



SOFTWARE FOR EMC IMMUNITY TESTING ICD.CONTROL

**APPLICATION NOTE
MIL-STD-461-CS114**

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This application note requires icd.control version 6 or newer.

CONTENT

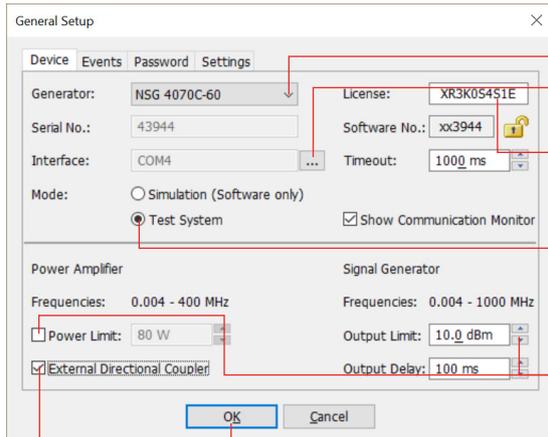
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1. EXAMPLE MIL-STD-461-CS114 TEST WITH EXTERNAL DIRECTIONAL COUPLER AND AMPLIFIER

1.1. Basic settings

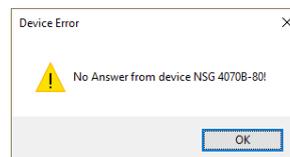


- Clicking on "General Setup" opens the generator settings menu.



- Select the appropriate generator model.
- If necessary, configure the interface.
- Enter the license number from the license certificate. The associated serial number is displayed in the left field.
- Select "Test system" for operation with connected generator. Choose simulation to control the settings, to get to know the program especially if there is no hardware.
- If necessary, set limits for the connected hardware. "Power Limit" limits the forward power. This avoids that in case of error, e.g. Power meter for the measurement of the target level not connected, the generator fully controlled and thus the power amplifier gives full power and thus the connected hardware is damaged. „Output Limit" limits the output level of the signal generator and is e.g. to 0 dBm if the maximum input power of the connected amplifier is limited to 0 dBm.

- When leaving the menu with "OK", the *idn? Command is sent to the device. If the answer is correct, the program changes to the main menu. If there is no connection, an error message appears. example:



- By clicking on "OK" the program changes again into the settings.

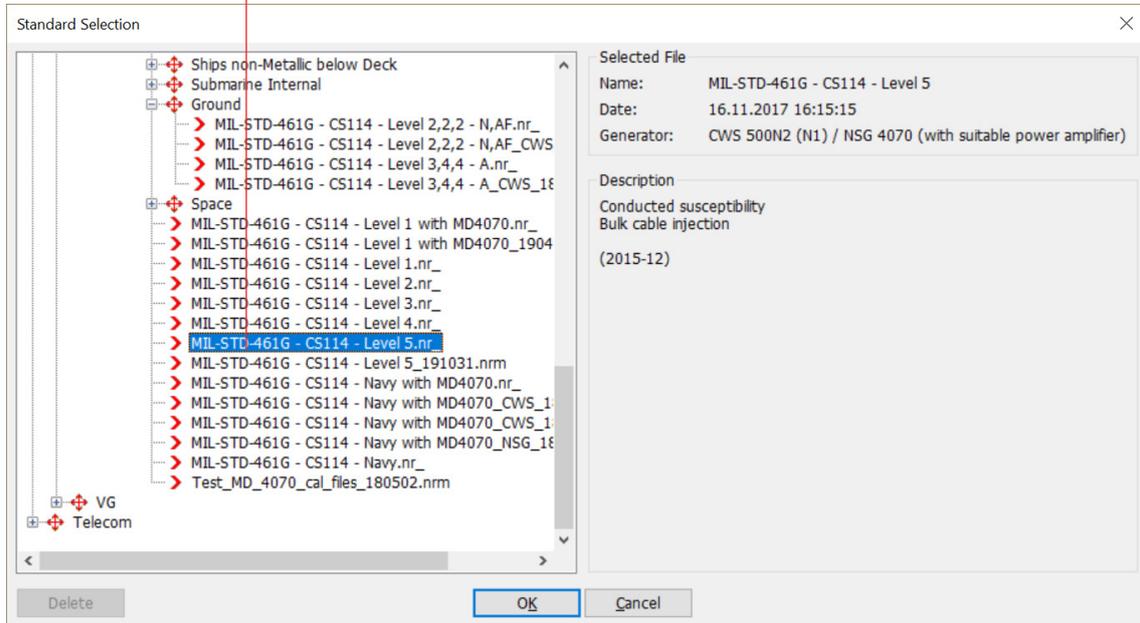
- If the hacking is set, the NSG 4070 expects the forward power at channel 2. For operation with the internal power amplifier and internal directional coupler, the hook must not be set.

1.2. Selecting and loading the test configuration



Click here to open the library.

Click here to open the configuration.

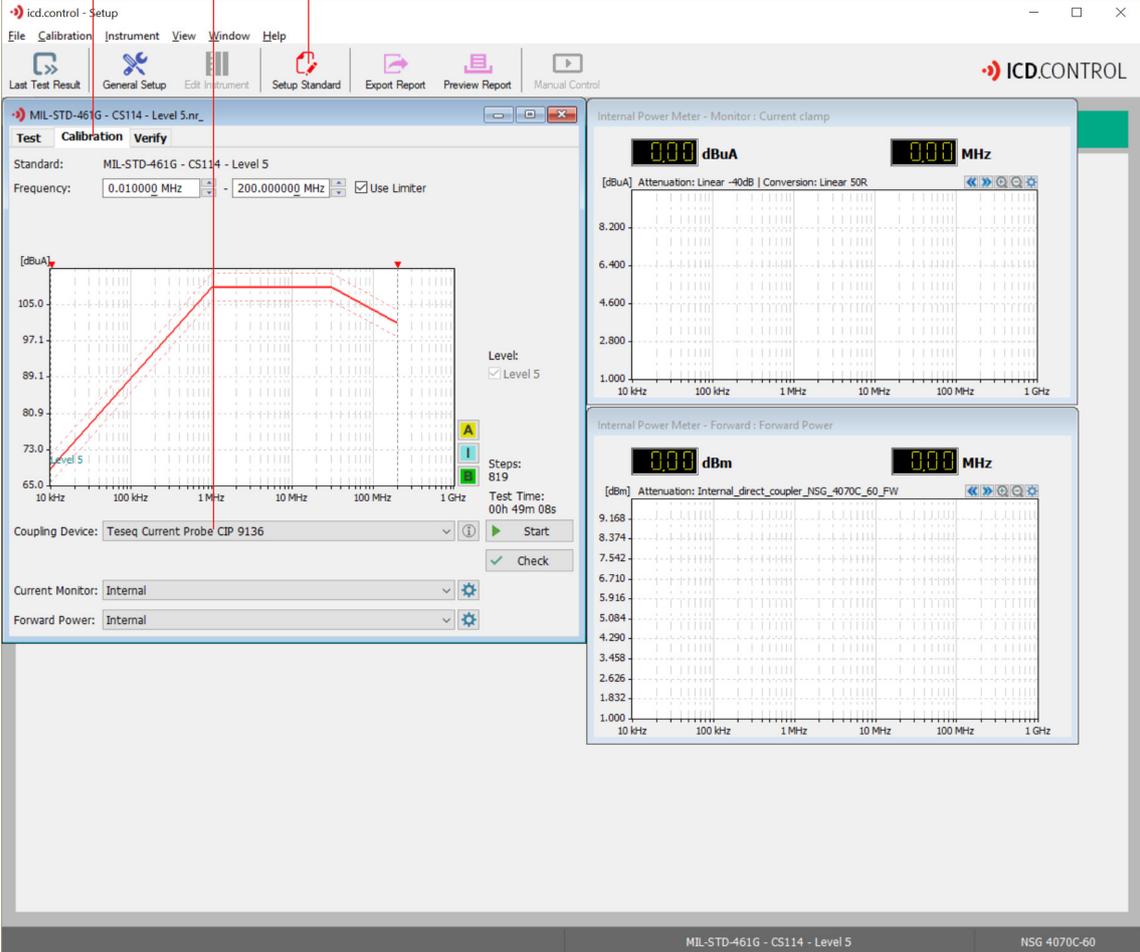


1.3. Calibration (test level adjustment)

■ Select "Calibration" to set the test level setting for the connected hardware.

