

# GENERATION OF GRAPHICS AND TABLES FROM TEMPLATE SETTINGS WITH R&S® ELEKTRA

## Products:

- R&S®ELEKTRA

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<https://www.rohde-schwarz.com/product/elektra>



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# 1 Overview

In electromagnetic compatibility (EMC) test applications, measurements are performed according to predefined template settings to ensure consistency and repeatability. These measurements are typically repeated multiple times across different frequencies and accessory positions, which are also defined within the template. Since both accessory positions and types can significantly influence the results, users often need to visualize and compare data across a range of configurations. Template settings streamline the generation of graphics and tables, allowing efficient analysis across frequencies, accessory positions, and types. This application note describes the different template settings in R&S®ELEKTRA related to graphics and tables. It also illustrates how the final outputs, presented as tables and graphics, show the measurement results for different configurations.

## 2 Scope

This version of the application notes explains how graphics and tables are generated from template settings in the Electromagnetic Interference (EMI) and Electromagnetic Susceptibility (EMS) test applications. This application note is based on R&S®ELEKTRA v5.22. Details on the tables and graphics for tests using Reverberation Chambers (RVC) are provided in a described in [1].

## 3 R&S® ELEKTRA Licenses

The following R&S ELEKTRA licenses and options are required to access the features described in this application note.

- Required
  - EMI extension to system – ELEMI-S
  - EMS extension to system – ELEMS-S
- Optional
  - EMI Extension for 3D Results Evaluation - ELEMI-3D (for 3D charts)
  - EMS extension to automotive/MIL – ELEMS-AMEX (to assess the impact of modulation on the results)

## 4 Generation of graphics and tables in EMI application

The Table 1 shows the typical parameters that control graphics and table generation along with their scope and expected output when enabled.

| Parameter                            | Parameter Scope                                                                                                                                                                                                                                   | Effect of Enabling                                                                                                          | Location in User Interface (UI)      |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Graphics Per Range                   | All frequency ranges                                                                                                                                                                                                                              | Multiple charts are created, each showing the overview results for a specific frequency range                               | Flow Details => Measurement Settings |
| Graphics Per Position                | Only for accessories with the parameter checked                                                                                                                                                                                                   | Multiple charts are created, each showing the overview results for a specific position of the accessory                     | Flow Details => Accessory Settings   |
| Merge                                | Only for accessories with the parameter checked.<br><br>Valid only if Graphics Per Position is checked.                                                                                                                                           | A single chart is created to show the overview results for a specific accessory                                             | Flow Details => Accessory Settings   |
| Combine                              | Only accessories with the parameter checked                                                                                                                                                                                                       | Multiple charts are created, each showing the overview results for a specific combination of accessory positions.           | Flow Details => Accessory Settings   |
| Data Reduction Per Position          | Only accessories with the parameter checked                                                                                                                                                                                                       | The data reduction is performed on each position of the accessory instead of a data reduction on the overview results alone | Flow Details => Accessory Settings   |
| Save Results for 3D Chart Evaluation | Only relevant for Electric Field Strength and Radiated Spurious Emission tests                                                                                                                                                                    | Tables to store data for 3 Chart creation are created                                                                       | Flow Details => Measurement Settings |
| Add Spectrogram Graphic              | Range-specific spectrogram generation is not supported.<br><br>The spectrogram spans the entire frequency range.<br><br>When graphics per position is active, the spectrogram are generated for every accessory position even if merge is checked | Multiple charts display the spectrogram for each checked detector as the test execution progresses                          |                                      |

Table 1 Typical parameters to control the generation of graphs and tables in EMI application.

The following points should be noted by the user for reference.

- The parameters listed in Table 1 control the generation of graphics and tables in the Overview Measurement Flow only.
- The number of ranges and accessories, as well as the types of accessories in the template, depend on the type of emissions test performed—either conducted or radiated.
- The number of traces in the graph corresponds to the number of detectors enabled in the receiver.
- For a specific frequency, the table shows the result from the first detector's max hold value and its accessory positions when multiple detectors are checked.
- Graphs for each accessory position display the entire frequency range defined in the template, unlike range- specific graphics.

- Graphics generated by enabling 'Graphics per Range' appear under the Range Graphics folder in the Test Content Explorer (TCE).
- Graphics generated by enabling 'Graphics per Position' appear under the Accessory Graphics folder in the TCE.

The following sections describe different use cases, illustrating the graphics and tables generated based on the checked parameters from Table 1. The examples in the following sections are based on a radiated emissions template designed for electric field strength measurements with azimuth, height and polarization control. The same principles apply to any other emissions templates with accessories supported for those templates.

## 4.1 No configurations enabled

This section describes the graphics and tables generated when none of the parameters in Table 1 are enabled.

Figure 1 shows the measurement settings in template with two subranges, two detectors and graphics per range not enabled.

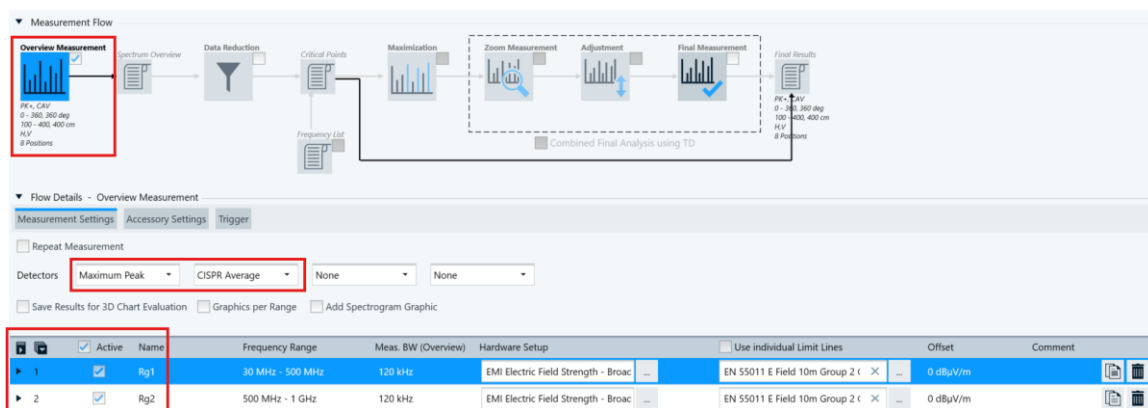


Figure 1 Graphics per range disabled in measurement settings.

Figure 2 shows the accessory settings in the template with three active accessories, while all the parameters controlling table and graphics generation based on accessory are not enabled.

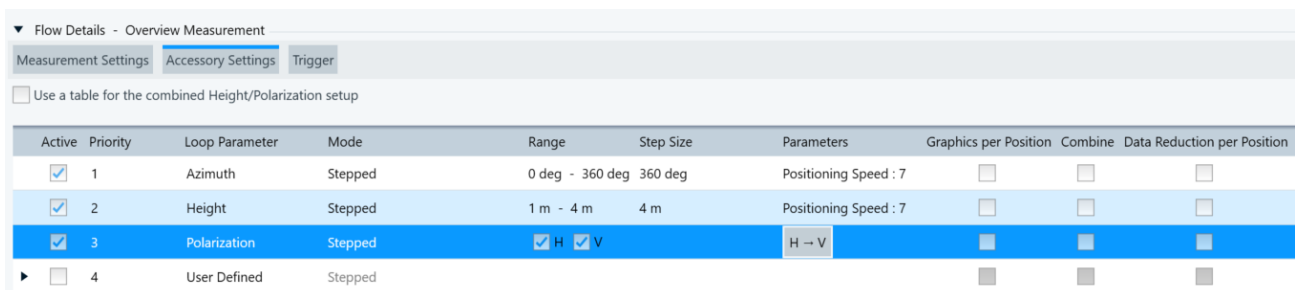


Figure 2 Accessory settings with multiple accessories and no parameters enabled.

Figure 3 shows the graphics and tables shown below appear in the TCE after overview measurement is executed based on template settings in Figure 1 & Figure 2. The Graphics folder includes a graphic for spectrum overview, while the Results Table folder includes a table for spectrum overview.

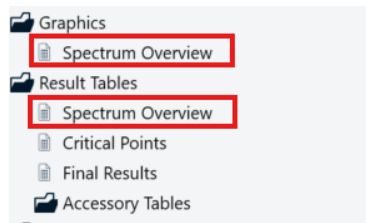


Figure 3 Graphics and tables in TCE with no parameters enabled.

## 4.2 Graphics per range enabled

Figure 4 shows the measurement settings in a template with two subranges, two detectors and graphics per range enabled.

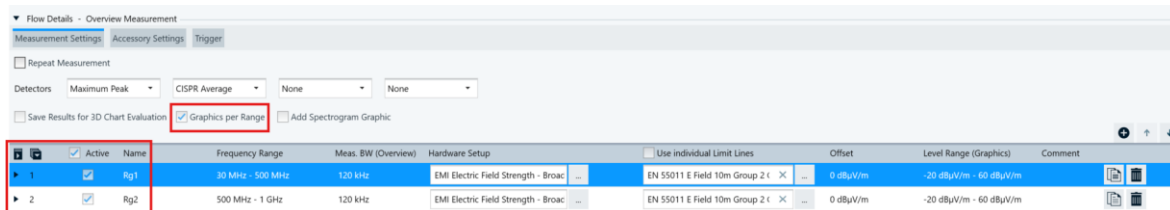


Figure 4 Graphics per range enabled in measurement settings.

The accessory settings are as shown in Figure 2 where all the parameters controlling the graphics and tables generation are not enabled. The graphics and tables shown in Figure 5 appear in the TCE after overview measurement is executed based on template settings in Figure 2 & Figure 4. For each range configured in the template, the Range Graphics folder includes a graphic, and the Range Tables folder includes a corresponding table.

