

Step by Step Guide R&S®ELEKTRA

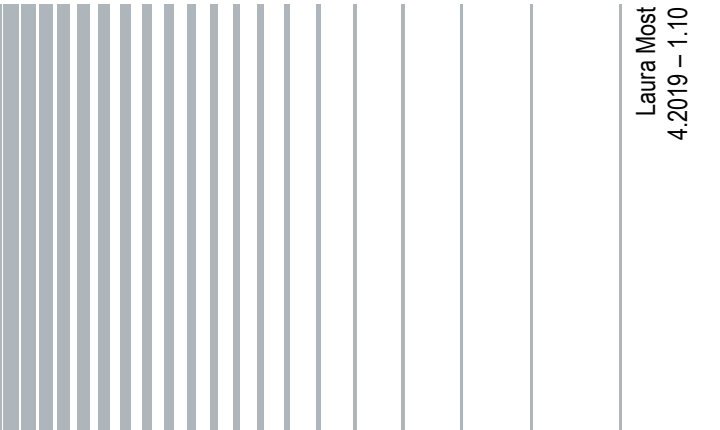


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1 Introduction

1.1 Learning Outcome

The objective of this document is to give all new customers of R&S®ELEKTRA a short overview of its functionality, the user interface and its correct usage.

Indispensable presupposition for this training is the knowledge of EMC basics.

After successful completing of this step-by-step guide they are perfectly acquainted with all general settings and are able to conduct EMS and EMI test measurements as well as generating final reports.

1.2 Disclaimer

The hardware setup used in this test example is modified in order to speed up the test run.

2 Installation

2.1 Installation of R&S®ELEKTRA

- Save ELEKTRASetup_Vx.xx.x.exe to desktop
- Double click on ELEKTRASetup_Vx.xx.x.exe to run the installation wizard
 - Click “Yes” if user account control pops up
- Select “License terms and condition” to read the terms and condition
- Select “Accept and Install” to proceed to installation
 - Alternatively, select “I agree to the License terms and conditions”
 - Click on “Install”
- Wait while the installation wizard executes the installation

If an ELEKTRA version was previously installed, a dialog will appear where you should select “Install clean database” for new installation
- Click “Finish” to complete the installation process

2.2 Starting up ELEKTRA

- Connect the dongle with the software license key or full demoverision
Small demoverision (= only ELEMI-E shows up) does not work for this guide!
- Double-click on the “ELEKTRA” icon on the desktop to startup ELEKTRA

At this point, the configuration wizard should appear
- Skip and start using ELEKTRA

2.3 Overview of ELEKTRA Home Screen

- Dashboard – *Provides fast and direct access to all software components*
- EUT – *Creates and manages EUT test plan in advance*

- Test - *are used to measure the electromagnetic compatibility of EUTs. Each test is based on a single Test Template, which must be configured before running the test*
- Test templates - *are used to configure EMC Tests. The software structure shows that a test has one test template, which contains "Hardware Setups" along with "Limit Lines" (or optional power/sensor limitation tables in EMS tests) and user-definable configuration settings*
- Report templates - *Report templates are used for the configuration of the test reports. Report templates contain user-definable settings and can be found in "Tests"*
- Hardware setups - *contain Devices and Signal Paths, as shown in the software structure, along with user-definable configuration settings*
- Device List - *comprises all measuring equipment on the test site*
- Table – *consists e.g. of limit lines, frequency list and transducer correction tables*
- Tools – *offers import, export options as well as the configuration wizard and the unit converter*
- Administration – *is for backups and settings*

2.4 License Activation

- Go to “Administration” -> General Settings and check setting “Allow device simulation” in demo mode you cannot uncheck
- And click on “safe” in order to adapt these changes
This step allows the simulation of measurement equipment, as in our test setup we have no devices connected
- View available license by selecting “Administration” > “License Management” -> “Manage Licenses”
- Ensure the licenses are all checked

2.5 Import of Predefined Measurement Configurations

- View all selectable libraries at “Tools” > “Configuration Wizard”
- In order to conduct a EN55014 (CISPR14) as we want to in this example, first deselect all other standards and only keep the “EN 55014 Household Appliances” at “radiated emissions testing: Templates and Limits”

All required/ referenced components get included automatically (e.g. limit lines)

- Click “Finish & Execute” to extract the default selection libraries
- Wait for the wizard to finish the installation

3 EUT Test Plan

3.1 EUT Configuration

EMC32's structure was bottom-up only, ELEKTRA can whereas be used in various ways

- Go to "EUTs" and create a new EUT by clicking on the plus sign at the bottom
- Rename it "Hairdryer 3000"
- Set the EUT to "Active" in order to link all test results to this EUT
- Click on the "Save" Button
- In the dialogue box check the "Add to Dashboard" box to add a tile for easy access on the dashboard and select save