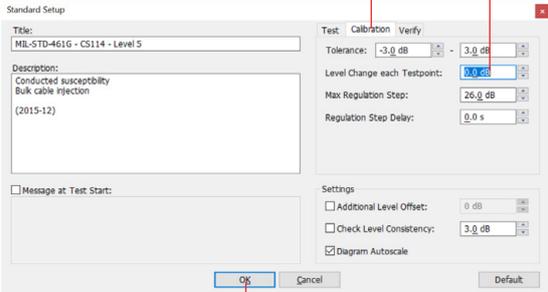
■ Select here the appropriate coupling network.

■ Select "Setup Standard" to change the basic settings for this test. See the example below.



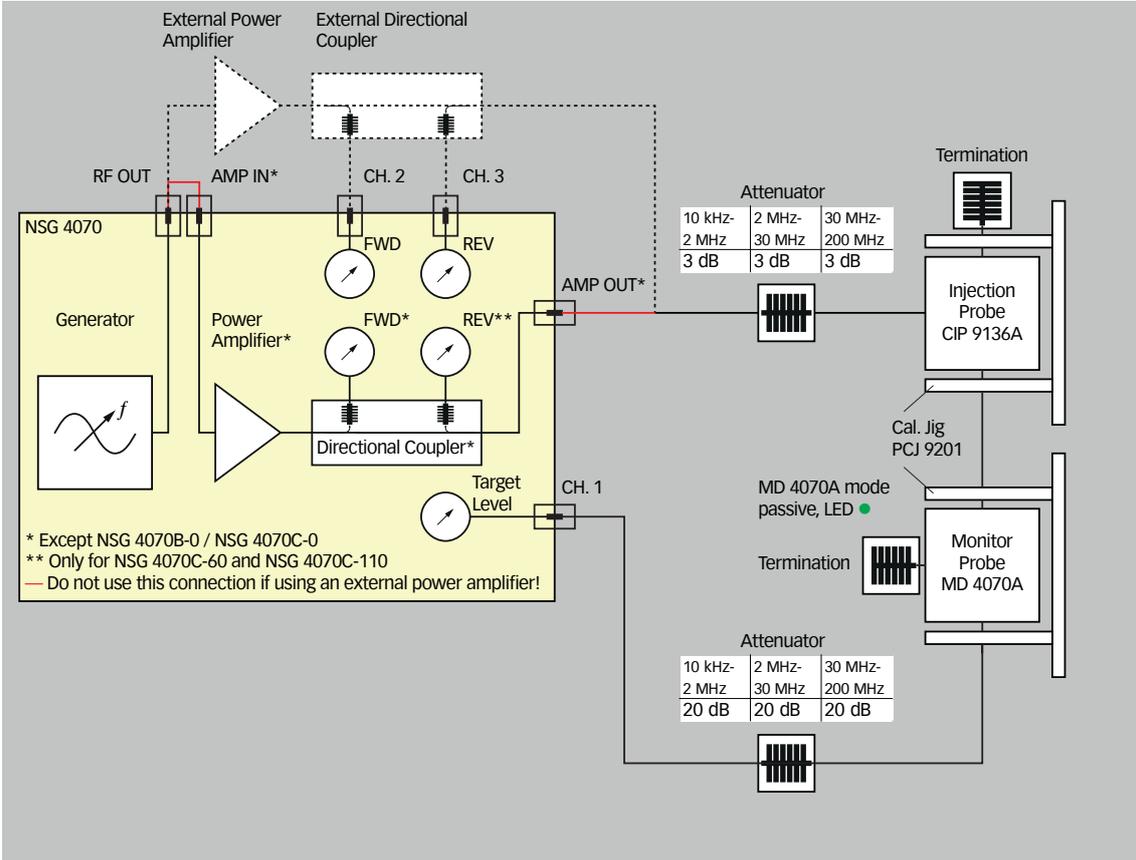
■ Choose "Calibration".

■ With a value of, for example, -6 dB, the level would be lowered by 6 dB at each frequency step and then gradually increased to the target level. A level reduction may be required by the standard. During calibration (procedure for setting the test level) these requirements do not usually exist and a value of 0 dB shortens the calibration time.

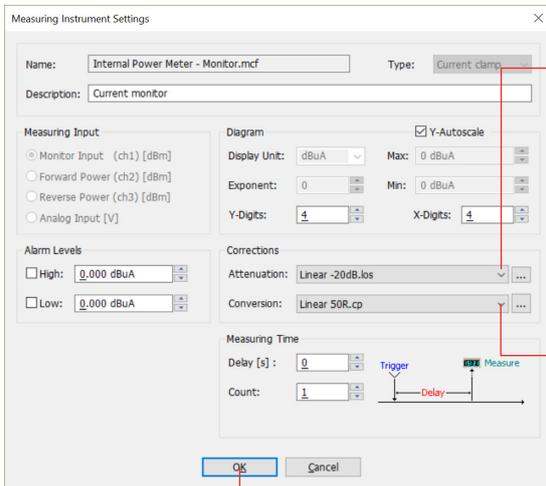
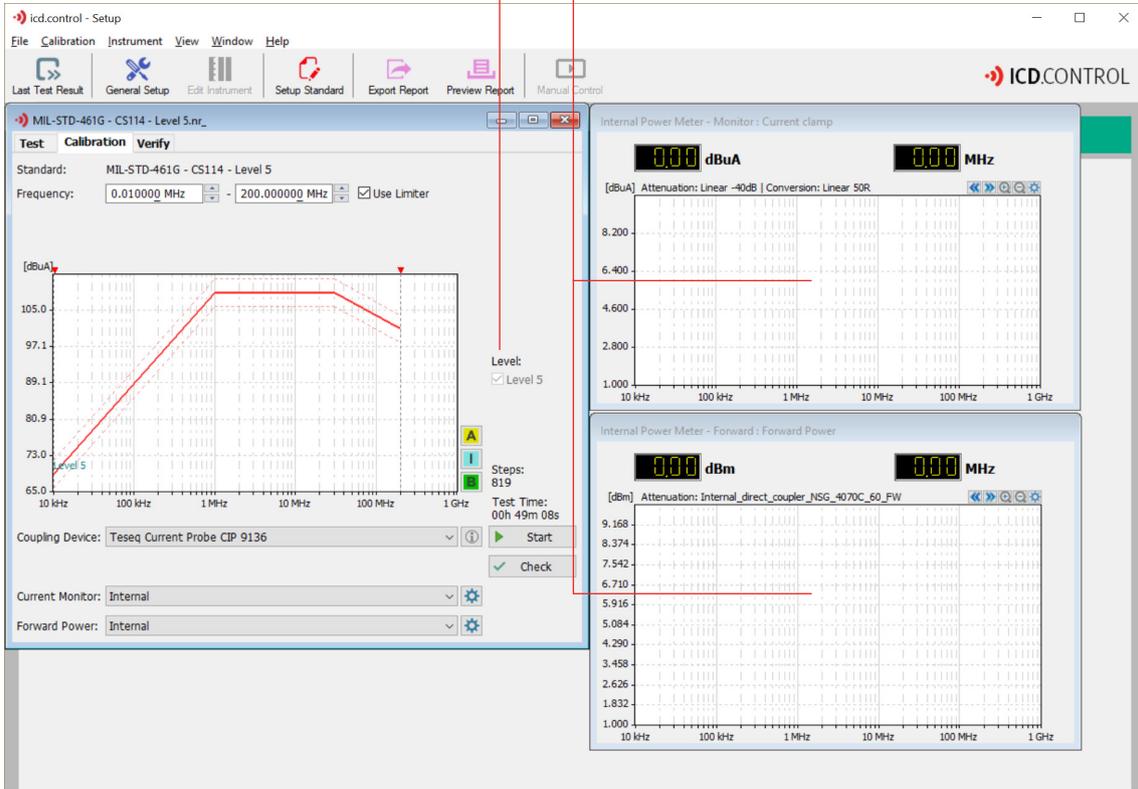


■ Click "OK" to save the settings.