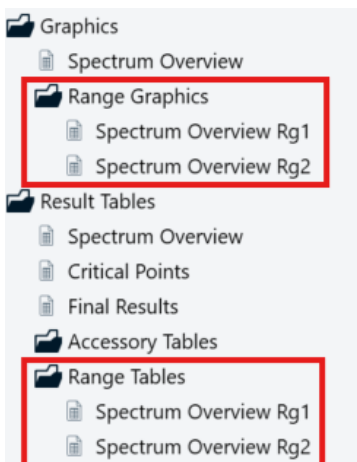


Figure 5 Graphics and tables in TCE with only graphics per range enabled.

The measurement values in the range-specific tables are derived from the spectrum overview table, limited to the desired range.

### 4.3 Graphics per position enabled

Figure 6 shows the accessory settings in the template with three active accessories and only the graphics per position parameter checked for all three accessories.

| Active                              | Priority | Loop Parameter | Mode    | Range                                                                       | Step Size | Parameters            | Graphics per Position               | Merge                    | Combine                  | Data Reduction per Position |
|-------------------------------------|----------|----------------|---------|-----------------------------------------------------------------------------|-----------|-----------------------|-------------------------------------|--------------------------|--------------------------|-----------------------------|
| <input checked="" type="checkbox"/> | 1        | Azimuth        | Stepped | 0 deg - 360 deg                                                             | 360 deg   | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 2        | Height         | Stepped | 1 m - 4 m                                                                   | 4 m       | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 3        | Polarization   | Stepped | <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> V |           | H → V                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input type="checkbox"/>            | 4        | User Defined   | Stepped |                                                                             |           |                       | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |

Figure 6 Accessory settings with multiple accessories and only graphics-per-position enabled.

The graphics per range parameter under measurement settings are not enabled as shown in Figure 1.

The graphics and tables shown in Figure 7 appear in the TCE after overview measurement is executed based on template settings in Figure 1 & Figure 6. The Accessory Graphics folder includes a graphic for each accessory position, while the Accessory Tables folder includes a table for each accessory position.

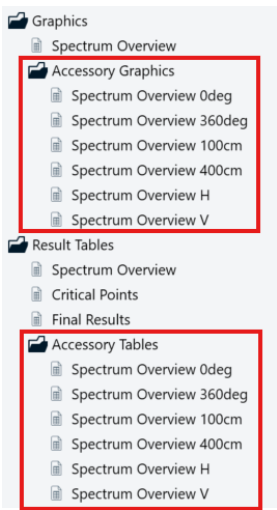


Figure 7 Graphics and tables in TCE with only graphics per position enabled.

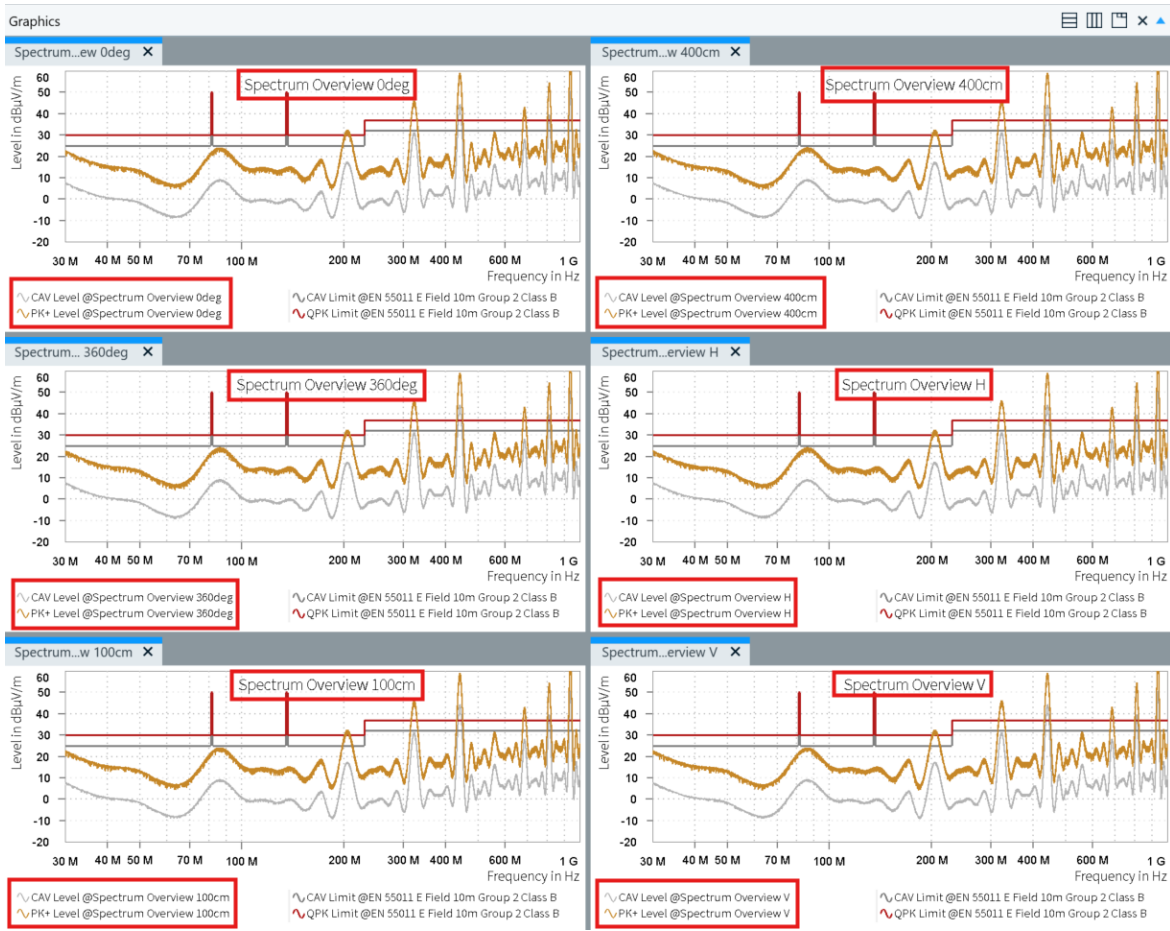


Figure 8 Traces representing every position of accessory in graphics with merge option not enabled.

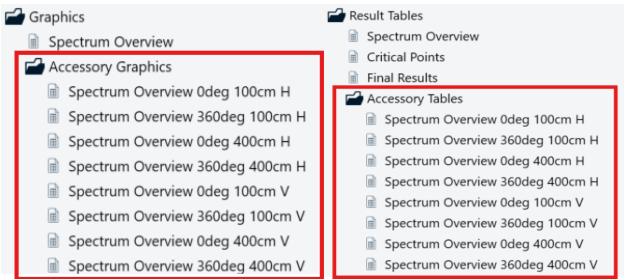
## 4.4 Combine enabled

Figure 9 shows the accessory settings in template with only combine enabled.

| Flow Details - Overview Measurement                                             |          |                |         |                                                                             |           |                       |                          |                                     |                             |
|---------------------------------------------------------------------------------|----------|----------------|---------|-----------------------------------------------------------------------------|-----------|-----------------------|--------------------------|-------------------------------------|-----------------------------|
| Measurement Settings Accessory Settings Trigger                                 |          |                |         |                                                                             |           |                       |                          |                                     |                             |
| <input type="checkbox"/> Use a table for the combined Height/Polarization setup |          |                |         |                                                                             |           |                       |                          |                                     |                             |
| Active                                                                          | Priority | Loop Parameter | Mode    | Range                                                                       | Step Size | Parameters            | Graphics per Position    | Combine                             | Data Reduction per Position |
| <input checked="" type="checkbox"/>                                             | 1        | Azimuth        | Stepped | 0 deg - 360 deg                                                             | 360 deg   | Positioning Speed : 7 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/>                                             | 2        | Height         | Stepped | 1 m - 4 m                                                                   | 4 m       | Positioning Speed : 7 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/>                                             | 3        | Polarization   | Stepped | <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> V |           | H - V                 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input type="checkbox"/>                                                        | 4        | User Defined   | Stepped |                                                                             |           |                       | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>    |

Figure 9 Graphics and tables in TCE with only combine enabled.

The Accessory Graphics folder contains a graphic for every accessory combination, while the Accessory Tables folder contains a table for each accessory combination.



### 4.5 Data reduction per position enabled

Figure 10 shows the accessory settings in template with data reduction per position enabled.

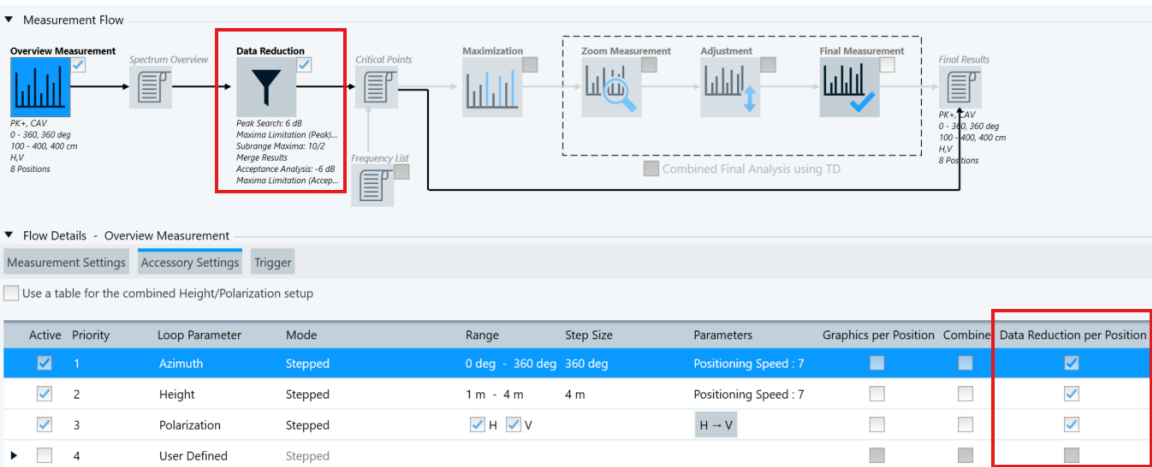


Figure 10 Settings with data reduction and data reduction per position enabled.

