

AW07A HF/VHF/UHF SWR Analyzer



DESCRIPTION

The AW07A SWR analyzer is a compact battery powered RF impedance analyzer. This unit combines six basic circuits; A variable oscillator, frequency counter, Independent Oscillator 50 ohm RF bridge, a 8-bit A-D converter, and microcontroller. This unit performs a wide variety of useful antenna and RF impedance measurements, including capacitive and inductive reactance. Adding a coupling inductor, this kit will be a dip meter! The operating frequency range of this unit extends from 1.8 to 490 MHz SWR measurements.

Specially designed for analyzing 50 ohm antenna, the AW07A also measures RF impedances between a few ohms and several hundred ohms. An easily accessed user controlled Z setting in the **ADVANCED** function menus allows changing SWR to any normalized impedance value between 10 and 500 ohms.

The AW07A also functions as a non-precision signal source and frequency counter. The operating frequency range of this unit extends from 1.5 to 71 MHz in six overlapping bands, and includes SWR measurements on 85-185MHz , 300-490 MHz.

SPECIFICATIONS:

Band Coverage : 160m,80m,40m, 20/30m,10/15m, 6m,2m, 70cm

Additional Feature: Frequency Counter

RF Output Level : 2Vpp

SWR Range : 1~9.9

Impedance Range: 10~500ohm

Battery : 8 * AA Alkaline Battery

External Power : DC 10.8~12V

Power Consumption : < 150mA (HF Bands, B/L Off) < 165mA (VU Bands, B/L Off)

The AW07A measures and displays the following:

1. Resonant Frequency
2. Reactance or X (ohms)
3. Signal Frequency (MHz)
4. Impedance or Z magnitude (ohms)
5. Resistance or R (ohms)
6. SWR (Zo programmable)
7. Simple Field Strength indicator (signal strength must be lower than 1.5)

Frequency Coverage:

The **FREQUENCY** switch selects the following internal oscillator frequency ranges. (A small overlap outside each range is provided):

HF: A: 1.5-2.7 MHz B: 2.5-4.8 MHz C: 4.6-9.6 MHz

D: 8.5-18.7 MHz E: 17.3-39 MHz F: 33.7-71 MHz

VHF: 85-185MHz continuous

UHF: 300-490MHz continuous

Signal source:

The AW07A is useful as a non-precision signal source. It provides a relatively pure signal of approximately 2 Vpp (due to local legal) into 50 ohm loads. The AW07A internal source impedance is 50 ohms. The AW07A is not a stable generator, but has adequate stability for non-critical applications such as alignment of broad bandwidth filters and circuits.

External Power Supply:

Voltage must be more than 10.8 volts, and preferably less than 12.5 volts, when the unit is on and operating. The supply must be reasonably well filtered, the case of the AW07A is connected directly to the negative terminal. The supply must *not* have a grounded positive lead. The AW07A can be used with external low voltage dc supplies. The ideal supply voltage is 10 volts dc, but the unit will function with voltages between 9.6 and 13 volts. The current demand is 150 mA maximum on HF , and 165 mA maximum on V/UHF with backlight off.

The AW07A has a recessed 2.1 mm power-type receptacle on the right of the TUNE Knob. This receptacle is labeled “**DC 10.8-12V**”.

The outside conductor of the **POWER** receptacle is negative, the center conductor positive.

Inserting a power plug in the “**DC 10.8-12V**” receptacle disables internal batteries as a power source. Internal batteries, although disabled for operating power by inserting a power supply plug, can still be trickle charged.(if user DIY the rechargeable Li-ion battery pack)

WARNING: REVERSE POLARITY OR EXCESSIVE VOLTAGE CAN DAMAGE OR DESTROY THE AW07A NEVER APPLY MORE THAN 13 VOLTS, NEVER USE AC OR POSITIVE GROUND SUPPLIES! NEVER ADD OR REMOVE BATTERIES WITH AN EXTERNAL POWER SUPPLY CONNECTED TO THIS UNIT, OR WITH THE POWER SWITCH ON.

About Batteries:

After the cover mounting screws are removed, remove the entire back cover. 8 AA Alkaline Battery can be installed onto the battery jack. DO NOT use external power supply when replacing batteries.

Key Functions:

- 1. PWR: power on/off switch**
- 2. Up: band up switch (HF only)**
- 3. Down: band down switch (HF only)**
- 4. HF V/UHF: HF & V/UHF band switch**
- 5. V/U: VHF & UHF mode change**
- 6. TUNE: tuning knob**

LCD MENU and DISPLAY

1. General Connection Guidelines

The “**ANTENNA**” connector (“N” female) on the top of the AW07A provides the primary RF measurement connection. This connector is used for all measurements.