Additional information like attachments can be added at "General Information" -> "Attachments"

User tags can be added to describe your EUT and simplify the search for it

- Type in "hairdryer" at "User Tags" and add it by clicking the "+" sign and save

3.2 Test Template Creation

- Select "Test Templates"
- Click on the funnel icon right next to the search bar to filter the result list
- Select "EMI", "radiated" and "30MHz – 1GHz"
- And finally select "EN 55014 E Field SAC 3m QP" and open by double clicking or clicking the pencil icon– as we want to conduct a CISPR14 radiated emissions test in a semi-anechoic chamber at a 3 meter distance with a quasi-peak detector

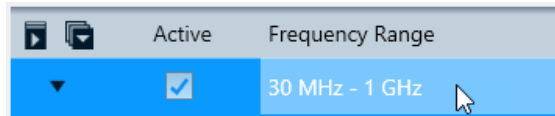
3.3 Setup of Test Template

Test template shows the measurement flow

- To complete the "General Settings" (at the top) please open the tab "Setup" and verify and set the parameters ...
- "Level Range (Graphics)" = -20 to 80 dB μ V/m
- for "Default Report Template" set to "EMI Report Template" which creates just a sample of a basic report

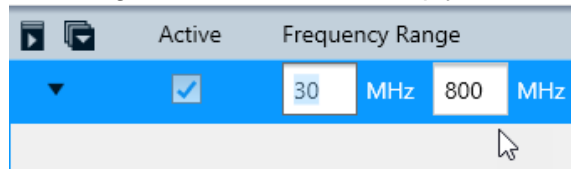
Now you can collapse the section "General Settings" to have the complete picture of each step in the "Measurement Flow"

- You can edit the test template e.g. you can change the frequency range → simply click on the Range display under flow details



If you want to edit the range values, click in the upper frequency field

- Type in the number and the first letter of the unit, e.g. if it was 1 GHz and you need to change to 800 MHz then simply enter "800M" and



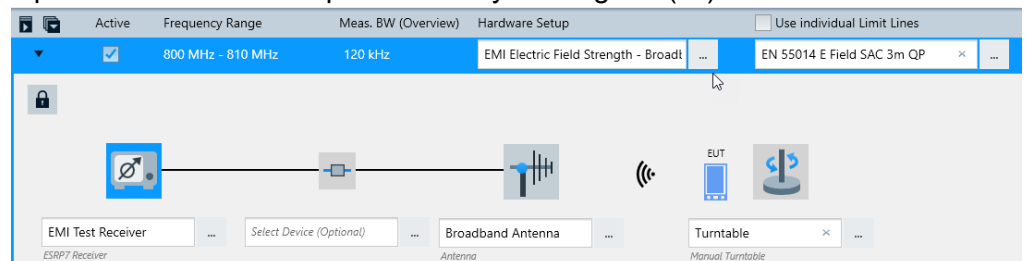
press "Enter"

3.4 Hardware Setup

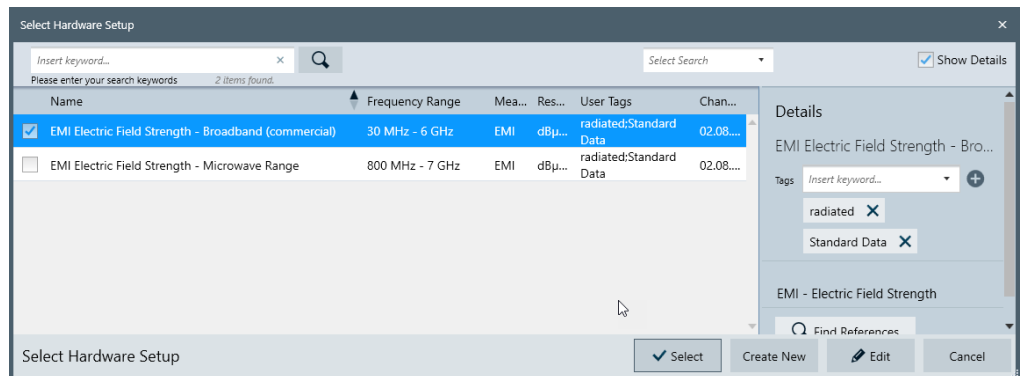
The hardware set-up used, is described in CISPR14. We do have an antenna on a mast with a receiver connected and the EUT on a turntable

Within the "Test Template" there is already a default hardware setup selected. Now we could either modify the default hardware setup – or create a new hardware setup