The graphics and tables shown in Figure 11 appear in the TCE after overview measurement is executed based on template settings shown in Figure 10. The Accessory Tables folder includes a table for each accessory position. By default, the data reduction flow uses the spectrum overview table as its input. However, when data reduction per position is enabled, the procedure instead uses the output tables from the Accessory Tables folder as input.

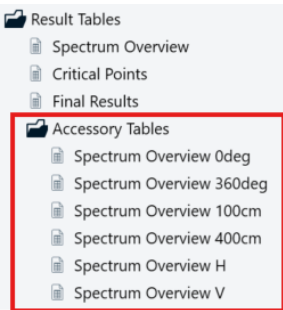


Figure 11 Tables in TCE with data reduction per position enabled.

## 4.6 Spectrogram graphics enabled

Figure 12 shows the measurement settings in template with two subranges, two detectors and spectrogram display enabled.

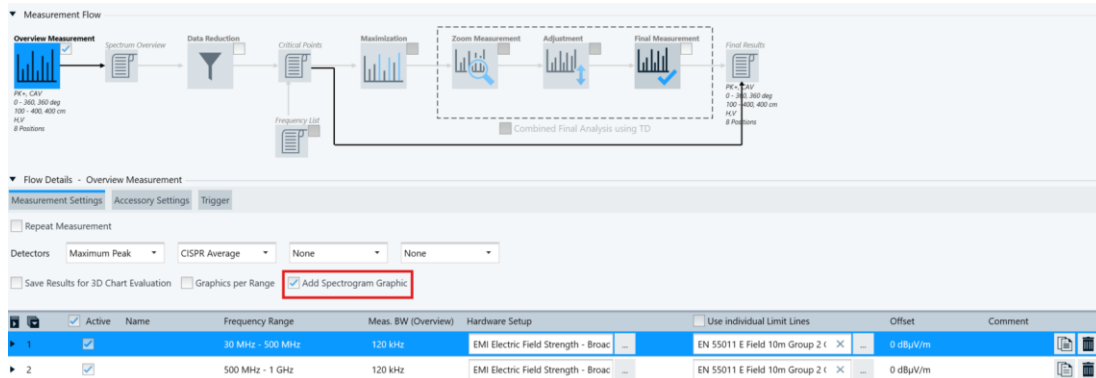


Figure 12 Measurement settings with spectrogram graphics enabled.

The graphics and tables shown in Figure 13 appear in the TCE after overview measurement is executed based on template settings shown in Figure 4 & Figure 15. The Spectrogram Graphics folder includes a graphic for each active detector, while the Spectrogram Tables folder includes a table with timestamps for every combination of accessory positions.

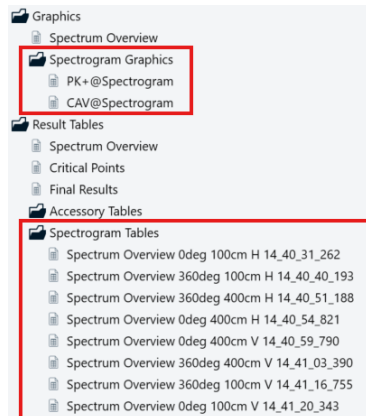


Figure 13 Graphics and tables in TCE with spectrogram display enabled.

Figure 14 shows the spectrogram graphics created when a spectrogram display is enabled.

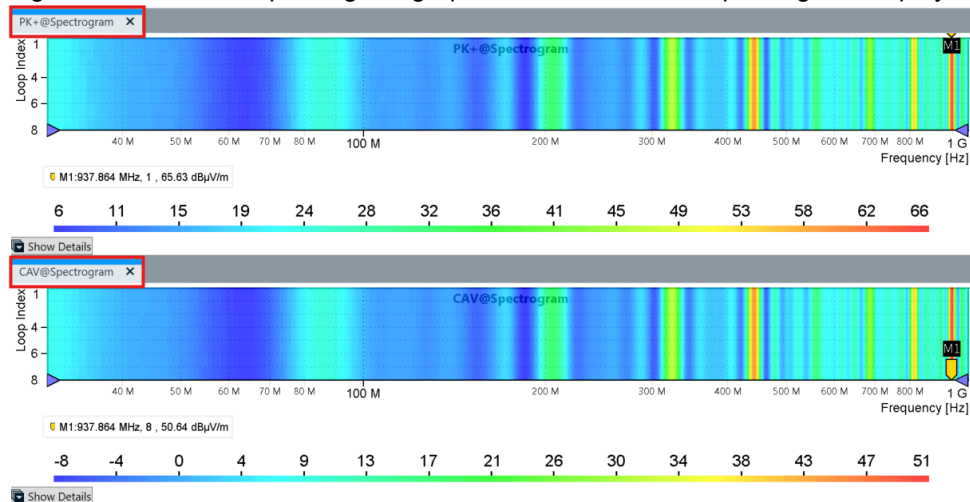


Figure 14 Spectrogram graphics for enabled detectors on enabling spectrogram display

## 4.7 Graphics per position and merge enabled

Figure 15 shows the accessory settings in the template with three active accessories and graphics per position parameter/merge checked for all three accessories.

▼ Flow Details - Overview Measurement

Measurement Settings Accessory Settings Trigger

☐ Use a table for the combined Height/Polarization setup

| Active                              | Priority | Loop Parameter | Mode    | Range                                                                       | Step Size | Parameters            | Graphics per Position               | Merge                               | Combine                  | Data Reduction per Position |
|-------------------------------------|----------|----------------|---------|-----------------------------------------------------------------------------|-----------|-----------------------|-------------------------------------|-------------------------------------|--------------------------|-----------------------------|
| <input checked="" type="checkbox"/> | 1        | Azimuth        | Stepped | 0 deg - 360 deg                                                             | 360 deg   | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 2        | Height         | Stepped | 1 m - 4 m                                                                   | 4 m       | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 3        | Polarization   | Stepped | <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> V |           | H → V                 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>    |
| <input type="checkbox"/>            | 4        | User Defined   | Stepped |                                                                             |           |                       | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>    |

Figure 15 Accessory settings with multiple accessories and graphics-per-position with merge enabled.

The graphics per range parameter under measurement settings are not enabled as shown in Figure 1.

The graphics and tables shown in Figure 16 appear in the TCE after overview measurement is executed based on template settings shown in Figure 1 & Figure 15. The Accessory Graphics folder includes a graphic for each accessory, while the Accessory Tables folder includes a table for each accessory position.

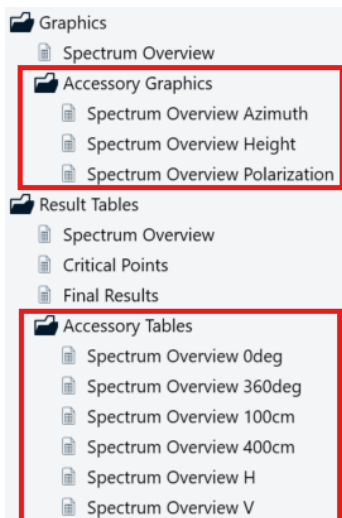


Figure 16 Graphics and tables in TCE with only graphics per position and merge enabled.

Figure 17 shows the traces representing every position of specific accessory when template settings are configured to create only one graphics per accessory.



Figure 17 Traces representing every position of each accessory in graphics with merge option is enabled.

## 4.8 Graphics per range & per position only enabled

The graphics and tables shown in Figure 18 appear in the TCE after overview measurement is executed based on template settings shown in Figure 4 & Figure 15. The Accessory Graphics folder includes a graphic for each accessory position, while the Range Graphics folder includes a graphic for each range and accessory position combination. The Accessory Tables folder includes a table for each accessory position, while the Range Tables folder includes a table for each range and accessory position combination.

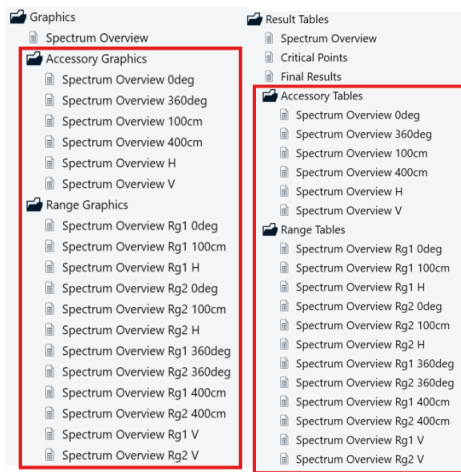


Figure 18 Graphics and tables in TCE with only graphics per range and per position enabled.

Graphics covering all the ranges are shown in the Graphics section and range specific graphics are shown in the Important Graphics section as seen in Figure 19.



Figure 19 Graphics for specific and all ranges when graphics per range & per position are enabled.

## 4.9 Graphics per range & position with merge enabled

The graphics and tables shown in Figure 20 appear in the TCE after overview measurement is executed based on template settings shown in Figure 5 & Figure 15. The Accessory Graphics folder includes a graphic for each accessory type, while the Range Graphics folder includes a graphic for each range and accessory type combination. The Accessory Tables folder includes a table for each accessory position, while the Range Tables folder includes a table for each range and accessory position combination.

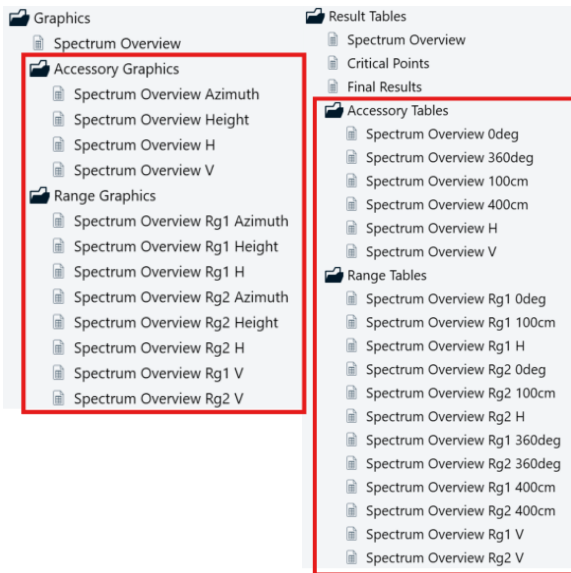


Figure 20 Graphics and tables in TCE with graphics per range and per position with merge enabled.