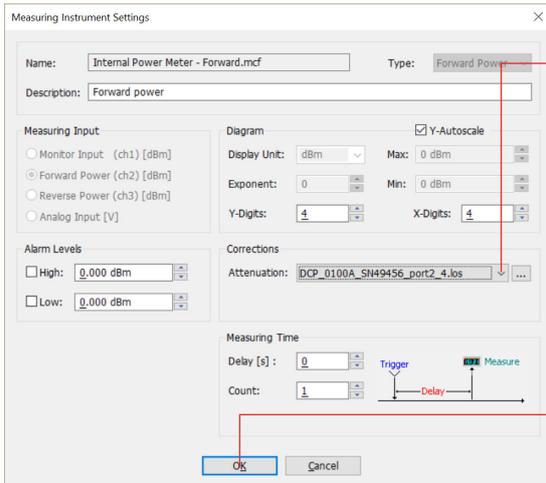
Select "View" and "Show Test Setup" to display a sample image for the test setup.



- Set the test level.
- A double-click into the diagram or a simple click on the settings symbol  opens the following menus.

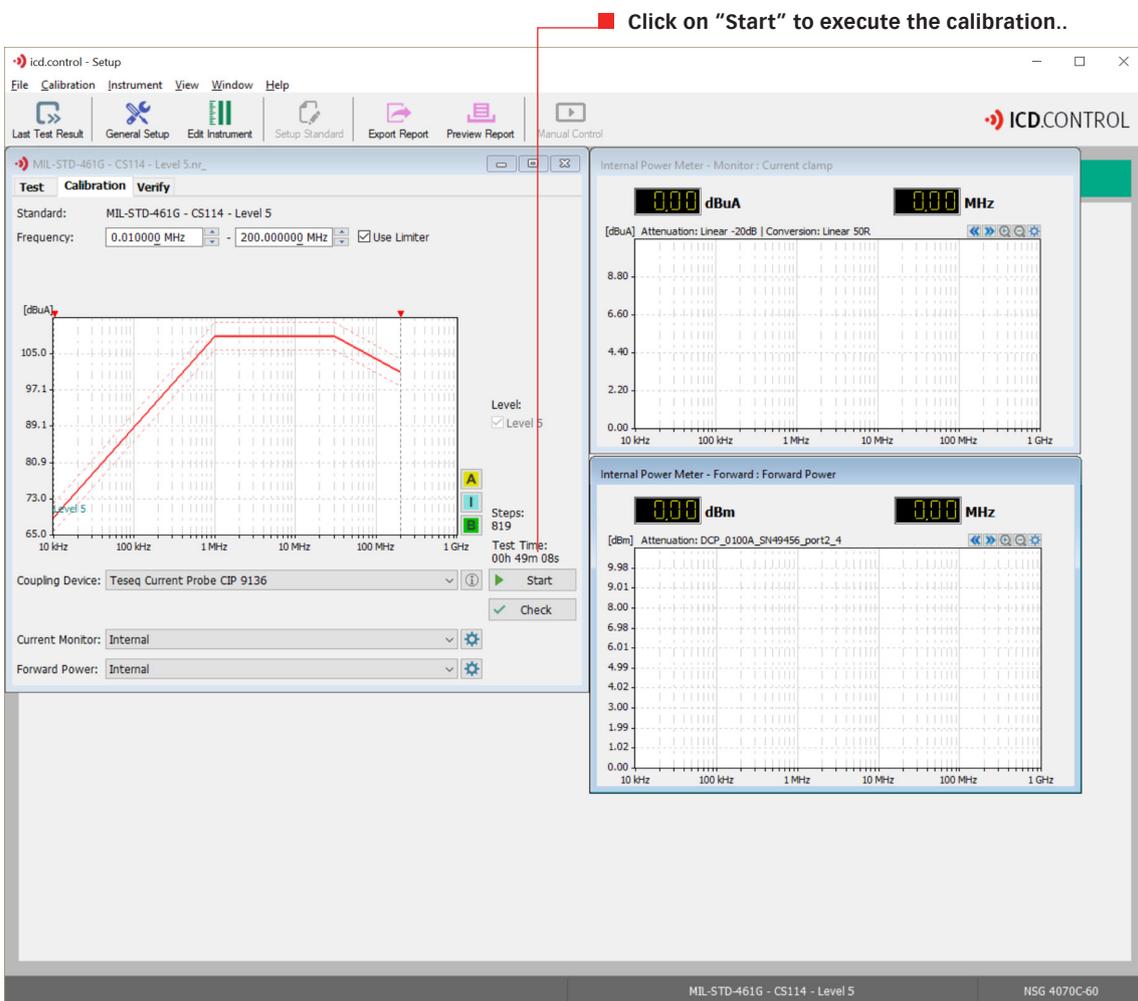


- Here, select the file containing the correction data of the attenuator connected on the power meter channel 1 of the NSG 4070, e.g. -20 dB for a 20 dB attenuator. This file can be supplemented with the attenuation values of the connected cable, recommended for long lines. For attenuation values, the software expects a minus sign before the numerical value. Clicking on the icon  opens the file.
- Select here the file which allows the correction data for current measurement in the 50 ohm jig, e.g. Linear 50R.cp. Clicking on the icon  opens the file.
- Click "OK" to save the settings.

