

Dual Receiver Measurement Application Note

Products:

- R&S®EMC32
- R&S®EMC32-K27

This application note shows all necessary settings for performing Dual Receiver Measurement using the R&S®EMC32-K27 option via R&S® EMC32 Measurement Software.

Note:

Please find the most up-to-date version of this document on our homepage
<https://www.rohde-schwarz.com/appnote/1SP20>

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1 Overview

This document describes the functionalities for R&S®EMC32-K27 option in R&S®EMC32 platform that have to be done to support the Dual Receiver Measurement.

The R&S®EMC32 software offers the following applications:

- Provide control for instruments (RF antenna, antenna mast, turntable, spectrum analyzer, network analyzer, EMI receiver)
- Perform reference level testing of system and measurement protocol as recommended by test standard
- Perform EUT Test and Measurement automatically
- Evaluate and display real-time value of the measurement
- Generate report

The R&S®EMC32-K27 option requires R&S®EMC32-EB Main Option (EMI Scan & Sweep Templates) and R&S®EMC32-K10 option (EMI Auto Test).

The following abbreviation are use in the following text:

- R&S®EMC32 software is referred to as EMC32
- R&S®EMC32-EB software option is referred to as EMC32-EB
- R&S®EMC32-K10 software option is referred to as EMC32-K10
- R&S®EMC32-K27 software option is referred to as EMC32-K27
- Dual Receiver Measurement is referred to as DRM
- Equipment under test is referred to as EUT
- Radio frequency is referred to as RF
- Electromagnetic interference is referred to as EMI
- Electromagnetic susceptibility is referred to as EMS
- Rohde & Schwarz GmbH & Co. KG is referred to as R&S®

2 Introduction

DRM setup in the chamber includes both horizontal and vertical antenna polarization mounted on individual masts, with respective EMI receivers connected and EUT on the turntable. EMI Auto Test measurement is then used to control both antennas simultaneously, thus reducing measurement time. EMC32 software is used.

Refer to the general block diagram below on the setup for DRM system.

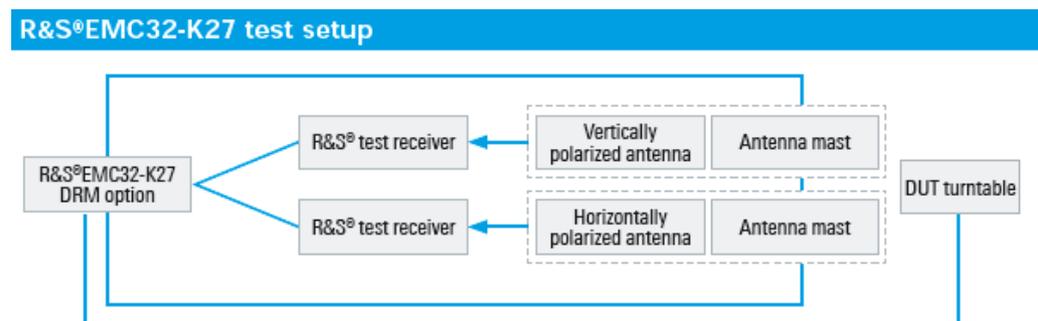


Fig. 2-1: Typical DRM system

The system above consists of the following:

- Two EMI receivers or spectrum analyzers of the same model for receiving signal from respective antennas
- Two Antennas for receiving signal at respective antenna masts
- Two Antenna Masts for height movement of respective antennas
- Turntable for respective antennas to receive the signal 360° from DUT

3 Test Configuration

Before performing DRM measurements in EMC32, setup the test configuration as described in the following sections:

- Instrumentation
- Naming Convention for DRM devices
- Special Configuration for DRM devices
- Hardware Setup
- DRM Mode
- Instrument placement in DRM Mode

3.1 Instrumentation

Refer to EMC32 "Online Help" by pressing "F1". In Online Help, select the **Index** tab, search for "Device list" to show a detailed description on setting up the instruments.