Graphics covering all the ranges are shown in the Graphics section and range specific graphics are shown in the Important Graphics section as seen in Figure 21. The accessory specific graphs show the traces for each accessory position & cover the frequency range of the template while the range specific graphs show the traces for each accessory position limited to the range as seen in Figure 21.



Figure 21 Graphics for specific and all ranges when graphics per range & per position with merge are enabled.

## 4.10 Graphics per position and combine enabled

Figure 22 shows the accessory settings in template with graphics per range and combine enabled.

| Active                              | Priority | Loop Parameter | Mode    | Range                                                                       | Step Size | Parameters            | Graphics per Position               | Merge                    | Combine                             | Data Reduction per Position |
|-------------------------------------|----------|----------------|---------|-----------------------------------------------------------------------------|-----------|-----------------------|-------------------------------------|--------------------------|-------------------------------------|-----------------------------|
| <input checked="" type="checkbox"/> | 1        | Azimuth        | Stepped | 0 deg - 360 deg                                                             | 360 deg   | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 2        | Height         | Stepped | 1 m - 4 m                                                                   | 4 m       | Positioning Speed : 7 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input checked="" type="checkbox"/> | 3        | Polarization   | Stepped | <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> V |           | H - V                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>    |
| <input type="checkbox"/>            | 4        | User Defined   | Stepped |                                                                             |           |                       | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>    |

Figure 22 Accessory settings with graphics per position and combine enabled.

The graphics and tables output will contain the items described in sections 4.3 and 4.4.

## 4.11 Graphics per range, graphics per position and combine enabled

The graphics and tables shown in Figure 23 appear in the TCE after overview measurement is executed based on template settings shown in Figure 4 & Figure 22. The Accessory Graphics folder includes a graphic for each accessory position as well as every combination of accessory positions, while the Range Graphics folder includes a graphic for each range and accessory position combination. The Accessory Tables folder includes a table for each accessory position as well as every combination of accessory positions, while the Range Tables folder includes a table for each range and accessory position combination.

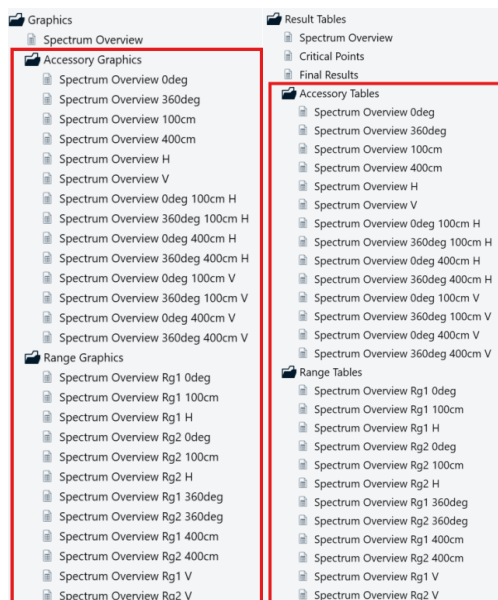


Figure 23 Graphics and tables in TCE with graphics per range, graphics per position and combine enabled.

## 4.12 Spectrogram graphics and graphics per position enabled

The graphics and tables shown in Figure 24 appear in the TCE after overview measurement is executed based on template settings shown in Figure 6 & Figure 12. The Accessory Graphics folder includes a graphic for each accessory position, while the Spectrogram Graphics folder includes a graphic for each active detector and accessory position combination. The Accessory Tables folder includes a table for each

accessory position, while the Spectrogram Tables folder includes a table with timestamps for every combination of accessory positions.

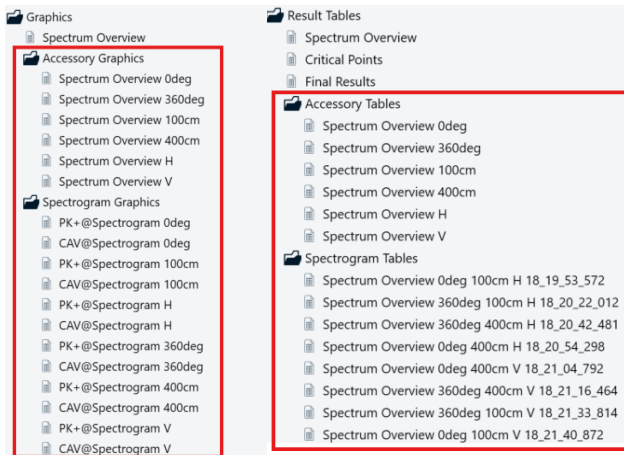


Figure 24 Graphics and tables in TCE with spectrogram display & graphics per position.

## 4.13 Spectrogram graphics and graphics per position with merge enabled

The graphics and tables shown in Figure 25 appear in the TCE after overview measurement is executed based on template settings shown in Figure 15 & Figure 12. The Accessory Graphics folder includes a graphic for every accessory, while the Spectrogram Graphics folder includes a graphic for each active detector and accessory position combination. The Accessory Tables folder includes a table for each accessory position, while the Spectrogram Tables folder includes a table with timestamps for every combination of accessory positions.

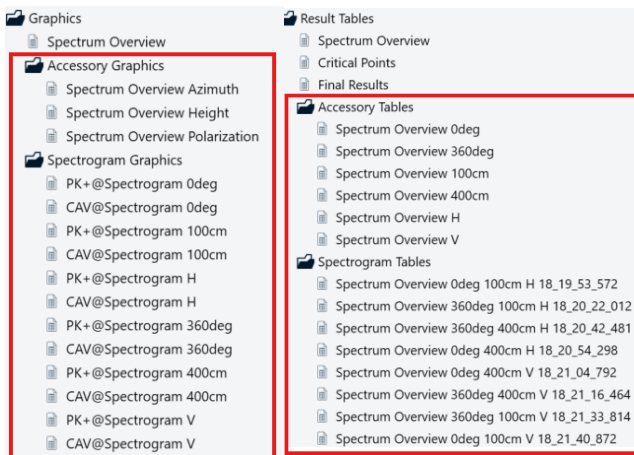


Figure 25 Graphics and tables in TCE with spectrogram display & graphics per position with merge enabled.

## 4.14 Tables for 3D chart evaluation enabled

Figure 26 shows the measurement settings in template with saving of 3D charts enabled.

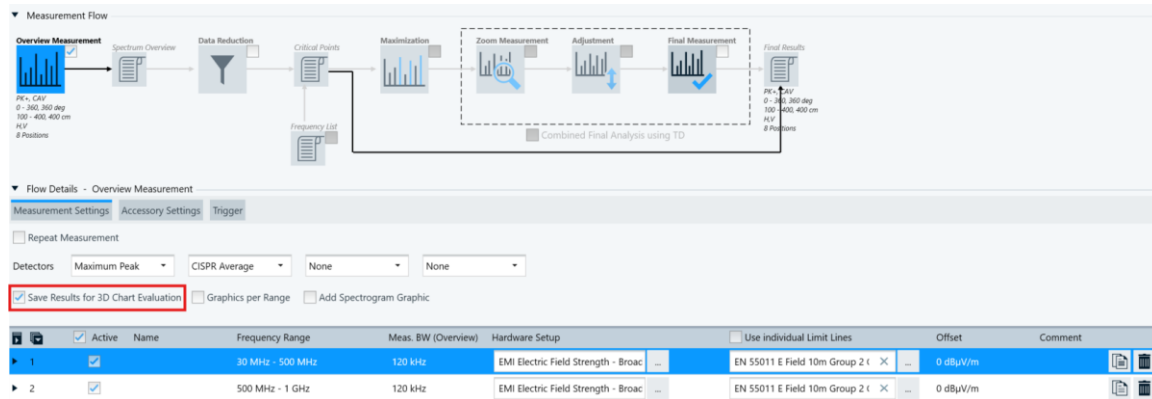


Figure 26 Measurement settings with saving of 3D charts enabled.

The tables shown in Figure 26 appear in the TCE after overview measurement is executed based on template settings shown in Figure 27. The 3D tables folder includes a table for every combination of accessory positions.

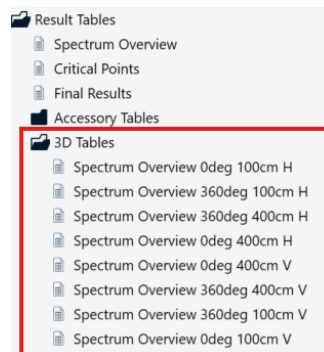


Figure 27 Tables in TCE with 3D chart evaluation enabled.

## 4.15 Graphics and Tables Generated via Evaluation Control

The test container hosts an evaluation control that will allow the user to create three-dimensional graphical representation of the tests. As a prerequisite, the test must use a test template configured to store results for 3D evaluation as shown in Figure 26. The evaluation control is as shown in Figure 28.

