



SOFTWARE FOR EMC IMMUNITY TESTING ICD.CONTROL

**APPLICATION NOTE
DIRCECTIONAL COUPLER**

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

CONTENT

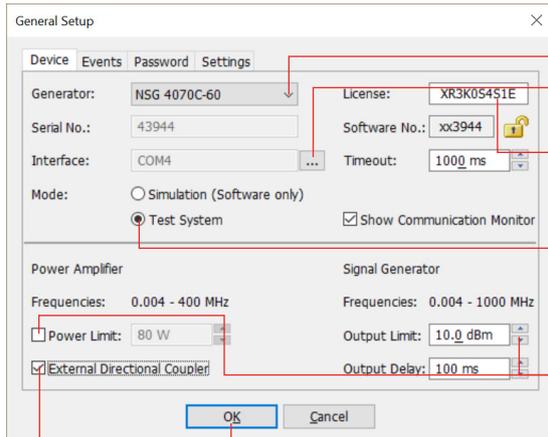
1.	Using external directional coupler and amplifier	4
1.1.	Basic Settings in the General Setup menu	4
1.2.	Create new attenuation files for the external directional coupler	5
1.3.	Selecting and loading the test configuration.....	8
1.4.	Configure the use of the correction factor for the directional coupler	9
2.	Using Internal directional coupler and amplifier	10
2.1.	Basic Settings in the General Setup menu	10
2.2.	Way 1: Read-out the internal directional coupler by using the "Device Transfer" function	11
2.3.	Way 2: Using the automatized read-out at first use.....	12

1. USING EXTERNAL DIRECTIONAL COUPLER AND AMPLIFIER

1.1. Basic Settings in the General Setup menu

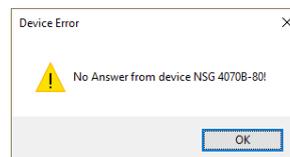


- Clicking on "General Setup" opens the generator settings menu.



- 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. Create new attenuation files for the external directional coupler

■ Copy the data you get from the calibration lab into an Excel file.

```

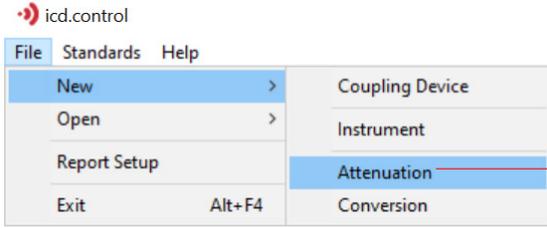
62805_CPL_DIR_2.dat - Editor
Datei Bearbeiten Format Ansicht Hilfe
DCP 0100A, SN.62805, Coupling and Directivity
frequency in MHz;Coupling attenuation Gate 2-4;Directivity Gate 1-4
0.009;40.0412;27.0738
0.01;40.0375;27.4795
0.02;40.0392;29.4836
0.03;40.0146;30.0344
0.04;40.034;30.1988
0.05;39.9688;30.3947
0.06;40.0093;30.5429
    
```

■ Convert the data to have the frequency in MHz and attenuation factor in dB (S21 values). Copy the data to the clipboard (Data in columns E and F for this example).

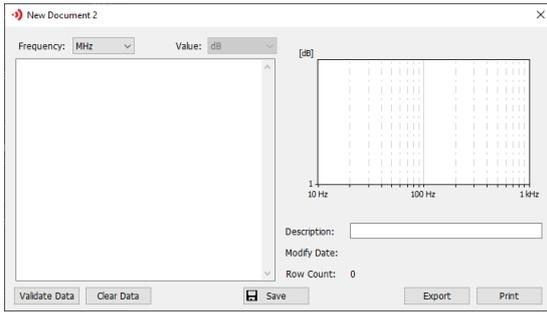
A	B	C	D	E	F
DCP 0100A, SN.62805, Coupling and Directivity					
frequency in MHz;Coupling att;Directivity Gate 1-4					
0.009	40.0412	27.0738		0.009	-40.0412
0.01	40.0375	27.4795		0.01	-40.0375
0.02	40.0392	29.4836		0.02	-40.0392
0.03	40.0146	30.0344		0.03	-40.0146
0.04	40.034	30.1988		0.04	-40.034
0.05	39.9688	30.3947		0.05	-39.9688
0.06	40.0093	30.5429		0.06	-40.0093
0.07	40.0264	30.4867		0.07	-40.0264
0.08	40.0255	30.6093		0.08	-40.0255
0.09	40.0316	30.5679		0.09	-40.0316
0.1	39.9755	30.6569		0.1	-39.9755
0.2	40.0258	30.8195		0.2	-40.0258
0.3	40.0004	30.9625		0.3	-40.0004



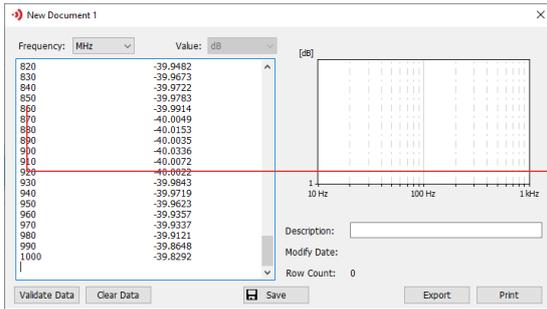
■ Select "File".



