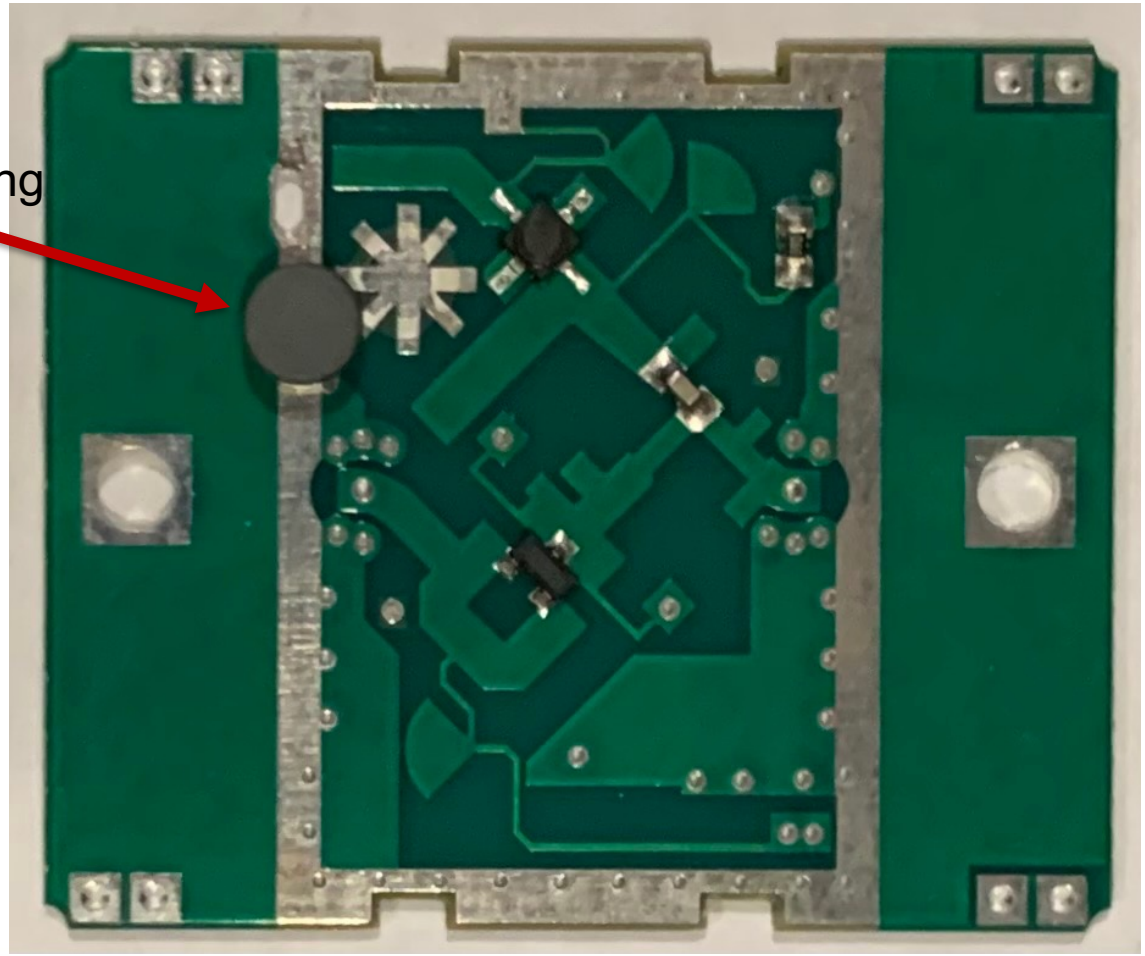
Dielectric Tunning Element not glued here.

Should be on Star burst.



