

R&S®AMS32 AREG800A Antenna Gain Calibration with AMS32-K81 Application Note

<http://www.rohde-schwarz.com/appnote/1SL399>

Version 01

ROHDE & SCHWARZ

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The Application Note describes the following R&S®AMS32 models and options:

- R&S® AMS32-K81, stock no. 1508.6680.81

The software contained in this product uses several valuable open source software packages. For information, see the "Open Source Acknowledgment" document, which is available for download from the R&S AMS32 product page.

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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Version 01 | R&S®AMS32 |

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol, e.g. R&S®AMS32 is indicated as R&S AMS32.

Contents

1	Documentation overview	4
2	Introduction.....	5
3	Pre-Requisites.....	6
3.1	SMW200A User Correction File.....	6
3.2	SGH-90M Calibration Data	6
4	Configuring AMS32.....	7
4.1	Device List	7
4.1.1	Configuring the AREG800A driver.....	7
4.1.2	Configuring the RF Generator (SMW200A).....	9
4.1.3	Other instruments	10
4.2	Calibration Setup	11
4.2.1	Selecting Instruments	11
4.2.2	Configuring the SMW200A	12
4.2.3	Configuring the AREG800A.....	13
4.2.4	Output File Name.....	14
4.2.5	Frequency Sweep.....	14
4.2.6	Reference Antenna Gain	15
4.2.7	Finalizing the Calibration Setups	15
5	Performing an Antenna Gain Calibration.....	17
5.1	Calibration Steps	17
5.1.1	Normalization	18
5.1.2	Path Calibration	18
5.1.3	Resulting Attenuation Table.....	19
5.2	Verification	21
6	Path Calibration with AREG800A	23
6.1	Power Sensor Level Calibration.....	23
6.2	Spectrum Analyzer IF Calibration	24
7	Contacting customer support.....	25

1 Documentation overview

The following items make up the user documentation for R&S AMS32:

- ▶ EMC32 Installation Manual: Contains information on how to install the EMC32 platform and the applications based on it, among others AMS32.
- ▶ AMS32 Getting Started Manual: Describes the first steps for configuring a new installation up to the point where OTA measurements are possible.
- ▶ AMS32 Online Help: Context-sensitive help utility callable from AMS32 pressing the "F1" key, or from the main menu. Contains detailed explanations about AMS32 GUI and operating principles.
- ▶ AMS32 Data Sheet: Contains an overview of the available software options and their applicability.

Additionally, several Technical Notes and Application Notes similar to the present one are available, describing individual topics with more detail.

2 Introduction

R&S AMS32 is the system software for OTA and antenna measurements from Rohde & Schwarz. In addition to DUT pattern measurements, it supports path calibration of the test environment, that is, recording the attenuation through the over-the-air measurement chamber. Such a chamber can be, for example, one of the compact chambers of the R&S ATSxxx family. One model of this chamber family is the ATS1500C, especially designed for tests of automotive radar equipment. The instrument of choice for performing such tests is the R&S AREG800A Automotive Radar Echo Generator.

With the new software option AMS32-K81, released with AMS32 V11.50, AMS32 supports path calibrations in the ATS1500C, using the AREG800A as measurement instrument. Special attention is paid to evaluating the Antenna Gain parameter to be uploaded to the AREG800A when measuring the EIRP of the DUT.

In this document we will describe in detail how to configure and perform path calibrations with AMS32-K81 in an ATS1500C, using an AREG800A. Section 3 describes two pre-requisites that need to be available before the calibration can be configured and started. Section 4 describes how to configure AMS32 for the calibration. Section 5 describes the most important procedure, Antenna Gain calibration for EIRP power measurements, in a step by step procedure. Section 6 describes two additional path calibration variants implemented with AMS32-K81.

For additional details on other features of AMS32 please refer to the data sheet and the online help utility available when installing the software. For more information on the ATS1500C and the AREG800A, please refer to the applicable instrument manuals.

3 Pre-Requisites

Before a path calibration can be configured in AMS32, two items must be available, which have to be generated externally. This section will name and briefly describe these items.

3.1 SMW200A User Correction File

A SMW200A will be used for generating the CW reference signal for the calibration. This CW signal must be generated so that the level arriving at the SGH-90M reference antenna is constant and equals +7 dBm over the whole frequency range. This is because the SGH-90M contains an active frequency multiplier which up-converts the CW signal, and this multiplier needs these +7 dBm at the input for operating correctly.

In order to generate this level correctly, the attenuation through the cable from the SMW200A output port to the SGH-90M input needs to be compensated. This can be done activating "User Correction" on the SMW200A and selecting an applicable file, which records the level offset to be compensated for, as a function of frequency.

Activating user correction and selecting the file can be done by remote control from AMS32. But the user correction file needs to be generated and stored manually on the SMW200A. Please refer to the applicable manual for information on how to create such a user correction file, with the help of a power sensor and the SMW200A.

Please note that the file needs to be saved to path "/user/var" on the SMW200A's hard disk for AMS32 being able to find it.

3.2 SGH-90M Calibration Data

A R&S SGH-90M reference antenna will be used during the path calibration described here. This antenna has a frequency-dependent gain, which needs to be considered when calculating the path attenuation. For AMS32 to be able to consider this gain, it must be stored as an AMS32 attenuation table to the applicable folder.

Each SGH-90M unit is individually calibrated in the manufacturing facility, and the calibration data delivered on a USB stick together with the antenna. Among others, the delivery includes a file in the correct table format for AMS32. Please make sure to copy the AMS32 attenuation table to the AMS32 attenuation table folder. By default, this is "C:\ProgramData\EMC32\System\Correction Tables\Attenuation".

If your data are not in the default folder C:\ProgramData\EMC32, you can check where they are in AMS32, in Extras > Options > File Location.

4 Configuring AMS32

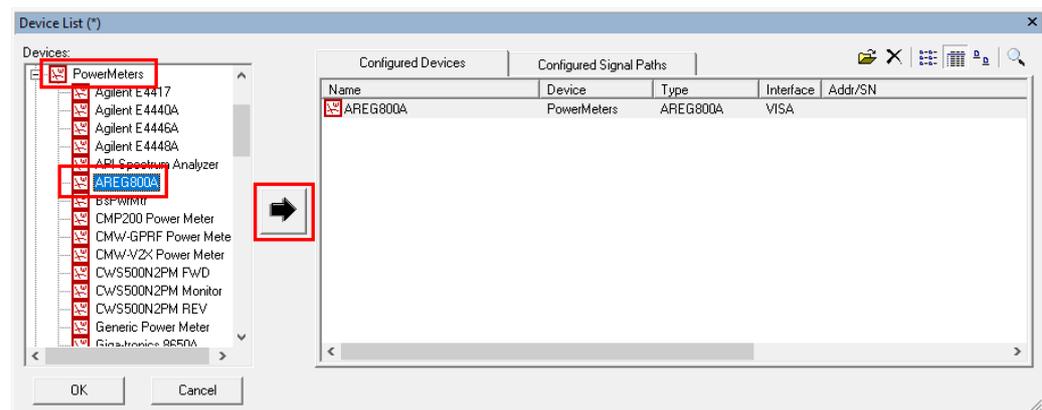
In the following, it is assumed that AMS32 V11.50 is installed, and option AMS32-K81 is active. No special mention is made to point out which of the described elements would not be available if this is not the case.