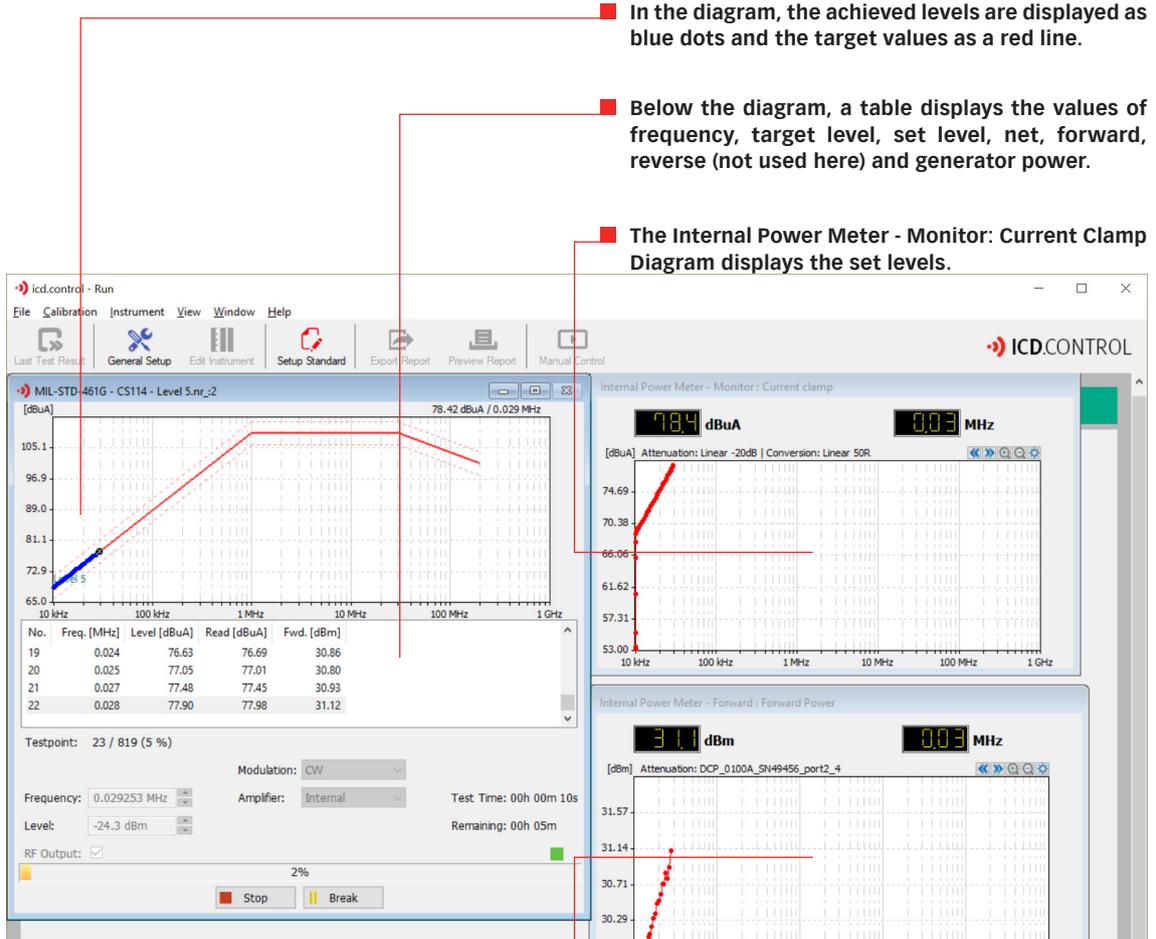


■ Select here the file containing the correction data of the internal directional coupler for measuring the forward power. For the correction data of a 40 dB directional coupler, the software expects a minus sign before the numerical value. Clicking on the icon  opens the file.

■ Click "OK" to save the settings.



■ Click on "Start" to execute the calibration..



The Internal Power Meter - Forward Power Diagram shows the required forward power for each level.

After successful calibration, the operator is prompted to save the file.

A comment can be inserted.

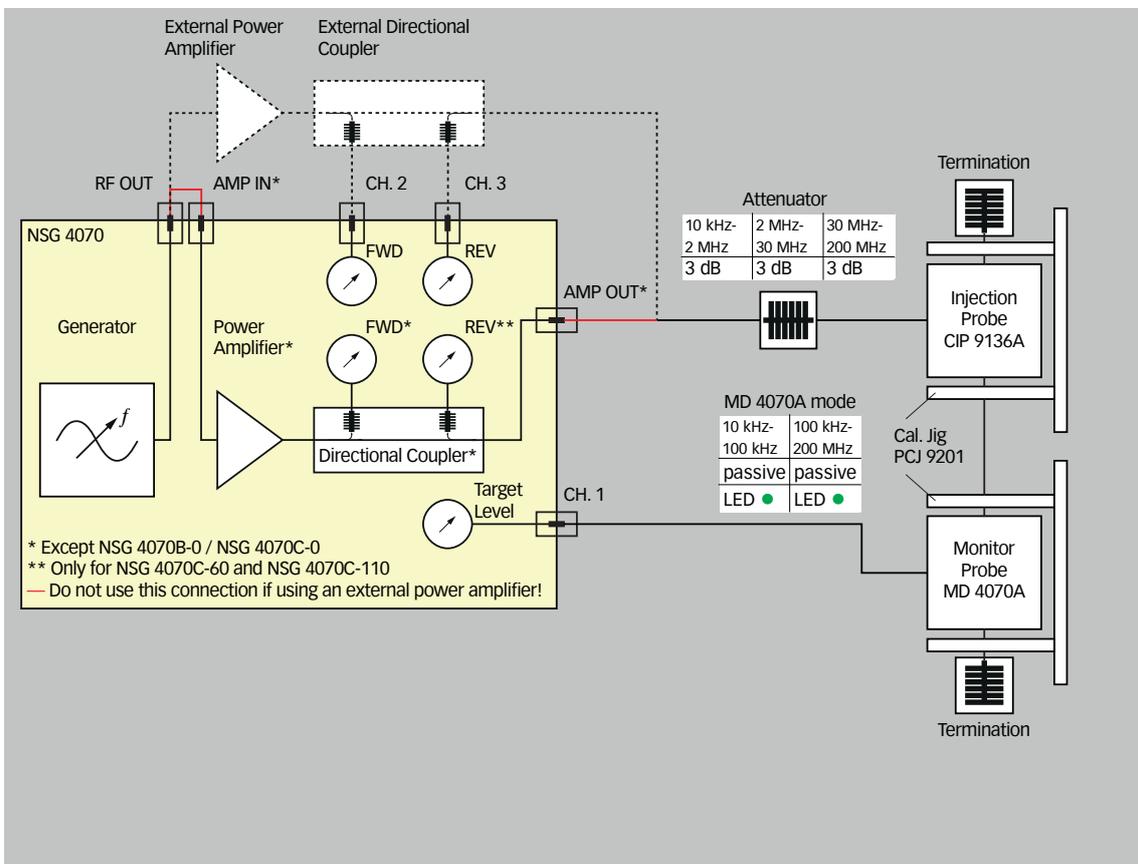
Click "Save" to save the settings.

A file name must be assigned.

Click "Save" to save the calibration.