Patch Antennas

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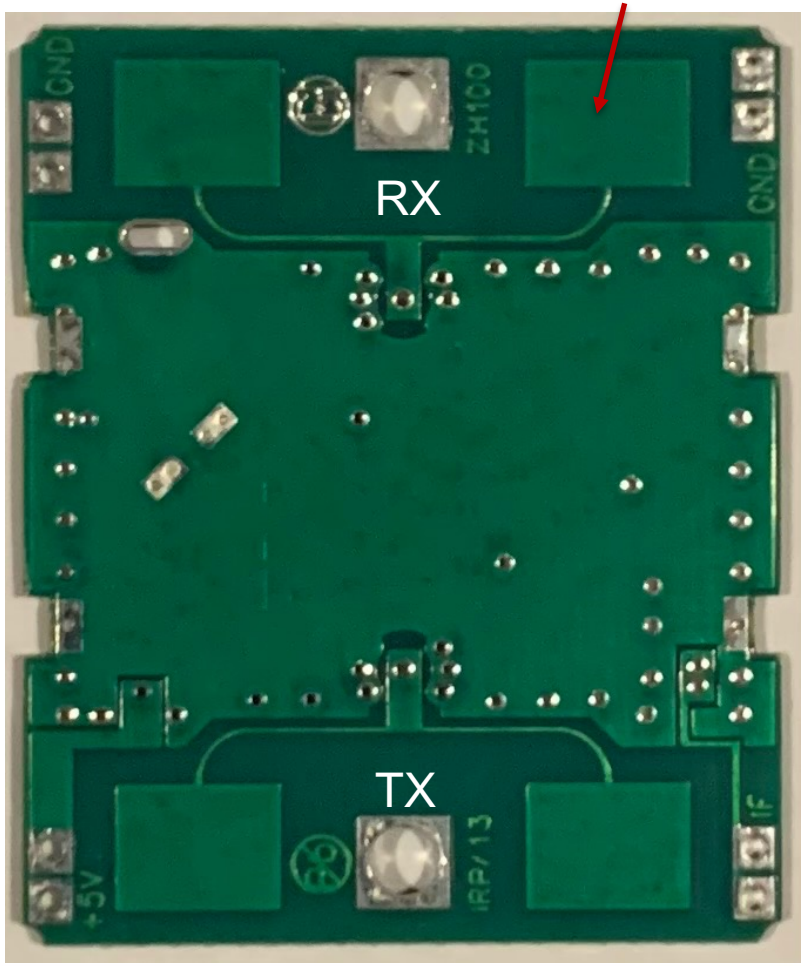
← 19.8 mm →

7.84 mm X 6.08 mm

GND

GND



← 35.6 mm →

+5VDC

IF OUT

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Block Diagram

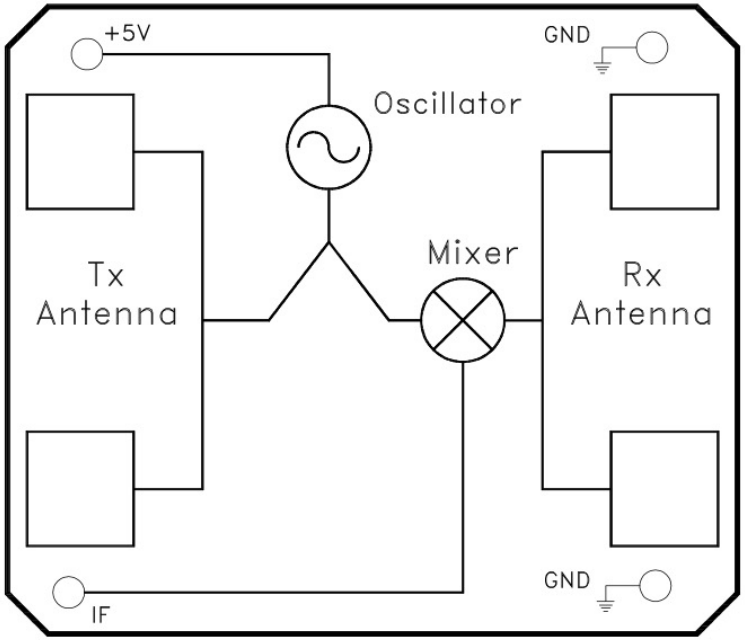
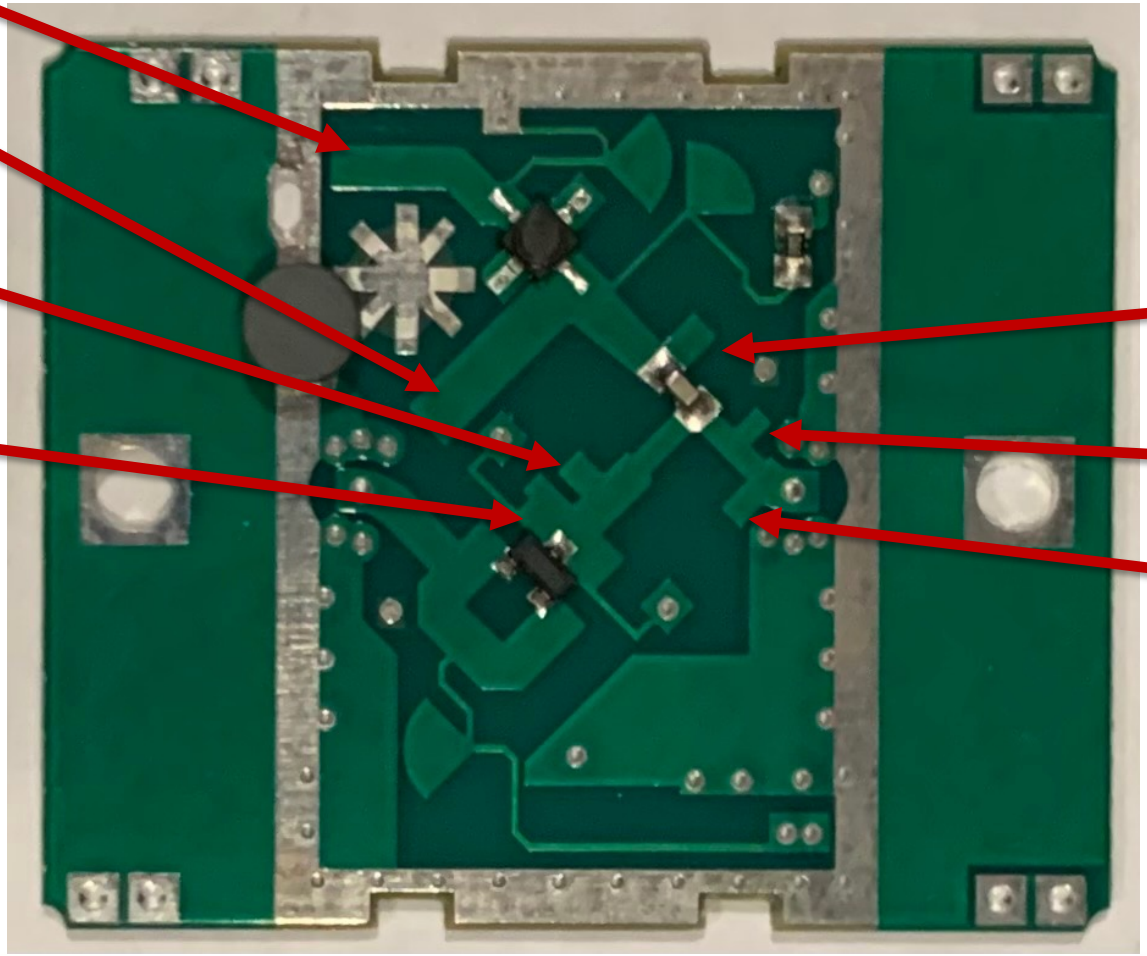


