

WE-2705P Antenna Analyzer

1.0 Features:

- Frequency range 1.5 – 2700 MHz
- Graphical display of SWR, Return loss, and Distance to Fault
- Smith chart display of Impedance
- Numerical display of $Z=R+jX$, L, C, $|Z|$, $|\Gamma|$, and θ
- Frequency range presets as well as adjustable center frequency and span. Multi-band Preset.
- Limit lines with Pass/Fail indication option
- Data averaging option
- Excellent visibility under all lighting conditions from transreflective LCD screen with low power back light
- Small size (155 mm x 96 mm x 30 mm), lightweight, handheld
- Intuitive, straightforward, task orientated, menu based user interface
- Robust easy to use keypad for data entry and navigation
- Auto power off
- Battery charge status indicator
- Optional SOL Calibration
- Excellent stability with temperature changes and ageing
- USB connectivity for easy file transfer to PC
- Stores up to 100 screen image 272x144 pixel bitmap files
- Windows XP, Vista, Windows 7 and Linux compatible
- Time and date stamp on files from real time clock
- Up to 6 Hr continuous operational time from internal LiPo battery
- Charging from USB or 5V adapter
- Leather protective case included
- USB Mini B to A lead included

2.0 Application:

- Test, tune, check and debug HF, VHF, PMR, UHF, TETRA, GSM, WiFi, 3G, 4G, LTE or WiMAX antenna and 50 Ohm cable systems:

3.0 Specification:

- Frequency range: 1.5 – 2700 MHz
- Centre frequency accuracy: ± 30 ppm @ 25 degree Celsius
- Sweep time: 1.5 seconds
- Frequency resolution: 101 points/sweep

- Output level: -10 dBm +/- 2 dB
- Maximum input: +20 dBm
- Reflection measurement range: 45 dB
- Directivity: > 40 dB * (note 1)
- SWR accuracy: +/- 5% * (note 2)
- Interference rejection: +7 dBm *(note 3)
- Complex impedance measurements: $Z=R+jX$, C, L, $|Z|$, $|\Gamma|$, θ , Smith Chart
- Impedance range: $R<999$, $|X| < 999$, $C < 9999999\text{pF}$, $L < 9999999\text{nH}$, $Z| < 999$, $|\Gamma| < 1$, $-180 < \theta < 180$
- Port extension: 99 m max
- Distance to fault measurement range: 4 cm to 330 m
- System impedance: 50 ohm
- Connector: N female
- Display: 64 x 128 transfective monochrome LCD
- Battery: 3.7V 1800 mAH LiPo 103450
- Operational time: > 6 hr continuous
- Charging current: 0.5 A
- Screen image storage: 272 x 144 pixel BMP
- USB: 2.0
- USB connector: mini B
- Size: 155 mm x 96 mm x 30 mm
- Weight: 350 g
- Operating temperature range: 0 – 45 degree Celsius
- Standards: CE

Notes:

- 1) After calibration with Agilent 909F-012 Precision Load. 5.0 - 2700 MHz.
- 2) Conditions: $1.0 < \text{SWR} < 2.0$, Frequency: 5.0 – 2700 MHz . +/- 10% 1.5 to 5.0 MHz. Temp: 25+-5 Deg Celsius
- 3) $F > 20$ kHz from measurement frequency, for +/- 0.5dB degradation on 14 dB measured return loss

4.0 Basic Operations:

a) SWR and Return Loss measurement:

This product is very easy to operate. Equipment settings are configured by navigating a simple menu based user interface, and selecting the desired option.

Position the marker using the left and right arrow keys. The marker will find the frequency of minimum return loss or SWR by pressing the down arrow key.

5.0 Advanced operations:

a) Distance to fault:

Navigate through the options, first selecting the velocity factor of the cable from a list of presets or

custom define.

Select required distance option from the list of presets. The cable length should not exceed the maximum distance specified for each option.

The DTF plot is generated from an Inverse Discrete Fourier Transform of measured complex frequency domain reflection data.

Discontinuities in impedance along the cable length will show as vertical lines of height proportional to the reflection at these discontinuities. The horizontal axis is proportional to distance. The marker shows the actual distance to the discontinuity (or fault).

Please note that a properly working antenna system will show a discontinuity at the end of the cable due to reflections over the majority of the DTF frequency range. If an antenna will be matched to the cable impedance for a small fraction of the total DTF measurement frequency range.

This will allow the length of the feeder cable to be measured, even with the antenna connected.

b) Impedance measurement:

Navigate through the options, first selecting the velocity factor for the interconnecting cable from a list of presets or custom define. With the numerical option, impedance is measured at the marker frequencies set within the frequency span width by using the left and right arrow keys.

If $|z| > 999$ then the parameters displayed are $|Z| > 999$ and the magnitude and phase of the reflection coefficient. Otherwise, the parameters displayed are: $Z=R+jX$, the value of L or C computed from X, and the magnitude and phase of the reflection coefficient.