The AW07A has a recessed 2.1 mm power-type receptacle on the right of the TUNE Knob. This receptacle is labeled “**DC 10.8-12V**”. Improper or incorrect power supply voltage or wiring could permanently damage this unit. (DO NOT INPUT The Voltage Over 13Volt DC)

2. Power-up Display

After turning on the “**POWER**” switch, or after applying external power with the “**POWER**” switch on, a sequence of messages appears on the LCD display.

The first message is a call sign of designer and backlight function indicator. Pressing & Hold the “Up” Button within 1 Sec. Backlight will be illuminated. If you do nothing, AW07A will entry next Menu (SWR Analyzer or Frequency Counter) after 1Sec. delay. Otherwise,

Pressing “Up” or “Down” Button then Power up. Inductance or Capacitance testing will be appeared.

Up & Down abbreviated “U” and “D” was appeared on the display. When initialized, D-FC, U-ANT Analyzer, DC : XX.XX V was represented as the following, Pressing “Down” for Frequency Counter, “Up” for Antenna Analyzer. Battery Voltage was represented by DC:XX.XXV.

3. Frequency Counter

The Fg was represented effective value of 3 places of decimals by fast gate. Sg means effective value of 4 places of decimals by slow gate. Pressing “Up” and “Down” Button to change the display. As a general rule the longer the time window the more accurate the frequency count . To prevent the damage, AW07A do have **Over Voltage Alarm Function** by magnetic induction. The accuracy of this counter is typically better than 0.03 %.

Notes: UV/HF Switch must be on HF position in frequency counter MODE. Otherwise, “FREQ.C SW Error ,PSE VU/HF SW UP” message appears. **Push the Switch back to HF position.**

4. SWR Analyzer

Entry SWR Analyzer MODE, The main or opening mode opening menu displays: Frequency, wave band, SWR on the first row. $Z > 1K\Omega$, $SWR > 9.9$ will be showed on the second row. When the antenna was connected or working under V/UHF, It was Displayed: resistance; and j reactance ; complex impedance and SWR . On HF band, pressing “UP” and “Down”, Will be change to Corresponding bands; Pressing “UV/HF”, Analyzer working under V/UHF bands. In this mode: AW07A can not be provided effective impedance value. Beside SWR, it also provide assistant **signal stick** when the $SWR < 2$.

Adjust the “**TUNE**” knob until the counter displays the desired frequency, or until you find the lowest SWR. This unit probability displays “Output Error” when it working under low end of UHF band .it means the frequency out of range. Reversed the knob, back to the suitably Frequency. This Unit provide effective value from 300 to 490MHz at least !!!!

Warning: The UNIT failure or LOW Battery while display “Output Error” except under UHF band. Pleast check it out, if you can’t deal with, please E-mail us or send it back.

5. Samples of Simple Antenna tuning

Most antennas are adjusted by varying the length of the elements. Most home made antennas are simple verticals or dipoles that are easily adjusted.

1. Dipoles

Since a dipole is a balanced antenna, it is a good idea to put a balun at the feedpoint. The balun can be as simple as several turns of coax several inches in diameter, or a complicated affair with many windings on a ferromagnetic core.

The height of the dipole, as well as it's surroundings, influence the feedpoint impedance and feedline SWR. Typical heights result in SWR readings below 1.5 to 1 in most installations when using 50 ohm coaxial cable.

In general, the only adjustment available is the length of the dipole. If the antenna is too long it will resonate too low in frequency, and if it is too short it will resonate too high.

Remember feedline length, when the antenna is not exactly the same impedance as the feedline, modifies the *impedance* along the feedpoint. **SWR** will remain constant (except for a small reduction in SWR as the feedline is made longer) if the feedline is a good quality 50 ohm cable. If feedline length changes SWR at any one fixed frequency, the feedline either has common mode currents that are detuning the antenna or the feedline is not a true 50 ohm cable. Common mode currents are caused by lack of a balun or other installation errors, such as a feedline paralleling the antenna.

2. Verticals

Verticals are usually unbalanced antennas. Many antenna manufacturers incorrectly downplay the need for a good radial system with a grounded vertical. With a good ground system, the SWR of a directly fed quarter-wave vertical can be nearly 2 to 1. SWR often improves if the ground system (and performance) is poor, so a low SWR with a directly fed Marconi might be a sign of inefficiency. Verticals are tuned like dipoles, lengthening the element moves the frequency lower, and shortening the element moves the frequency higher.

3. Steps of Tuning a simple antenna

Select any mode that indicates SWR. Tuning basic antennas fed can be accomplished with the following steps:

1. Momentarily short the feedline center conductor and shield, then connect the feedline to the AW07A.
2. Adjust the AW07A frequency to the desired frequency.
3. Read SWR, and adjust the AW07A frequency until the lowest SWR is found. (Be sure cable Z_0 matches Analyzer Z_0).
4. Divide the measured frequency by the desired frequency.
5. Multiply the present antenna length by the result of step 4. This will be close to the antenna length actually needed.

Any questions, please email me!

Email: ba5walin@gmail.com or bd5rt@hotmail.com