- Open the hardware setup selection by clicking the (...) button

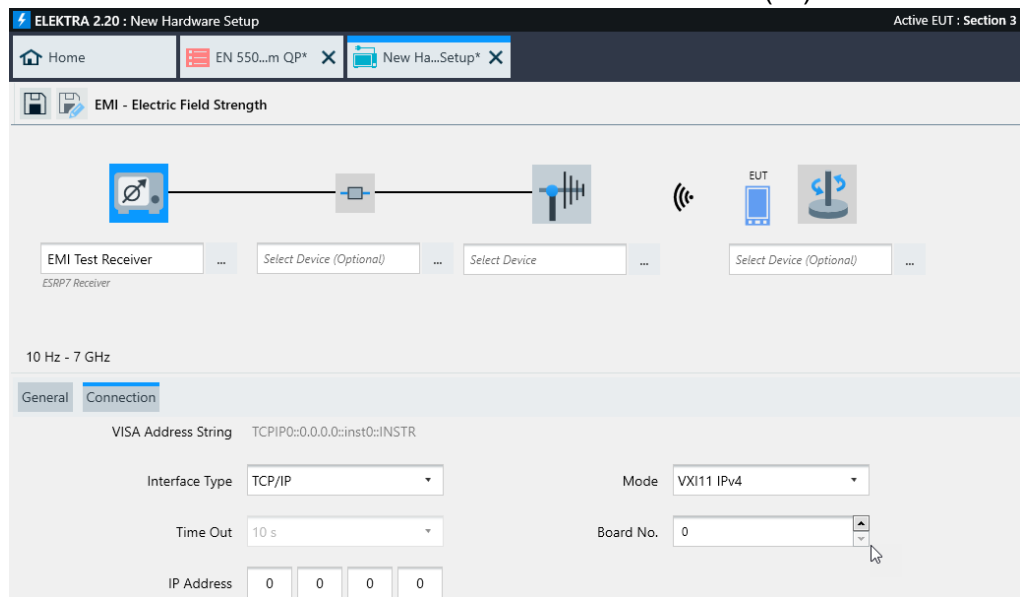


- Click on "Create New" to open up a new "EMI Electric Field Strength" hardware setup



The next step is assigning parameters to the form

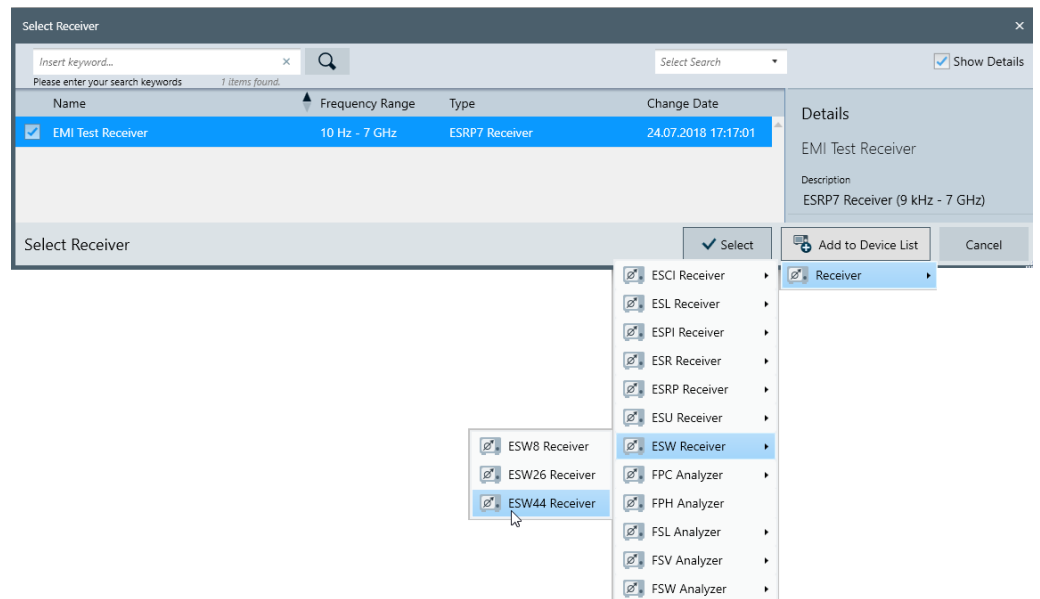
- Start with the Test Receiver and click the selection button (...)



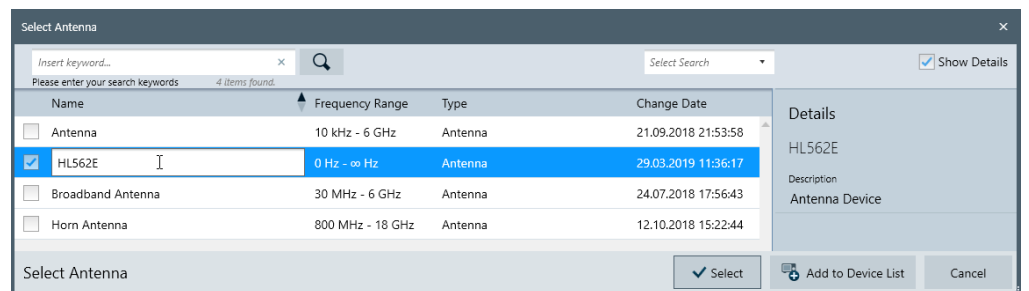
You can Select the Test Receiver from existing default device list – or add a new instrument to the device list

