# **Test & Monitoring GUI Instruction**

#### 1. Introduction

Test & Monitoring GUI (TM\_GUI) is a software used to perform DTV signal measurements and it's designed to work together with a PC and an Anywave exciter which has installed the TM\_GUI option.

To install TM\_GUI, extract the compressed file and execute the **Setup\_any.msi** file. Follow the instruction of installation process. The TM\_GUI has no special system requirements and supports all prevalent operating systems including Windows 7 and Windows XP.

Note: A file **msvcr100.dll** is required to run the TM\_GUI. Usually it could be found in C:\Windows\system32 or C:\Windows\sysWOW64, depending on the system which the PC is running. If it's missing in the system, copy this file from the installation folder to C:\Windows\system32 or C:\Windows\sysWOW64 to complete the installation.

Before running the TM\_GUI, make sure that

- a) Have an Anywave exciter which supports the TM\_GUI option. If not so, user may contact the manufacturer for an upgrade.
- b) Connect the PC which has installed this software to the Anywave exciter via a network cable. User may have to set up the network configuration for both the PC and the exciter before a connection is established successfully.
- c) Power up the exciter. Connect the signal which is to be measured to the **RFINA** port of the exciter, and **MUST** wait until the exciter gets a valid reading of TSNR, which is displayed on the front panel LCD or the built-in webpage.

Important Notice:

- 1) The signal to be measured could be the exciter's own RF output, or the feedback samples before or after the filter of a transmitter which is currently connected to the same exciter.
- 2) The TM\_GUI could run either the pre-correction is ON (ADPC is HOLD) or OFF (ADPC is OFF). However when the ADPC is changed from n OFF to HOLD, or from OFF to UPDATE (1/2/3/4), there may be a temporary loss of connection because MCU is busy with the pre-correction. After the pre-correction is finished, the connection will resume automatically.

#### 2. Operation

Run the executable file **TM\_GUI.exe** located in the installation folder. The main screen will appear as follows. And the information bar displays: "Initialized successfully!".

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Performance Measurement GUI	
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PORT: 5700	
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Initialized successfully!	2013-12-25 13:45:28

Note:

 User could use any preferred IP, other than the original one, and set it as the default IP by going to System->Config->Default IP. The new default IP will not be active until the restart of TM\_GUI.

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System(S) Help(H)	
Performance Measurement GUI	
Exciter Connection	
IP: 192.168.1.144	
PORT: 5700	
Config Settings	
Auto Save IMD and SNR Data	
Auto Save Path: E:\document\ALT\ and Group Delay	
Enable Exciter Comunications Log	
Default IP: 192, 168, 1, 143	
MD and SNR	
Initialized successfully!	2014/6/9 17:12:31

2) Version V1.07 and on supports automatic logging of SNR and IMD (shoulder levels) readings. To enable this function, user should check the option of "Auto Save IMD and SNR Data" in menu System->Config Settings, shown as below. Every 24 hours, one CSV formatted TEXT file is saved including information of time, SNR, LID (lower shoulder level) and UID (upper shoulder level) readings of exciter. User may also change location of all saved files by assigning a different value of "Auto Save Path".

Please note there are no files saved automatically until this Auto Save function is enabled. However user is still able to save all these information manually by using "Save to File" in each single measurement window.

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Enter the exciter's IP address, for example, 192.168.1.143 in the IP bar according to the LAN settings, and keep the **PORT 5700** unchanged. Click on **Connect**. If the communication is OK, the main screen will appear as follows, and the information bar displays: "Successful connection with the server!".

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	Constellation Eye-diagram	
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Successfully connected	with served	2013-12-25 13:45:57

If the connection does not establish with a certain time, an error window pops out as follows. Check the connection and try again.

Error	
8	Connection Error:A connection attempt failed because the connected party did not properly respond after a period of time, or established connection failed because connected host has failed to respond,Please Check!
	ΟΚ

Click on **Disconnect** to break the connection with the server. Please note the **Connect** and **Disconnect** buttons are enable only when all the measurement windows are closed and the TM\_GUI is back to its main screen. After the disconnection, the information bar displays "Successful Disconnected with the server!"

The TM\_GUI supports 5 groups of measurements: Constellation, Eye Diagram, Amplitude Flatness & Group Delay, Spectrum, IMD and SNR. Accordingly there are five functional buttons on the lower half of the main screen as follows.

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System (S) Help (H)	
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PORT: 5700	
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Successfully connected with server!	2013-12-25 13:45:57

Only one group of measurements is performed at each time. Once a button is clicked, an additional window pops out, displaying the corresponding measurement results. Before this pop-out window is closed, the connection and disconnection buttons and all five functional buttons are disabled.

Each measurement window has a similar format. The current IMD and SNR results are listed on the left side of each measurement window. A figure (or figures) is in the middle, displaying the current measurements. If more than one color is used in the figure(s), an annotation is shown on the right side of the window. A **Close & Back to Main** button is at the bottom. Clicking on this button or closing the whole measurement window itself could both end the current measure function and go back to the main screen. A **Save to File** button in the bottom right corner is used to export the measurements to files of .jpg or .txt format.

## 1) Constellation

The horizontal axis of the Cartesian plane of this figure is the real part (In Phase) of the sampled symbols, and the vertical axis is the imaginary part (Quadrature). For ATSC 8VSB modulation, the eight regions stand for the eight possible symbols, while the seven dashed lines mean the decision threshold.



### 2) Eye-diagram

The Eye-diagram is constructed from a digital waveform by folding the parts of the waveform corresponding to each individual bit into a single graph with signal amplitude on the vertical axis and symbol sampling time on horizontal axis. A good digital waveform with sharp rise and fall times and constant amplitude will have an eye diagram as follows.



### 3) Amplitude Flatness & Group Delay

This measurement window has two figures in the middle. The top half is the figure of Amplitude Flatness which indicates the frequency response distortion within  $\pm 3$  MHz bandwidth. The bottom half is the figure of Group Delay which indicates group delay error. According to the ATSC standard, the requirement of frequency response error is  $\pm 0.5$  dB, and the requirement of group delay error is  $\pm 52$  ns, which are all shown in the figures using red solid lines.

On the left side of this window, besides the SNR and IMD results, it also displays the peak values and the corresponding frequency offsets, as well as the final test results (Pass or Fail) of these two measurements.



# 4) Spectrum

This measurement window has a figure indicates the power spectrum density. According to the ATSC standard, the requirement is shown in the figure using red solid line, and a final test result (Pass or Fail) is displayed on the left side of the window too, below the SNR and IMD readings.



## 5) IMD and SNR

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The IMD and SNR measurements are displayed in the same figure with the dB on the vertical axis and time on the horizontal axis. According to the ATSC standard, the requirement of IMD ( $\pm$ 500 kHz) is  $\pm$ 47 dB, and the requirement of SNR is  $\pm$  27 dB, which are all shown in the figures using red solid lines.

The figure could save up to 600 seconds of measurement results and all the values could be exported to either .txt file or .jpg file.