Diagram A: Block Diagram

Stub Lengths



PCB Substrate
1 mm Thick

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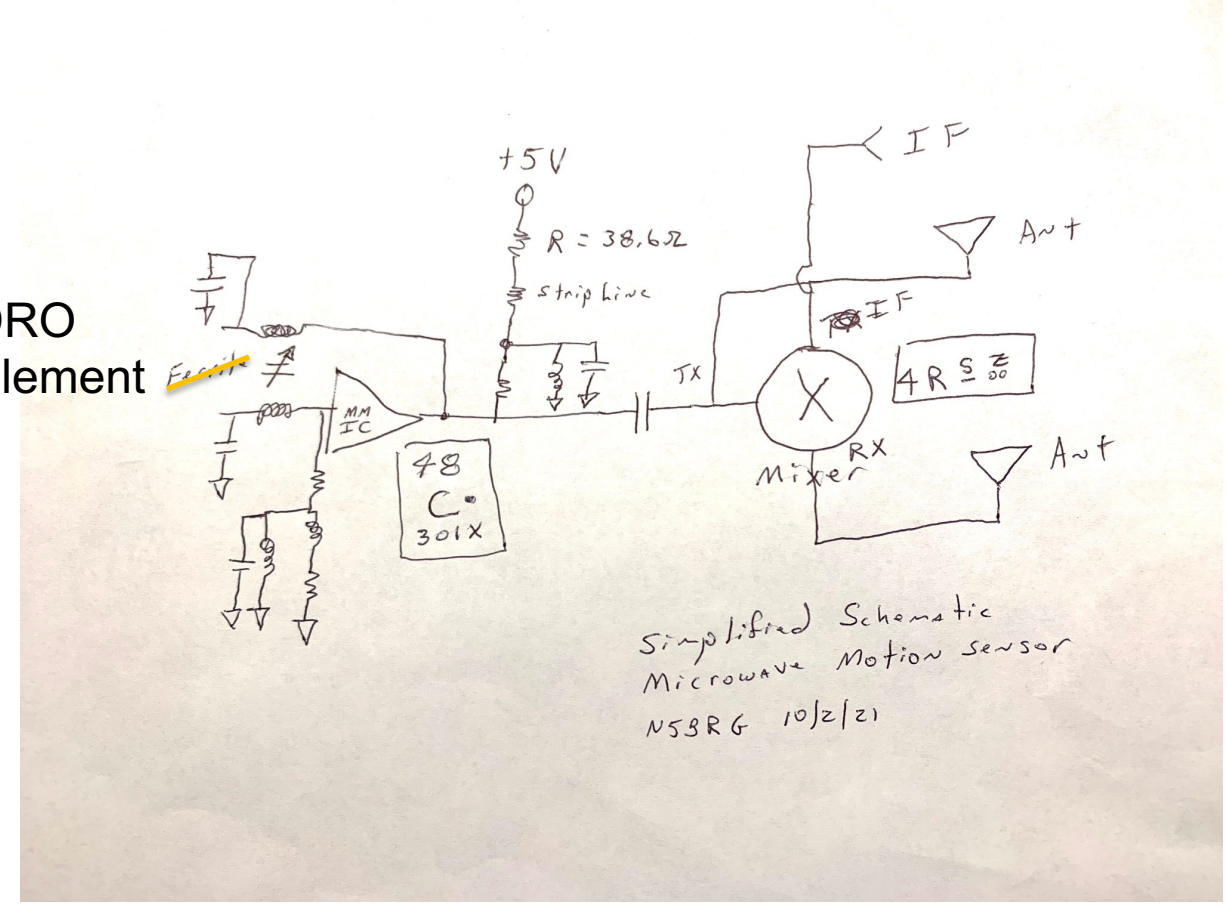
Simplified Schematic