In this example you will create a new device

- Click on "Add to Device List"
- Select "Receiver" -> "ESW Receiver" -> "ESW44 Receiver"
- Select and Rename it by clicking on the name and type in „ESW44“



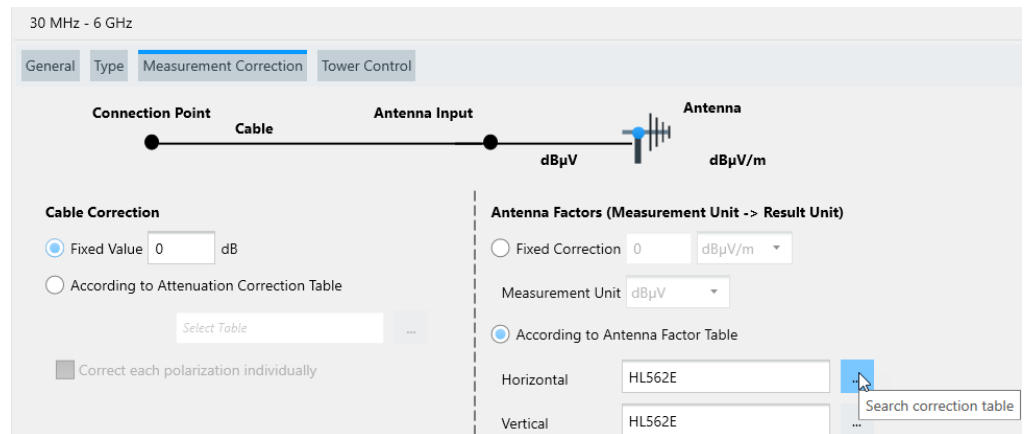
- Save the receiver settings by clicking “Select”
- In the next step, we will specify the Antenna, therefore please click selection button [...] in the Select Antenna panel we can choose among items, which are already available or click "Add to Device List" and then select a new antenna
- create a new Antenna and click on the name again and change the designation to "HL562E"
- simply complete editing and leave the panel with button "Select"



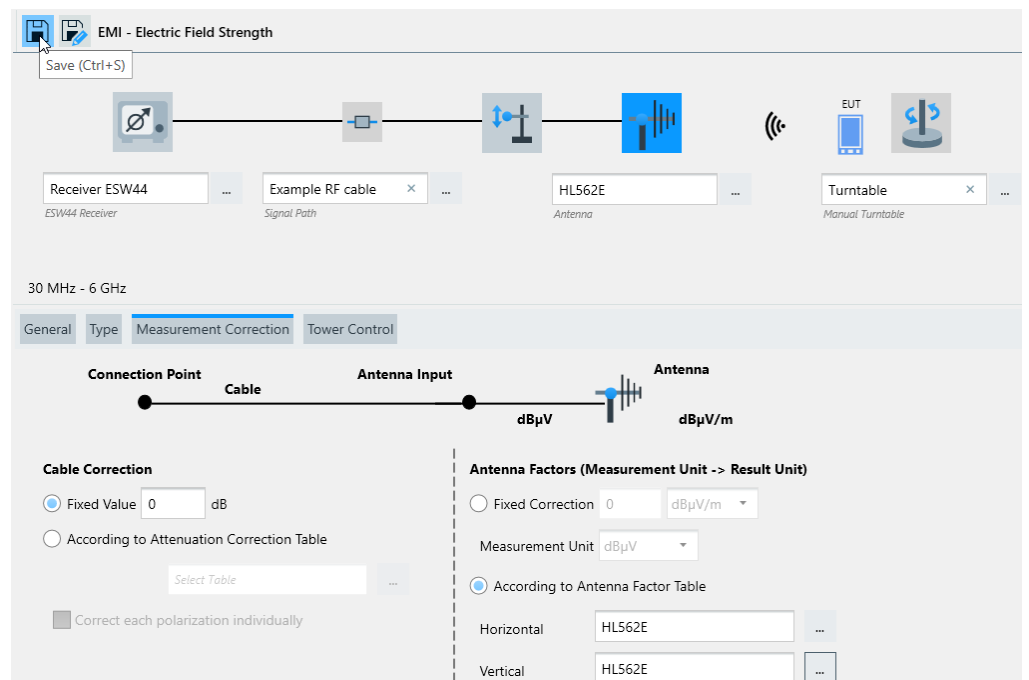
- We use the antenna for receiving only, for that we go to „type“ and select „receiving antenna“
- For the antenna we need to add more specific data – most important is the "Measurement Correction" which you may select among the tabs below

