3D Evaluation for EMI Auto Test with R&S©EMC32-K23

EMC32
Application Note

Products:

| R&S®EMC32-EB

| R&S®EMC32-K10

| R&S®EMC32-K23

The option R&S®EMC32-K23 extends the emission measurement of the EMI Auto Test (R&S®EMC32-K10) with 3D measurement capabilities.
This extension is useful to display the 3D radiation pattern of each frequency.
This Application Notes shows all necessary settings for 3D measurement.

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1 Introduction

This application note gives an introduction to the 3D evaluation with the extension R&S®EMC32-K23 for R&S®EMC32-EB EMI section with R&S®EMC32-K10 EMI Auto Test.
The purpose of the 3D graphics component in EMC32 is to provide a means of displaying the data acquired over a full cylinder in an intuitive way as designers are used to.

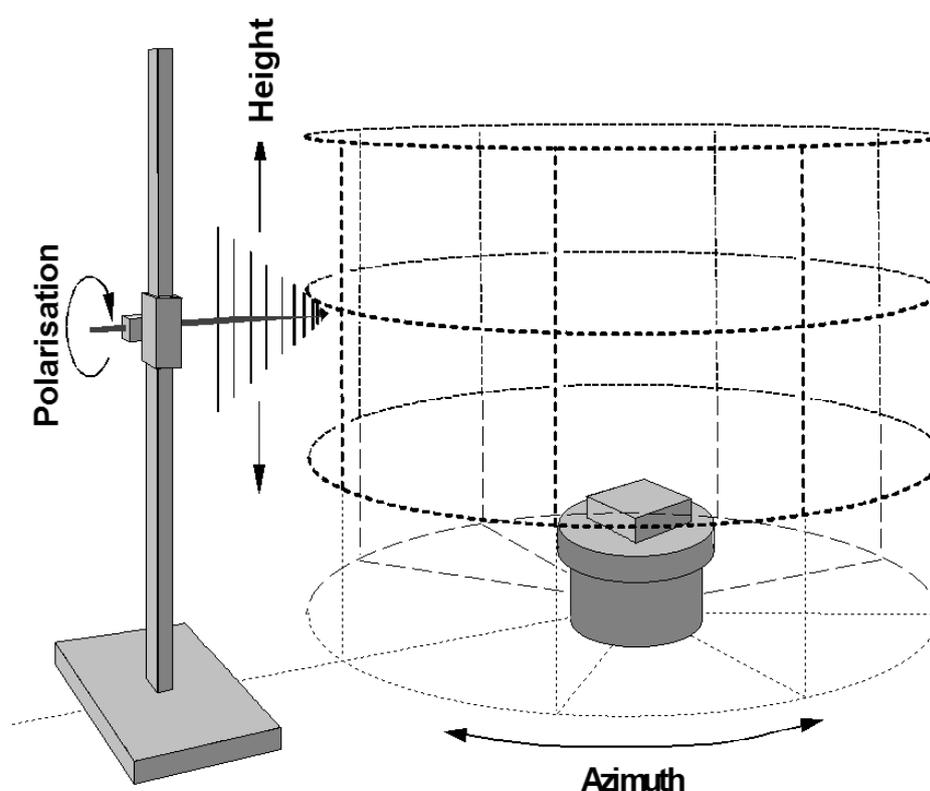## Principle of search for worst case setting

Figure 1: Measurement Setup

Key features are the possibility to rotate and zoom the view by simple mouse movements. A wide range of display of functions for modifying and scaling the display according to the user's preferences and needs.
This option for the EMC32-K10 EMI Auto Test sequence provides additional functions for the graphical presentation of the radiated emission measurement results. This additional graph will be created in 3D which can be configured as follow.