DRO Element



DRO References

- https://gedlm.com/DRO/
  - Good reference on DRO oscillators
- https://accelconf.web.cern.ch/p99/PAPERS/MOP47.PDF

Can View

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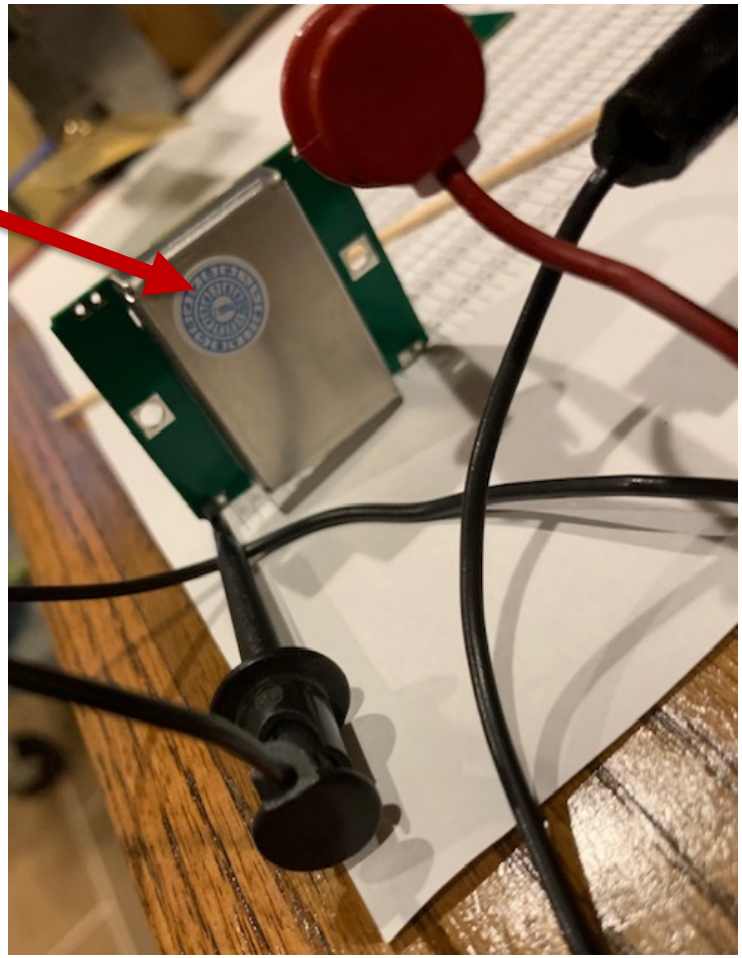
DRO Adjustment Hole here.