The corresponding tables for horizontal and vertical antenna factors are available by default

- Now we select the transducer correction tables for the antenna

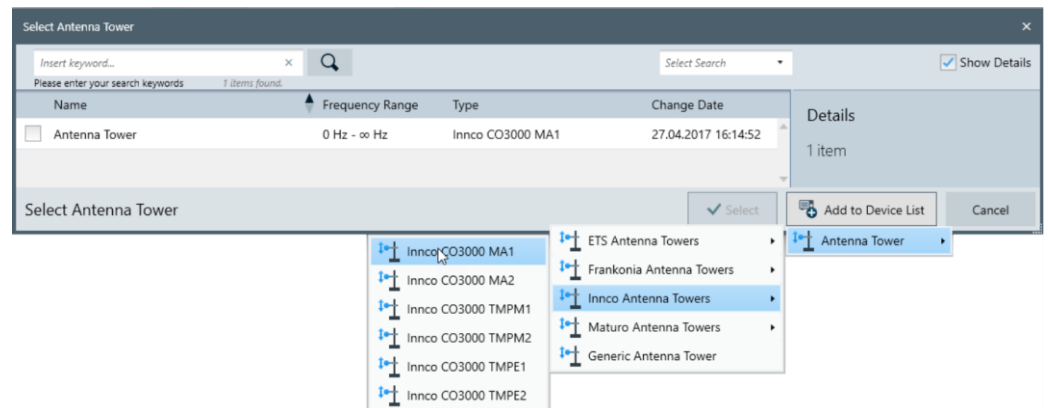


- Click on the icon "Save" → this is by the way an important action to validate all parameters which have been entered and are made effective by saving
- We rename the hardware setup „EMI radiated“



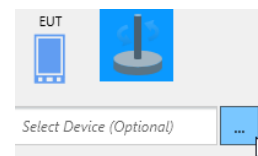
- Click again on the Antenna icon; now select the tab "Tower Control"
- Then configure the "height control"
The configuration shall comprise an "Automatic Tower"
- Search for an Antenna Tower in the Device List by clicking on the selection button [...]
- With "Add to Device List" you can choose among a remarkable number of devices, just by expanding the related Buttons "Antenna Tower" → for this example: Incco Antenna Towers → "Incco CO3000 MA1"

device – which shall be used for automatic height and polarization control



- Make the same selection for the "Polarization Control" and choose the existing device;

Do not use "Add to device list" at this stage!

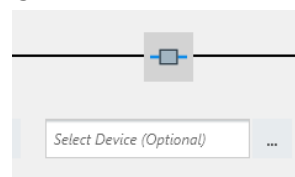


Proceed with selecting the turntable

- Click on "Add to Device List" → "Turntable" → "Innco Turntables" → and finally select "Innco CO3000 DT1" and confirm the selection with button "Select"

Now we add data to the signal path from Antenna to Test Receiver, therefore

- Click on the selection button (...) below the signal path



- Click on "Add to Device List" -> "Signal Path" -> "Signal Path"

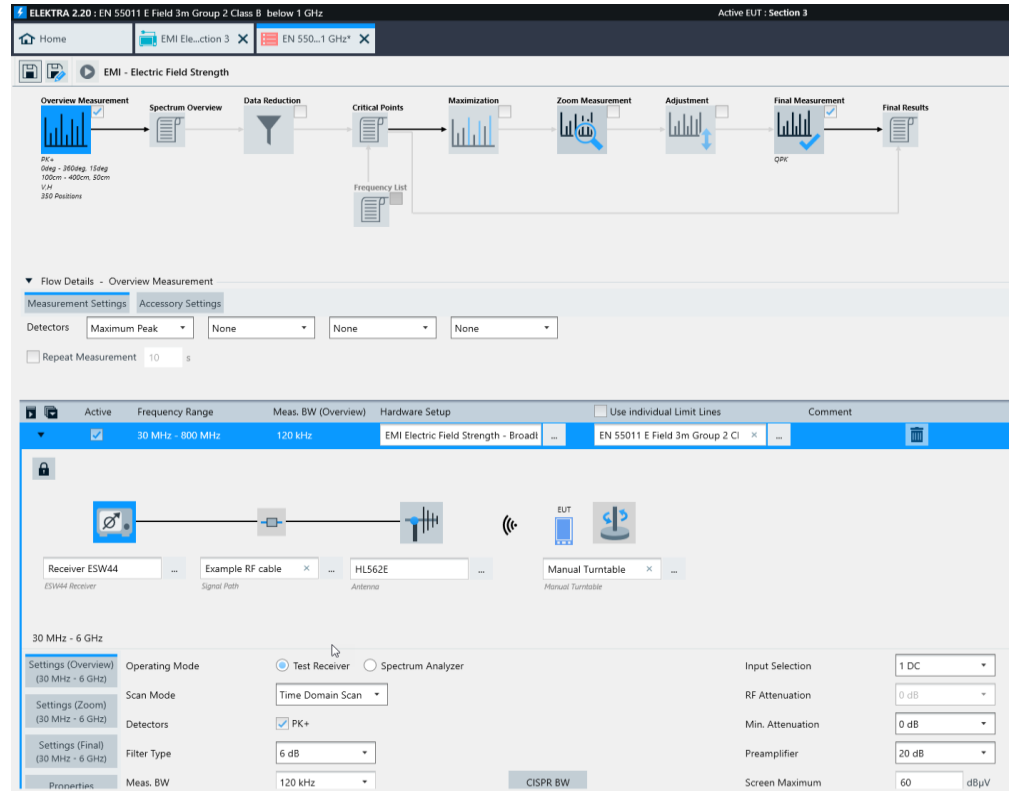
We simplify the attenuation of the signal path and instead of an attenuation table insert a constant 1 dB attenuation

