



voyantic

Voyantic **Tag**surance Sweep Data Analyzer

Manual

rev.1.0.0

Compatible with:

Software version 1.2.0

1 Important Information

PLEASE READ THE COMPLETE USER GUIDE CAREFULLY BEFORE USING THE VOYANTIC TAGSURANCE™ SWEEP DATA ANALYZER.

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3 Product Overview

3.1 Tagsurance Sweep Data Analyzer

The Tagsurance Sweep Data Analyzer is a computer software for Windows XP/Vista/7/8. It is designed for the analysis of the sweep test results. The accepted result file format is the same as the Tagsurance GUI result file format. The main operations of the program are: data reviewing as a function of frequency, transmitted power and test order; data screening; and calculations of statistical parameters.

3.2 System Requirements

Minimum system requirements for Tagformance Sweep Data Analyzer:

Windows XP (SP2; 32 bit) / Windows Vista (SP2; 32 bit) / Windows 7(32/64 bit; Starter Edition is not supported) / Windows 8

2.4 GHz Pentium 4 or equivalent (e.g. 1.6 GHz Pentium M or AMD Athlon 2800+)

2 GB RAM (up to 6 GB may be required for analyzing large amount of results)

1 GB free hard disk space

Minimum screen resolution 1024 x 768

4 Installation

4.1 *Installing the Tagsurance Sweep Data Analyzer Software*

If you are using Windows 8, it is recommended to turn off the Windows fast startup during the installation or alternatively manually fully reboot the PC after installation to enable proper completion of the driver installations.

To install the Tagsurance Graphical user Interface:

1. From the USB Stick browse and run: .../ TSDA Installer/setup.exe .
From the downloaded zip file: extract the zip file and run the extracted.../setup.exe .
2. Select the destination folder paths for the installation files.
 - Note that when used, the program creates and updates files under its own installation folder. The program and the user must have the privileges for this for correct operation. Specific Windows system folders have restricted access for programs to write to. This includes the Program files folder in Windows Vista/7/8.
3. Read and accept the license agreements and follow the instructions on the screen to install the product.
4. The summary of the installed/modified content will be presented for acceptance before starting the installation.
5. After successful installation, the installer prompts the user to restart the computer.
6. The program can be run from the Start menu.

5 Operation of the Tagsurance Sweep Data Analyzer

5.1 Introduction to the software

To start the application, run: 'sweep_data_analyzer.exe', or use shortcut in the Start menu. After startup, the user interface is ready to use. The view after startup is shown in Figure 1 .