Test Setup

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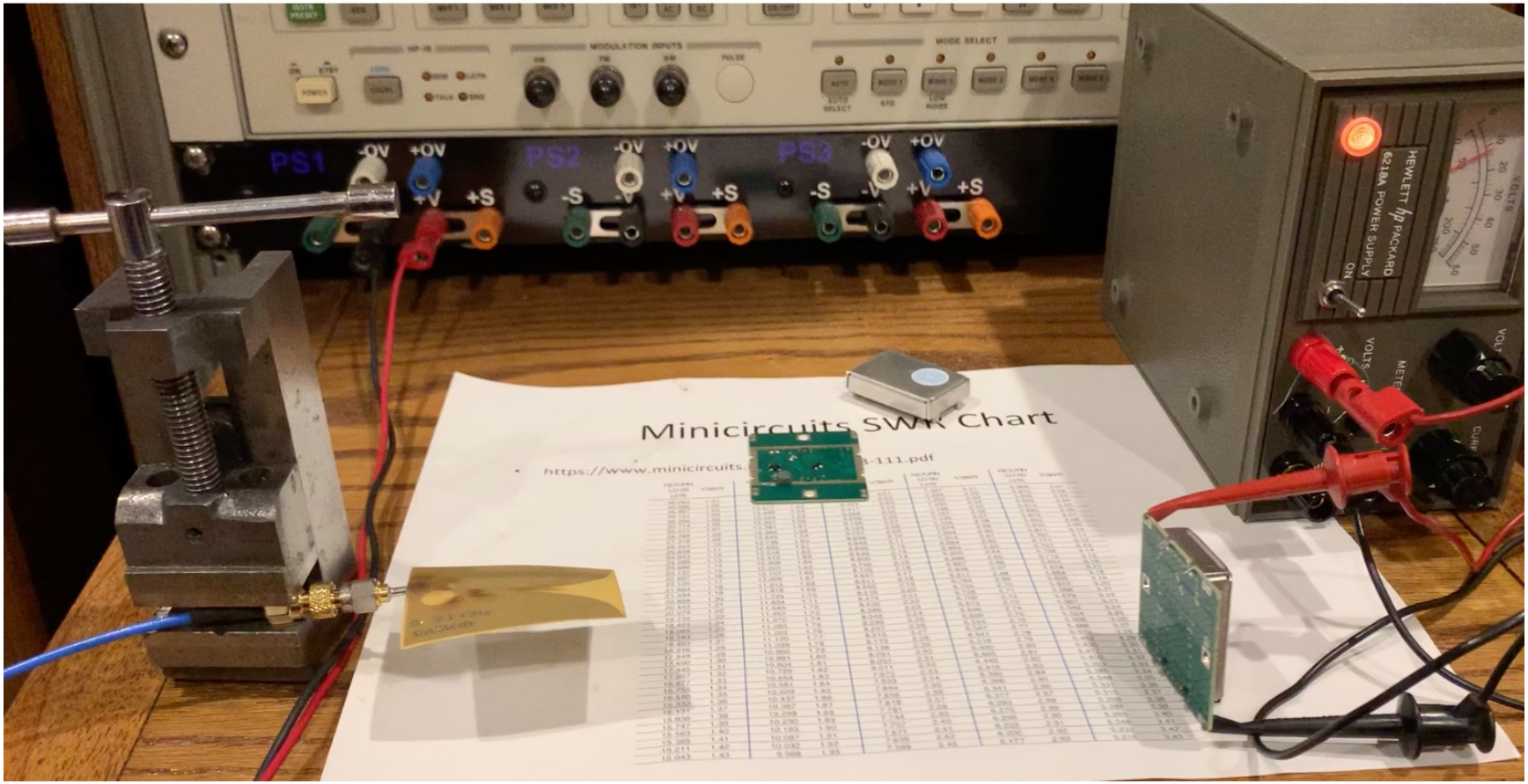