3D measurement can be performed for two types of measurements

1. Open-Area-Test-Site (level vs. azimuth vs. height → cylindrical coordinates)
2. E(I)RP (level vs. azimuth vs. elevation → spherical coordinates)

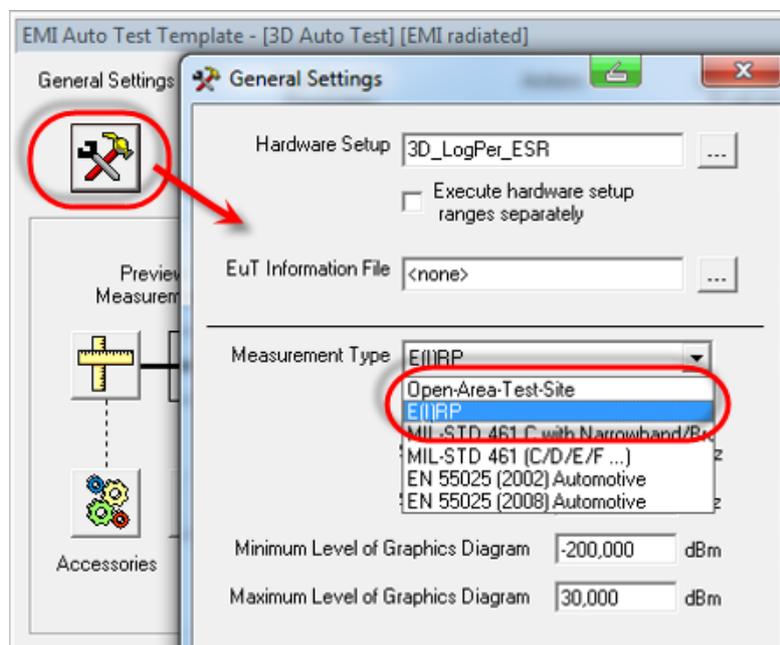These measurements can be selected in the General Settings of EMI Auto Test Template.

Figure 2: Measurement Types

After selecting the required measurement type, the 3D evaluation option will be activated in settings of the Preview Measurements and Maximization Measurements. The accessories settings for preview and maximization measurement shall also be configured and checked when activating the 3D option.
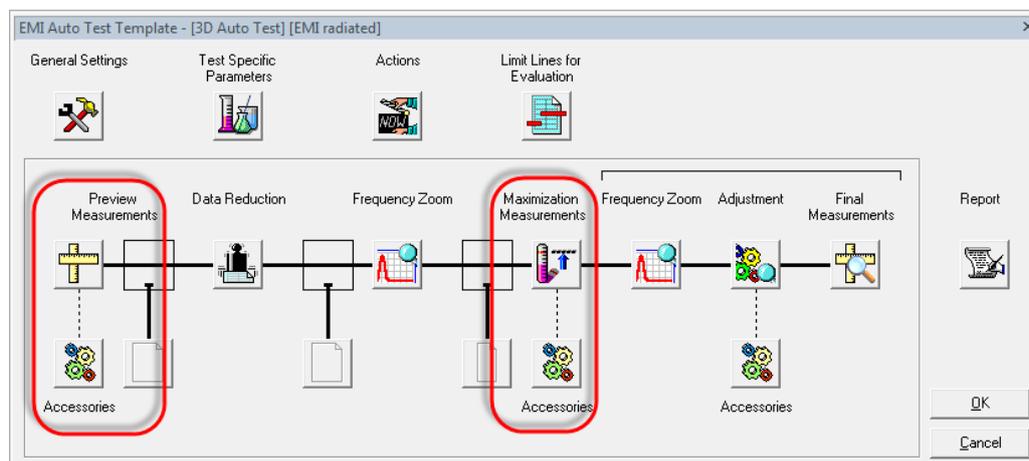