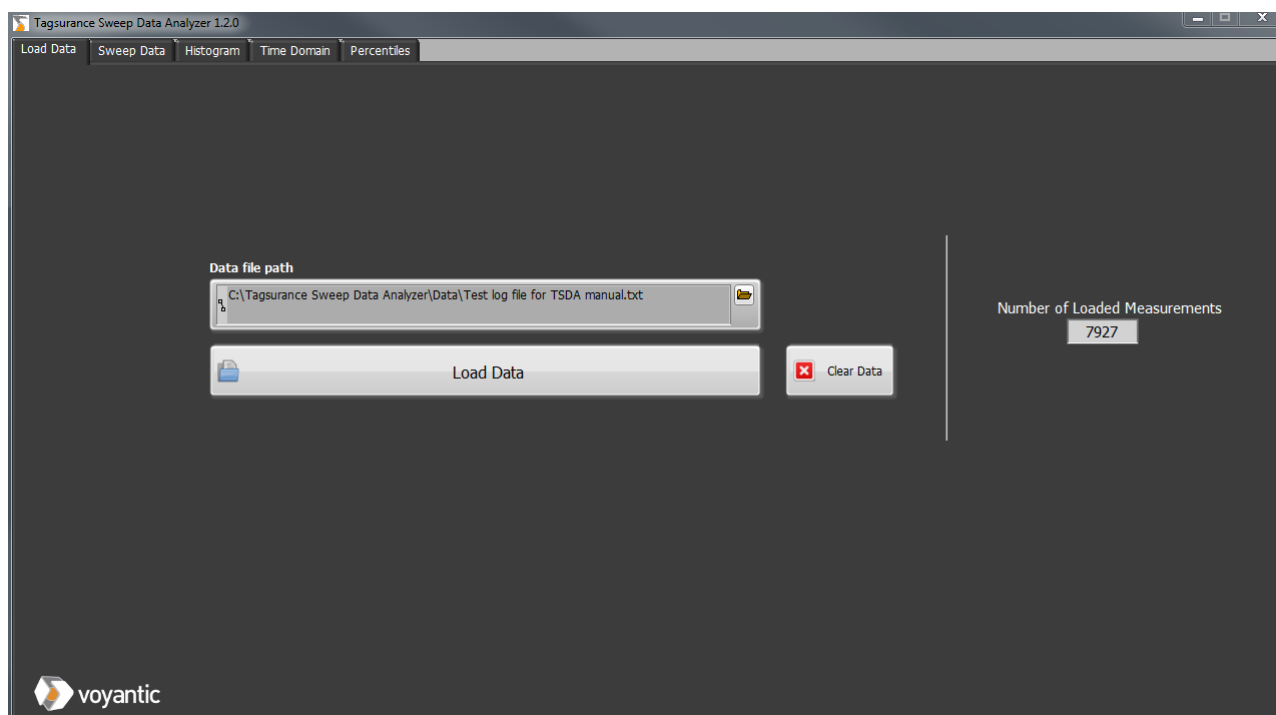


Figure 1 Application software front panel: default view after startup.

The application interface consists of separate tabs containing various information of the loaded Tagsurance measurement data. The application will open to the Load Data –tab, which is the tab used to load the Tagsurance sweep data. The controls and functions are explained in Table 1 .

Table 1 Data loading controls

Data file path	To define location of the Tagsurance result file
Load Data	To load the Tagsurance result file
Clear Data	To clear previously loaded measurement data
Number of Loaded Measurements	Number of measurements in the result file loaded

5.2 Load Data

The Tagsurance Sweep Data Analyzer software is an analysis tool for the Tagsurance test data. The data can be loaded from a text file which implements the Tagsurance result file format, generated by the Tagsurance GUI.

To load the Tagsurance measurement file, click the folder sign on the upper right corner of the Data file path window and browse to the folder where the measurement file is located. After the path is selected, click Load Data button. Application will load the data and switch automatically to the Sweep Data -tab.

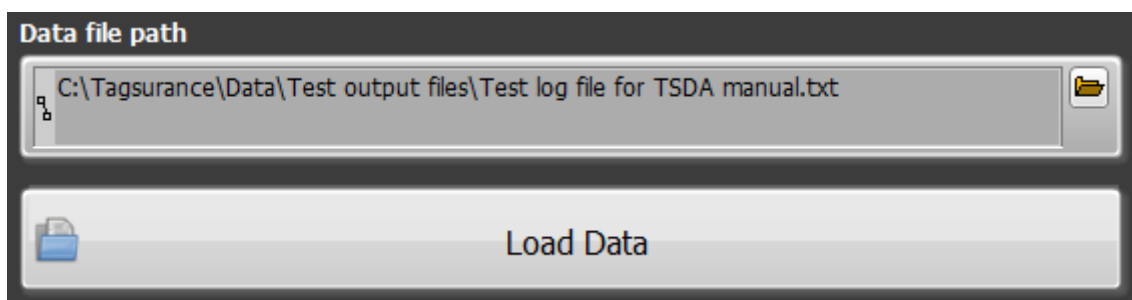


Figure 2 Load Data

5.2.1 Sweep Data and Tag ID from the Loaded Data

When loading data from file, only sweep data and read results of the first read command in the test sequence are considered. After loading data, one threshold sweep data curve represents one tested tag, and as a Tag ID the tag is named by the read result. In case of a failed read in the result file, the name field will be empty.

Example: The result data includes two reads: EPC and TID respectively, the Tag ID as a tag name, will be then EPC.

5.2.2 Tag ID Duplicates

While loading data from file, the possible read data duplicates are checked and the popup window will notice about the duplicates. The popup, shown in Figure 3, will display the number of duplicate tags with possibility to save the information into a separate text file or to continue without saving.

The duplicates will be marked by adding a “*” symbol to the beginning of the tag name in the graph legend, i.e. Tag ID. In case of failed read results, the empty read results will not be interpret as duplicates.



Figure 3 Tag ID duplicates

5.2.3 Error in Result Data

In case of an error in the data of the result file, the *Tag ID* will be named as “X” and the sweep data will not be taken into account when calculating statistical parameters or envelope curves. In the loaded results file, the error is indicated at the end of the test data row. This kind of an error is caused by the reception error of data transferring via RS232 from the measurement unit to the GUI software.