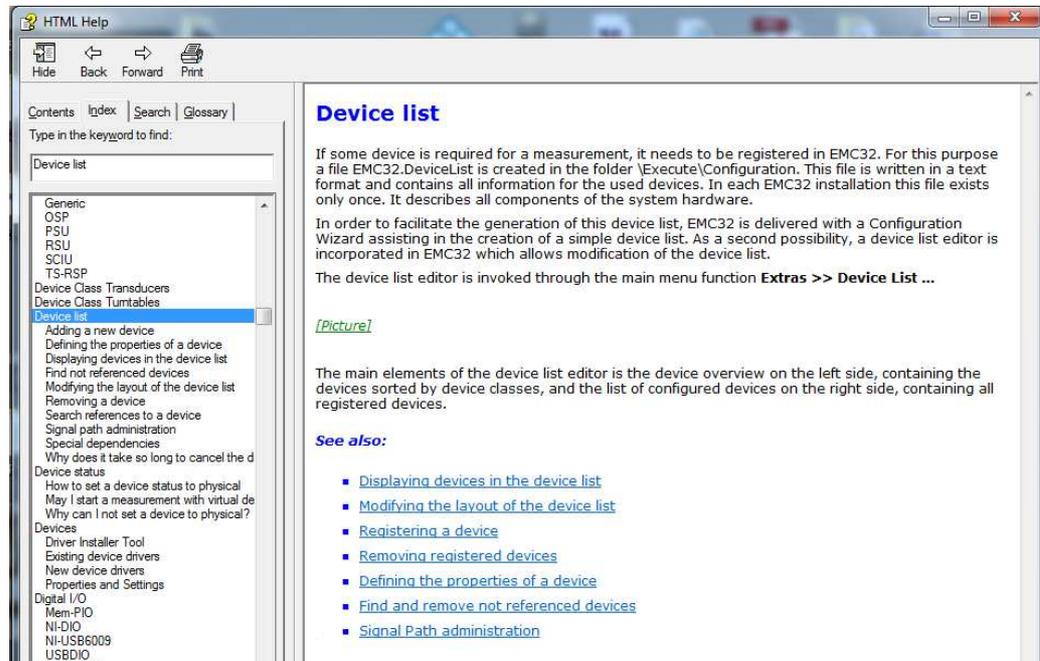


Fig. 3-1: Online help for device list

EMC32 supports a wide range of receiver & spectrum analyzer models, antenna, antenna mast controller, and turntable controller.

In DRM, the following seven devices are required:

- 2x Antennas Device of any Antenna type,
- 2x Antenna Towers Device of any Mast type,
- 2x Receivers or Spectrum Analyzer Device of any receiver / spectrum analyzer type but **both have to be the same model** and
- Turntables Device of any Turntable type.

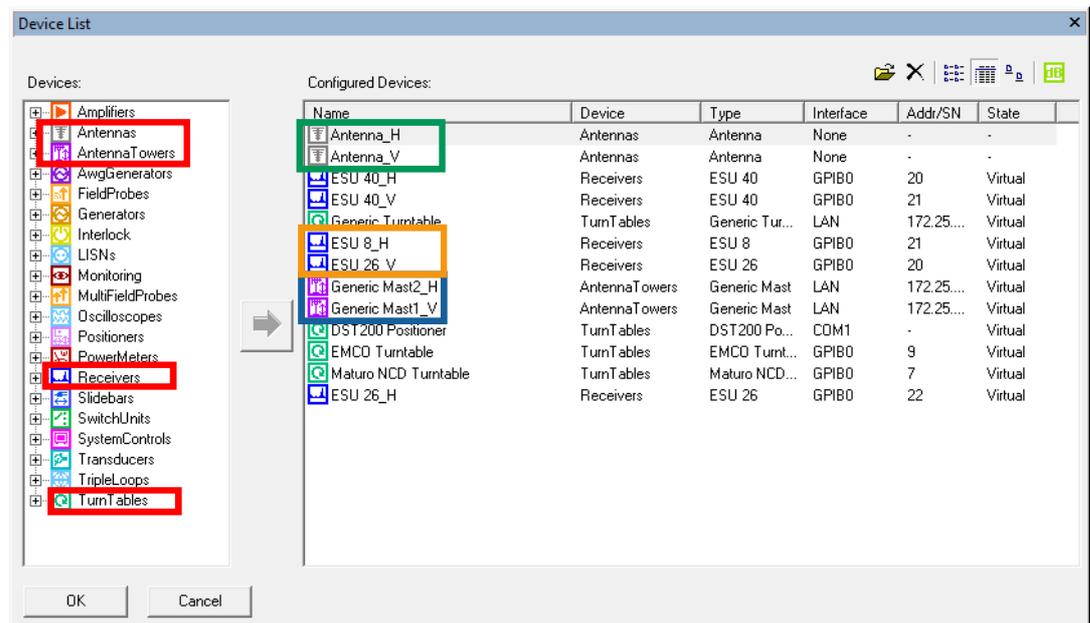


Fig. 3-2: Device list dialog box

3.2 Naming Convention for DRM devices

It is recommend to practice following while configuring DRM in EMC32 as to have clarity on the actual device been physical.

- ▶ Antenna - name the antenna with fixed polarization to be configured as that polarization. As show in Fig. 4-2 in green box.
- ▶ Antenna Towers - Name the antenna tower with fixed polarization that to be mount with the antenna of that polarization. As show in Fig. 4-2 in blue box
- ▶ EMI Receiver / Spectrum Analyzer - Name the Receiver or Spectrum Analyzer with fixed polarization that been connected to the antenna of that polarization. As show in Fig. 4-2 in orange box.

3.3 Special Configuration for DRM devices

While setting up following instruments, in DRM, those parameters will affect the measurement result accuracy. Therefore, need to configure the parameter accurately and correctly.

Antenna Tower -

Specify the offset value when actual position of the antenna is not at the starting position (0 deg) of the turntable.