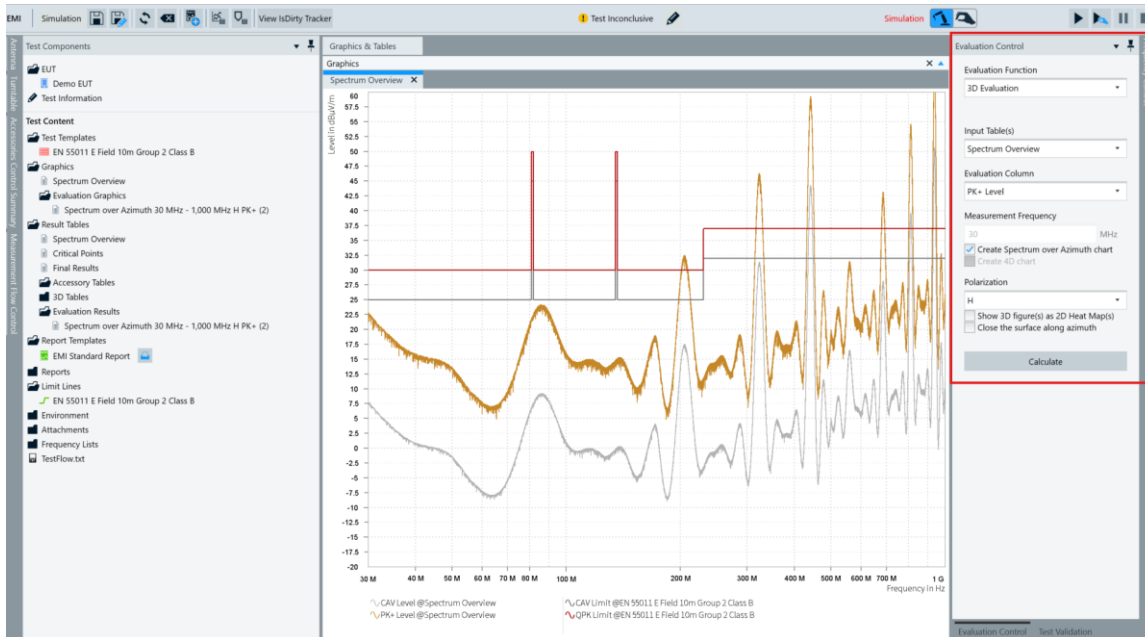


Figure 28 Evaluation control inside the test container.

Clicking the Calculate button evaluates generates the graphics under Evaluation Graphics folder and tables under the Evaluation Results folder as shown Figure 29.

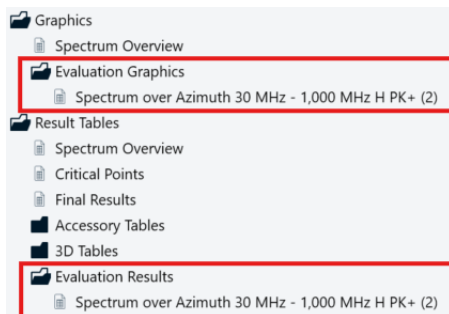


Figure 29 Graphics and tables in TCE using evaluation control.

The scope of this document is limited to specifying where the generated graphics and tables are stored. It does not cover the usage of evaluation control and the different graphics/tables that can be generated by using the evaluation control.

## 4.16 Append adjustment graphics images to attachments enabled

Figure 30 shows the adjustment settings in template with the option to append adjustment graphics enabled.

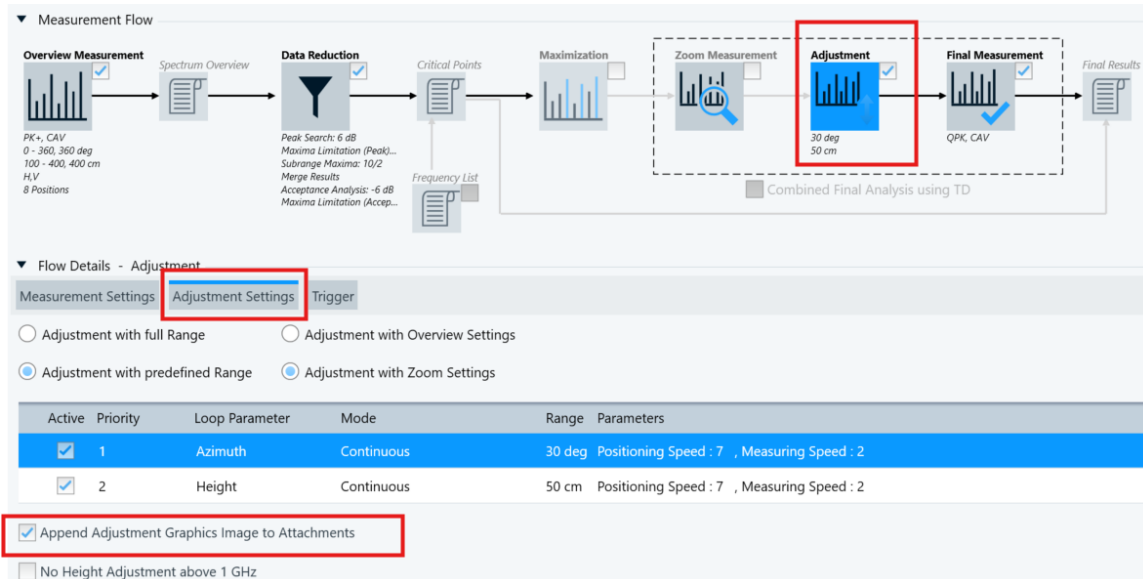


Figure 30 Settings with adjustment and append adjustment graphics enabled.

The images shown in Figure 31 appear in the TCE under the Attachments folder after adjustment measurement is executed based on template settings shown in Figure 30. The image file name contains the frequency and accessory adjustment ranges.

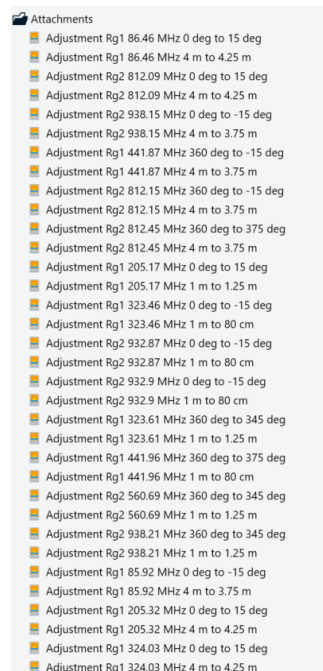


Figure 31 Images in TCE for various adjustment positions.

## 4.17 System Check enabled

The System Check tab, shown in Figure 32, is available only when system check is selected in the hardware setup.

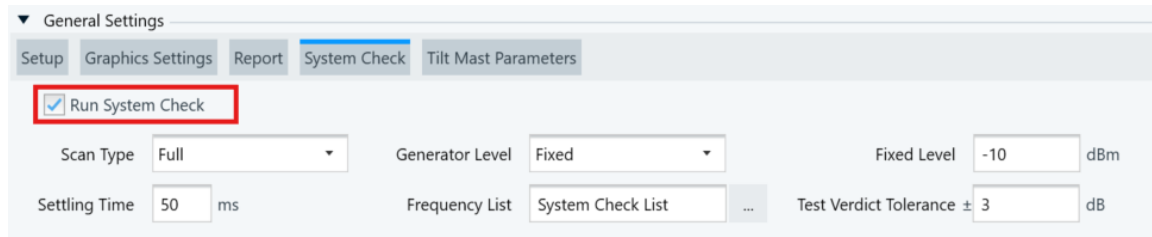


Figure 32 Enabling system check in General Settings

The System Check table shown under Result Tables folder in Figure 33 appear in the TCE after overview measurement is executed based on template settings shown in Figure 32.

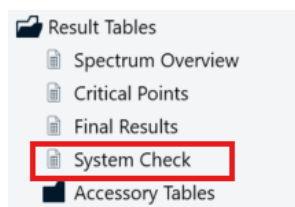


Figure 33 Tables in TCE with system check enabled.

# 5 Generation of graphics and tables in EMS application

The Table 2 shows the typical parameters that control graphics and table generation along with their scope and expected output when enabled.

| Parameter                                          | Parameter Scope                                                                                 | Effect of Enabling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Location in User Interface (UI)                                                         |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Display                                            | All frequency ranges, limited to the system or EUT monitoring channel to which they are applied | A chart for each monitoring channel showing the overview results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | System Monitoring Channel in Test Template<br>EUT Monitoring in EUT Monitoring channels |
| Eval display                                       | All frequency ranges, limited to the system or EUT monitoring channel to which they are applied | Multiple charts are created, each showing the overview results for accessory positions, types or combinations depending on user configuration in data evaluation panel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | System Monitoring Channel in Test Template<br>EUT Monitoring in EUT Monitoring channels |
| Do Worst Case Analysis for EUT Monitoring Channels | Applicable for all active EUT monitoring channels.                                              | A single chart is created for every active 'EUT Monitoring' channel after all test frequencies and accessory-loop positions in the overview result tables are checked to identify the maximum deviation from the NoGo criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Measurement Flow => Data Evaluation                                                     |
| Combine all loop results after measurement         | Only for selected accessories                                                                   | <p>Multiple charts are created, each showing the overview results for accessory positions, types or combinations depending on user configuration for each accessory.</p> <p>The merged result tables are created only if the accessory is selected in the Data Evaluation Tab</p> <p>The charts are created for selected accessories only if the following are enabled.</p> <ul style="list-style-type: none"> <li>• Display for the accessory type in the Data Evaluation Tab</li> <li>• Eval Display for the channel (system or EUT monitoring)</li> </ul> <p>For each accessory, chart display is decided by the following selection.</p> <ul style="list-style-type: none"> <li>• Accessory Step</li> <li>• Accessory Type</li> <li>• Loop/Merge Results Table</li> </ul> | Measurement Flow => Data Evaluation                                                     |
| Merge results after each accessory loop            | Only for selected accessories                                                                   | The merge results tables and graphics are displayed as the test progresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Measurement Flow => Data Evaluation                                                     |
| Show Trace for Critical Points table               |                                                                                                 | Shows the points from Critical Table relevant to the accessory position or type in the corresponding chart if display is enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Measurement Flow => Data Evaluation                                                     |
| Show Trace for Final Result table                  |                                                                                                 | Shows the points from Final Table relevant to the accessory position or type in the corresponding chart if display is enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Measurement Flow => Data Evaluation                                                     |

Table 2 Typical parameters to control the generation of graphs and tables in EMS application.

The following points should be noted by the user for reference.