5.3 Sweep Data



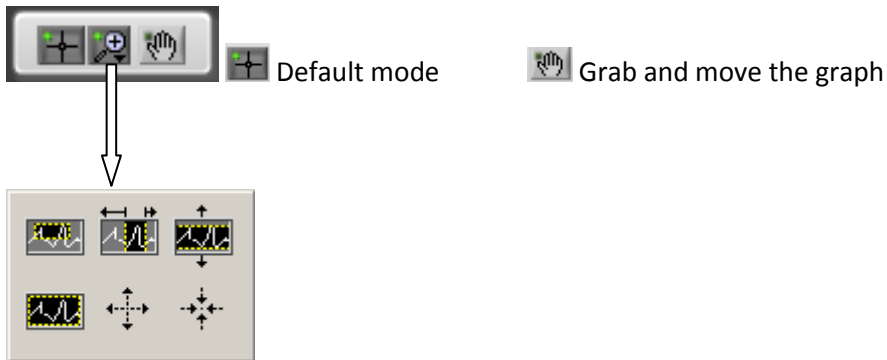
Figure 4 Sweep Data view

Sweep Data -tab presents the loaded Tagsurance Sweep data in graphical format. In this tab it is possible to screen data, view percentiles, calculate median, find the golden sample and samples closest to the envelopes. The controls and functions are explained in Table 2.

Table 2 Controls and functions of the Sweep Data view

Find & Load Golden Sample	Locate and highlight the tag which is closest to the calculated median of the loaded data
Load Median	Calculate and highlight median graph of the loaded data
Load Median and Percentiles	Calculate and highlight median graph and percentiles of the loaded data. Percentiles calculated are as defined on the percentiles tab
Options	Select whether the whole measured frequency range or just one or two segments of the frequency range are used to define golden sample and closest to the envelopes
Load by Tag#	Locate and highlight the tag based on the order number of the tag
Load by Tag ID	Locate and highlight the tag based on the ID of the tag
Clear Graph	Clear all graphs from the grid
Reset Original Data	Reset all screenings and return to original loaded data
Show envelopes	Show the extreme value curves of the shown data set
Show closest to envelopes	Locate and highlight the tags which are closest to the envelopes
Screening clause	Define which screening variables are used and how the screening variable definitions are applied if more than one is used. &=AND, +=OR
Frequency point	Define frequency point for the screening variable
Upper limit	Define an upper limit for the carrier power level in screening variable
Lower limit	Define a lower limit for the carrier power level in screening variable
In bounds 1=in, 0=out	Define whether the screened results must be between or outside the specified limits
Screen the original data	Execute the defined screening clause
Save Graph	Save a picture of the plotted data

It is possible to zoom in and out of the plotted graphs using different zoom options.



Crop an area with mouse from the graph to zoom into



Select horizontal area from the graph to zoom into



Select vertical area from the graph to zoom into



Reset to original graph



Zoom in to desired point of the graph



Zoom out from desired point of the graph

The user can also manually change the scaling of the graph by clicking the first or the last value of X or Y – axis and changing it. The rest of the values will adapt to the change. To reset back to the original scaling, click “Reset to original graph” –button.

The visual appearance of the plotted curves can be modified in multiple ways by clicking the icon of the curve. This is a good way to highlight the interesting curves from the others.