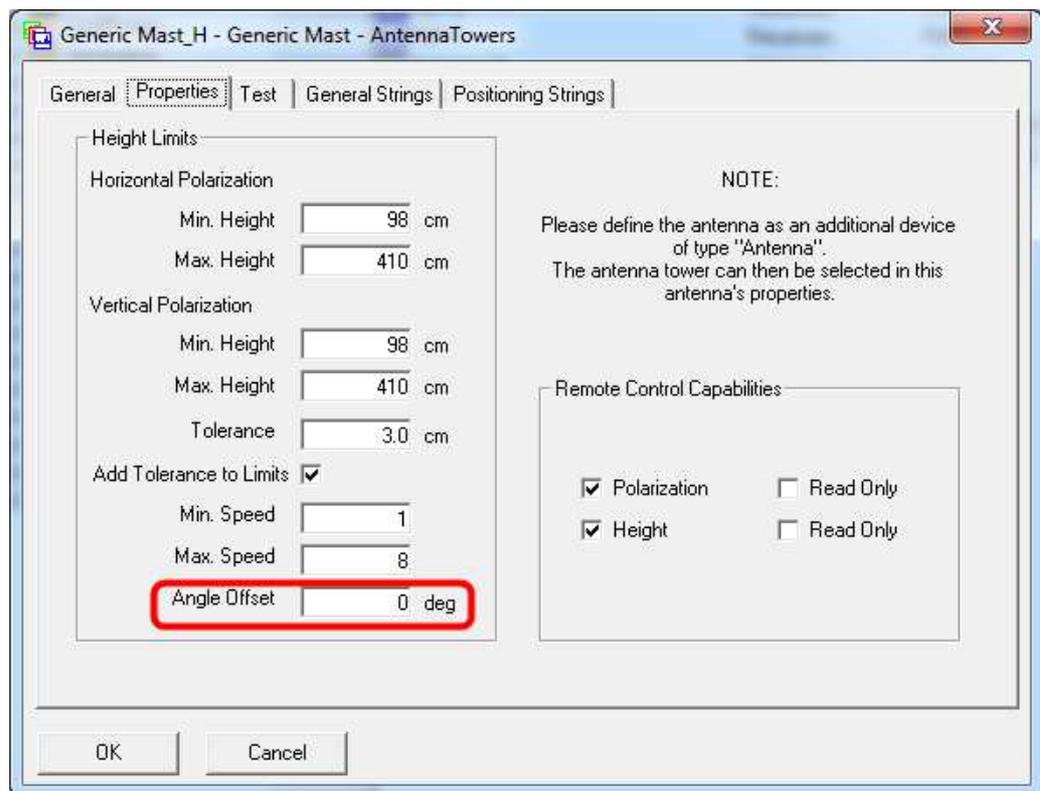


Fig. 3-3: Antenna Towers dialog box

Antenna: -

Select polarization according to naming convention of that antenna.
Only a polarization to be select.

Assign the antenna tower according to naming convention that tie to that antenna polarization.

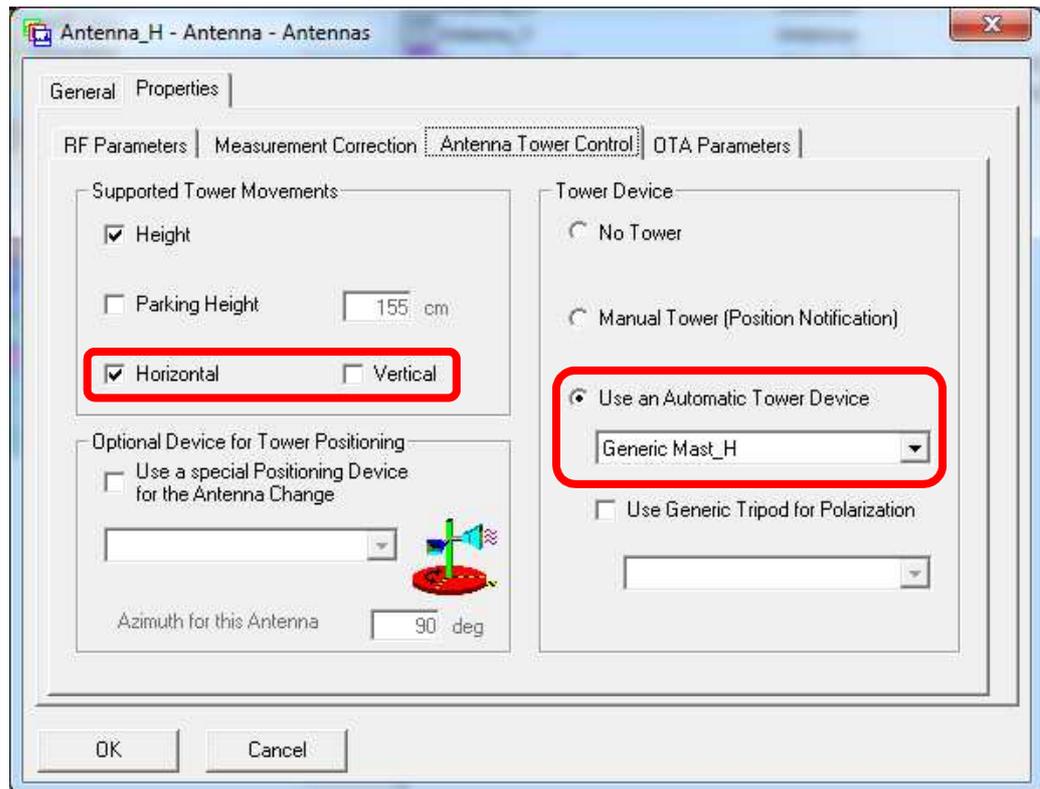


Fig. 3-4: Antenna dialog box

3.4 Hardware Setup

Refer to EMC32 "Online Help" by pressing "F1". In Online Help, select the **Index** tab, search for "Hardware Setup" to show a detailed description on setting up the hardware.