4.1 Device List

Configuring AMS32 starts with adding the available instruments to the Device List. Open the Device List from Extras > Device List ...

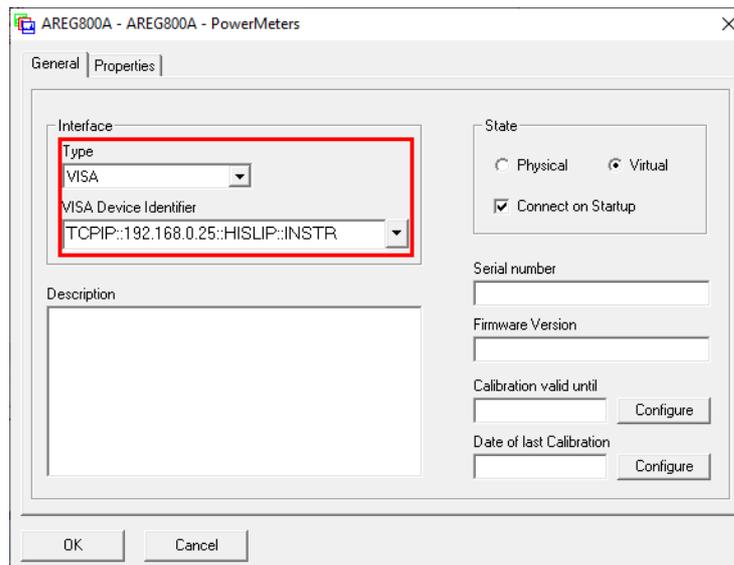
4.1.1 Configuring the AREG800A driver

Find the AREG800A in the left-hand pane showing all available device drivers, in section Power Meters. Add it to the list of selected devices by clicking on the arrow button in the middle of the two lists.

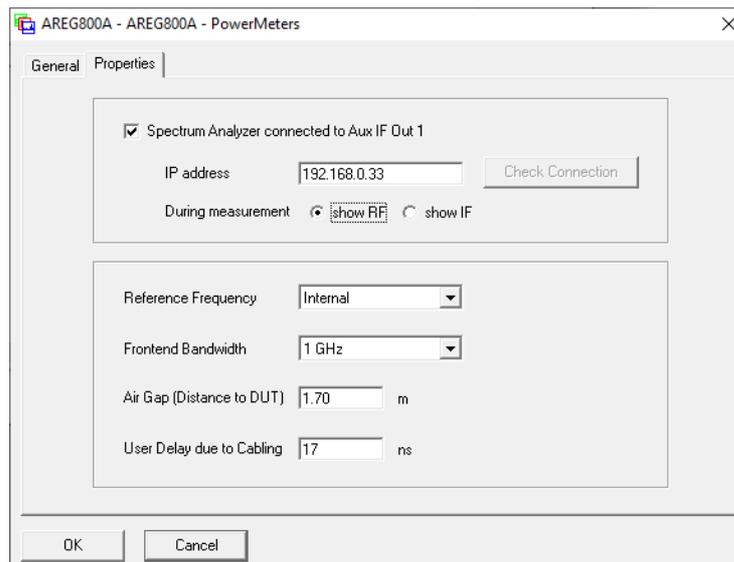


Configure the Properties of the AREG800A driver. To this purpose, double-click on the entry in the right-hand list. The driver's Properties dialog will open. It is made up of two Tabs "General" and "Properties".

The "General" tab is common to all instrument drivers and allows configuring some general properties. Most important is the address for remote control of the instrument. Select interface type "VISA", and configure the address to "TCPIP::<IP address>::hislip::instr" (not case sensitive).



The “Properties” tab allows configuring hardware-related characteristics of the instrument or test environment which are bound not to change during operation.



The following items can be configured:

- ▶ "Spectrum Analyzer connected to Aux IF Out 1": Check this box if a R&S spectrum analyzer, e.g. an FSW, is connected to the "Aux IF Out 1" port of the AREG800A. This can be controlled from AMS32 for the IF path calibration, refer to section 5.2.
- ▶ "IP address" of the spectrum analyzer: If the above box is checked, the IP address of the analyzer needs to be entered here.

A button "Check Connection" is available for testing the connection once a valid address has been entered; the button is enabled only if an AMS32 dongle is connected to the control PC.

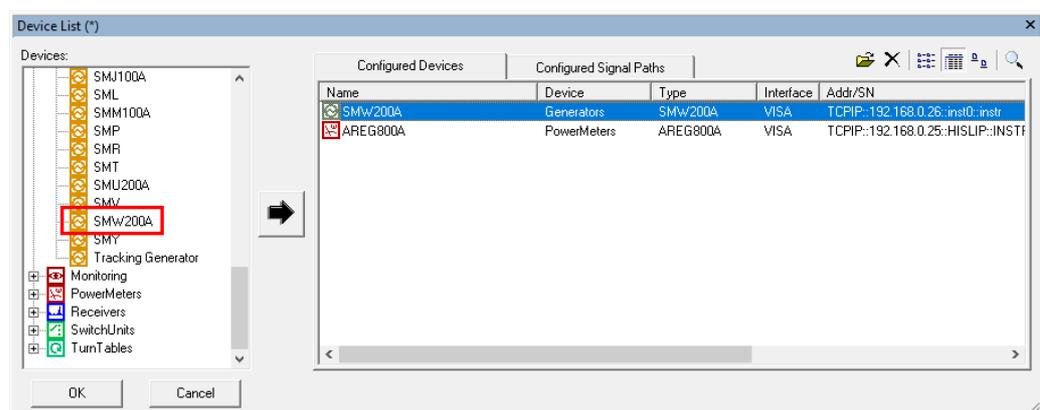
- ▶ "During measurement show RF of IF": The spectrum analyzer can be programmed to consider a frequency offset. This is used to show either the IF at which the measurement takes place, or the RF of the test signal in the chamber.
- ▶ "Reference Frequency": Configure the AREG's reference frequency to be generated internally or fed in externally.
- ▶ "Frontend Bandwidth": Configure the bandwidth of the AREG's RF frontend, at the back wall of the chamber. Possible selections are "1 GHz", "2 GHz" and "5 GHz", where certain frontends can eventually be used with different bandwidths. Please ask your R&S Application Engineer for details.
- ▶ "Air Gap (Distance to DUT)": Configure the distance from the DUT to the measurement probe (in an ATS1500C to the CATR mirror). This parameter can be configured to the AREG800A; the instrument considers this distance for correcting the measured power level. Please ask your R&S Application Engineer for details.
- ▶ "User Delay due to Cabling": Another parameter configurable to the AREG800A, used for considering the external cable from the frontend to the instrument for correctly analyzing incoming signals. Please ask your R&S Application Engineer for details.

Once all parameters are configured as necessary, save and close the Properties dialog clicking on "OK".