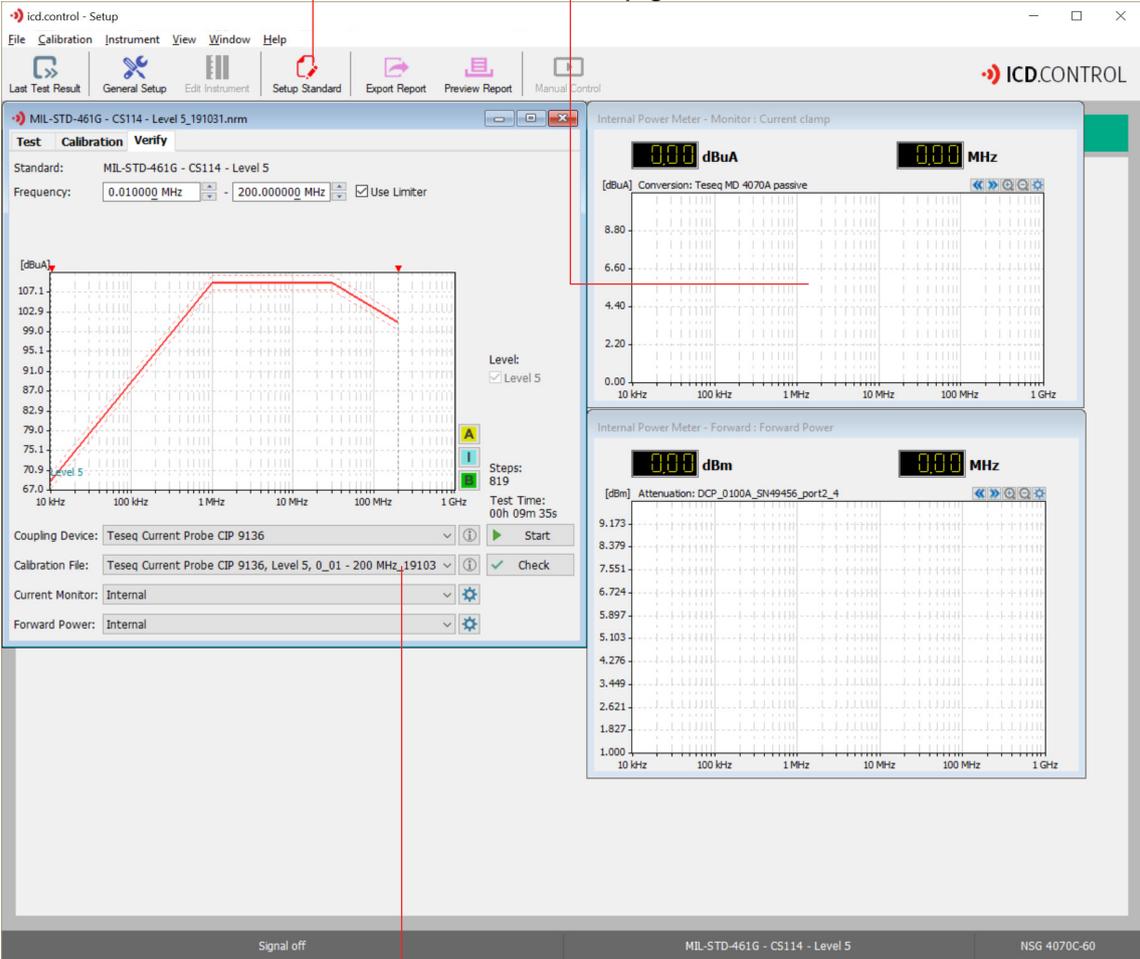
1.4. Verification

- Select "Verify" to perform the verification.
- Select "View" and "Show Test Setup" to display a sample image for the test setup.

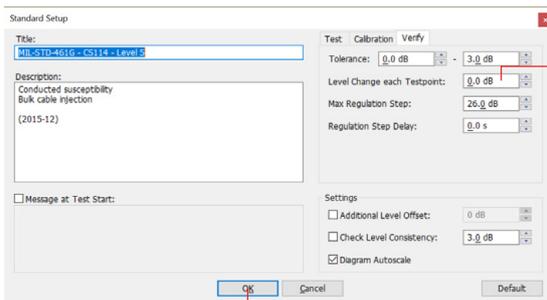


Change in setup standard eg. the lowering of the level per frequency step according to the standard specification. Click on the edge of the window if the Setup Standard switch is greyed out. See menu on the other side.

A double click into the diagram or a simple click on the settings icon  opens the following menu for selecting the MD 4070 (2nd menu on the following page)..

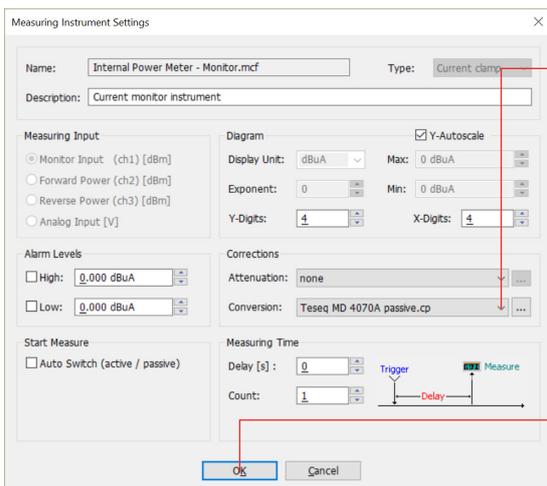


Immediately after calibration and saving the results, this file is used for verification and testing. If necessary, select another calibration file. Click on the icon  to display the content.



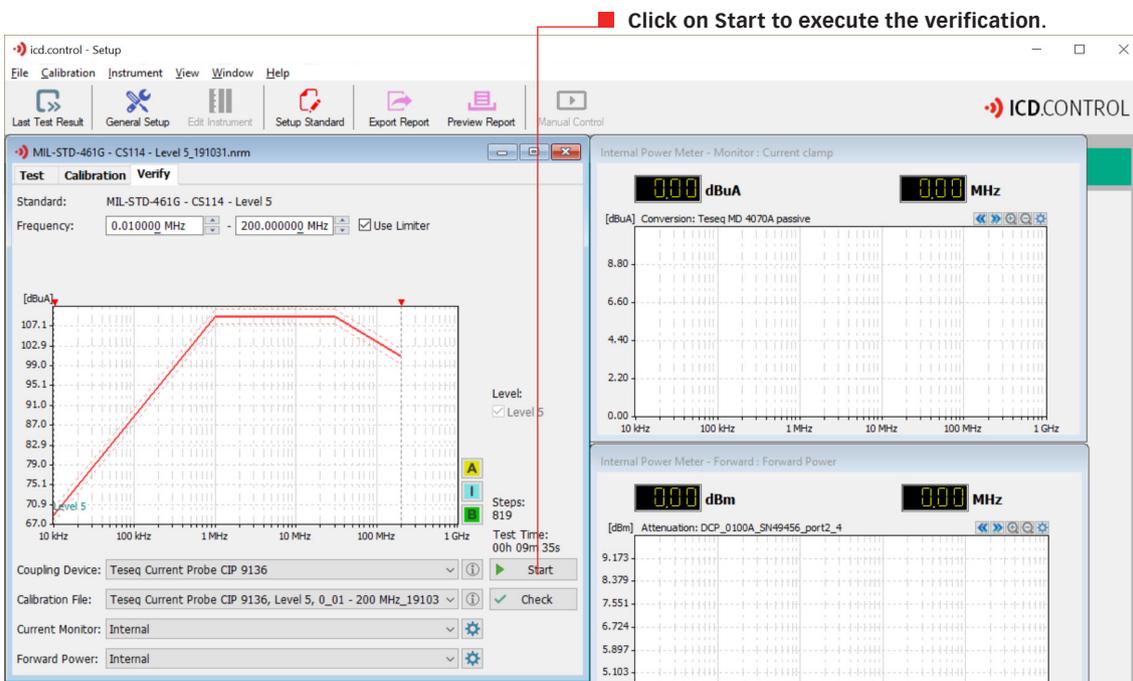
With a value of, for example, -6 dB, the level would be lowered by 6 dB at each frequency step and then gradually increased to the target level. A level reduction may be required by the standard. In the case of verification, this requirement usually does not exist and a value of 0 dB shortens the test time.

Mit Klick auf OK werden die Einstellungen gespeichert.