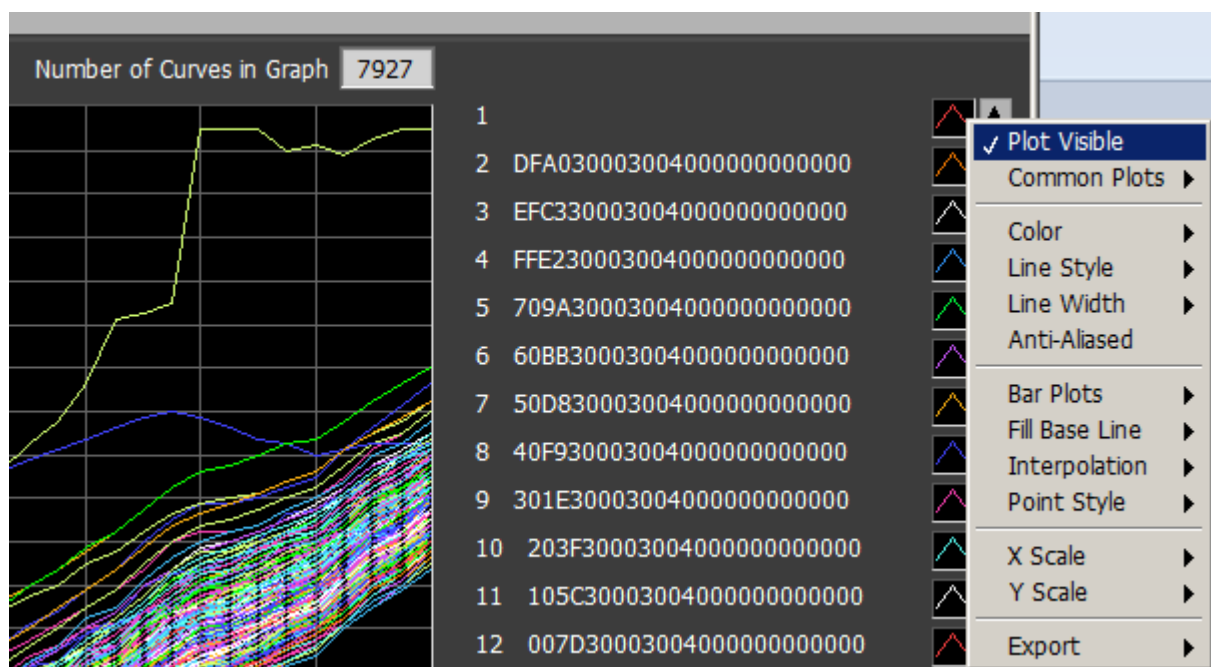


Figure 5 Plot settings menu

Table 3 describes whether the function is effective to the full, originally loaded data or to the screened data and for which frequency ranges the functions can be applied.

Table 3 The data and possible frequency ranges used in Sweep Data functions

	Full Data	Screened Data	Full Frequency Range	Custom Frequency Range
Find and Load Golden Sample	X		X	X
Load Median	X		X	
Load Median and Percentiles	X		X	
Load By Tag#	X		X	
Load by Tag ID	X		X	
Screen the original data	X		X	
Show envelopes	X	X	X	
Show closest to envelopes	X	X	X	X

Clicking the 'options' button opens a window for setting a specific frequency range or two separate ranges, based on which the calculation to find the golden sample, envelope graphs or tag sample results closest to the envelope graphs is performed.

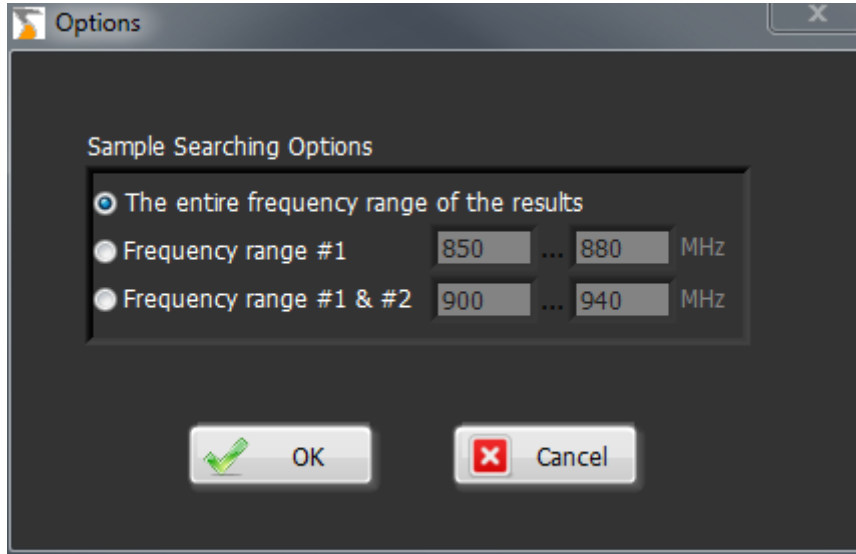


Figure 6 Options view

5.3.1 Median

Median is calculated at each frequency point and is based on the power values of the threshold sweep results. As a result, the calculated median curve will be added to the graph.

$$Median(f) = \begin{cases} s_i(f) & \text{if } n \text{ is odd} \\ 0,5(s_{k-1}(f) + s_k(f)) & \text{if } n \text{ is even} \end{cases}$$

where n is the number of sweeps at the frequency point f ,

s is the sorted value from the threshold power results at the frequency point f , $i = \frac{n-1}{2}$, and $k = \frac{n}{2}$.