4.1.2 Configuring the RF Generator (SMW200A)

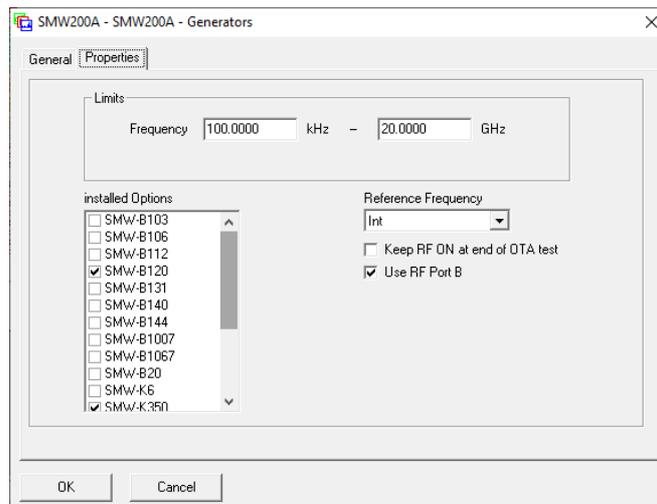
As discussed, the AREG800A will be used for power measurements. For path calibration, a CW reference signal needs to be generated in addition. To this purpose, a RF signal generator is needed, which shall be remotely controlled by AMS32, and hence also needs to be entered to the Device List. The default instrument used in automotive test systems is the R&S SMW200A.

Add the SMW200A instrument driver to the list of selected devices from section "Generators":



Configure the Properties of the SMW200A driver. To this purpose, double-click on the entry in the right-hand list. The driver's Properties dialog will open. It is made up of two Tabs "General" and "Properties".

The "General" tab has the same purpose as described in the previous section. The "Properties" tab is mainly used for displaying the characteristics of the instrument (frequency range, installed options) when it is physically connected to the control PC.



Three GUI elements are worth mentioning:

- ▶ "Reference Frequency": Configure the SMW200A's reference frequency to be generated internally or fed in externally.
- ▶ "Keep RF ON at the end of OTA test": Configured whether the RF signal shall remain switched on at the end of a measurement or not. It may be useful to leave it ON if some visual or manual check of the setup is intended after the test. It may be sensitive to switch the signal OFF for avoiding long-term load of the DUT.
- ▶ "Use RF Port B": The SMW200A may be fitted with a second RF output port. Check this box for using this second port (labelled 'B' on the instrument) if this shall be used for feeding the DUT during the procedures described below. The principal port 'A' can then be used for other purposes.

4.1.3 Other instruments

With an SMW200A and an AREG800A, the EIRP Antenna Gain Calibration can be performed, no other instruments drivers need to be added. However, it may be useful, depending on what else shall be done with the system and AMS32, to add other device drivers. Consider the following:

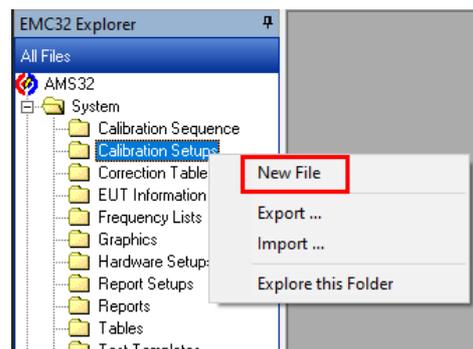
- ▶ ATS1500C positioner axes: Add two instances of driver "ATS 1500 Positioner" (from section "TurnTables")
- ▶ Spectrum analyzer: For using the possible spectrum analyzer for other tasks than path calibration with AREG, add driver "OTA Spectrum Analyzer" from section "PowerMeters".
- ▶ Switch Unit: If the system comprises any relay switch unit (e.g. R&S OSP200) for routing RF signals to and from different instruments, add the applicable driver from section "SwitchUnits".
- ▶ Signal Paths / Antenna: For configuring a complete measurement system for OTA measurements, additional logical instruments are needed. Please refer to further AMS32 documentation.

Once all necessary instrument drivers have been added to the Device List and are correctly configured, save and close the Device List clicking on "OK".

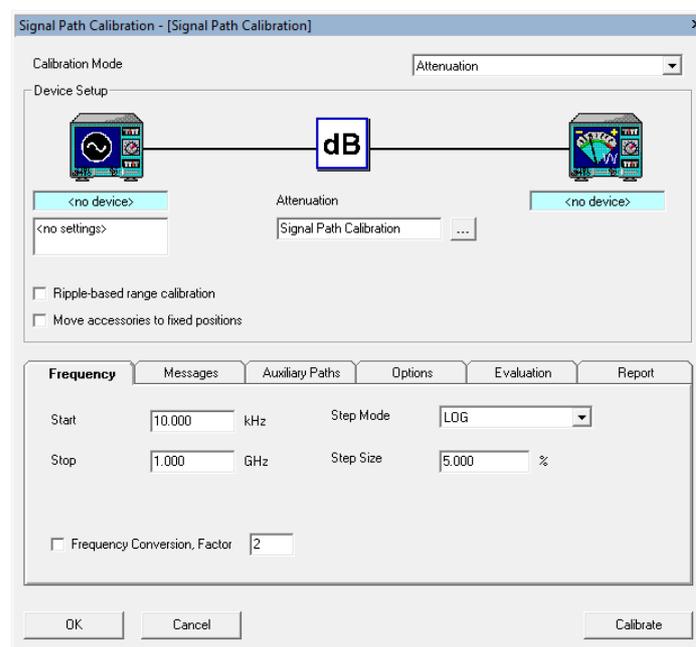
4.2 Calibration Setup

Once all relevant instruments have been added to the Device List and configured appropriately, you can proceed with configuring the path calibration procedure.

To this purpose, AMS32 implements the Calibration Setup file type. You can create a new Calibration Setup right-clicking on the entry System > Calibration Setups in the AMS32 Explorer, and selecting "New File":



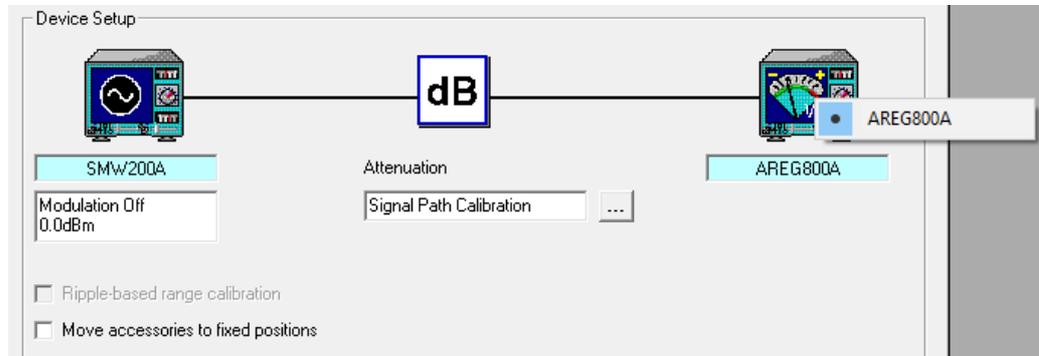
This will open a new empty Calibration Setup. The rest of this section will describe how to configure it.