Figure 3: Preview, Maximization and Final measurement settings

1.1 Preview Measurements Settings

In order to activate the 3D evaluation for Preview Measurement results the check box "Save Preview Results for 3D chart Evaluation" has to be checked in the Preview Measurements Dialog of the EMI Auto Test Template.
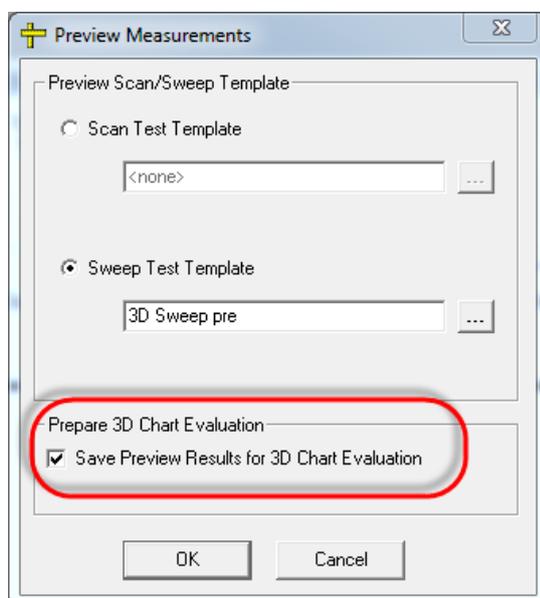

Figure 4: Preview Measurement, 3D selection

The parameters of the accessories can be configured as required for the 3D evaluation. They are important for better 3D graphical view since the 3D resolution depends on the accessories step size.

In order to get a sufficient resolution for the 3D evaluation the accessories step size need to be adjusted. These values have to be 8 or more azimuth positions and 3 or more height / elevation positions.

The stop value of the azimuth needs to be less than 360 degree because azimuth values greater or equal than 360 it will be replaced at 0 degree.
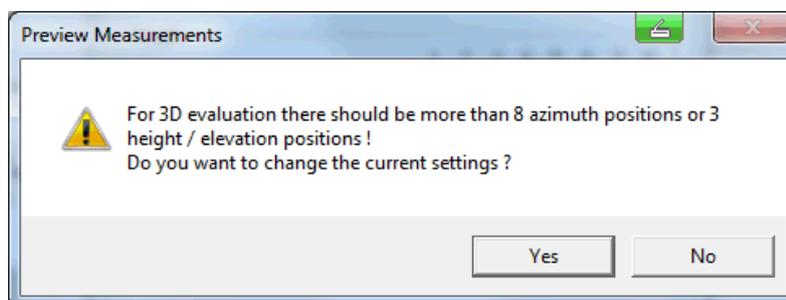

Figure 5: Step size requirement for 3D Evaluation

This 3D preview measurement message will appear if the required step size is not selected in the accessories settings.

The step size needs to be adjusted if the message dialog appears. This can be done by clicking on the accessories button which is below the Preview Measurement button (refer to figure 2).
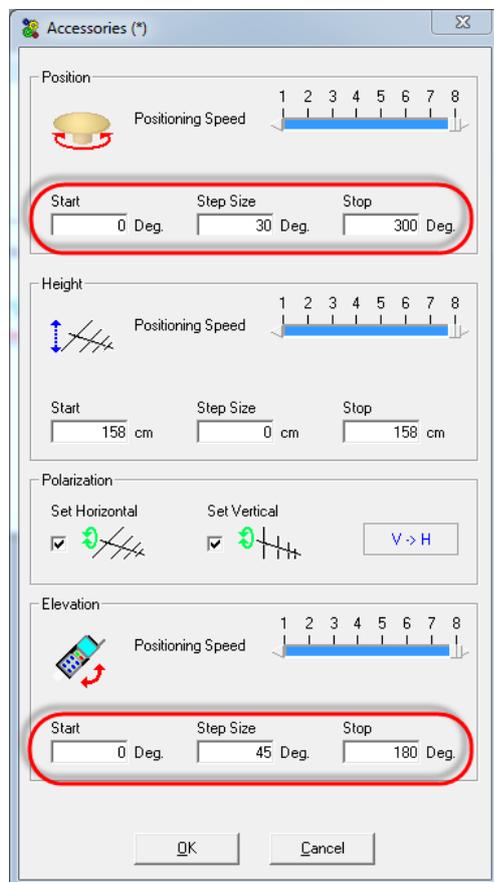