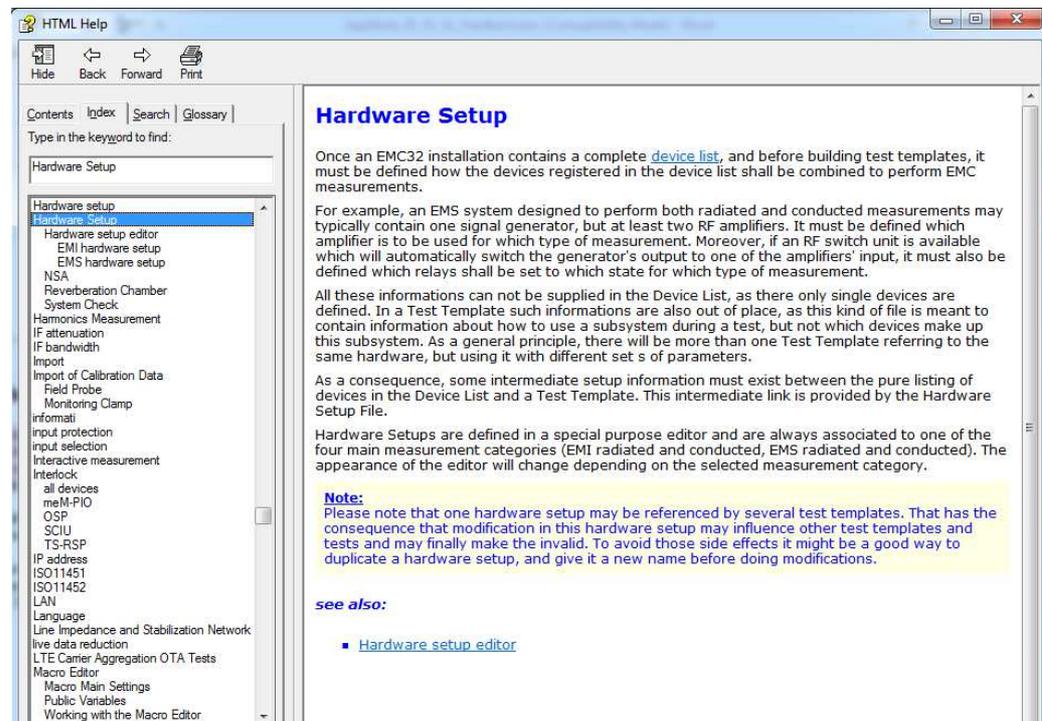


Fig. 3-5: Online help for hardware setup

Hardware setup can be configured for splitting into different frequency subranges to suit different antennas, and receiver & spectrum analyzer models. It is recommended to splitting into different frequency subranges according to the antenna frequency ranges.

A typical DRM system setup consists of two receive antennas, antenna towers, receivers and a turntable (see chapter 2. "Introductions" on page 4).

3.5 DRM Mode

Switch the mode to DRM by check on "Dual Receiver Meas." from "Select the View(s)"

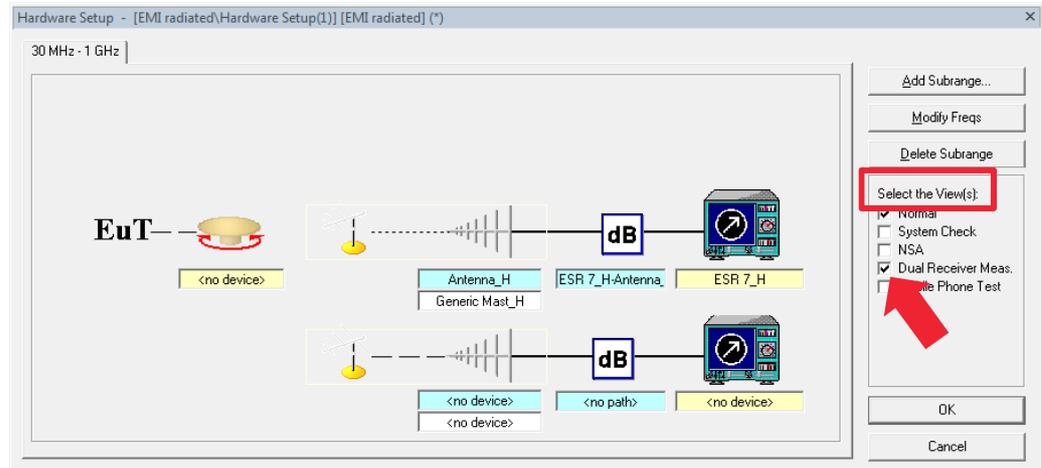


Fig. 3-6: DRM mode in hardware setup

Move the mouse cursor to the receiver icon and right click on the mouse and a range of receivers for selection. (Devices must be added in device list in order to appear here) Than repeat the steps for another receiver.

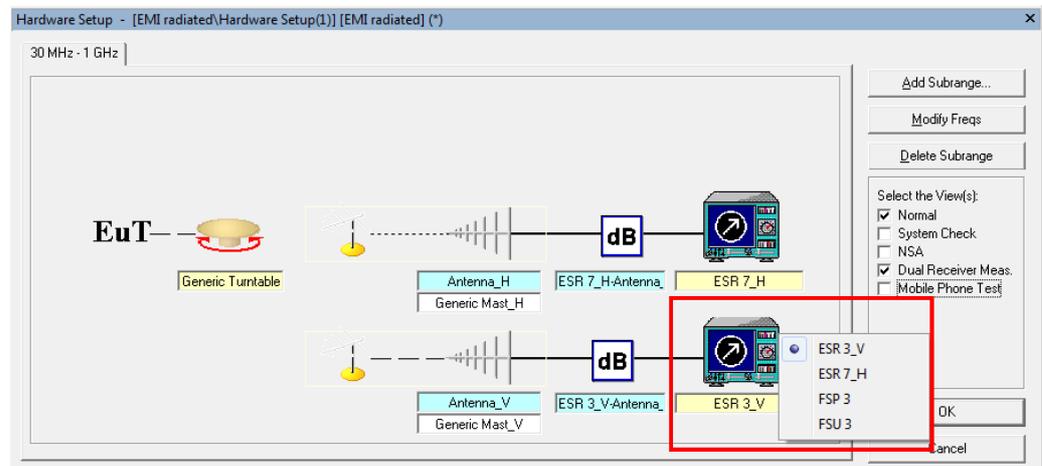


Fig. 3-7: Input device (receiver) in detail

3.6 Instrument placement in DRM Mode

While setting up the hardware, do input the accurate device to respective space provide in the hardware setup as for the software to register the device to be use in this hardware setup. As DRM measurement makes use of both polarizations, **the bottom devices icon MUST be input with vertical polarization devices.**