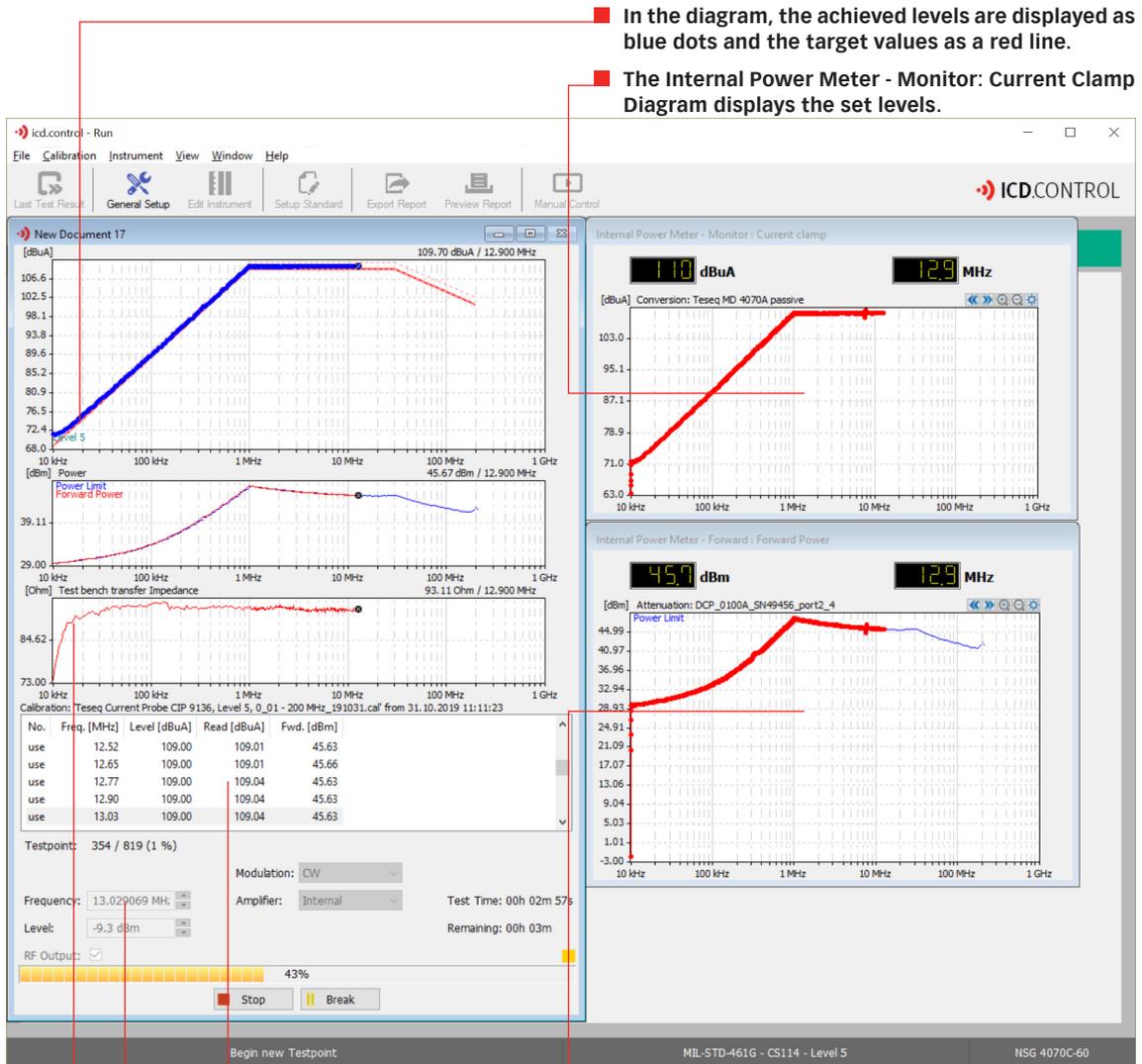


Select here the file containing the correction data of the MD 4070A for the passive mode. Clicking on the icon ... opens the file.

Click "OK" to save the settings.



Click on Start to execute the verification.



In the diagram, the achieved levels are displayed as blue dots and the target values as a red line.

The Internal Power Meter - Monitor: Current Clamp Diagram displays the set levels.

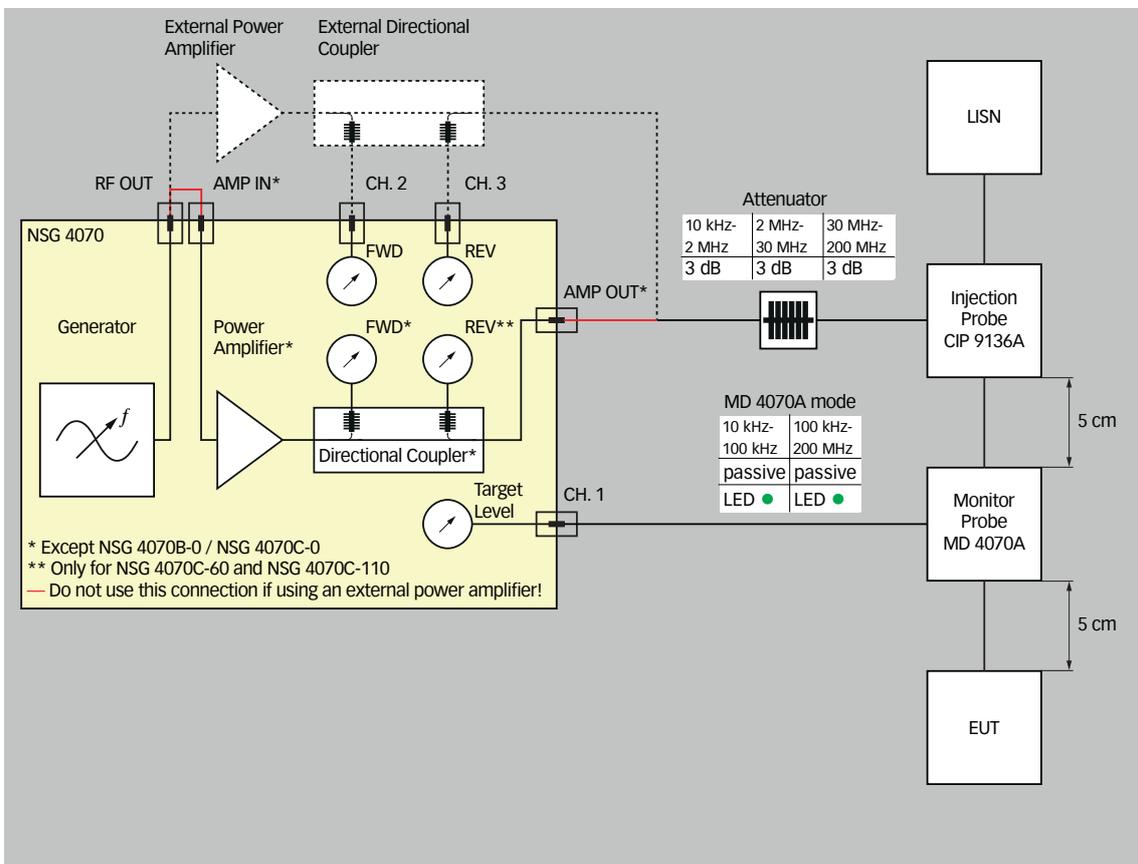
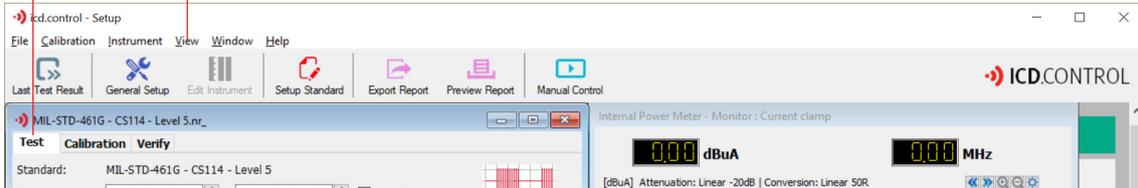
The Internal Power Meter - Forward Power Diagram shows the required forward power for each level.

The table shows the currently used values of the calibration file.