The median calculation is based on the original data downloaded from the Tagsurance result file.

5.3.2 Median Result - "Golden Sample"

The threshold sweep which represents best the median of the test data can be found by the Tagsurance Sweep Data Analyzer. This median threshold power sweep result is called here as the "golden sample". The golden sample is searched by the method of least squares.

$$S_i = \sum_f (Median(f) - X_i(f))^2$$

$$S_{\min} = \min(S_i) = \min\{S_1, S_2, \dots, S_n\}$$

$$\text{Golden Sample} = X_{\min}(f)$$

where $Median(f)$ is the calculated median of the whole result data as function of frequency, $X_i(f)$ are threshold power sweeps as function of frequency, and n is the number of the threshold power sweeps.

The frequency range, where the searching of a median threshold power sweep result is done, can be defined by the user. The options to define the range are presented in Chapter 5.3.3 .

5.3.3 Sample Searching Options

When searching a sample by the method of least squares, by default, the comparisons are made at every frequency point of the original data, e.g. the sweeps are made from 800MHz to 1100MHz with a step of 5 MHz, the sample will be chosen by the comparisons made at 800, 805, 810,..., 1100 MHz.

In the options dialog, the user can define the comparison range to be narrower or divided to two separate ranges. After redefinition, the method of least squares is implemented only on defined frequency range(s) and the data points outside of the range(s) will not affect the sample searching.

5.3.4 Envelopes

The envelope curves are created based on the sweeps on the graph.

$$Envelope_{high}(f) = \max\{X_i(f)\}$$

$$Envelope_{low}(f) = \min\{X_i(f)\}$$

5.3.5 Samples Closest to Envelopes

For finding samples which are closest to the envelopes, the closest one to the high envelope curve and the closest one to the low envelope curve, is made by the method of least squares.

$$S_i = \sum_f (Envelope(f) - X_i(f))^2$$

$$S_{\min} = \min(S_i) = \min\{S_1, S_2, \dots, S_n\}$$

$$\text{The closest sample to envelope} = X_{\min}(f)$$

The frequency range, where the searching of a sample closest to envelopes is done, can be defined by the user similarly as for the golden sample (see chapter 5.3.3).

5.3.6 Screening

The subset of the original data can be screened so that only the subset is shown in the graph. The screening is always made for the original data regardless of the current data in the graph.

The *Screening clause* consists of variables (A, B, C, D, E, F) and logical operations AND (&) and OR (+). Brackets are not allowed. Each variable used in screening clause must be fully defined in the *Screening variable definitions* table. The defined frequencies in the table are not required to be the exact test frequencies of the result data. If there is no test result for the frequency in the data, the corresponding power value will be linearly interpolated from the original data.