4.2.1 Selecting Instruments

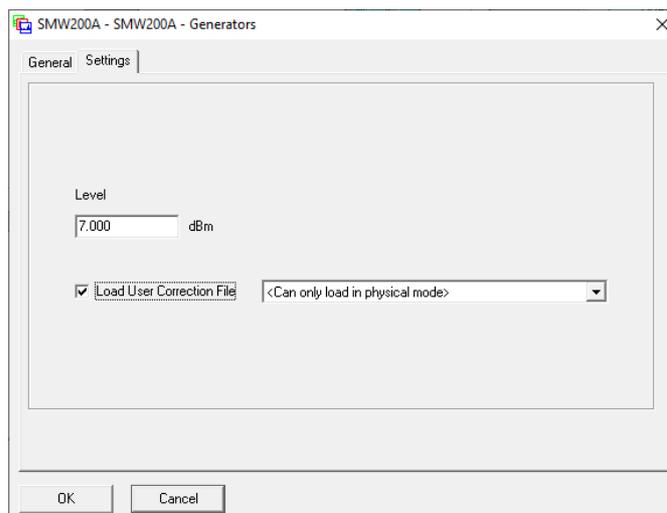
For both icons in the "Device Setup" frame, appropriate instruments need to be selected. To this purpose, right-click on the icon. A list with the instruments in the Device List that can be selected at this point will be displayed. Choose the one you want to use. As we have added only one generator and one power meter to the Device

List in section 4.1, we will have only one instrument to select for each icon: The SMW200A for the generator (left icon) and the AREG800A for the power meter (right icon).



4.2.2 Configuring the SMW200A

Left-click on the generator icon, where the SMW200A has been selected. A dialog will pop up allowing to configure settings for the calibration procedure:



Configure the following items:

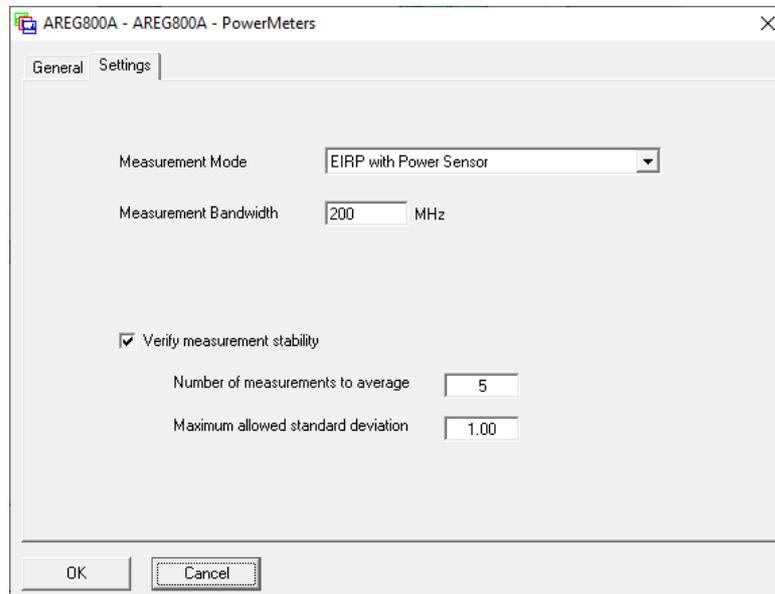
- ▶ "Level": Enter 7 dBm in this field. As discussed earlier (section 3.1) this is the level of the CW reference signal that needs to be generated at the input of the reference antenna.
- ▶ "Load User Correction File": Check this box. This will activate user correction on the SMW200A, and allow selecting a file stored on the SMW200A hard disk to this purpose. Select the applicable file from the selection box to the right.

Note: The files stored on the hard disk can only be retrieved in physical mode, i.e., when an AMS32 dongle is plugged in to the PC, and the SMW200A can be addressed from AMS32. The screenshot above was taken in virtual (simulation) mode.

Note: AMS32 will only retrieve file names from the SMW200A top folder "/user/var". Please make sure to save the applicable file there and not in any sub-folder.

4.2.3 Configuring the AREG800A

Left-click on the right icon where the AREG800A has been selected. A dialog will pop up allowing to configure settings for the calibration procedure:



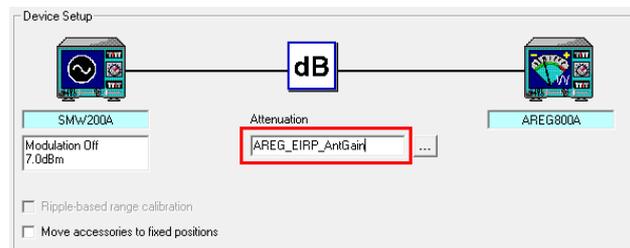
Configure the following items:

- ▶ "Measurement Mode": Three calibration modes are available: "EIRP with Power Sensor", "RF Level with Power Sensor", "IF Level with Spectrum Analyzer". The first one is the most important one and is described in section 5. The other two are alternatives, they are described in section 6. Mode "IF Level ..." is only available if a spectrum analyzer has been configured in the Properties of the AREG800A driver, as described in section 4.1.1.
- ▶ "Measurement Bandwidth": This defines the bandwidth which is expected to be configured to the AREG800A for the DUT measurement. The item is only available if mode "EIRP ..." is selected. The bandwidth will be used for the second verification run, as described in section 5.2.
- ▶ "Verify measurement stability": If the box is checked, all measurements during the calibration are not performed only once, but repeated until the configured "number of measurements to average" gives a standard deviation below the "maximum allowed standard deviation". The resulting power level is then the average of these measurements.

Use this feature to stabilize the measurements, and hence reduce uncertainty, but be aware that this makes the calibration procedure longer. Also, be careful not to impose too low a limit for the standard deviation. Ultimately, if the allowed deviation is not reached, the software will perform a maximum of five times the configured number of measurements and will proceed nonetheless.

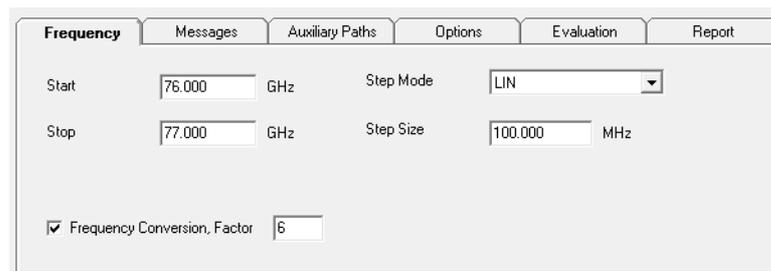
4.2.4 Output File Name

The result of the calibration process will be a data table of type "Attenuation". The name of this table can be defined in the field "Attenuation". Below an example how to define the name "AREG_EIRP_AntGain" for the output table.



4.2.5 Frequency Sweep

An essential point is defining the frequency sweep according to your needs. On the one hand, the calibration table shall cover the DUT test frequency range, on the other hand, it is limited by the usable range of the system (AREG800A and RF frontend).