TX Signal

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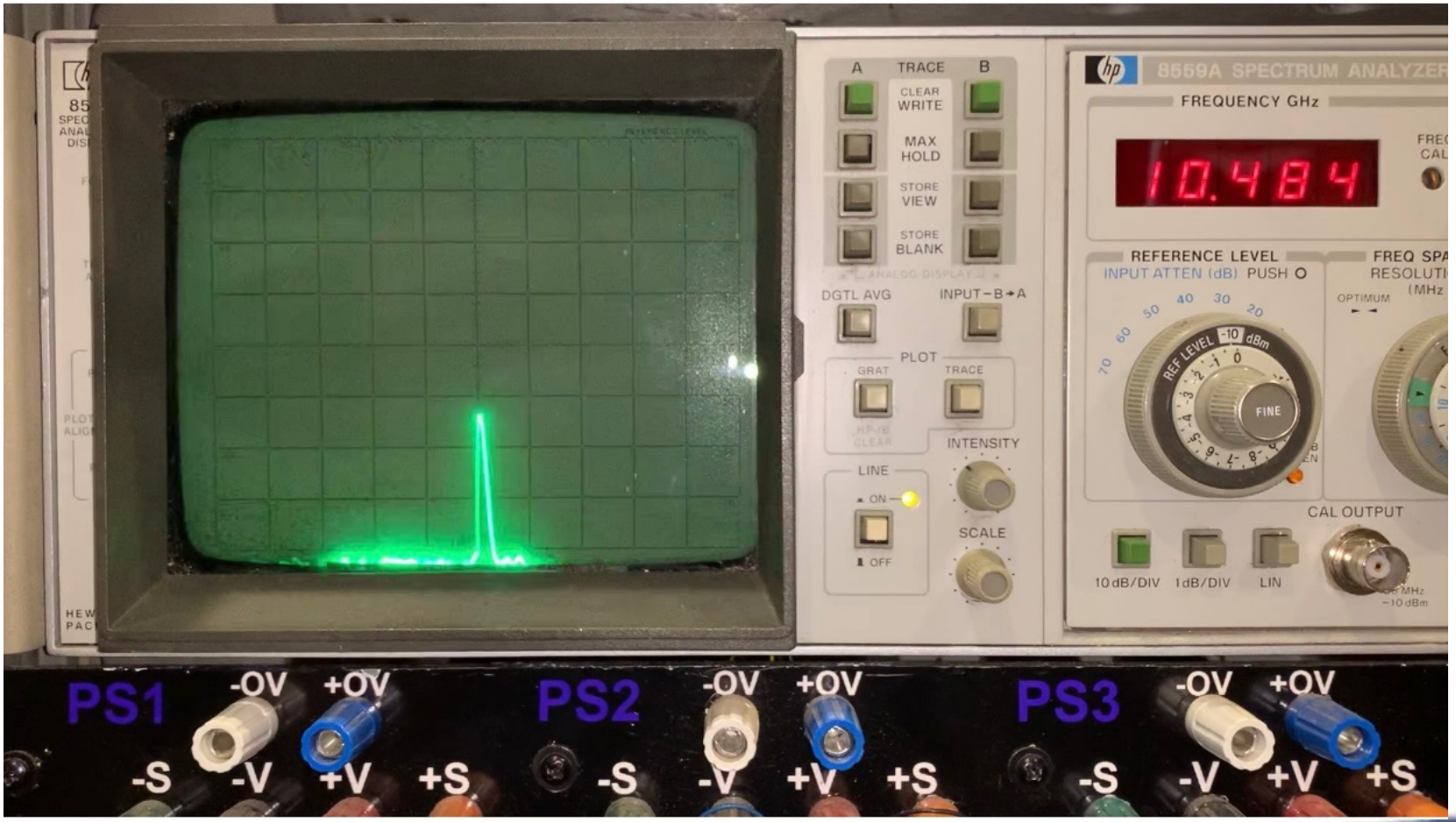

Signal + Spur

Spur ~ 9.68 GHz 20 DB down

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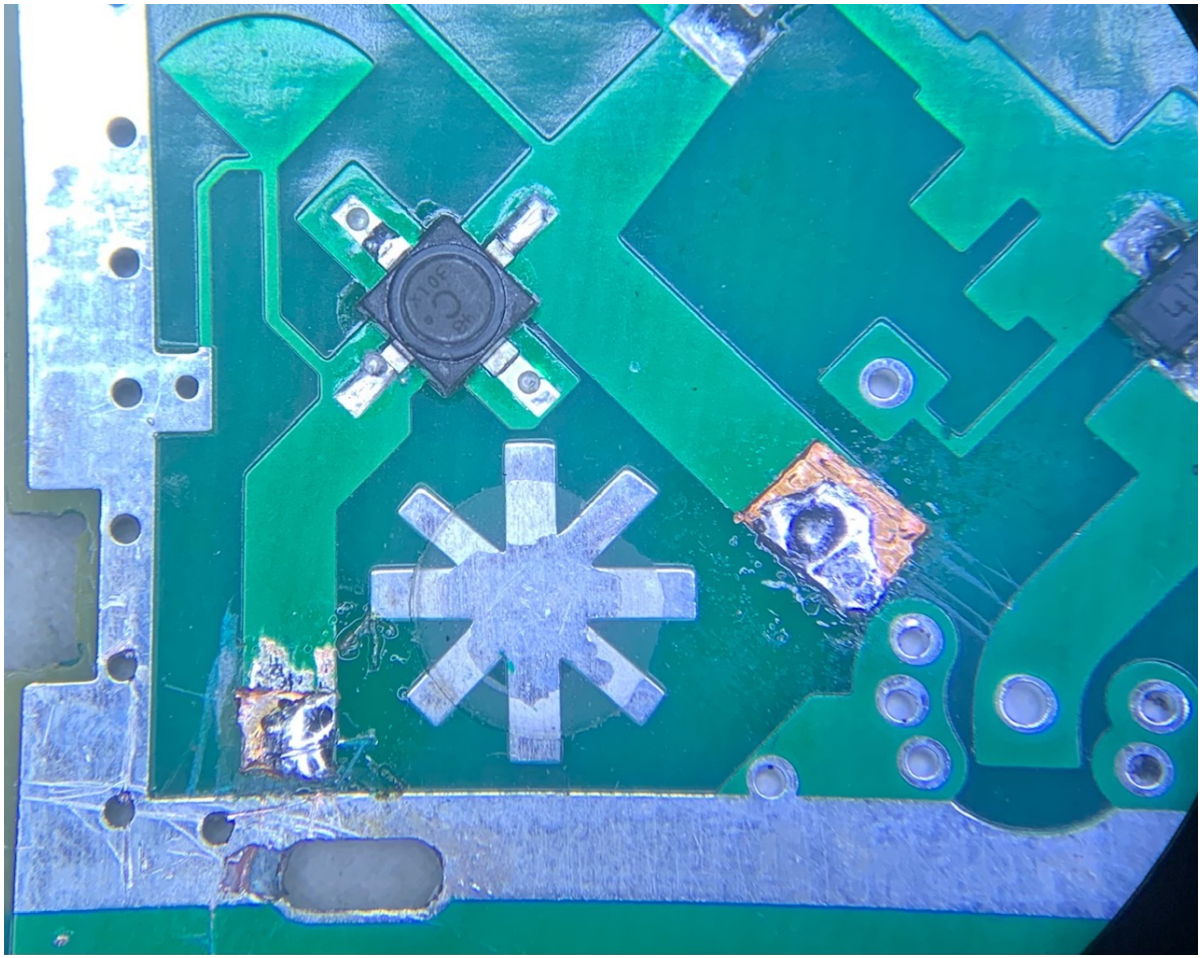
Adding copper to stub