- Save the Hardware Setup and go back to the test template

All parameters for deployment have to be saved, and are then effective for deployment – after this ELEKTRA will give you a hint that the item is reloaded to give confidence to your continuing workflow

The next step would be the selecting of limit lines which in our case are already preselected according to the standard

- Now scroll the "Test Template" to evaluate and visualize the "Measurement Flow" and the corresponding "Flow Details" comprising the "Measurement Settings"



According to the standard we perform the following measuring steps, overview, data reduction, zoom, adjustment and final measurement

- Ensure the measurement steps are activated by clicking the check boxes

When you edit a hardware setup from a test template you first need to unlock the setup. This is vital in order to prevent unintended changes to the hardware setup, as a hardware setup can be used for various test templates

- Change the time/ point to 5ms

Within "Properties" you would add connection details for the instruments if you had physical hardware

- For "Overview Measurement" → "Measurement Settings" → set one Detectors to "Maximum Peak"

In order to simplify the demonstration, we use larger stepsize for the antenna tower and the turntable to guarantee a faster test run

- in the tab "Accessory Settings" → "Loop Parameter" "Azimuth" → to range 0 – 180 degrees at 90 degree stepsize and Positioning Speed of 8

Active	Priority	Loop Parameter	Mode	Range	Step Size	Parameters
<input checked="" type="checkbox"/>	1	Azimuth	Stepped	0 deg - 180 deg	90 deg	Positioning Speed : 8

- Set the height stepping from 1 m to 2 m at 1 m step size and positioning speed to 8
- click below to deselect vertical polarization for this first overview measurement

Active	Priority	Loop Parameter	Mode	Range	Step Size	Parameters
<input checked="" type="checkbox"/>	2	Height	Stepped	1 m - 2 m	1 m	Positioning Speed : 7
<input checked="" type="checkbox"/>	3	Polarization	Stepped	<input checked="" type="checkbox"/> H <input type="checkbox"/> V		

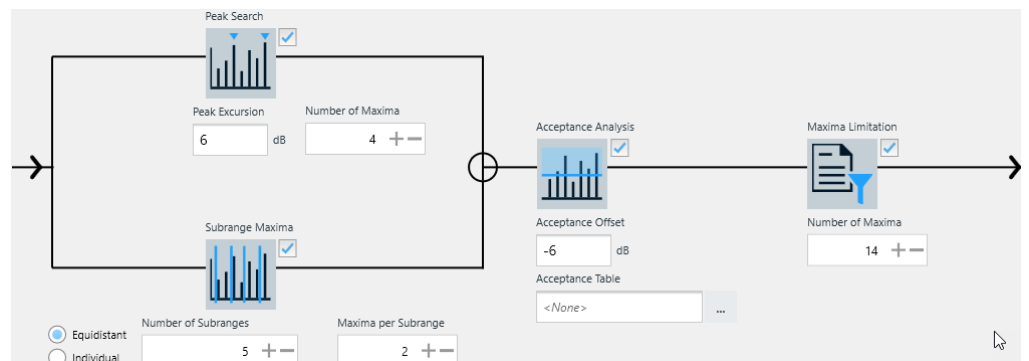
- Click on "Data Reduction"

The methods for determining the critical points is defined in the specific standard and we modify the parameters as follows:

- Leave the "Peak Excursion" at 6 dB and reduce the "Number of Maxima" to 4 "Number of Subranges" is set to 5 and we keep the number of "Maxima per Subrange" with 2

This combination of Peak Search and Subrange Maxima will look for the 4 worst peaks getting close less than 6 dB to the limit line and will further examine the frequency range in slices of 5 subranges and determine 2 local maxima for each subrange

- In total we will get no more than 14 Maxima from this setup – so we change the parameter "Maxima Limitation" to 14