Figure 6: Preview Measurement, settings of Accessories

1.2 Maximization Measurements Settings

In order to activate the 3D evaluation for Maximization Measurement results the check box "Save Maximization Results for 3D Chart Evaluation" has to be selected in the Maximization Measurement Dialog of the EMI Auto Test Template.
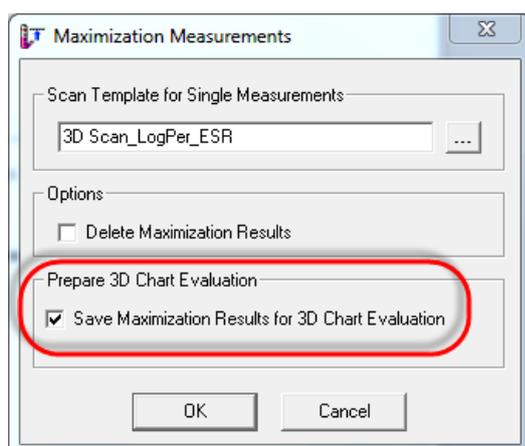
Figure 7: Maximization Measurement, 3D selection

In order to get a sufficient resolution for the 3D evaluation the accessories step size need to be adjusted. These values have to be 8 or more azimuth positions and 3 or more height / elevation positions.

This can be done by clicking on the accessories button which is below the Maximization Measurement button (refer to figure 2).
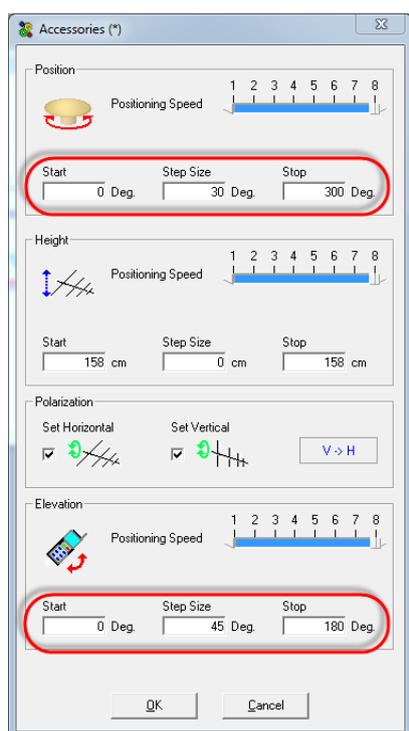

Figure 8: Maximization Measurement, settings of Accessories

1.3   3D Evaluation Procedure

3D graphics shows the radiation pattern of the EUT measured during the preview or maximization measurement. The frequency for 3D evaluation graphics can be easily set by drag and drop from the measurement graph or the measurement result tables.

Drag and drop from Full Spectrum Graphics:

Move the mouse pointer over frequency trace in the Full Spectrum Graphics until the trace tooltip for the desired frequency appears. Left mouse click on the trace, hold it, then drag it to the 3D evaluation window and drop it (i.e. release the mouse button). This will generate the 3D graphical view of the selected frequency.
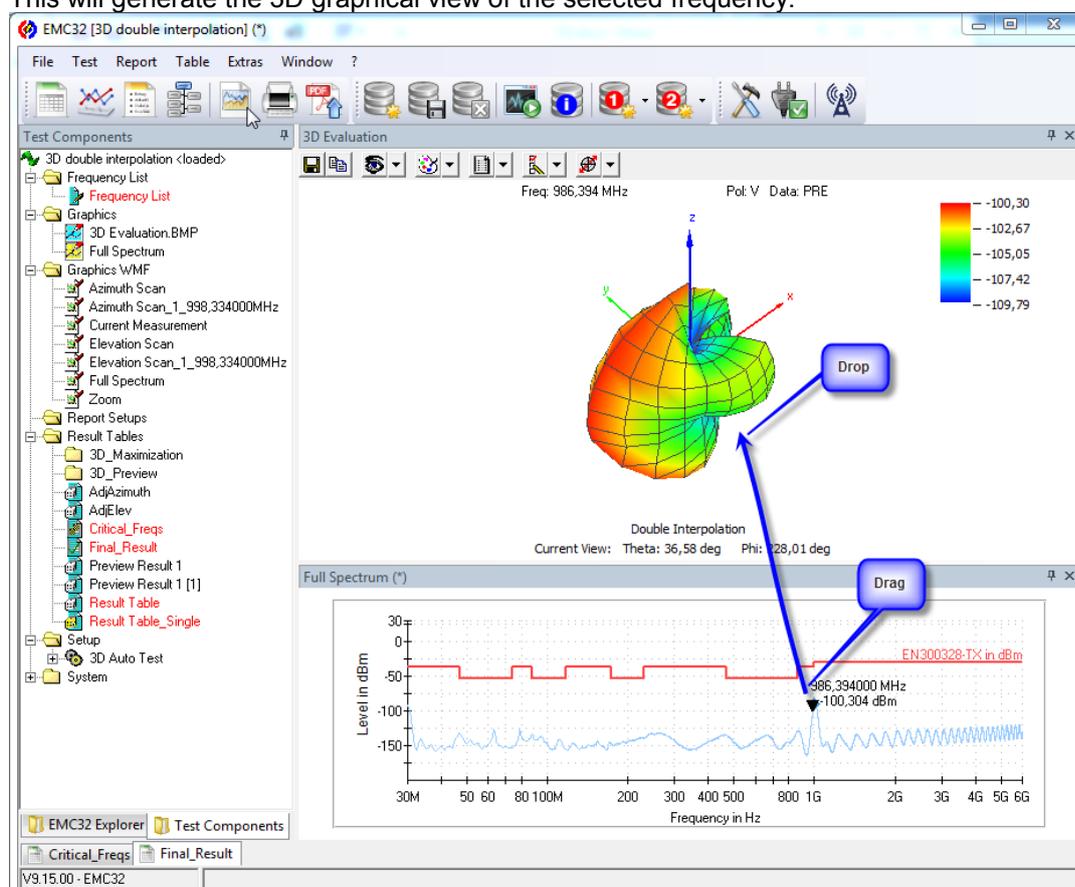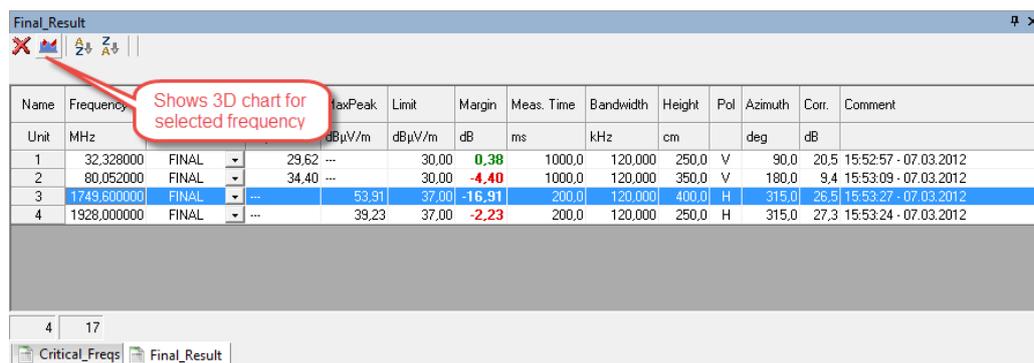

Figure 9: 3D evaluation Graphical view by drag and drop

This 3D graph can be viewed from different angles, by placing the mouse cursor on the graph. Click the right mouse button, hold it and rotate it into different directions.