- The parameters in Table 2 control the generation of graphics and tables in the Data Evaluation Flow, except when 'Merge results after each accessory loop' is enabled. When 'Merge results after each accessory loop' is enabled, graphics and tables for accessory loops are generated during the Overview Measurement flow and updated as test progresses.

- The number of ranges and accessories, as well as the types of accessories in the template, depend on the type of immunity test performed—either conducted or radiated.
- Combining the loop results to generate graphics and tables relies on the overview measurement results produced during the overview measurement process. Therefore, the overview measurement flow must be completed before performing any data evaluation or combining loop results.
- The Final result table is populated during the execution of the interactive measurement. If the user wants the final results to be displayed in the graphics generated by combining the loop results from the overview measurement, the data evaluation must be performed after the interactive measurement.

The examples in the following sections are based on a radiated immunity template designed for susceptibility measurement.

The measurement settings with two ranges are as shown in Figure 34.

Flow Details - Overview Measurement

Measurement Settings | Accessory Settings

Leveling Mode | Leveling Options | Power Level Limitation | Sensor Level Limitation

Level On: Substitution Method (dropdown)

Power Control: Forward Power (dropdown)

Reference Calibration Table: ISO 11451-2 100V/m Examf (dropdown) [X] ...

☐ Use a frequency-range-specific reference calibration table

Frequency Range List

|     | Active                              | Frequency Range  | Steps | Test Level | Dwell                  | Modulation | Hardware Setup                | Comment |
|-----|-------------------------------------|------------------|-------|------------|------------------------|------------|-------------------------------|---------|
| ▶ 1 | <input checked="" type="checkbox"/> | 80 MHz - 400 MHz | 20 %  | LOG        | ISO11452-2... 0 s, 0 s | CW, AM     | ISO 11452-1 AC 80-1000MHz (f) | ...     |
| ▶ 2 | <input checked="" type="checkbox"/> | 400 MHz - 1 GHz  | 20 %  | LOG        | ISO11452-2... 0 s, 0 s | CW, AM     | ISO 11452-1 AC 80-1000MHz (f) | ...     |

Figure 34 Measurement settings.

The accessory settings with modulation, azimuth, and polarization control as shown in Figure 35.

Flow Details - Overview Measurement

Measurement Settings | Accessory Settings

☒ Use Modulation Sequence (ELEMS-AMEX required)

|   | Active                              | Priority | Loop Parameter     | Mode    | Range                                                                       | Step Size | Parameters            |
|---|-------------------------------------|----------|--------------------|---------|-----------------------------------------------------------------------------|-----------|-----------------------|
| ▶ | <input type="checkbox"/>            | 1        | Inner User Defined | Stepped |                                                                             |           |                       |
|   | <input checked="" type="checkbox"/> | 2        | Modulation         | Stepped |                                                                             |           |                       |
|   | <input checked="" type="checkbox"/> | 3        | Frequency          | Stepped |                                                                             |           |                       |
|   | <input checked="" type="checkbox"/> | 4        | Polarization       | Stepped | <input checked="" type="checkbox"/> H <input checked="" type="checkbox"/> V |           | H → V                 |
|   | <input checked="" type="checkbox"/> | 5        | Azimuth            | Stepped | 0 deg - 360 deg                                                             | 360 deg   | Positioning Speed : 7 |
|   | <input type="checkbox"/>            | 6        | Height             | Stepped | 1 m - 4 m                                                                   | 50 cm     | Positioning Speed : 7 |
| ▶ | <input type="checkbox"/>            | 7        | User Defined       | Stepped |                                                                             |           |                       |

Figure 35 Accessory Settings.

The test level and transducer forward system monitoring channels are enabled as shown in Figure 36.

▼ System Monitoring

| No. | Active                              | Parameter                | Unit | Y-Axis Range | Combine                             | LOG X-Axis                          | LOG Y-Axis                          | Display                             | Eval Display                        | Detector | Measurement Extension |
|-----|-------------------------------------|--------------------------|------|--------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------|-----------------------|
| 1   | <input checked="" type="checkbox"/> | Test Level               | V/m  | 0 ... 150    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Peak     | -                     |
| 2   | <input type="checkbox"/>            | Sensor Level             | V/m  | 0 ... 30     | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | Peak     | No Measurement        |
| 3   | <input checked="" type="checkbox"/> | Transducer Forward Power | W    | 0 ... 500    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Peak     | No Measurement        |

Figure 36 Enabled system monitoring channels.

A EUT monitoring channel is enabled as shown in Figure 37.

EUT Monitoring Channels

| Active                              | Name      | Measurement Device | Unit | Y-Axis Range | NoGo                | Limit   | LOG X-Axis                          | LOG Y-Axis                          | Display                             | Eval Display                        |
|-------------------------------------|-----------|--------------------|------|--------------|---------------------|---------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | Channel 1 | Generic Monitoring | V    | 1 ... 10     | Outside Value Range | 4 ... 6 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Measurement: Device Settings: Options

Generic Monitoring (Publ) ... <None>

Figure 37 Enabled EUT monitoring channel.

The following sections describe different use cases, illustrating the graphics and tables generated based on the enabled parameters from Table 2.

## 5.1 Worst case analysis for EUT monitoring channels enabled

Figure 38 shows the data evaluation settings in template with worst case analysis for EUT monitoring channels enabled.

▼ Flow Details - Data Evaluation

Data Evaluation

☒ Do Worst Case Analysis for EUT monitoring channels

☐ Combine all loop results after measurement

☐ Merge results after each accessory loop

☐ Show trace for Critical Points table

☐ Show trace for Final Results table

☐ Create Spectrum Overview Combined result table

Select loop parameters to combine result(s)

| Loop Parameter                                 | Display                  | Group By       |
|------------------------------------------------|--------------------------|----------------|
| <input checked="" type="checkbox"/> Modulation | <input type="checkbox"/> | Accessory Step |
| <input type="checkbox"/> Polarization          | <input type="checkbox"/> | Accessory Step |
| <input type="checkbox"/> Azimuth               | <input type="checkbox"/> | Accessory Step |

Figure 38 Data evaluation settings with worst case analysis enabled.

The graphics and tables shown in Figure 39 appear in the TCE after overview measurement is executed based on template settings shown in Figure 38. The Evaluation Graphics folder includes a worst-case analysis graphic for each EUT monitoring channel, while Evaluation Results folder includes a table holding data worst case analysis data for every measured frequency.

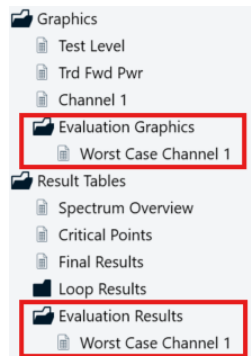


Figure 39 Graphics and tables in TCE with worst case analysis enabled.

Figure 40 shows the graphics and tables generated from worst case analysis. A marker indicating the worst-case deviation from the criteria is placed on the chart at the frequency where it occurs. The table lists the name of the source file of every record and the accessory positions corresponding to the deviation can be inferred.

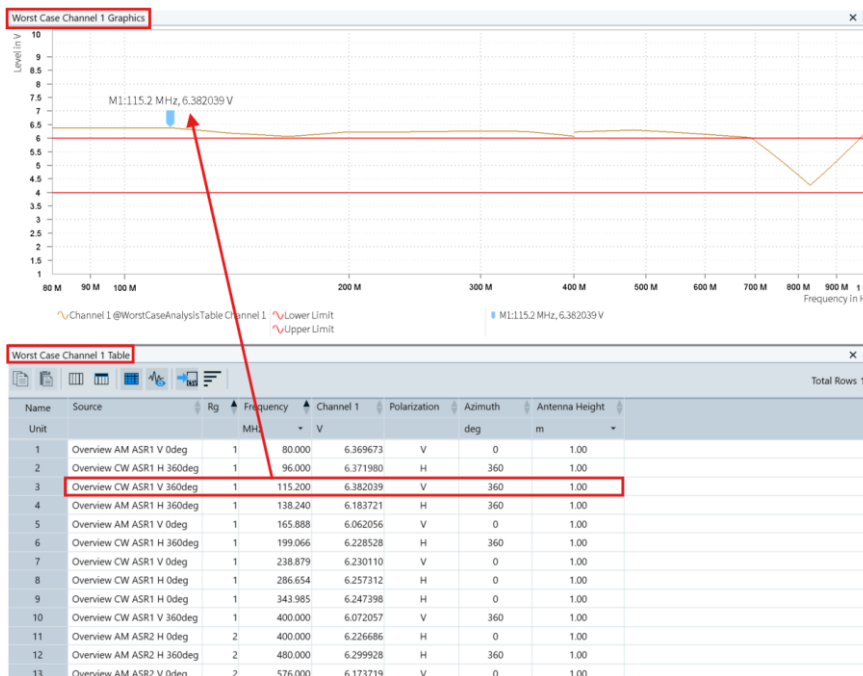


Figure 40 Graphics and tables showing the worst-case analysis.

## 5.2 Overview measurement results combined over accessory positions

Figure 41 shows the data evaluation settings in template with options to combine measurement results over accessory positions.

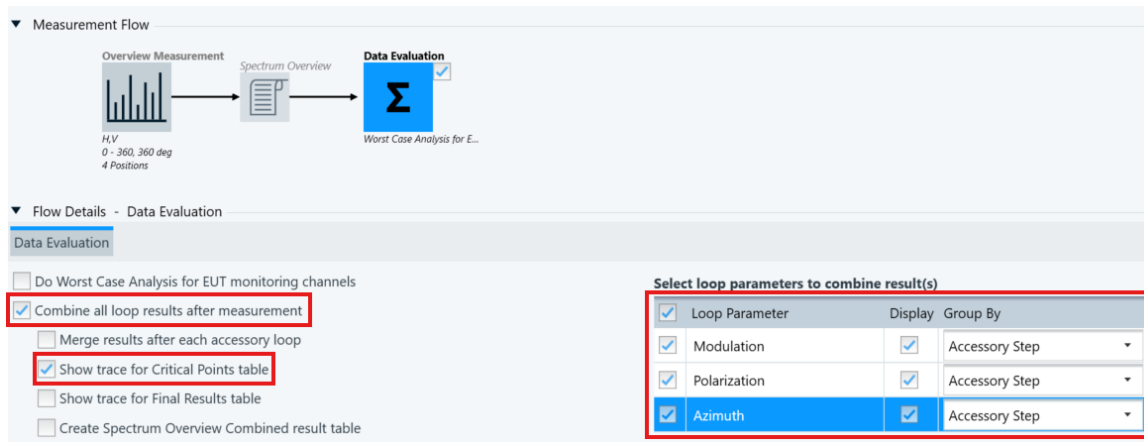


Figure 41 Data evaluation settings with measurement results combined over accessory positions.