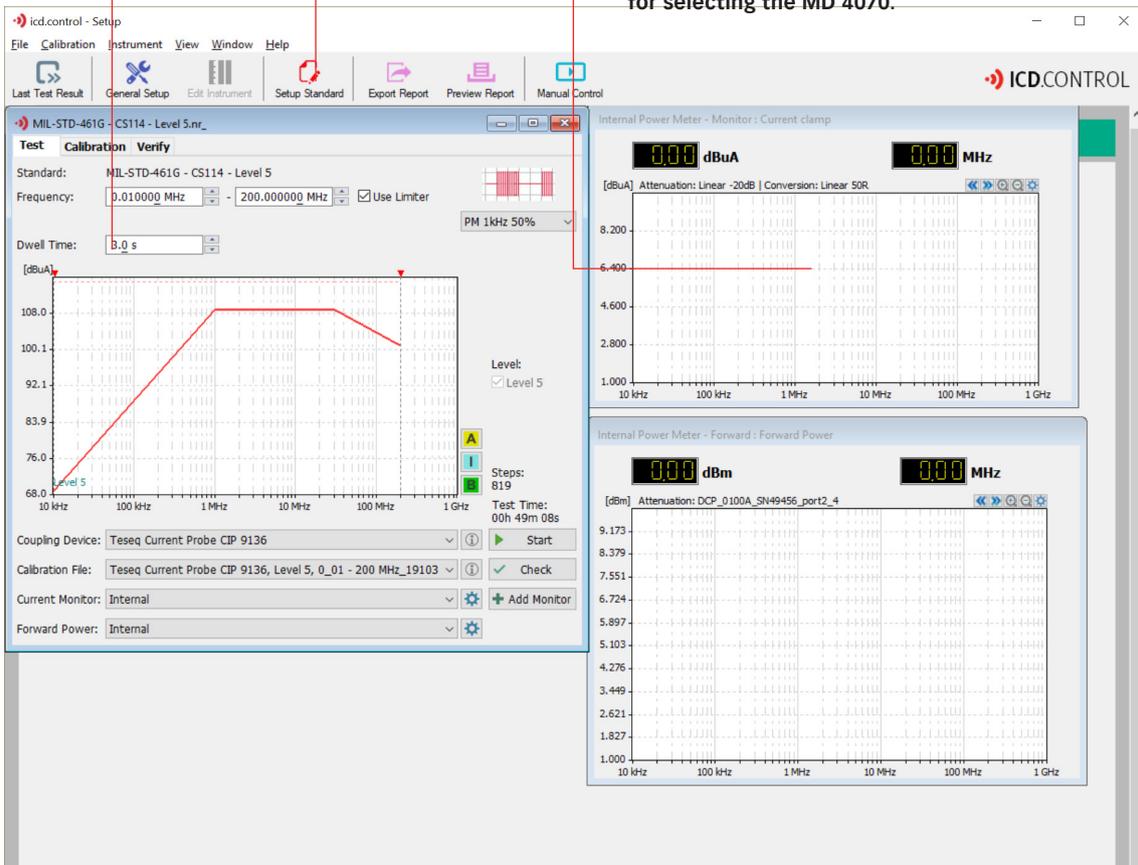
The status area displays the test time, remaining test time, dwell time, and the status of the modulation and level. The button **Break** can be used to switch directly to the manual mode, for example, to check at a specific frequency with lowered level.

The diagram "Test bench transfer impedance" shows the current impedance of the test setup. A value of 100 ohms represents the same ratios as previously calibrated. Values above 100 ohms increase the output power up to a limit of four times the calibrated power.

- Select "Test" to switch to the test mode.
- Select "View" and "Show Test Setup" to display a sample image for the test setup.

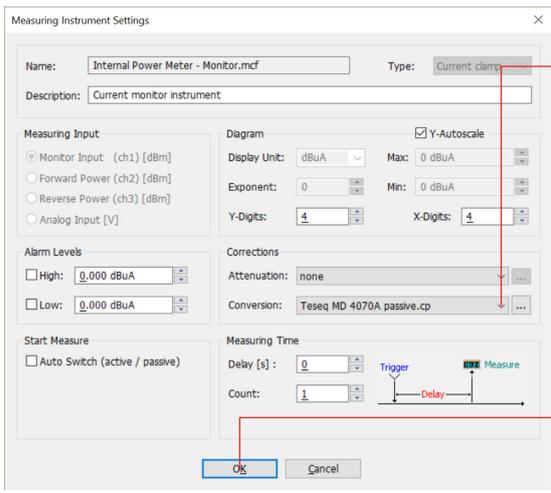


- Change the dwell time according to the standard specification.
- Change in "Setup standard" eg. the lowering of the level per frequency step according to the standard specification. Click on the edge of the window if the "Setup Standard" switch is greyed out.
- A double click into the diagram or a simple click on the settings symbol  opens the following menu for selecting the MD 4070.



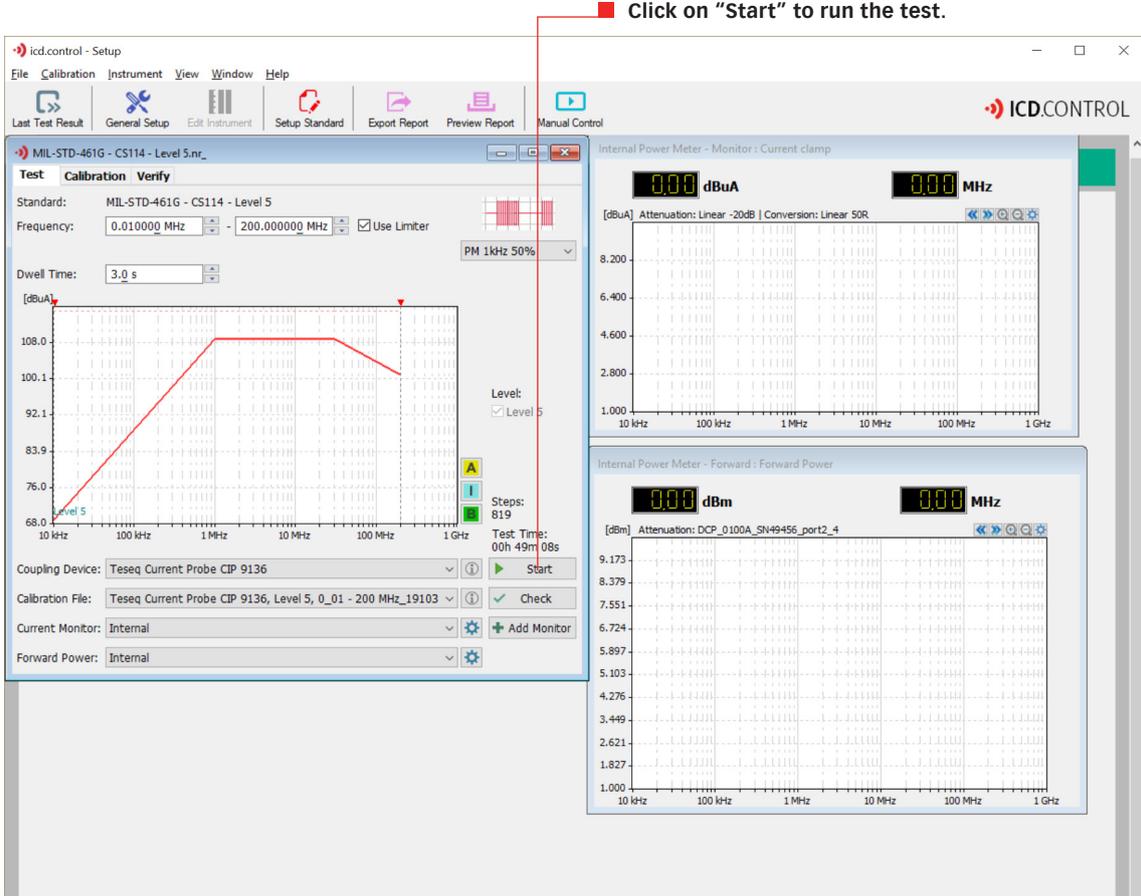
The screenshot shows the ICD.CONTROL software interface. The main window is titled "MIL-STD-461G - CS114 - Level 5.nr_". It features a menu bar (File, Calibration, Instrument, View, Window, Help) and a toolbar with icons for Last Test Result, General Setup, Edit Instrument, Setup Standard, Export Report, Preview Report, and Manual Control. The main area is divided into several sections:

- Test Calibration Verify**: Shows the standard "MIL-STD-461G - CS114 - Level 5", frequency range from 0.010000 MHz to 200.000000 MHz, and a dwell time of 0.0 s.
- Graph**: A plot of level in dBuA versus frequency from 10 kHz to 1 GHz. A red line shows the level profile, which rises from 68.0 dBuA at 10 kHz to 108.0 dBuA at 1 MHz, then drops to 92.1 dBuA at 100 MHz. A "Level 5" label is present at the start of the curve.
- Settings**: Includes "Coupling Device: Teseq Current Probe CIP 9136", "Calibration File: Teseq Current Probe CIP 9136, Level 5, 0_01 - 200 MHz 19103", "Current Monitor: Internal", and "Forward Power: Internal".
- Internal Power Meter - Monitor: Current clamp**: Shows a digital readout of 0.00 dBuA and 0.00 MHz. The graph below it shows a flat line at approximately 6.400 dBuA across the frequency range.
- Internal Power Meter - Forward: Forward Power**: Shows a digital readout of 0.00 dBm and 0.00 MHz. The graph below it shows a flat line at approximately 6.724 dBm across the frequency range.