Drag and drop from Critical Frequency or Final Result Table

As an alternative option to the drag & drop method the 3D chart can be also show via the critical frequency or final result table when the measurement mode is on by selecting the frequency row and clicking on the marked toolbar button.

Figure 10: 3D evaluation Graphical view by table editor

1.3.1 Data Interpolation

Different interpolation schemes can be used for displaying additional grid points and smoothing the 3D graph.

Three different interpolation schemes are available for graphical view.

1. No interpolation
2. Single Interpolation
3. Double Interpolation

A better graphical view can be achieved by selecting the "Double Interpolation" in the 3D tab. The default value can be selected via Options ----> Graphics ----> 3D tab.
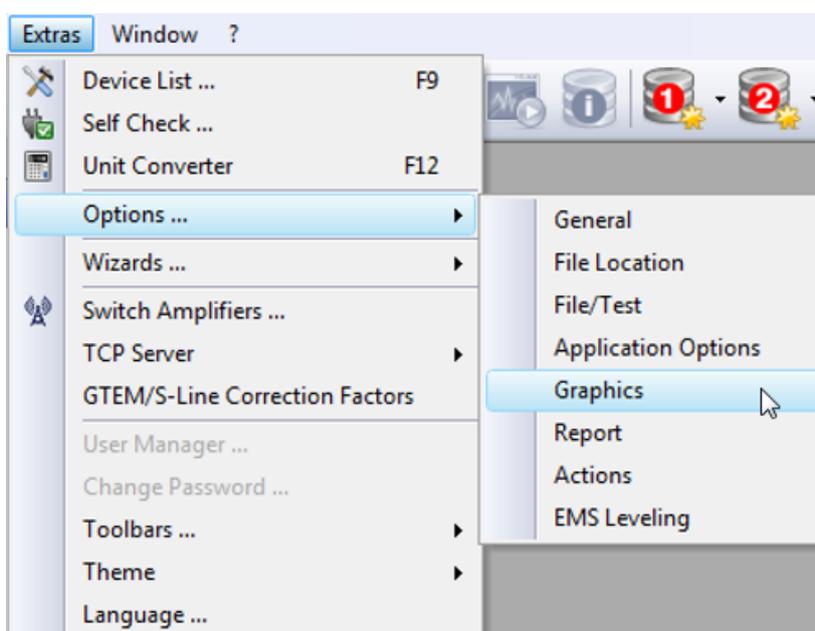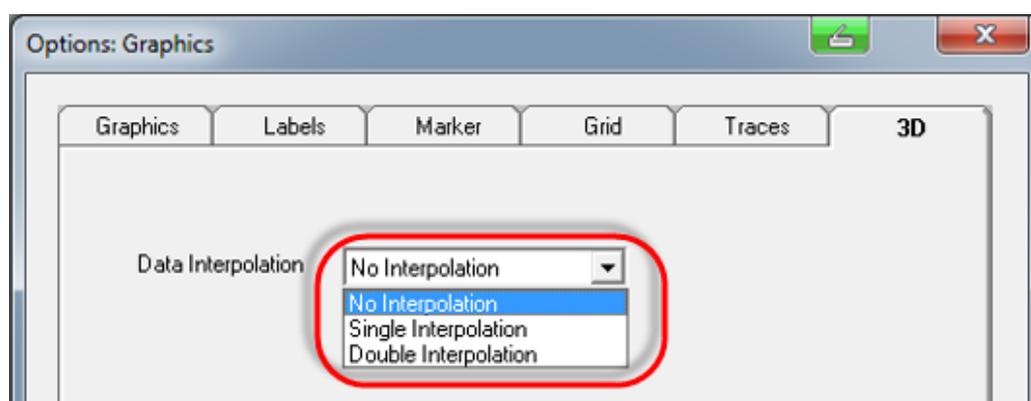