"Zoom Measurement" is an important step to increase measurement accuracy of our critical frequencies

- Select "Zoom Measurement" and within tab "Zoom Settings" set "Number of Measurement Bandwidths" to 10
- Click on "Adjustment" and in the tab "Measurement Settings" set the detector to "Maximum Peak"

- In the tab "Adjustment Range" make sure you select "Adjustment with predefined Range" and set ranges of "Azimuth" to 30 deg and "Height" to 1m

Active	Priority	Loop Parameter	Mode	Range
<input type="checkbox"/>	1	Azimuth	Continuous	30 deg
<input checked="" type="checkbox"/>	2	Height	Continuous	1m m

- Select "Final Measurement" and set the detector to quasi-peak
- Save the Test Template

3.5 Creating a Report Template

Before we finally start our test run, we have the opportunity to create a test report template which is needed for generating the final report

A report can be added as the „Default Report Template“ which can be found under „General Settings“ -> “Setup” of the open Test template

ELEKTRA 2.10 : EN 55011 E Field 3m Group 2 Class B below 1 GHz

Home | EN 550... 1 GHz

EMI - Electric Field Strength

General Settings

Setup | Limit Lines

Audio Demodulation Type: OFF

Level Range (Graphics): -20 - 60 dBµV/m

Default Report Template: General Report

Measurement Flow

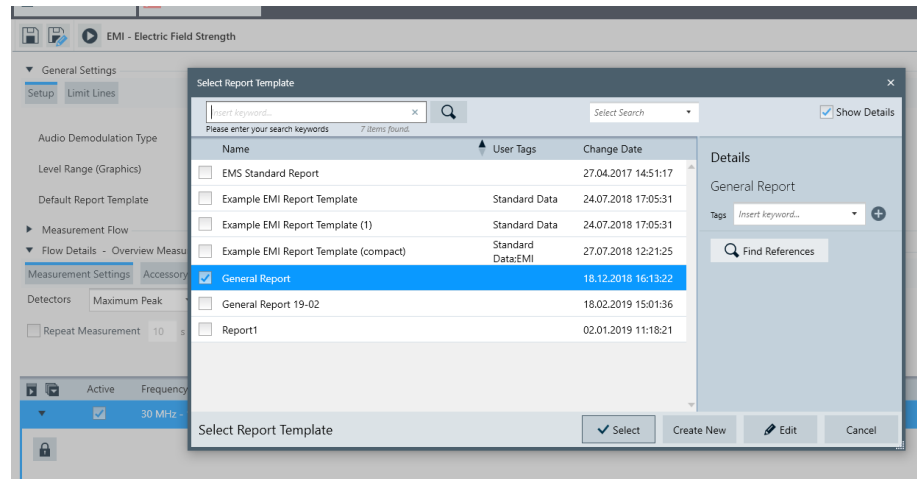
Flow Details - Overview Measurement

Measurement Settings | Accessory Settings

Detectors: Maximum Peak | None | None

Repeat Measurement: 10 s

- Click on the selection button; Here you choose between „Create new“ or „Edit“ in order to switch to the report template section of ELEKTRA
- Select the Default Report Template and click on “edit”



Now you have the possibility to change the information within the report such as the title, header and the footer

Starting with the header, you can expand submenus in order to change what you want to see at the left, center and right of your report

- Change the left header to „version“, the center header to „test name“ and the right header to „logo“

General

Report Title

▼ Header

Left

Center

Right

► Footer

▼ Available Components

- EMI Graphics (+)
- EMI Test Template (+)
- EMI Tables (+)
- Generic Graphics (+)
- Generic Table (+)
- Test Information (+)
- Text (+)
- Image / Photo (+)

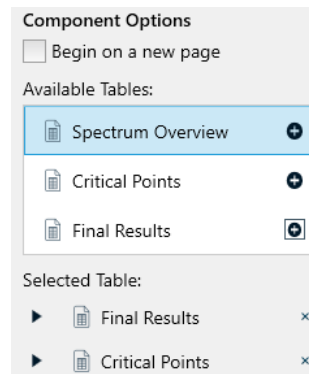
► Selected Components

You can now repeat the same process with the footer of your report by simply clicking on „footer“ below the „header“ menu on the left side