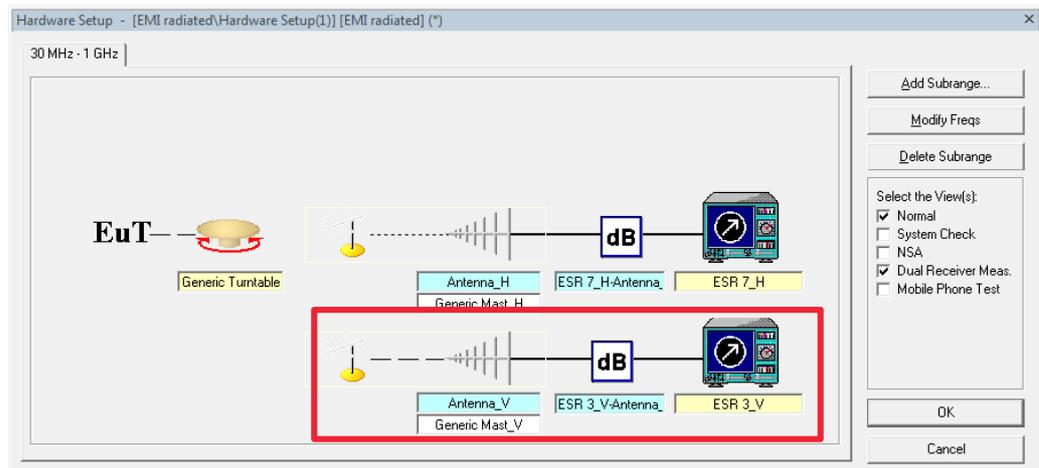


Fig. 3-8: Bottom devices MUST be Vertical polarization device

4 Test Template Configurations

Before performing DRM measurements in EMC32, setup the test template configuration as described in the following sections:

- EMI Scan & Sweep Test Template
- Important parameter configuration for EMI Scan & Sweep Test Template
- EMI Auto Test Template
- EMI Auto Test for DRM

4.1 EMI Scan & Sweep Test Templates

Refer to EMC32 "Online Help" by pressing "F1". In Online Help, select the **Index** tab, search for "EMI Scan/Sweep editor" to show a detailed description on setting up the EMI Scan & Sweep test template.

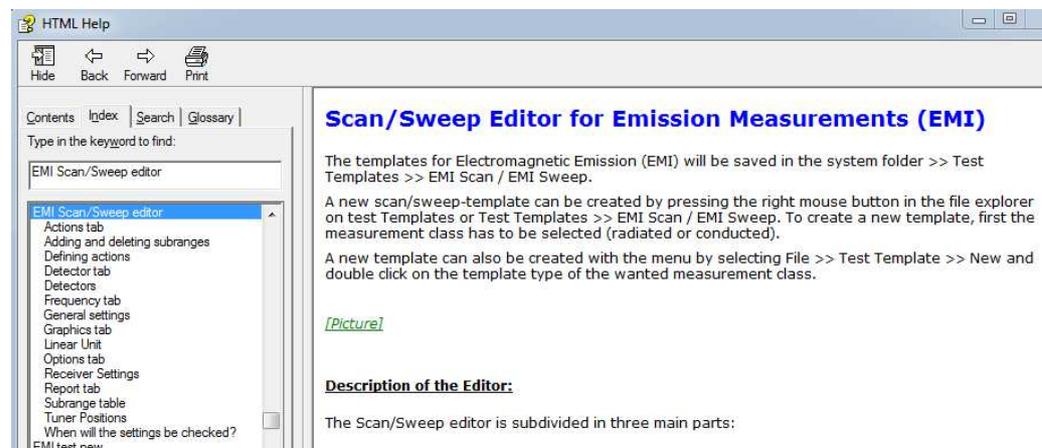


Fig. 4-1: Online help for EMI Scan & Sweep test template

The purpose of scan & sweep test for DRM is to capture interference emitted from EUT and check whether scan / sweep results fulfil the CISPR standard requirement. Those not fulfilling, will be captured in result table for further processing.

4.1.1 Important parameter configuration for EMI Scan & Sweep Test Template

This section describes parameters that need to be set in order to perform DRM.

4.1.1.1 Detector Tab: Selection of Detector

Select the required detector for the test/measurement in this Scan & Sweep test template.