5.4 Histogram

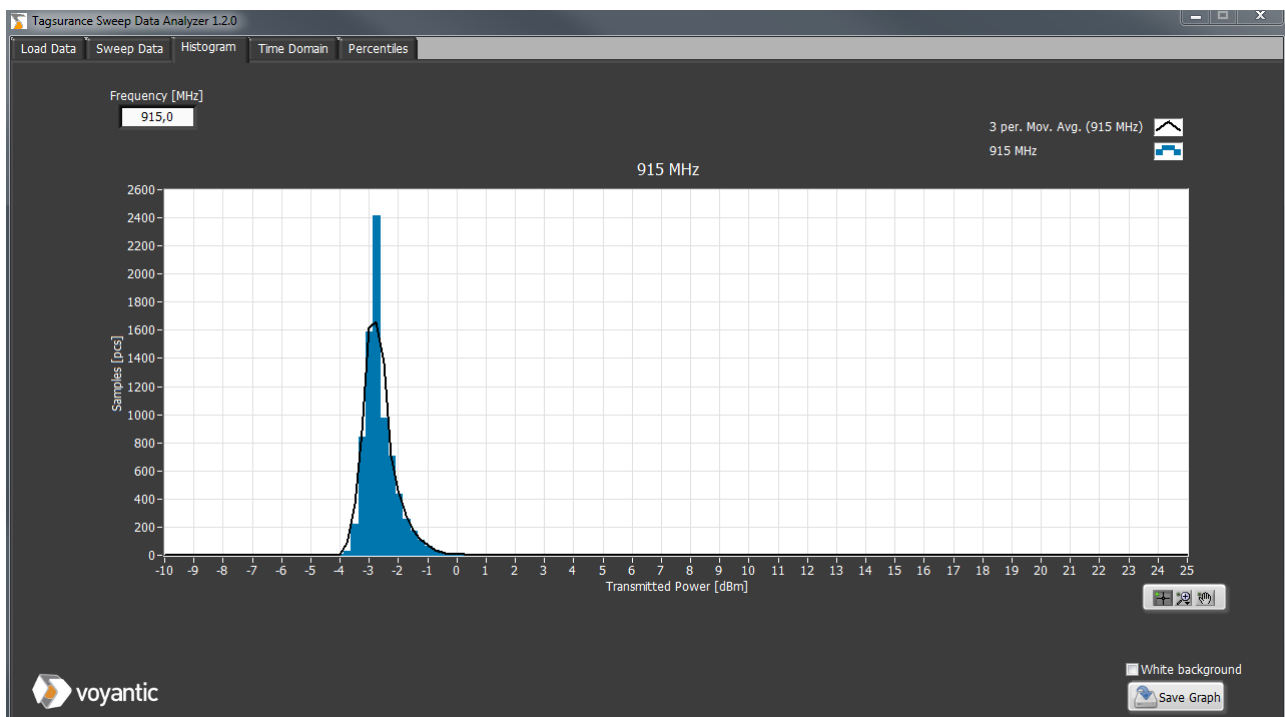


Figure 7 Histogram view

In the Histogram tab, the user can view the variation of the transmitted power on each measured frequency point separately. Frequency is selected from a drop down menu by clicking the Frequency window. The frequency options in the drop down menu are the frequency points, where the threshold power has been measured. Histogram is not drawn as interpolated data on other frequencies. The height of the blue bars (y-axis) represents the amount of tags in the whole data that have the threshold power indicated by the x-axis. The black curve in the graph represents the moving average of 3 periods, for the histogram data.

In the bottom of the tab, there is a button that enables saving the graph as a picture file.