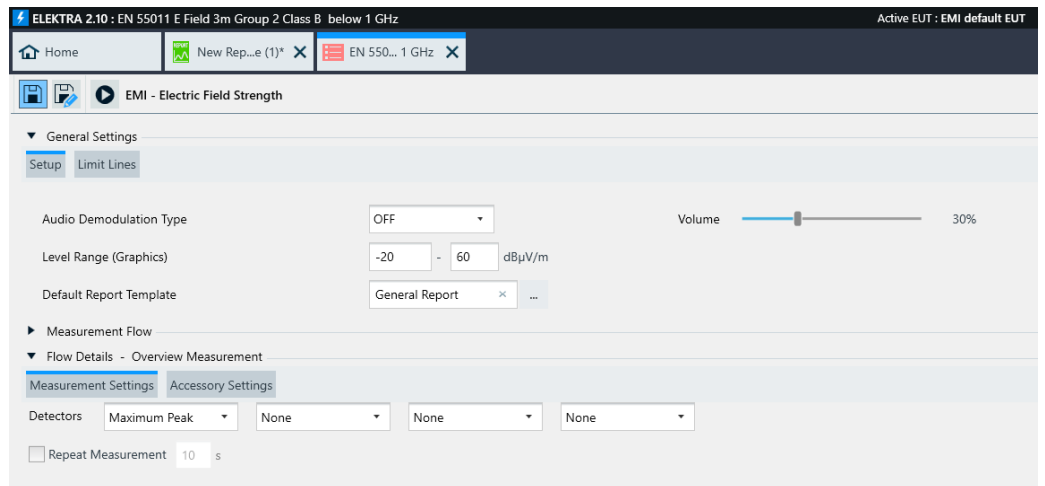
- After finishing this formal preparations we can select the data we want to see in our final report by clicking „Available Components“, which can be found again below the header and footer information
- Add „EUT Information“ by clicking on the plus sign in order to include the information about the equipment that was tested

The default report is already configured to include „EMI Graphics“ and „EMI Tables“

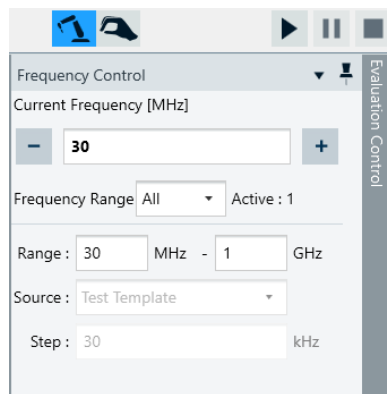
- Additionally add „EMI Test Template“ and „EMI Hardware Setup“ as information to the report
- Select „EMI Tables“ in the “Selected Components” area; the „component options“ opens up where you can click the plus sign to add “critical points”



- You have now finished the report settings and can save the report as (click “Save as”) „Hairdryer Report“
- Now go back to the test template and confirm the changes
- After saving the test template, you can move forward to the last step. In order to start the test you need to click on the „Create test from template” / Play button at the top left side

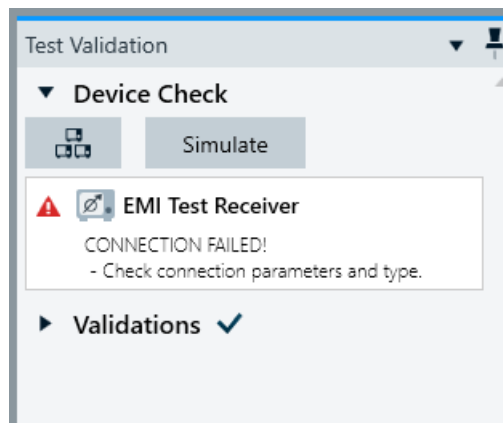


- You can choose between interactive and automated test run in our case we select “automated” and start the measurement by clicking the start button

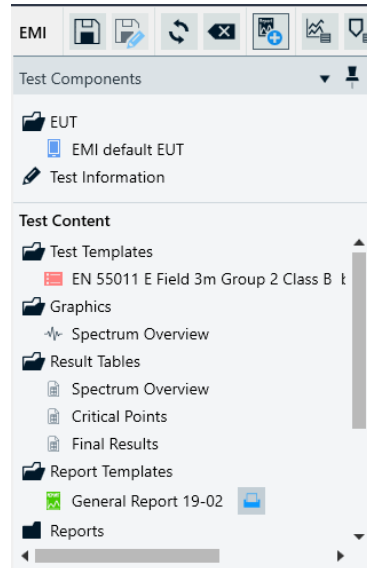


ELEKTRA will then validate the hardware setup as well as the test template

- As there are currently no devices connected, you can simply simulate the devices by clicking the „Simulate“ button that pops up after the validation has been done



- When the test run has been completed, we first save our completed test and then the final test report can be generated by clicking „Add report“



- Go back to the active EUT „hairdryer 3000“

The generated test is also saved in the EUT test plan which can be found at the EUT test plan tab

In order to plan further tests for this EUT you can add test categories, like a conducted test e.g. and configure this test in advance

The status of all planned EUT tests is shown in the test plan and from here a summary report can be generated

4 Summary

This Step-by-Step Guide demonstrated how to create, configure and run an EMI radiated test with the help of ELEKTRA. In addition to that, the preparation of a final test report, was shown.

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries.

The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

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Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- Longevity and optimized total cost of ownership



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