The frequency range is configured in tab "Frequency" in the lower part of the Calibration Setup dialog. The following items are available:

- ▶ "Start": Configures the start frequency of the sweep. The field interprets characters for defining frequency magnitude factors; for example, type in "76G" for configuring 76 GHz as the start frequency.
- ▶ "Stop": Configures the stop frequency of the sweep
- ▶ "Step Mode": Three step modes are available: "LIN", "LOG", "Frequency List".

In case of "LIN", the frequency range is stepped through in linear (equidistant) steps. The step size is configured in field "Step Size".

In case of "LOG", the frequency range is stepped through in logarithmic (constant ratio) steps. The increase ratio in % is configured in field "Step Size".

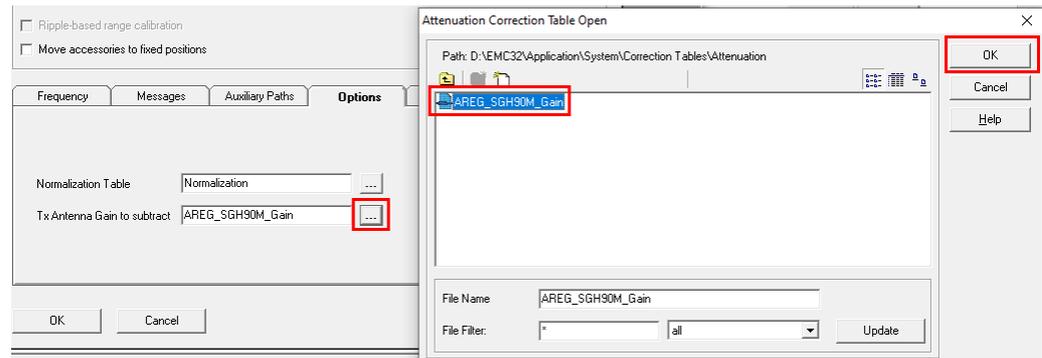
"Frequency List" allows selecting a file of this type, in which an arbitrary list of frequencies is defined. It is not recommended to use this selection for this case.

- ▶ "Frequency Conversion": Checking this box informs the software that an external component in the system up-converts the frequency generated by the RF generator. The conversion factor can also be configured.

Please make sure to check this box and enter a factor of 6 (as in the figure above) for the AREG path calibration, as a SHG-90M is used in this case, which does such an up-conversion.

4.2.6 Reference Antenna Gain

For a correct path calibration, the gain of the SGH-90M reference antenna needs to be subtracted from the measured levels. In order to AMS32 being able to do so, this gain needs to be configured. Use the "Tx Antenna Gain to subtract" field in tab "Options" to this purpose: Click on the button to the right of the field, and select the applicable attenuation table containing the gain data. Refer to section 3.2 for more details about where to get this table from.



4.2.7 Finalizing the Calibration Setups

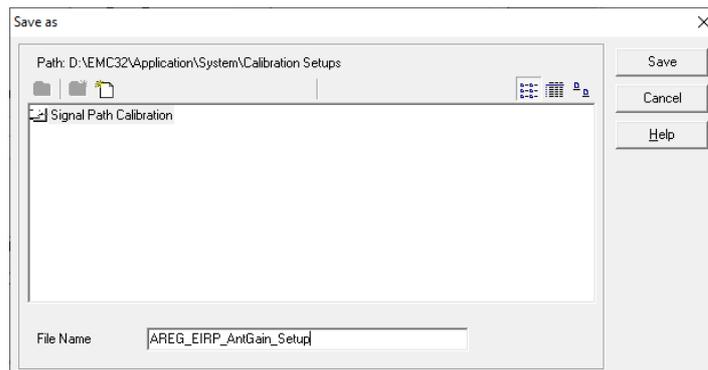
One more important setting to consider relates to the Normalization table in the "Options" tab. This field is used for compensating a possible extension cable in case some end point of the path to be calibrated cannot be reached directly with system cables.

In the case of an ATS1500C with AREG800A, this is not necessary. Therefore, no normalization table needs to be considered. Please delete the table name "Normalization" with which the field is initialized by default. For doing so, place the cursor in the field, and press the "Delete" key on your keyboard once.



This completes the configuration of a Calibration Setup for the considered environment. There are many more fields in the editor, but they are not relevant for the procedure described herein. Refer to the AMS32 online help for additional information on these fields.

For saving the setup, please click on "OK" and save the setup with a meaningful name, so you can identify it later on.



The saved setup can now be found in the AMS32 Explorer. For opening it again please double-click on the entry in the Explorer. For creating a copy as a starting point for another setup, use the context menu (right-click) entries "Duplicate" and "Rename", or open the setup and save it with another name with the main menu entry "File > Save As..."

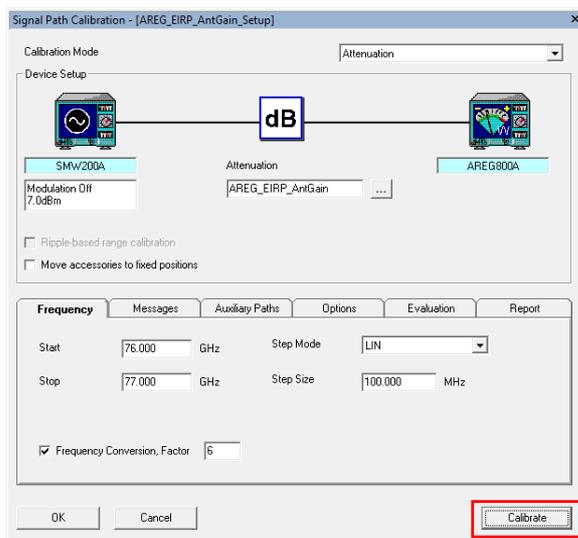


5 Performing an Antenna Gain Calibration

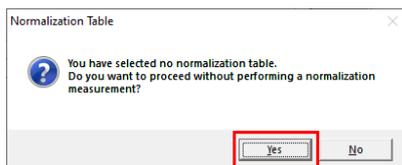
Once a suitable Calibration Setup is configured, we are ready for performing a path calibration.

5.1 Calibration Steps

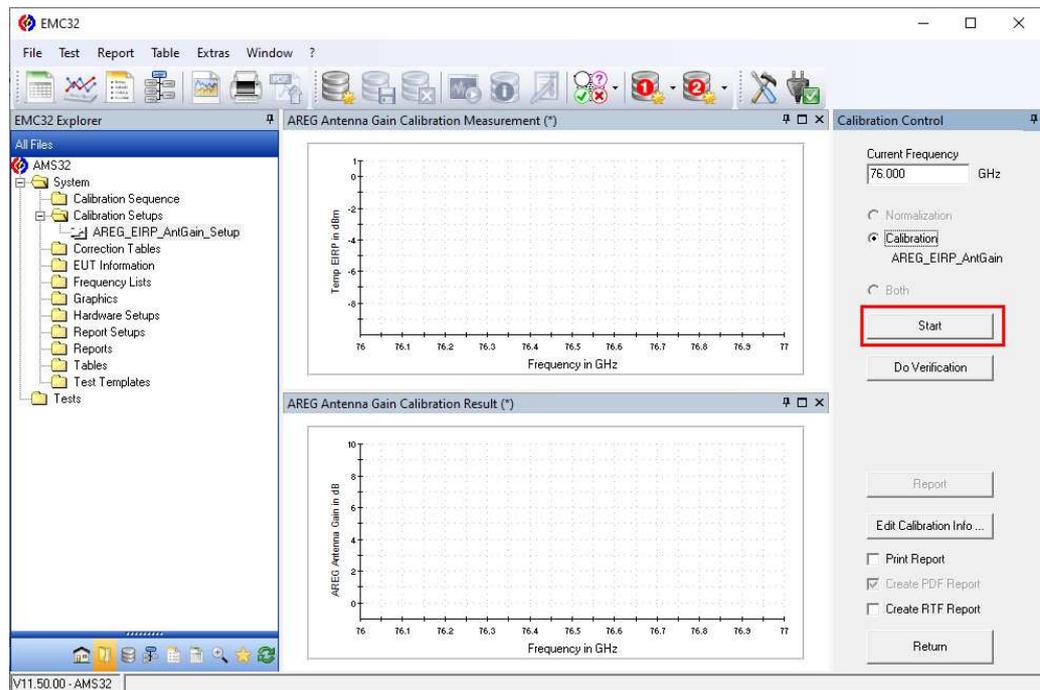
To this purpose, open the setup created as described in section 4, and click on the "Calibrate" button:



If no normalization table is configured, as recommended in section 4.2.7, you will receive a message asking for confirmation whether you want to perform a calibration without normalization:



Click on "Yes". Then the AMS32 GUI will change to the calibration procedure view:



Click on "Start" for initializing the calibration procedure.

5.1.1 Normalization

Normally, a path calibration procedure would start with a normalization step. However, in our case of an Antenna Gain Calibration for the AREG800A, as we have configured to work without a normalization table, this step will be skipped.

It can be seen in the figure above that the radio button for selecting "Normalization" is grayed out, so normalization procedure cannot be activated.

5.1.2 Path Calibration

In consequence, after pressing the "Start" button the calibration step will directly be started. In first place, the following message will appear:



This is thought as a kind of reminder to set up the system as needed:

- ▶ Reference antenna shall be set up in the chamber, correctly aligned with the CATR mirror. The power supply for the antenna shall be switched on.
- ▶ The cable from the SMW to the reference antenna shall be in place. The cable shall be the same as measured previously for recording the User Correction table on the SMW, refer to sections 3.1 and 4.1.2.
- ▶ Both positioner axes of the ATS1500C shall be at 0 deg.
- ▶ The NRP power sensor shall be connected to and identified by the AREG800A.

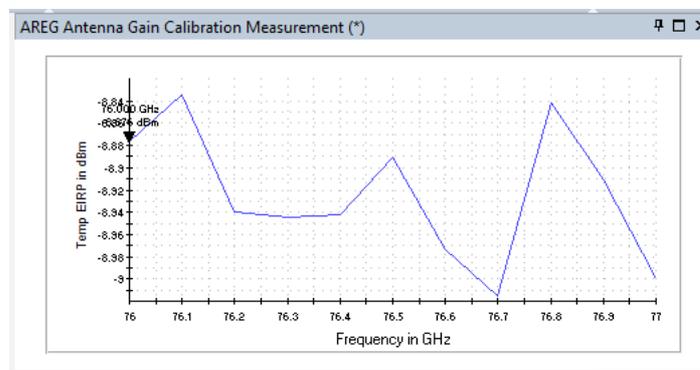
- ▶ If a path calibration for the IF signal is going to be performed, the spectrum analyzer needs to be switched on, and its input connected to the "Aux IF Out 1" connector of the AREG800A.

You have the possibility of changing the pop-up message, in the "Messages" tab of the Calibration Setup.

Once the system is correctly set up, you can acknowledge the message clicking "OK", and the software will perform the calibration:

- ▶ The SMW200A is reset
- ▶ The AREG800A is and programmed as configured in section 4.1.1. The measurement bandwidth is set to 0 Hz.
- ▶ The power sensor connected to the AREG800A is zeroed.
- ▶ The SMW200A is programmed to generate the reference signal as configured in section 4.1.2.
- ▶ The SMW200A and the AREG800A are set to the start frequency of the calibration.
- ▶ The measured EIRP is queried from the AREG800A. If measurement stabilization has been activated, the EIRP is queried repeatedly until fulfilling the required standard deviation.
- ▶ The same is done in a loop for all frequencies in the sweep as configured.
- ▶ When the sweep is finished, the SMW200A is switched off and user correction is switched off.

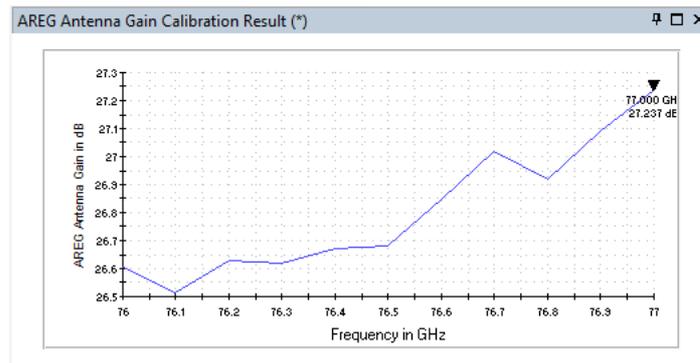
The AMS32 GUI will show the measured EIRP values in the top graphic display ("measurement graphic"). Also, the currently active frequency will be displayed in the "Frequency" field.



5.1.3 Resulting Attenuation Table

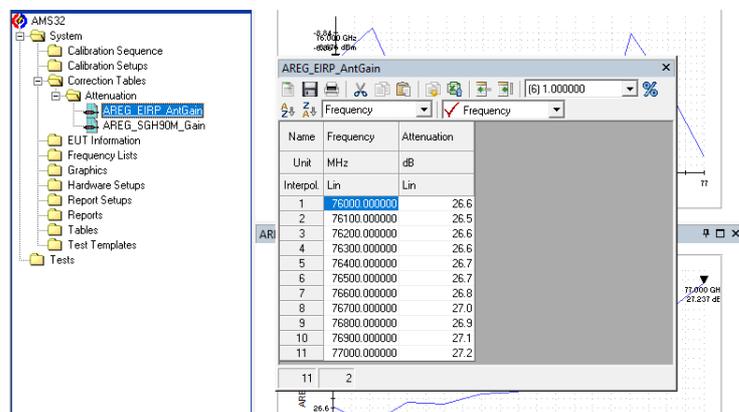
Once the calibration sweep is finished, the measured results will be converted to the target quantity, the AREG Antenna Gain, subtracting the level at the reference plane from the measured EIRP. The reference plane is defined at the phase center of the reference antenna; the level at this plane is the input level at the reference antenna plus its gain.

The resulting Antenna Gain over frequency is displayed graphically in the lower graphic display of AMS32 ("calibration graphic").



The results are also saved to the attenuation table the name of which was configured as described in section 4.2.4.

This table can be reviewed opening it from the AMS32 Explorer in System >> Correction Tables >> Attenuation.