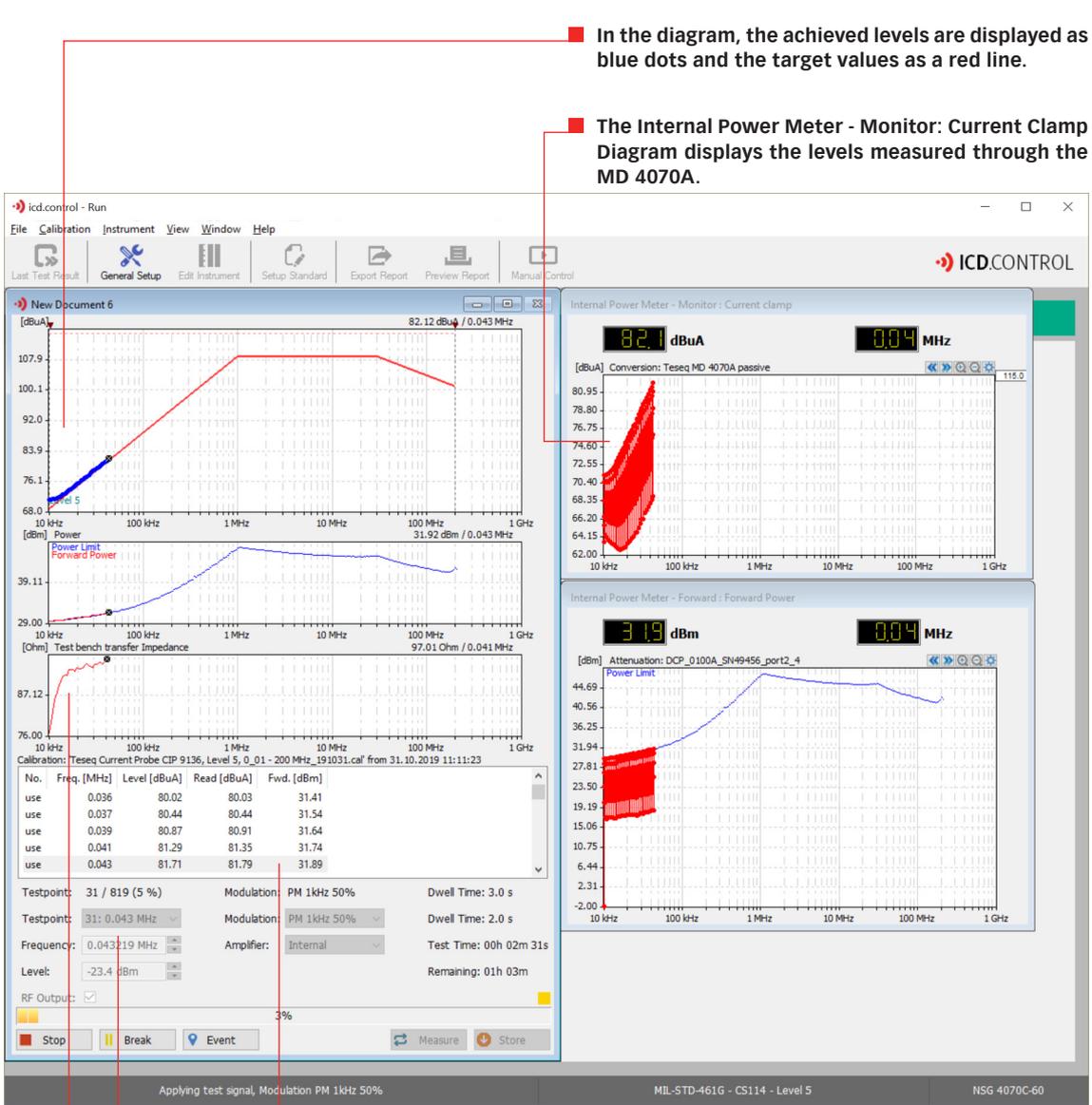


■ Select here the file containing the correction data of the MD 4070A for the passive mode. Clicking on the icon  opens the file.

■ Click "OK" to save the settings.



■ Click on "Start" to run the test.



■ In the diagram, the achieved levels are displayed as blue dots and the target values as a red line.

■ The Internal Power Meter - Monitor: Current Clamp Diagram displays the levels measured through the MD 4070A.

■ The table shows the currently used values of the calibration file.

■ The status area displays the test time, remaining test time, dwell time, and the status of the modulation and level. The button **Break** can be used to switch directly to the manual mode, for example, to check at a specific frequency with lowered level.

■ The diagram "Test bench transfer impedance" shows the current impedance of the test setup. A value of 100 ohms represents the same ratios as previously calibrated. Values above 100 ohms increase the output power up to a limit of four times the calibrated power.

1.6. Test end and report creation

■ The completion of the test run is indicated by the appearance of the "Test Event" window.

■ A comment can be inserted.

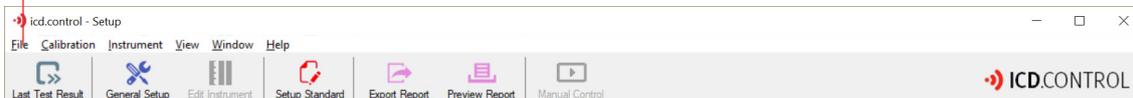
■ By clicking "Save" the generation of the test report is started.

■ Corresponding fields can be filled out and comments inserted.

■ Click on "OK" to apply the settings.

1.7. Save the configuration

■ By clicking on "File", "Save as" and assigning a file name, the settings are applied.



Manufacturer

AMETEK CTS Europe GmbH
 12623 Berlin, Germany
 Landsberger Str. 255
 T +49 30 5659 8835
 F +49 30 5659 8834
 customercare.cts@ametek.com
www.ametek-cts.com

China

**AMETEK Commercial Enterprise (Shanghai)
 Co., Ltd. Beijing Branch**
 T +8610 8526 2111
 F +8610 8526 2141
 sales.cts.cn@ametek.com

Japan

AMETEK Co., Ltd. Nagoya Office
 T +81 52 709 5501
 cts-japan.sales@ametek.com

Taiwan

AMETEK Taiwan Corp. Ltd
 T +886 3 575 0099
 taiwansales.cts@ametek.com

USA

AMETEK CTS US
 T +1 732 417 0501
 Toll free +1 888 417 0501
 usasales.cts@ametek.com

Europe

AMETEK CTS Europe GmbH
 T +49 2307 26070-0
 sales.cts.eu@ametek.com

Singapore

AMETEK Singapore Pte Ltd
 T +65 6484 2388
 singapore.sales.cts@ametek.com

To find your local partner within
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