Copper added to stubs



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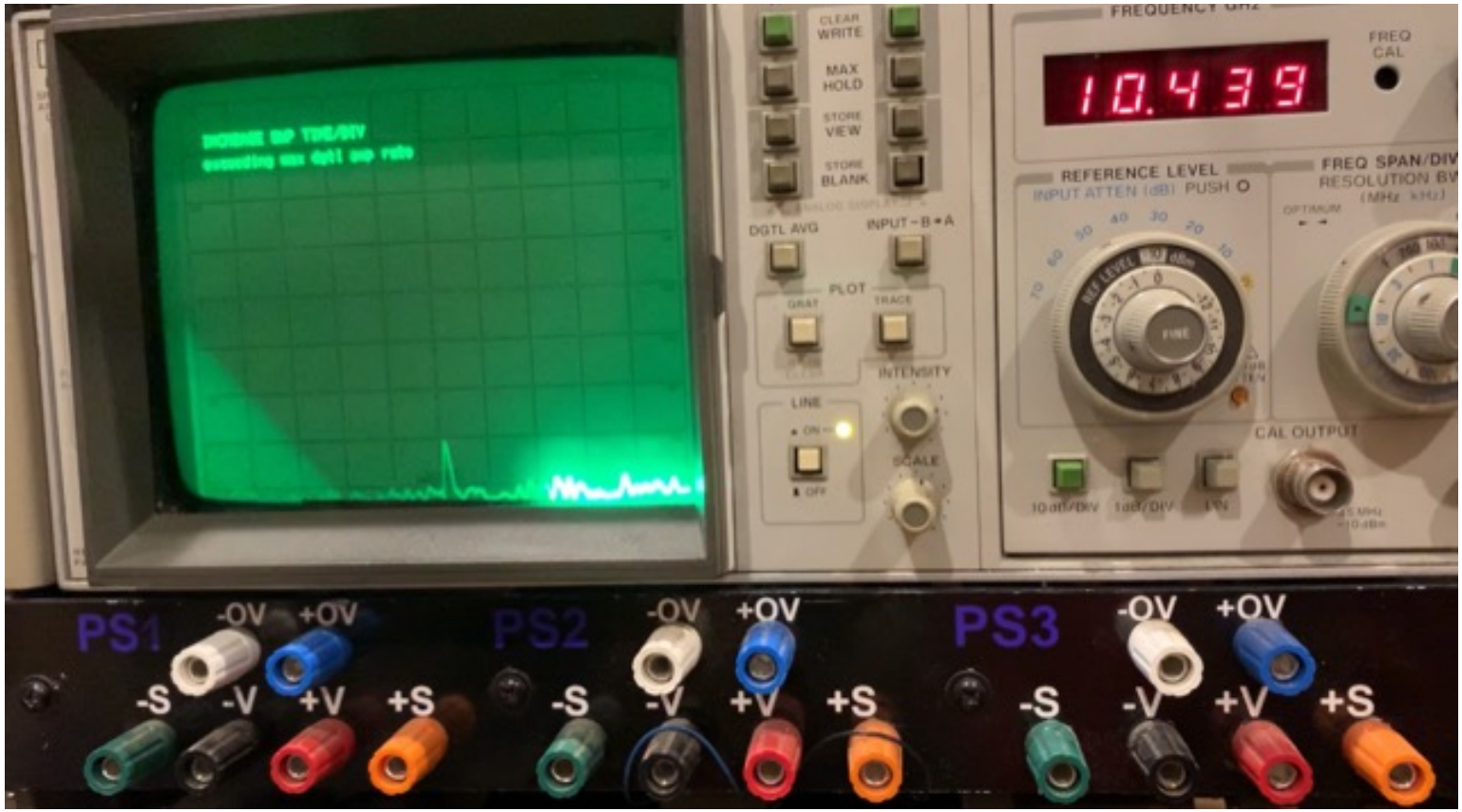
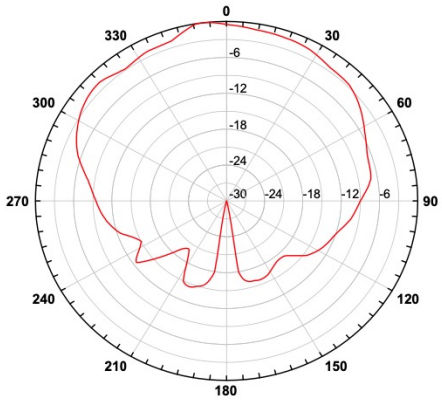
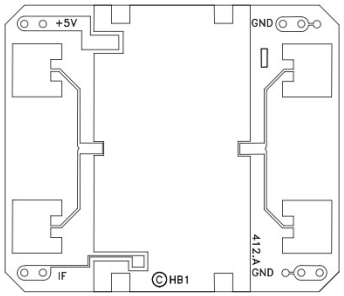
Adjusted Frequency