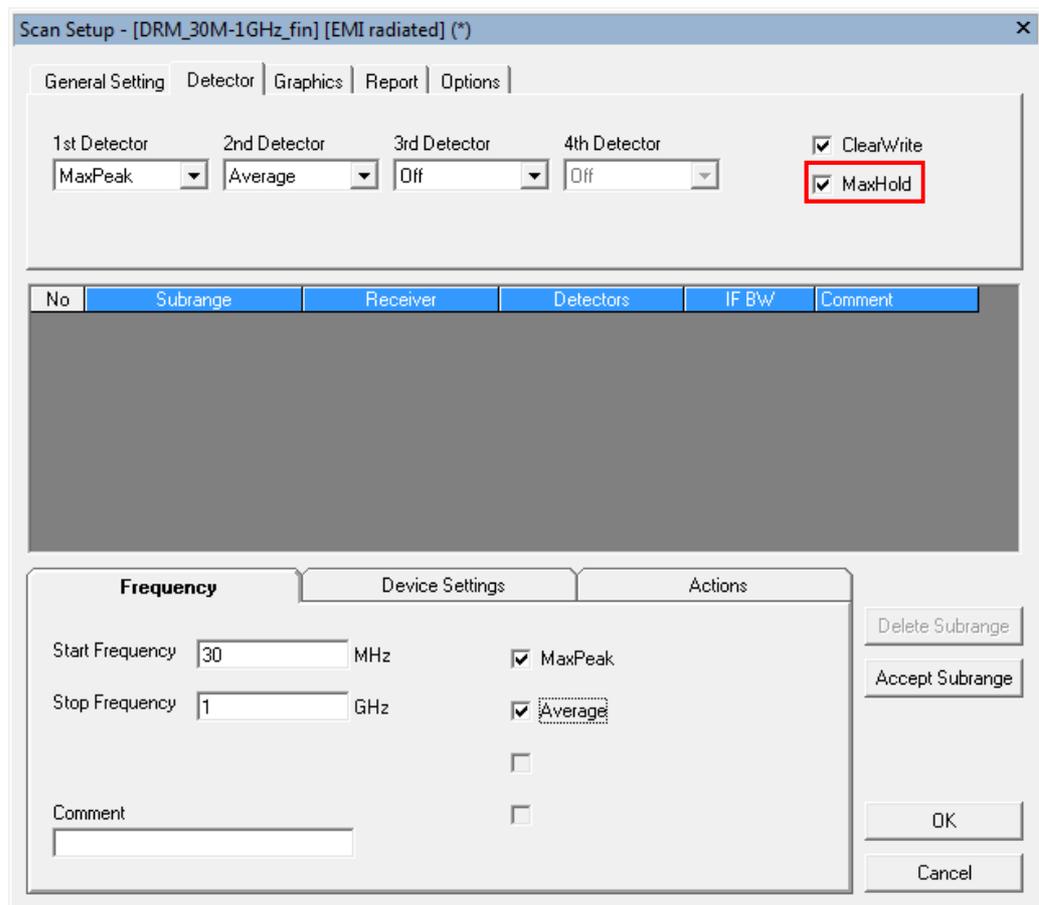


Fig. 4-2: Detector Tab in detail

MaxHold must be checked if continuous turntable is used.

4.1.1.2 Device Settings Tab: Configure the device

Click on the device icon and a dialog box will appear for input by user or according to standard. This device configuration will be tied with the frequency test range.

In DRM, this device configuration will be duplicate to the other EMI receiver of the other polarization.