5.5 Time Domain

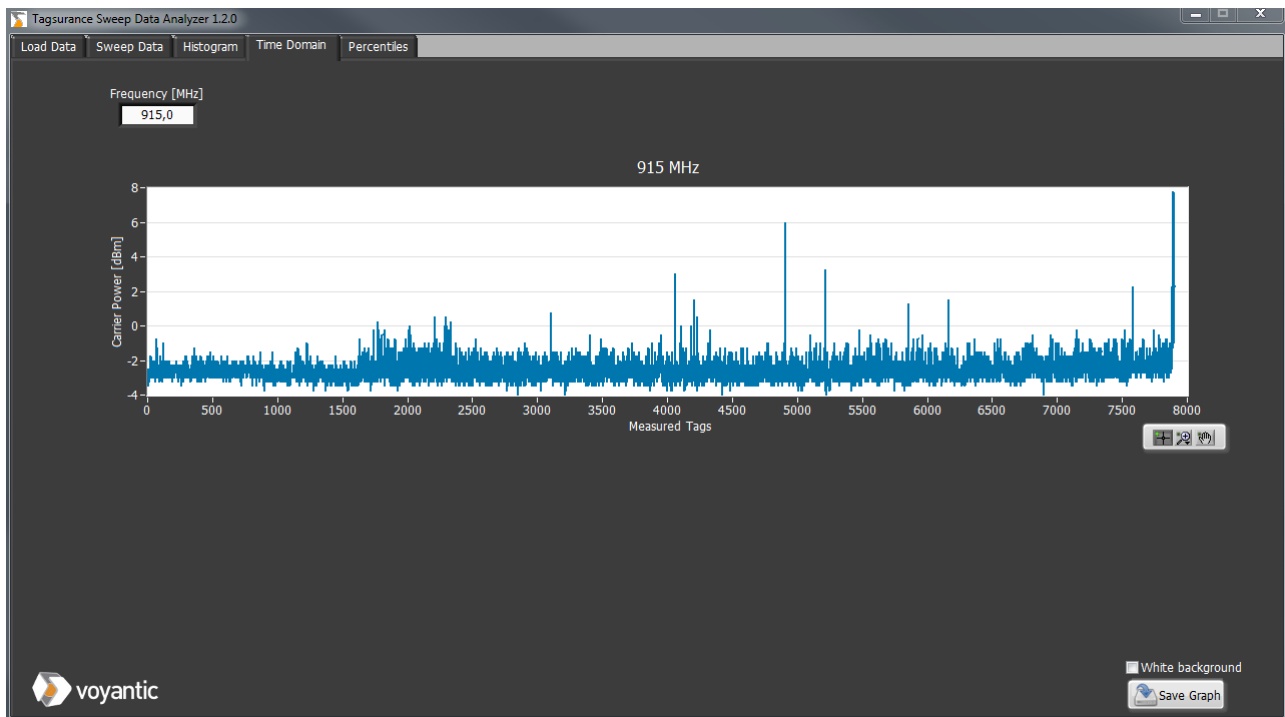


Figure 8 Time Domain view

In the Time Domain tab, the user can view the variation of the threshold power levels of the tags from the beginning of testing to the end of testing. Each value point represents one tag and the results can be viewed on each measured frequency point separately. Frequency is selected by clicking the Frequency window. The frequency options in the drop down menu are the frequency points, where the threshold power has been measured. The curve is not drawn as interpolated data on other frequencies.

In the bottom of the tab, there is a button that enables saving the graph as a picture file.

5.6 Percentiles

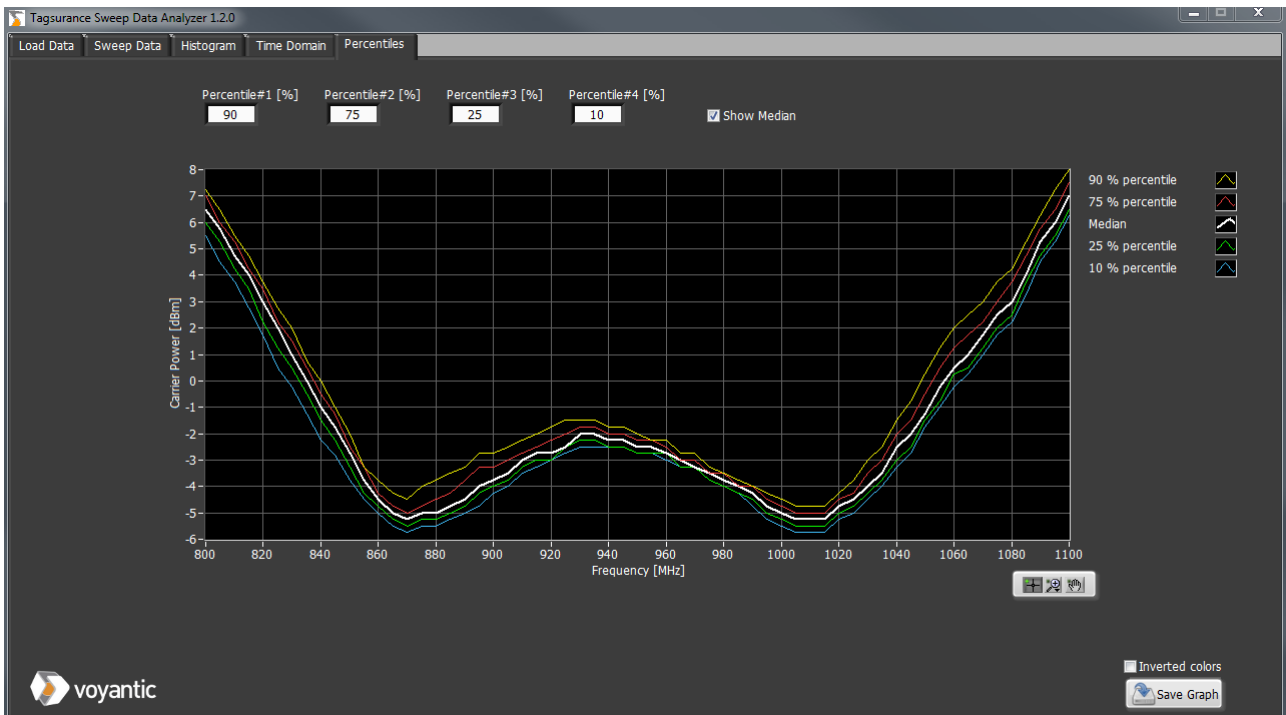


Figure 9 Percentiles view

In the Percentiles tab, the user can view and define percentile graphs for the measured data. Default values are 90, 75, 25 and 10 %. It is also possible to set the median graph visible in the same graph. The percentiles defined here are used in the graph on the Sweep Data tab when the median and percentiles are loaded.