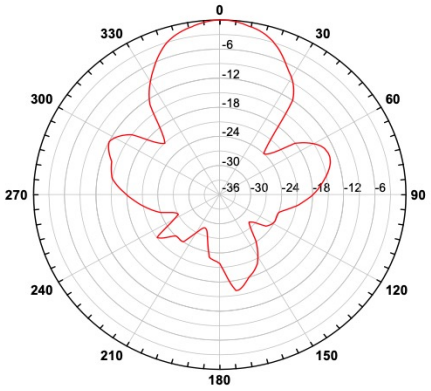


TX or RX Antenna Pattern



Azimuth





Elevation

Regulation Info from Ap Note

Frequency	Country	Remark
9.35 GHz	Germany	
9.9 GHz	France, Italy	
10.525 GHz	USA, Belgium, Netherlands	
10.587 GHz	UK	Outdoor applications
10.687 GHz	UK	Indoor applications

The Math

Cos**θ** gives you the vector moving straight at sensor. **θ=0** Yields 100% of energy.

2V is covering both out to target and back.

Doppler will the the ration of OSC Frequency and the speed of light.

$$F_d = 2V\left(\frac{F_t}{c}\right)\mathrm{Cos}\,\theta$$

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 module.

Hackaday Has a Product on the way.

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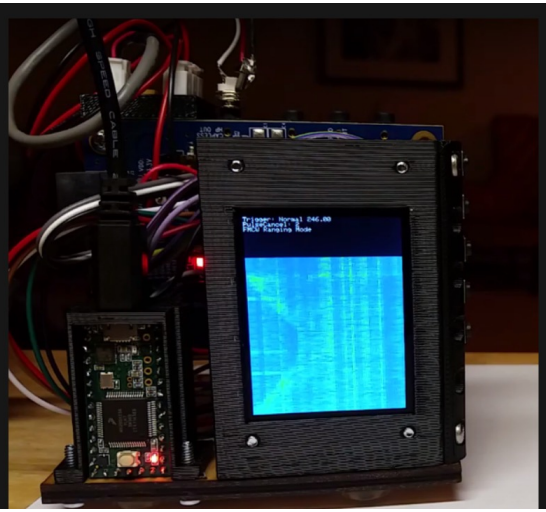

DESCRIPTION

Inspired by the work of Gregory Charvat (http://hackaday.com/2014/02/24/guest-post-try-radar-for-your-next-project/) (http://hackaday.com/2014/03/17/radar-imaging-in-your-garage-synthetic-aperture-radar/) I decided to build my own FMCW ranging radar.

Since the coffee can thing had already been done I challenged my self to extra low cost. Using an HB100, teensy 3.2 and ADAU1761 I've built a functioning FMCW ranging radar.

More details to come...

ENJOY THIS PROJECT?