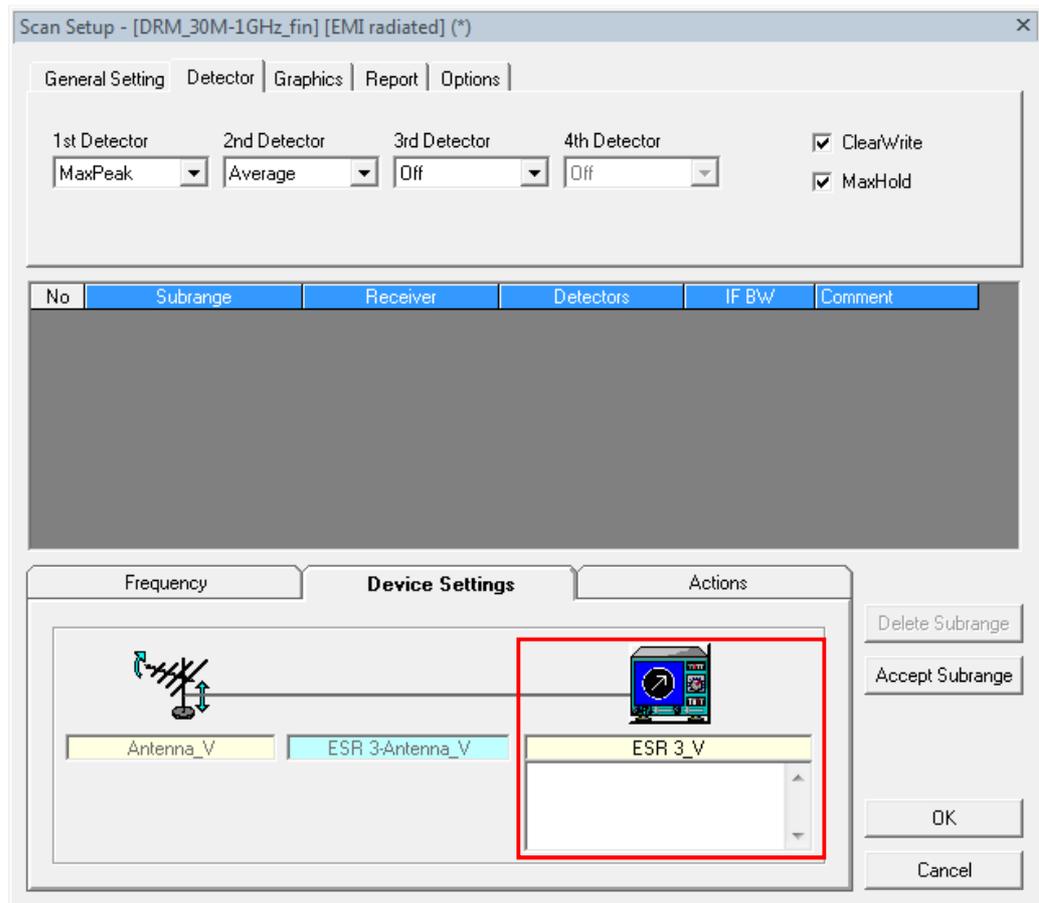


Fig. 4-3: Device Setting Tab in detail

Input all the parameter in this dialog box as per user requirements or as stated in the standard, exclude 'General' tab. Except for 'Input/Repetition' tab on the Repetition section, must click on the 'Single' button.

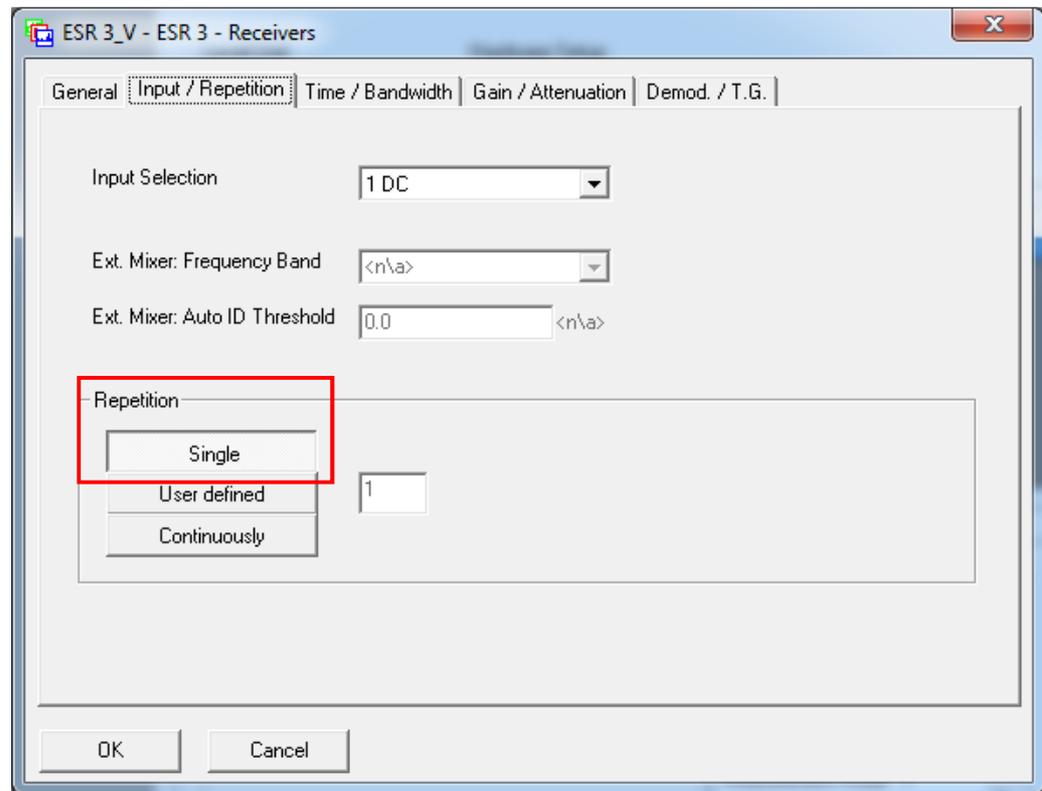


Fig. 4-4: Input / Repetition Tab in detail

If user wishes to have a longer sweeping time, the configuration files of this receiver need to be configured. Please refer to appendix.

4.2 EMI Auto Test Template

Refer to EMC32 "Online Help" by pressing "F1". In Online Help, select the **Index** tab, search for "EMC32-K10" then enter and select "EMI editor for automatic tests" to show a detailed description on setting up the EMI Auto test template.