The user should refer to Figure 34 - Figure 37 for the measurement, accessory & monitoring settings that determine the graphics and tables generated described in this section.

Figure 42 shows the graphics generated from combining measurement results over accessory positions under the Accessory Graphics folder.

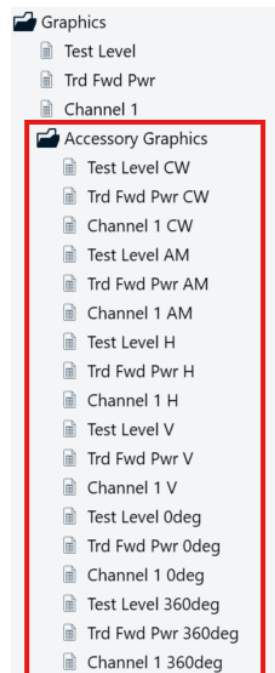


Figure 42 Graphics in TCE with measurement results combined over accessory steps.

Figure 43 shows the tables generated from combining measurement results over accessory positions, stored in the Merged Results folder, with a separate subfolder for each accessory type.

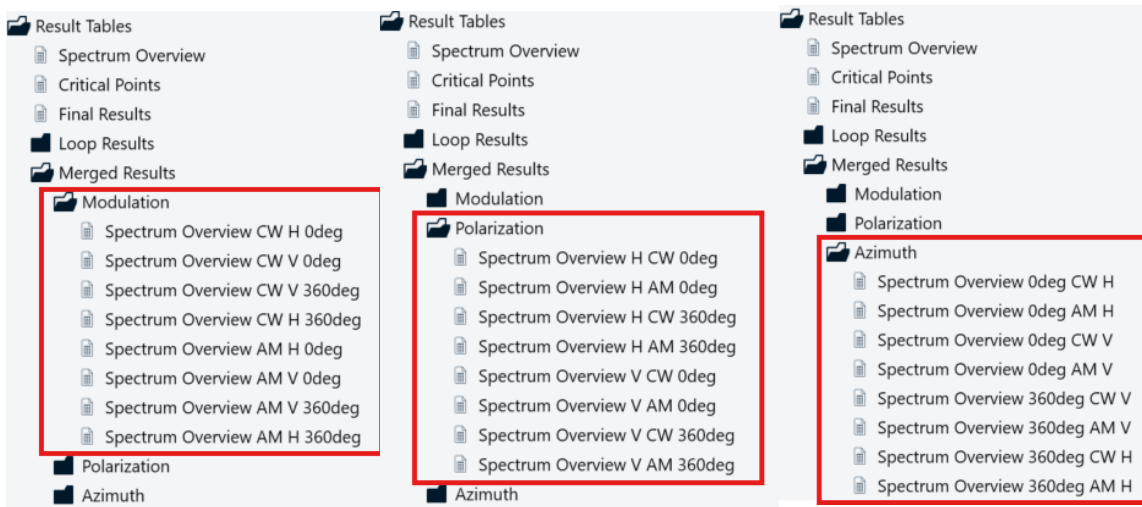


Figure 43 Tables in TCE with measurement results combined over accessory steps.

Figure 44 shows the test levels for CW modulation, with traces corresponding to different accessory combinations involving CW modulation. The source table for each trace can be found in the Modulation subfolder shown in Figure 44. Also, points from Critical table associated with CW modulation are shown as Show trace from Critical Points table option (see Figure 41).

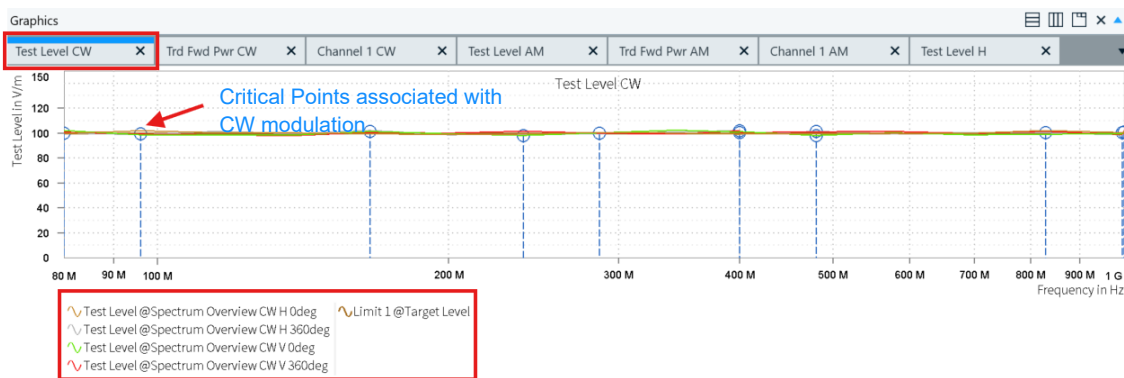


Figure 44 Test level for CW modulation for grouping based on accessory position.

## 5.3 Overview measurement results combined over accessory types

Figure 45 shows the data evaluation settings in template with options to combine measurement results over accessory positions.

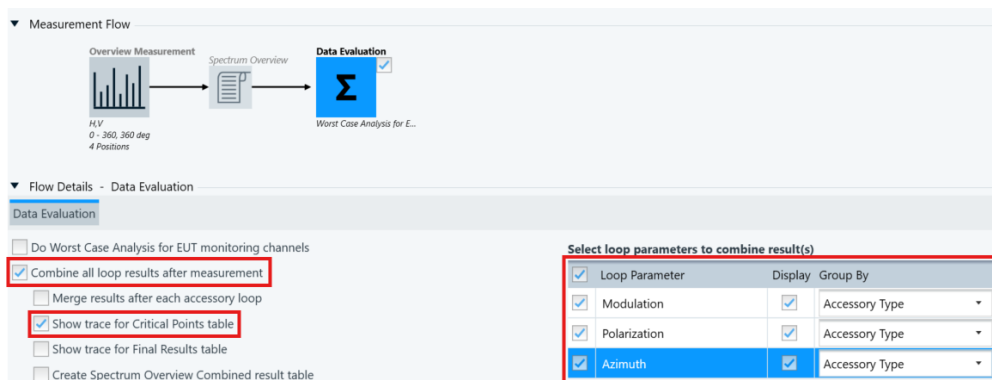


Figure 45 Data evaluation settings with measurement results combined over accessory types.

The user should refer to Figure 34 - Figure 37 for the measurement, accessory & monitoring settings that determine the graphics and tables generated described in this section.

Figure 46 shows the graphics generated from combining measurement results over accessory types under the Accessory Graphics folder.

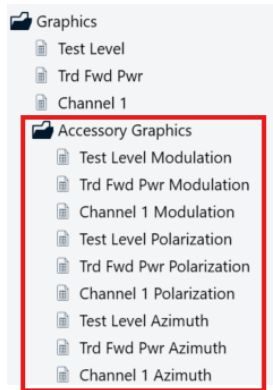


Figure 46 Graphics in TCE with measurement results combined over accessory types.

Figure 47 shows the tables generated from combining measurement results over accessory types, stored in the Merged Results folder, with a separate subfolder for each accessory type. From Figure 43 and Figure 47, we can see the tables generated for accessory positions and types are identical.

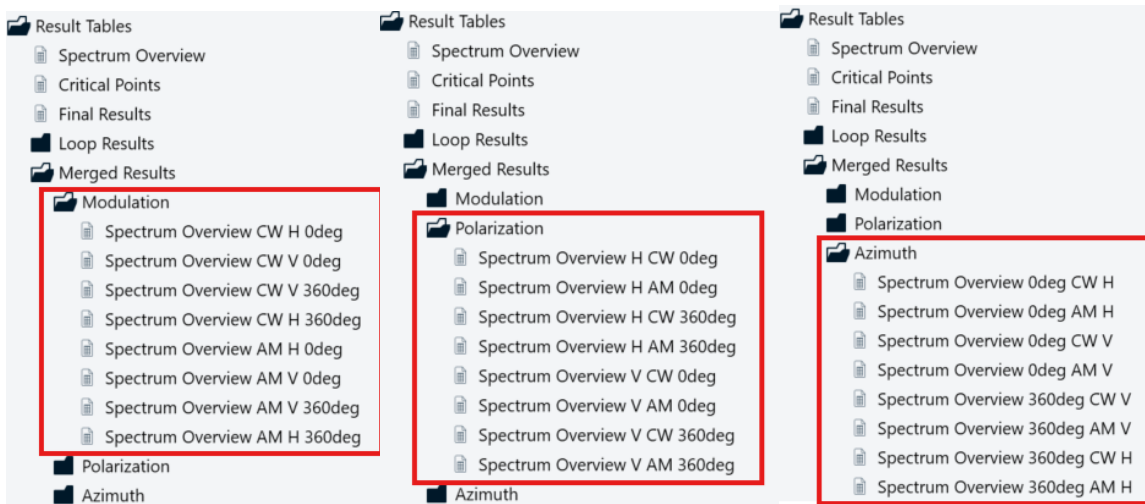


Figure 47 Tables in TCE with measurement results combined over accessory types.