Figure 11: Path to the Data Interpolation

Figure 12: Data Interpolation Types

Different interpolation schemes can also be selected from the 3D evaluation window.
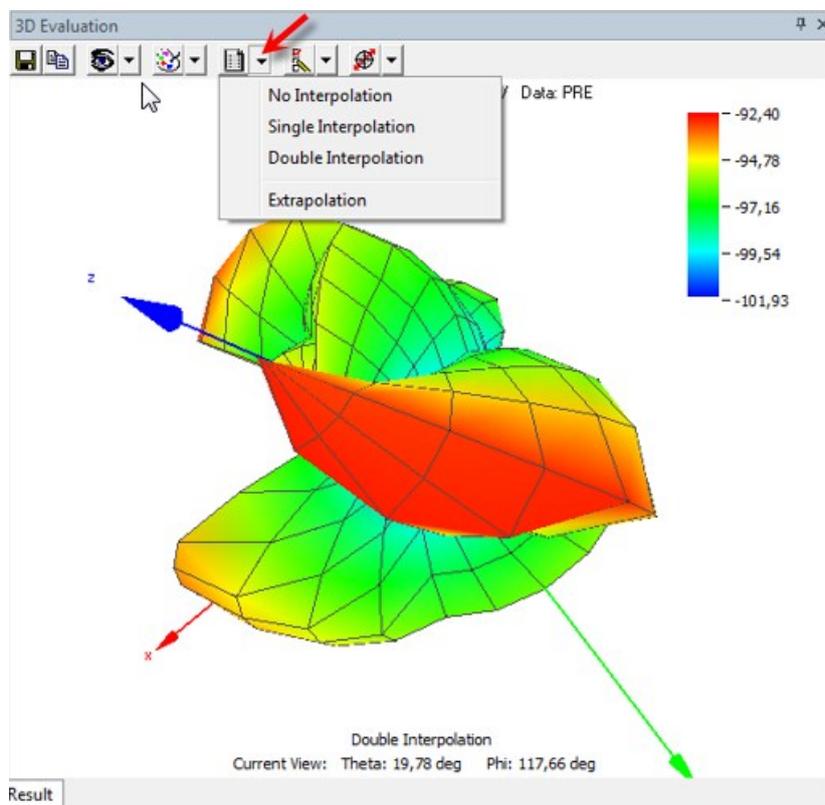

**Figure 13: Data Interpolation Types**

1.3.2   Mouse interactions

- A *left click* on a data point sets a marker at this position. Additionally, the corresponding information to this point is displayed. If the user has enabled the marker cuts, the horizontal and vertical cuts are displayed too.

- **Right mouse button clicked** while moving the mouse, rotates the data plot.

- According to the mouse motion. With the help of this, it is possible to navigate to every data point. If the view information is enabled, the current view direction will be displayed.

- *Left and right mouse button clicked* while moving the mouse up and down will perform a zoom in and out.

1.3.3 3D Graphics Toolbar

Toolbar buttons are described in the following from left to right:

- **Save button**: Saves the 3D graphic in JPG format to a selectable folder.

- **Copy button**: Copies the 3D graph to the Windows clipboard in WMF format. From there, it can be pasted to any standard application like eg. Word.