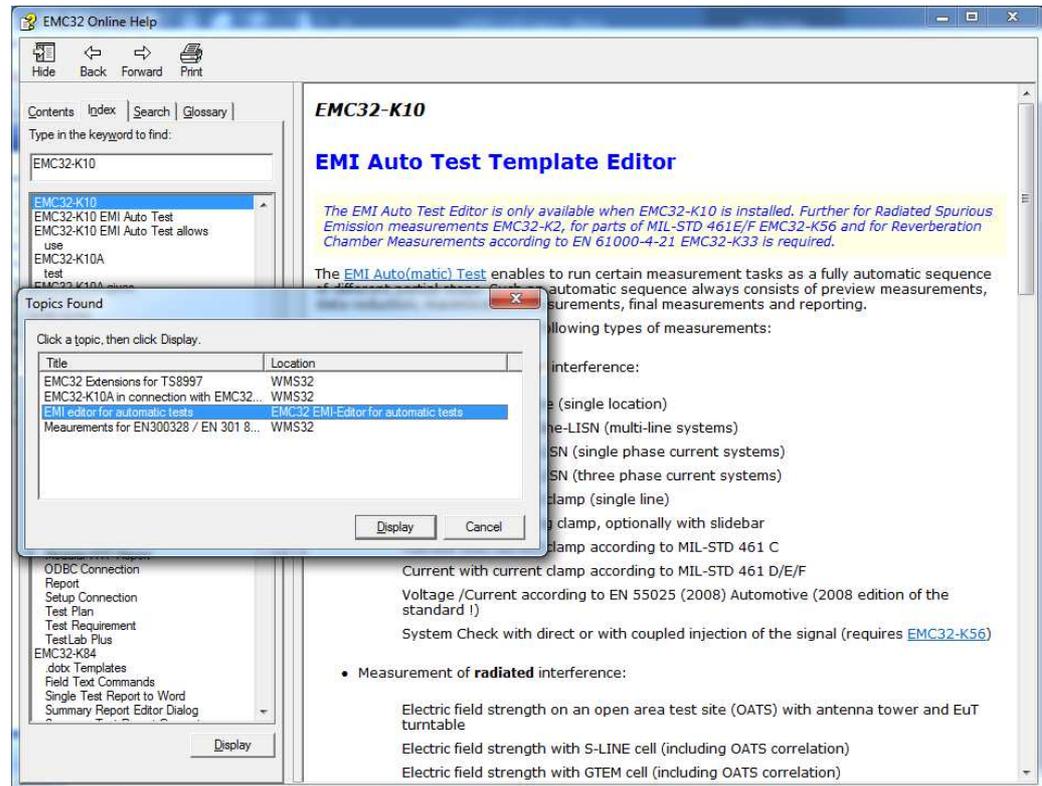


Fig. 4-6: Online help for creating a new EMI Auto test

This template is used for measuring interference emitted from EUT in 360 degree, different polarization and height position to determine which point or position that emit the worst interference thru sequence process. DRM is to help reduce such process time by simultaneously measure two polarization at the beginning of sequence process than continue to find the worst interference emitted.

4.2.1 EMI Auto Test for DRM

This section shows the GUI for DRM in V10.xx onwards.



Click on to start measurement once it complete loading into measurement mode



Fig. 4-7: Measurement mode in detail



Click to exit measurement mode once the measurement had ended.

5 Interactive Measurement for DRM

Interactive Measurement functionalities can refer to the application note as the link provided below:

https://www.rohde-schwarz.com/sg/applications/interactive-emi-measurements-with-r-s-emc32-k24-application-note_56280-64768.html

The Interactive Measurement for DRM is abit different for the accessories movement control as described in the following sections:

- Interactive Measurement: Accessories movement control

5.1 Interactive Measurement: Accessories movement control

Moving accessories to different position for obtain different result. First, select the accessories that want to be move from Accessories window on left side.

Accessories been selected can be identify with orange on the accessory's button and accessory's name will appear in Interactive Device Control window.

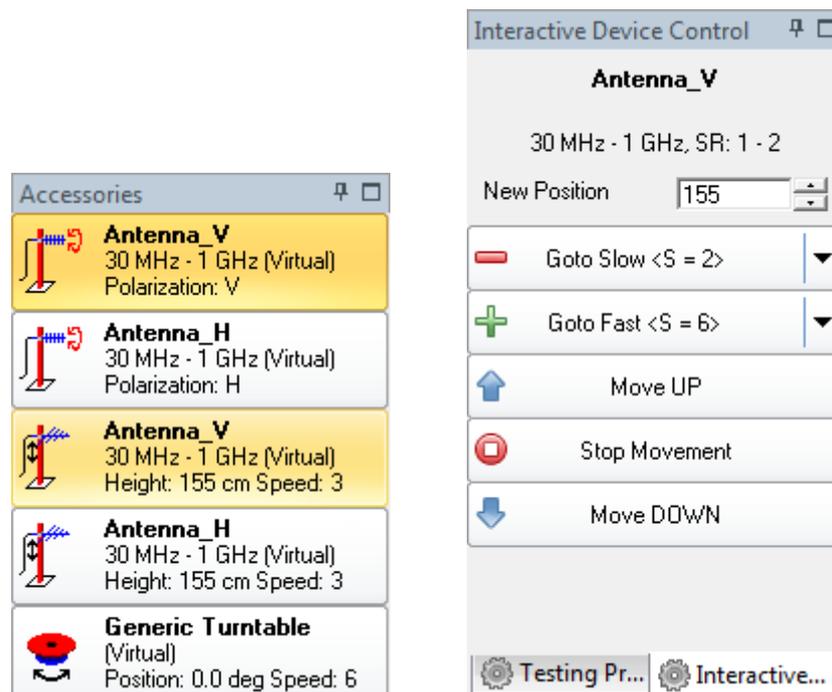


Fig. 5-1: Accessories & Interactive Device Control windows

From Interactive Device Control window, the selected accessory can be move according to user preference.

This feature still executable during measuring.

6 Appendix

6.1 Receiver configuration file for longer sweeping time

Amend the values of this parameter (FastBound) in the configuration file of that receiver been use in the hardware setup.



Fig. 6-1: Receiver Configuration file

Open the file as Notepad so it is editable. Then search for the "Fastbound" parameter and change to a recommended values (30).

```
[Constants]
FastBound= 0.5
ScanNumResultsMax= 1e6
BlupoffsetScan_s= 0
BlupoffsetFast_s= 0
BlupoffsetQpScan_s= 0
BlupoffsetQpFast_s= 0
TmoScanPrep_s= 0
```

Fig. 6-2: "FastBound" parameter

With the values 30, it approximate 29s sweep time.

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