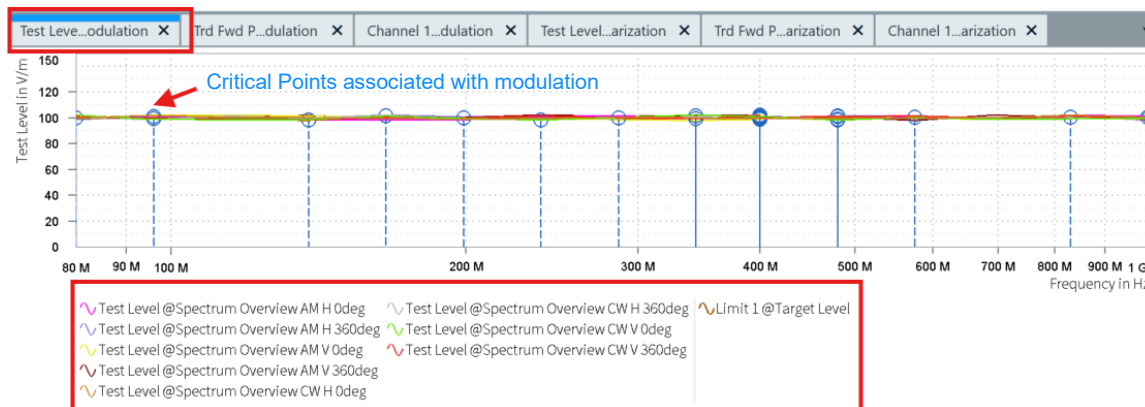


Figure 48 Test level for modulation for grouping based on accessory type.

Figure 48 shows the test levels for modulation, with traces corresponding to different accessory combinations involving all modulation types. The source table for each trace can be found in the Modulation subfolder shown in Figure 47. Also, all points from Critical table (every accessory combination will involve a modulation) are shown as Show trace from Critical Points table option is enabled (see Figure 41).

### 5.4 Overview measurement results over different accessory combinations

Figure 45 shows the data evaluation settings in template with options to combine measurement results over accessory positions. Use this setting carefully, as it may produce an extensive number of charts.

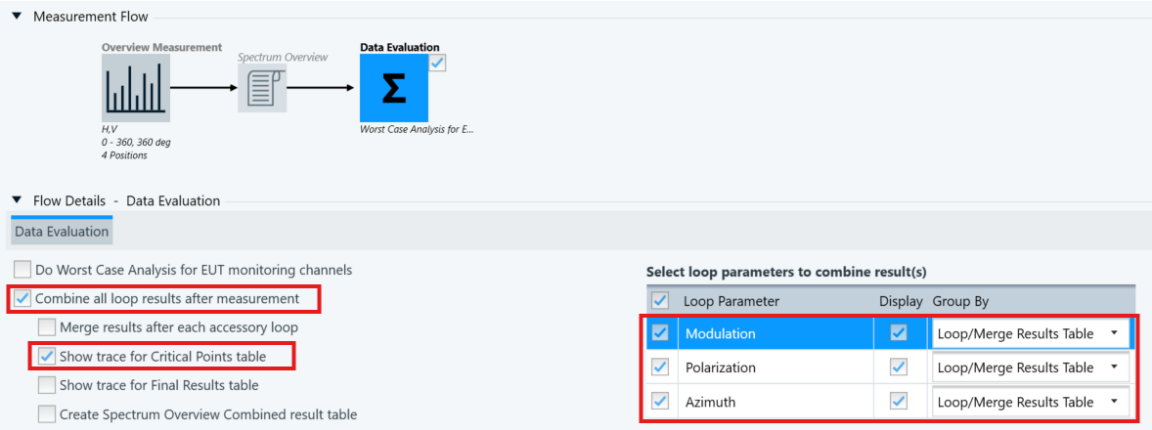


Figure 49 Data evaluation settings with measurement results over different accessory combinations.

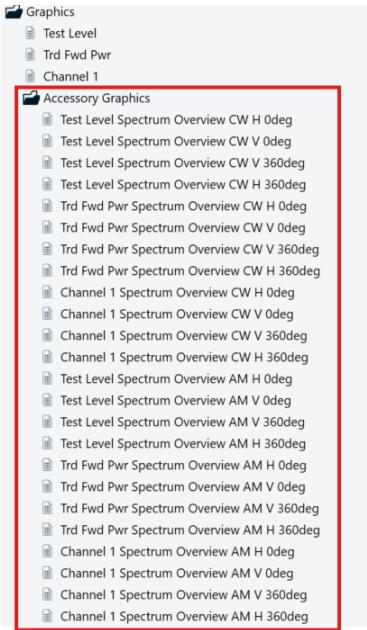


Figure 50 Graphics in TCE with measurement results over different accessory combinations.

The tables generated are the same as shown in Figure 47.

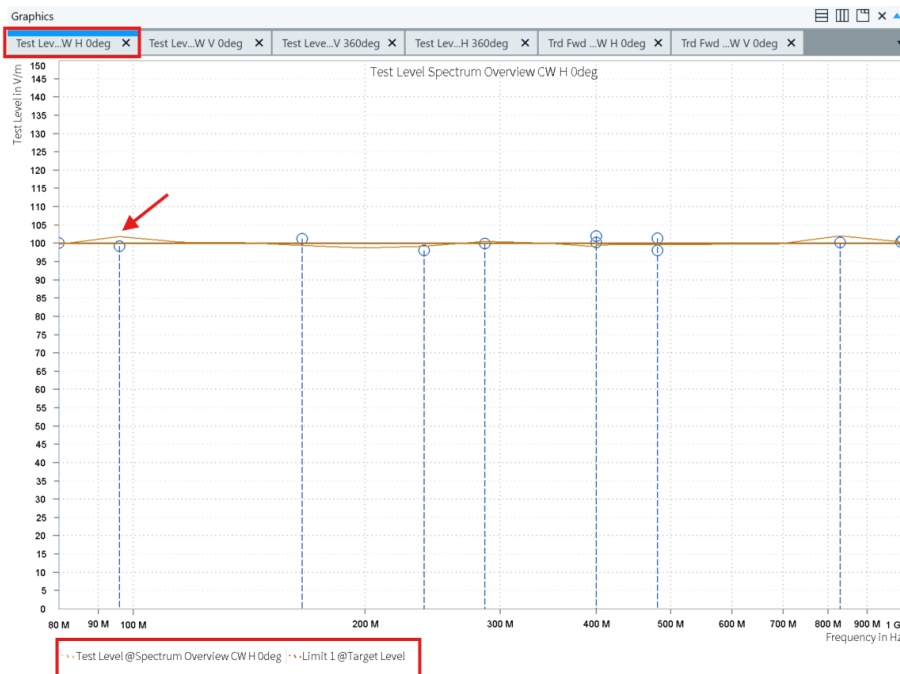


Figure 51 Test level for a specific accessory combination.

Figure 51 shows the test levels for a specific accessory combination indicated in the trace name. The source table for each trace is shown in Figure 47. Also, all points from Critical table associated with this specific accessory combination are shown as Show trace from Critical Points table option is enabled (see Figure 41).

## 5.5 Combined overview result table enabled

Figure 52 shows the data evaluation settings in template with options to combine measurement results over accessory positions.

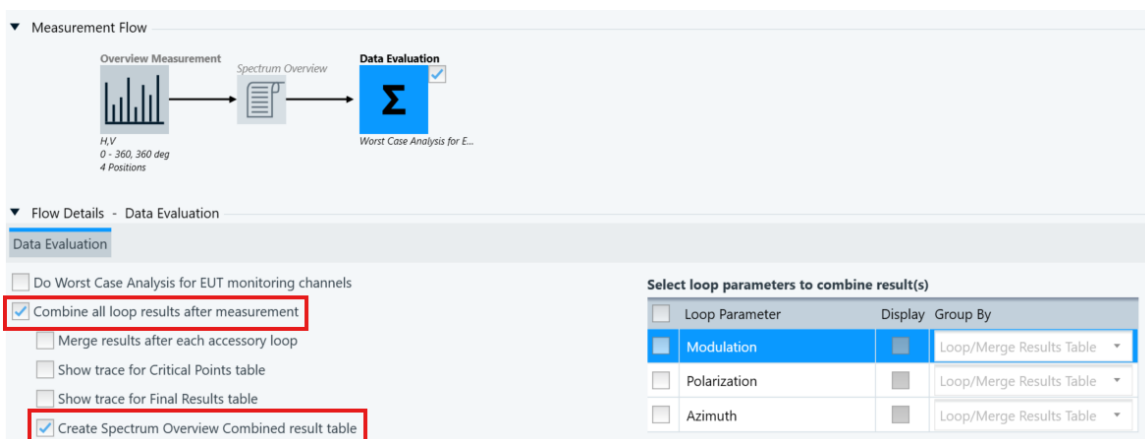


Figure 52 Data evaluation settings with options to combine measurement results.

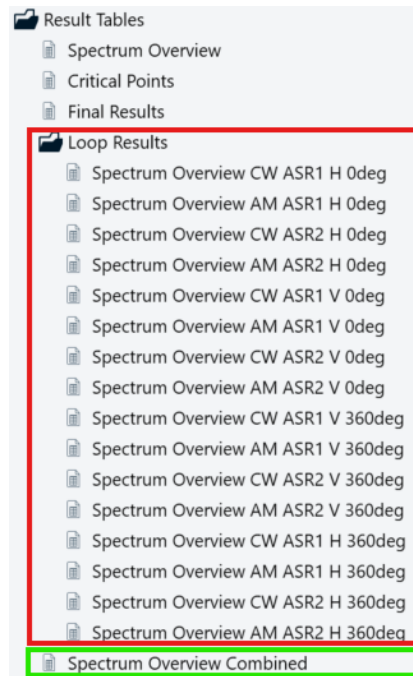


Figure 53 Combined spectrum overview table in TCE.

Figure 53 shows the combined spectrum overview table derived by merging data from all tables under the Loop Results folder.

## 6 Reference documents

- [1] [Measurements in Reverberation Chamber with R&S® ELEKTRA](#)

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