Additionally, the linear average of the Antenna Gain values is calculated, and is stored in the file for reference. For finding it, please proceed as follows:

- ▶ Find the attenuation file in the Windows Explorer. The default path where the files are saved is C:\ProgramData\EMC32\System\Correction Tables\Attenuation. The file name is as configured in section 4.2.4, with extension *.Attenuation, in the example herein, "AREG_EIRP_AntGain.Attenuation"
- ▶ Open the file with any editor.
- ▶ Find the average value in the corresponding section:

```

AREG_EIRP_AntGain.Attenuation - Notepad
File Edit Format View Help
[FileInfo]
Author=AMS32
Version=8.3
MeasClass=0 <No Class>
Start=76.0000000000E+9
Stop=77.0000000000E+9

[MoreSettings]
CallIncludeFrgCorr= 0
CalDate=08/12/2022
CallTime=16:49:03

[AREG Antenna Gain]
AntGainAvg=26.809174988E+0

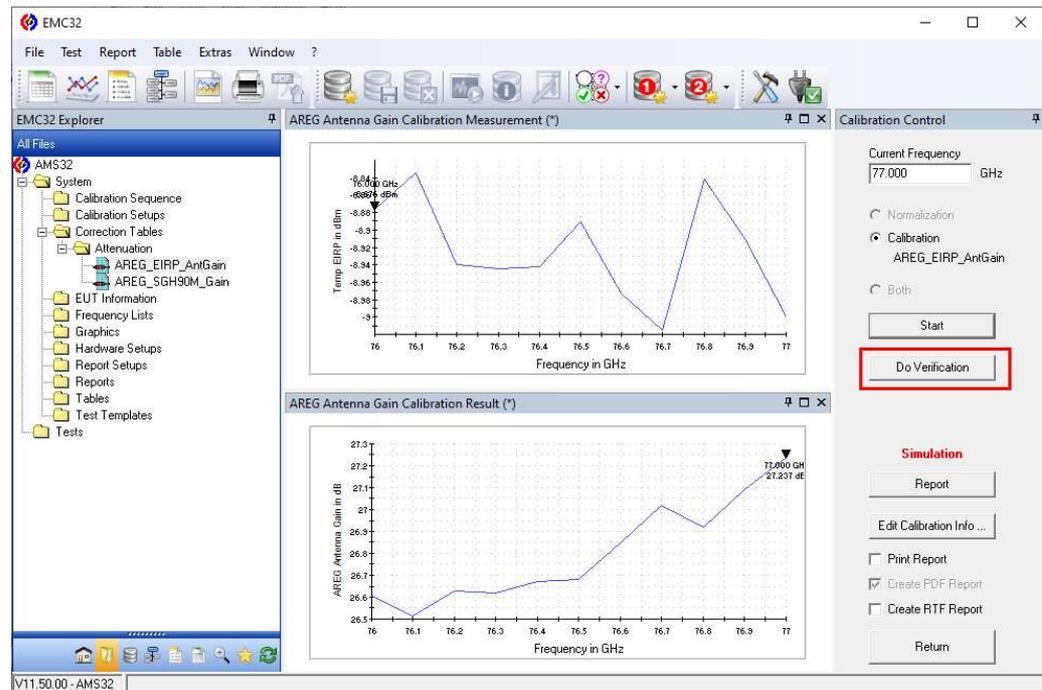
[TableSettings]
TableType= 41 Attenuation Correction Table
IndicateDetector=0
Columns=2
Rows= 11
  
```

Set this value manually to the entry field "AREG Antenna Gain RX" in the AREG800A GUI when DUT performing tests in the calibrated environment.

5.2 Verification

In addition to performing the calibration as described above, AMS32 offers the possibility of conducting verification measurements for evaluating the frequency response of the AREG800A's EIRP measurement when using the calibrated data.

To this purpose, simply click on "Do Verification" in the calibration control dialog once the calibration process itself is finished:



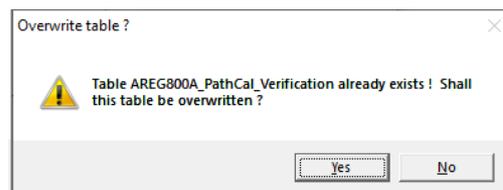
The verification procedure will perform the same sweep as described in section 5.1.2 twice again, with the difference that the calibrated Antenna Gain is uploaded to the AREG800A. Therefore, this verification is simulating the behavior of the AREG800A in a DUT measurement, with the calibrated Antenna Gain configured to the instrument. The first sweep will be conducted with 0 Hz measurement bandwidth, as indicated in the AMS32 status bar,



the second sweep with the bandwidth configured in section 4.2.3.

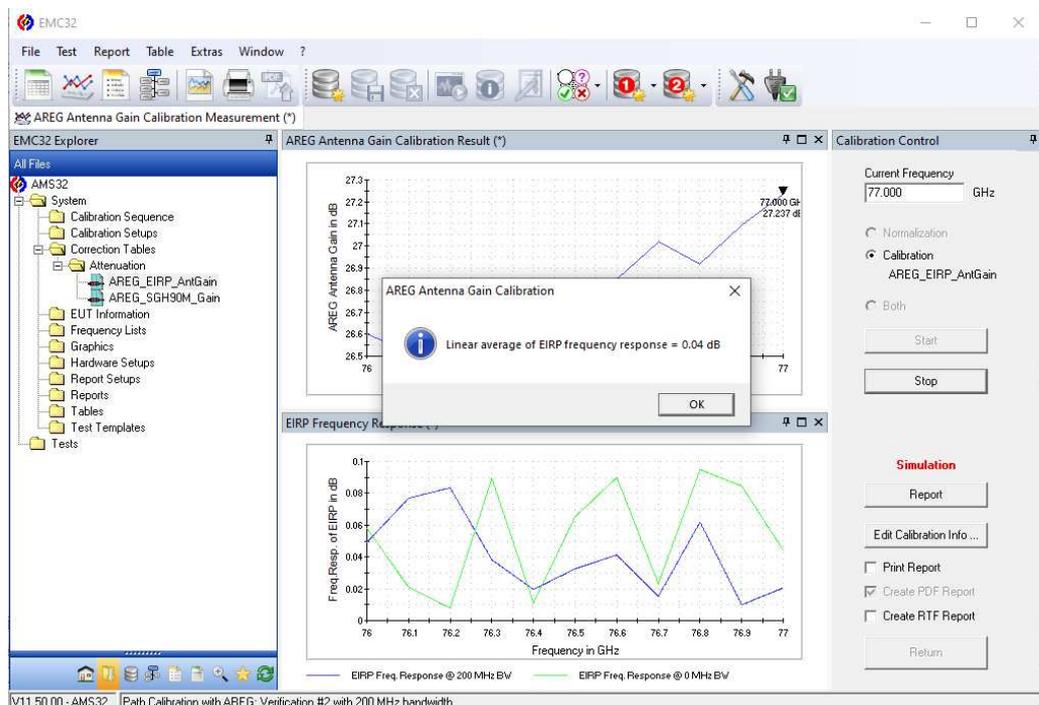


Results are saved to a table with name "AREG800A_Path_Cal_Verification". Whenever you are asked whether that table shall be overwritten, please make sure to answer with "Yes".

