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## FAQ AAZ-0217A: 3 - 60MHZ HF PIC18F2550 USB SWR Antenna Analyzer

### What is AAZ-0217A?

It measures SWR of device under test (DUT), connected at BNC connector for frequency from 3 to 60MHZ, without using a transmitter.

It has:

1. A signal Generator from 3 to 60MHZ (Si5351 from 1 to 200MHZ)
2. A Return loss Bridge
3. RF Detector
4. A processor to analyzer results and present to PC thru USB.

### How it is powered:

AAZ-0217A is an USB device. Receives 5V from your PC's USB port. Option is made available in AAZ0217 board to power it from FRC16 socket. This option is for future expansion of this analyzer for use with a blue tooth module or Wifi module.

BT and WIFI functions are not implemented in FW at moment and still under test and development

### Why Freq Range is 3 to 60MHZ?

Although Si5351 can generate from 100KHZ to 200MHZ, restricted range is targeted looking at hardware limitations where we use most non-SMD parts so that homebrewers can assemble kits.

For larger range and better performance, we must revise board design, use most SMT parts and many more design changes are required.

Upper frequency limit is result of LPF used (L1/L2 and caps) which is good to 65 or 70MHZ. Its selected keeping in mind use of this project for up to 50MHZ of amateur bands.

## **PC Software:**

Software running on WIN OS, must have latest update of dot net framework from Microsoft.

Software communicates to Si5351 module by I2C two lines and generates any freq from 1 to 200MHZ. By suitably changing LPF design, homebrewers may obtain any range required.

## **Software Calibration:**

Basic “Short” and “Open” calibration is required for AAZ0217A. This gives basic idea of open and short condition to processor to evaluate SWR from 1:1 to infinity for the entire range of frequency.

## **Generator Frequency Setting:**

When connected first time to PC, two things to be done by the user:

1. Set Generator Freq in setup menu
2. Calibrate, Save and Restart.

## **Is this a precision swr antenna analyzer?**

No. This is experimental SWR measurement device designed for radio amateurs keeping in mind following factors:

1. Simple one processor design
2. Free Software and PIC18F2550 code provided by Tony/I2TZK
3. Simple Resistive RL Bridge
4. Economical RF Detector (AD8307)
5. Economical RF Generator (Si5351)
6. USB Powered and USB HID Device

Devise gives you a good idea of your antenna SWR condition without using a transmitter. It's useful device for making changes to an Antenna or installing an Antenna.

### **DDS V Si5351:**

Our earlier projects used DDS chips AD9850/51 and were very good and successful projects. Change to Si5351 became a requirement due to unavailability of these chips and increased price.

Whereas DDS chips generated a sine wave, which is suitable for analyzer purpose, Si5351 is a square wave generator. Attempts are made to convert square wave to reasonable sine wave by way of using a LPF and RF Transformers.

Si5351 do generate strong harmonics (because of square wave generator) and harmonics must be suppressed before signal is used at RL Bridge. Since its impracticable to use several LPF for the frequency from 1 to 60MHZ in this small, economical design, results may be more influenced (by Harmonics) below 10MHZ.

However, our tests indicated reasonable flat result from 3 to 60MHZ with 50 ohms terminated graph line below 1.03 or 1.05 SWR.

### **SOFTWARE Win OS Requirements:**

AAZ FW requires that you have latest update of dotnet framework for your WIN OS from Microsoft.

AAZ-0217 is tested on Win7, 8 and 10. For win10, you may be required to look into OS's "permissions" id AAZ unit is not found by system.

No WIN drivers are required as AAZ uses HID of WIN OS

### **Improve accuracy?**

Well, design and FW are capable of improving performance of this unit but it is not possible using standard components. Entire design needs to be changed to use SMD parts for best performance. Perhaps, it takes away all the fun of homebrewing!!

**Thanks & 73s**

**Dinesh Gajjar**  
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For more details, please visit Project Page: <http://www.foxdelta.com>