The measurement plane can be altered by adjusting parameter D with the down and up arrow keys. I.e. to measure the impedance at the end of a length of coaxial cable, with the cable open circuited at the end, adjust D until a reflection coefficient phase of 0 degrees is measured, then connect the load to be measured (e.g. the base of a vertical antenna). D corresponds to the length of the cable (m). Alternatively, if the cable length is known, enter D directly as the cable length.

With the smith chart option, impedance is measured at the marker frequency set within the frequency span width by using the left and right arrow keys. Impedance is displayed in the form $R + j X$

The measurement plane can be altered by adjusting parameter D with the up and down arrow keys. D corresponds to the length of the cable (m).

6.0 Data Averaging:

To reduce the effects of noise, data averaging can be employed. To do this, go into the Utilities menu, select Settings and then select Averaging. With this function turned on, the letter A is displayed in the bottom right of the relevant displays.

Averaging in this mode is applied to the marker data for SWR, Return Loss, and Impedance.

7.0 Calibration:

Every analyzer is factory calibrated with an Agilent 85032-60011 Precision Short and an Agilent 909F-012 Precision 50 ohm Load before shipping.

It is possible to select either this default factory calibration data or to perform User Calibration to generate new calibration data. All calibration data is obtained from a frequency sweep of 1.5 – 2700 MHz. Interpolation is also used.

To select Factory Calibration, select Utilities from the Main menu, then Calibration, then Factory Cal. The Status of the instrument will then read, Status: Factory.

To perform User Calibration, select Utilities from the Main menu, then Calibration, then User Cal. Connect Load and Short standards as directed. The N socket is simply left open for the open circuit calibration. The impedance characteristic of the N socket is accounted for in the calibration procedure. The Short termination used must have the same reference plane specification as the Agilent 85032-60011. The 50 ohm Load must have a return loss specification of >36 dB for the accuracy specification to be relevant.

The Status of the instrument will then read, Status: User.

The calibration status User or Factory will be retained when powering off the product.

Please note that if the Calibration Status is Factory, and User Calibration is subsequently selected, the calibration procedure must be followed through, or the Calibration Status will remain Factory.

The reference plane of the calibrated instrument is at the position of the short.

8.0 Up-loading/Deleting Screen Image Files With PC (Personal Computer):

Connect the product via a USB cable to the PC. The product screen will then show USB Connected.

If this is the first time the product is connected to the PC, the PC will automatically search for a driver. It should find one automatically.

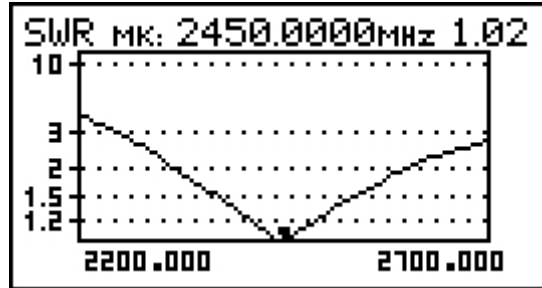
Go to the PC and look for external devices. (Start, then My Computer for Windows Systems).

The product will appear as an external device on the PC labelled with the product name e.g. WE-2705P.

Click on the device icon to see files. These may be copied, moved to a folder on the PC or viewed in the usual manner (double click on file).

Please note that files can only be erased from the product (Utilities, then Delete Files, then select Yes or No).

Typical Up-loaded Screen Image:



9.0 Setting the Real-time Clock:

Select Utilities, then Settings, then Set Date and Time.

10.0 Reset:

Holding down the PWR key and the down arrow key together for 3 seconds restores the default settings of the instrument. Calibration data is unaltered.

11.0 Battery Charging:

Charge by connecting the unit to a PC or other USB charging device (Car USB adapter etc).

The unit may also be charged by connecting to a 5V 1A Regulated PSU adapter with 2.1 mm plug.

While charging, the charge in progress icon (symbol above the battery status indicator) will appear. It will disappear when the battery is fully charged.

Only charge the battery when the ambient temperature is between 10 and 35 deg C

As with all Lithium Polymer batteries, the product should not be left unattended when charging.

12.0 Note:

This product, similar to all products of this type, emits a low power radio frequency signal. When connected to an antenna, it may cause interference to neighbouring radio communication systems. Connect for only as long as is necessary. The user is responsible for the consequences of any interference caused.

The antenna port is ESD protected. However, excessive static build up on an antenna may cause damage to the product when connected. As a precaution, discharge antenna before connecting.

13.0 Care of the Product:

To prolong the life of the N connector, the use of a 'connector saver' e.g JYEBAO AD-N3N8 is recommended.

Waterbeach Electronics Ltd
8 Burgess Road
Waterbeach
Cambridge.
CB25 9ND
UK

Document Version 2.4 17/04/21