- **View button**: Allows to set the Phi and Theta angles from which to view the 3D plot. Six fixed vies (top, bottom, front, back, right and left) are available as well as the possibility to enter any angle combination. Default view angles are Phi = 45 degree, Theta = 60 degree.
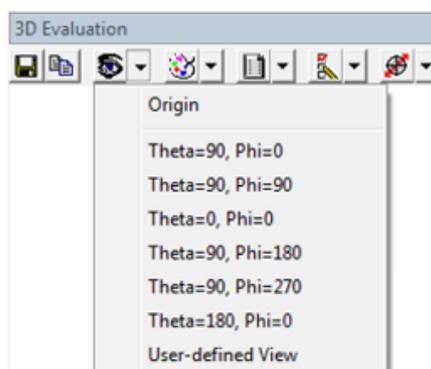
- **Data button**: Allows to define the interpolation scheme for displaying additional grid points and smoothing the 3D picture.
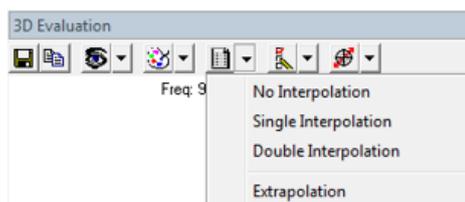
- **Options button**: The 3D graph can display additional elements when a marker has been set. These include the phi and theta cuts for the current marker position and the current phi, theta and level values. This menu allows to enable and disable this display.
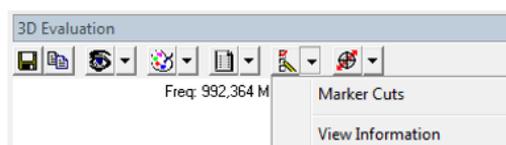
- **Scale button**: Allows to define the level scale. Available settings are: Scale to value range, Auto scale (next multiple of 10 dB for minimum and maximum), and a user definable level scale.

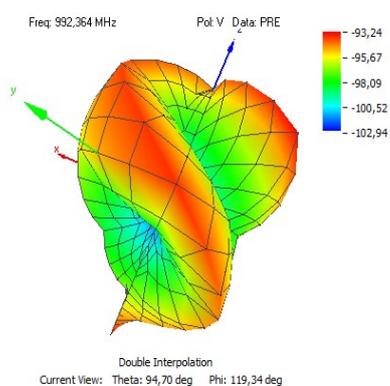### 1.3.4   3D Graphics with Different Interpolation
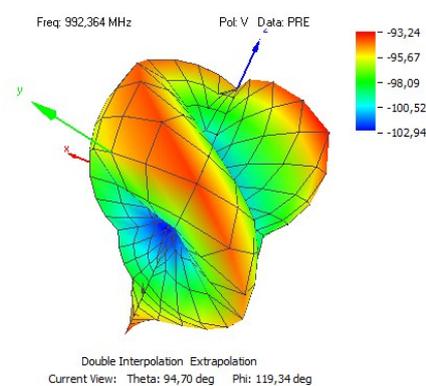

Figure 14: Double Interpolation
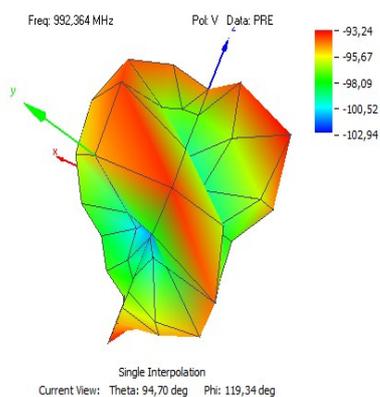

Figure 15: Double Interpolation Extrapolation

Figure 16: Single Interpolation
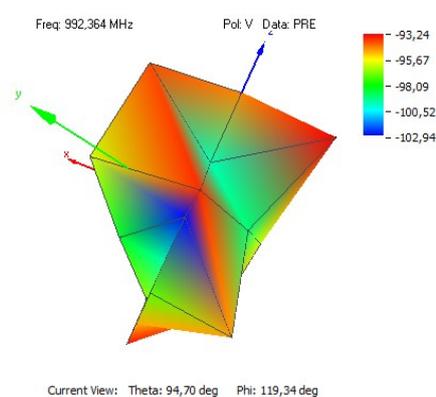
Figure 17: No Interpolation

2 Ordering Information

Designation	Type	Order No.
EMI measurement Software	R&S®EMC32-EB	1119.4638.02
EMI Auto Test	R&S®EMC32-K10	1117.6840.02
3D Evaluation for EMI Auto Test	R&S®EMC32-K23	1504.9190.02

About Rohde & Schwarz

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Environmental commitment
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- Continuous improvement in environmental sustainability
- ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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