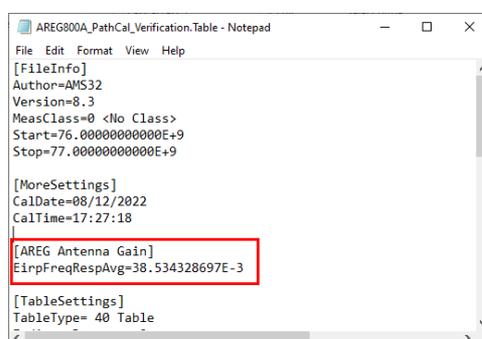


After the final verification step, the measurement graphic is hidden, and a Verification graphic is displayed at the bottom of the AMS32 GUI, showing the frequency response (deviation of the expected value) of the EIRP with frequency.

Additionally, a message box is popped up informing about the linear average of the frequency response at the target bandwidth.



As stated, verification results are saved to a table with name "AREG800A_Path_Cal_Verification". This table can be found in folder C:\ProgramData\EMC32\System\Tables. It also contains the average response figure in the same way as the Antenna Gain table contains the average calibration result:



If you want to keep this table for documentation purposes, simply copy it with another name, either from the AMS32 Explorer (System > Table, right-click, choose "Duplicate" and "Rename"), or in the Windows Explorer.

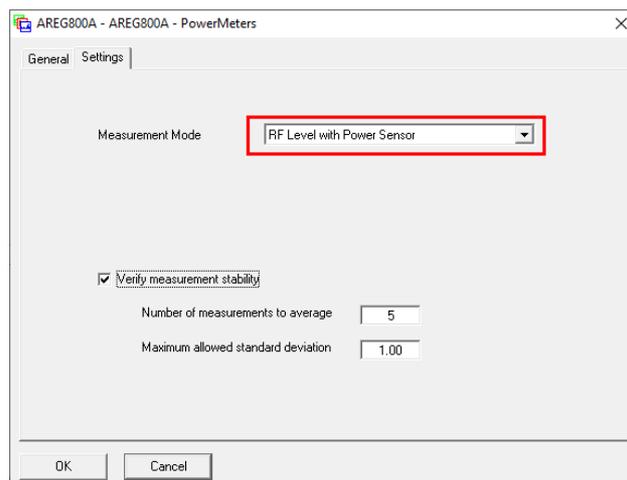
6 Path Calibration with AREG800A

The EIRP Antenna Gain calibration described in the previous sections is the main application of software option AMS32-K81. Two additional, closely related, calibration procedures have also been implemented. Both use the same instrumentation and the same AMS32 dialog as described above, so this section will rely on the detail information given previously.

6.1 Power Sensor Level Calibration

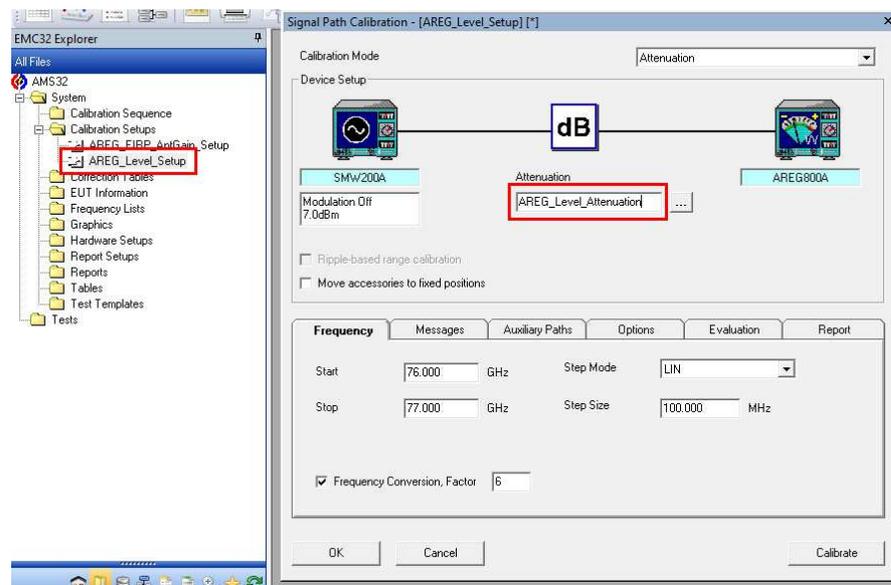
The first additional procedure uses the same setup including the SMW200A generator, the SGH-90M reference antenna, and the AREG800A as measurement instrument. The only difference is that the quantity measured on the AREG800A is not the EIRP radiated from the DUT, but directly the RF level arriving at the instrument's frontend. This quantity is independent of the Antenna Gain parameter.

For configuring this Level Calibration, a different measurement quantity needs to be selected in the AREG settings dialog described in section 4.2.3:



As can be seen, in this case no measurement bandwidth needs to be configured, as the level measurement is directly performed by the power sensor connected to the AREG800A, so no evaluation at all is being done by this instrument.

It is recommended to create a separate Calibration Setup if you want to use this procedure alternatively to the EIRP Antenna Gain calibration, and to save the path attenuation to a different table:



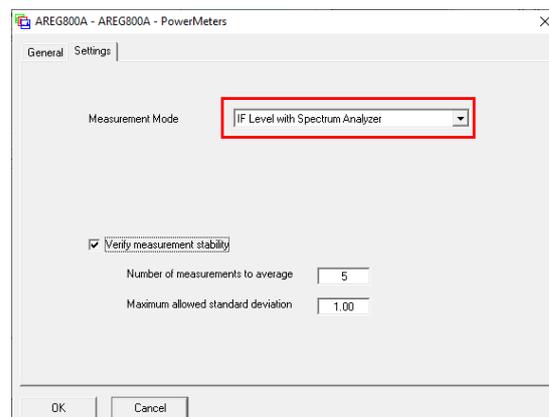
All other parameters can remain the same as in the previous section.

The calibration procedure will be executed identically as described above, with the exception that the verification measurement will be done only once, no Verification graphic will be displayed and no average response figure will be calculated. This is because the path attenuation calibrated with this procedure will not be used as a parameter value to be set up on the AREG800A. Instead, this path attenuation is typically used by AMS32 for correcting the level measurement for the OTA range loss.

6.2 Spectrum Analyzer IF Calibration

The same applies to the second additional calibration procedure, the measurement of the path attenuation on the IF frequency, with the help of a spectrum analyzer (R&S FSW) connected to the IF output (port Aux IF Out 1) of the AREG800A.

Use the third selection in the AREG800A settings dialog for activating this procedure:



The spectrum analyzer will be configured to display either the IF at which the measurement is done, or the RF of the signal in the chamber, depending on what is configured in the driver's Properties (see section 4.1.1). The measurement itself will be an RMS averaging measurement over 500 ms.

7 Contacting customer support

Information on support contact is mandatory in each manual. Contact is the R&S Customer Support Center, or a subsidiary for specific projects.

Recommended position in manual:

- At the end of the Troubleshooting chapter
- At the end of the Maintenance chapter
- on highest chapter level in Getting Started manuals, if it has neither Troubleshooting nor Maintenance chapter

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support or follow this QR code:



Figure 7-1: QR code to the Rohde & Schwarz support page