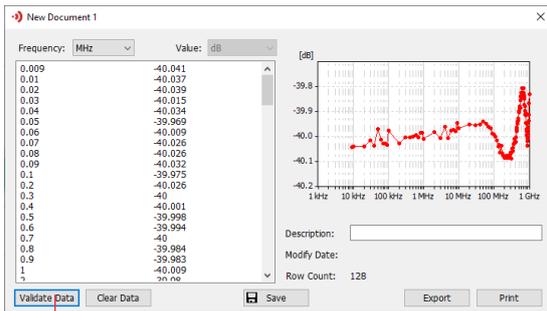
■ Select "Attenuation".

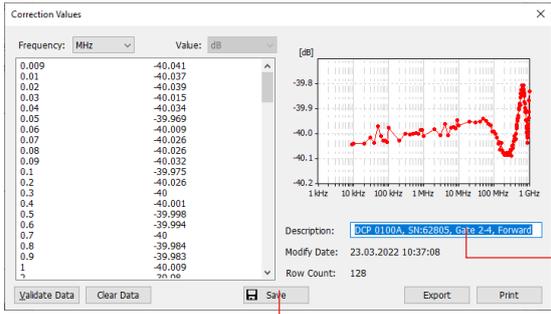


■ Set the cursor in this field. Paste the data from the clipboard.



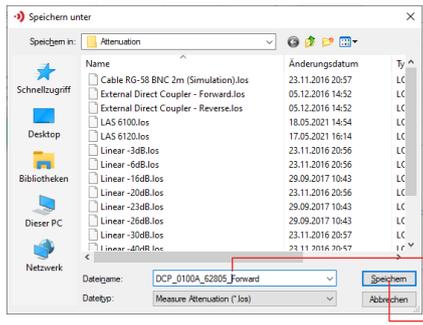
■ Press "Validate Data".





■ Add a description.

■ Press "Save".



■ Give a proper file name.

■ Press "Save".

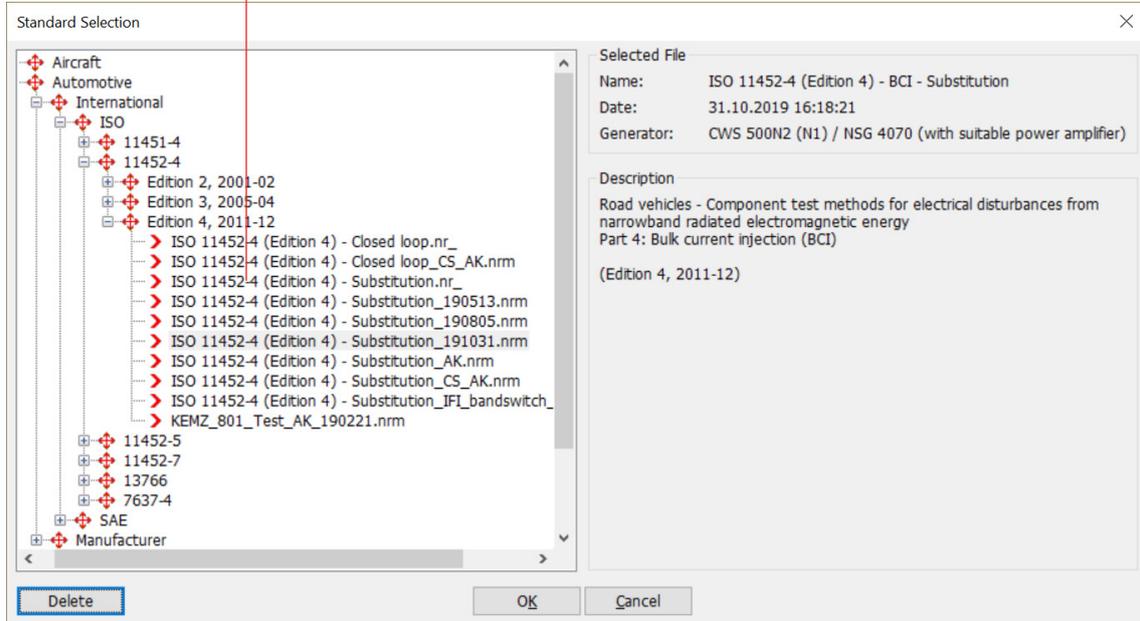
The procedure must also be carried out for the other channel e.g. to measure the reverse power.

1.3. Selecting and loading the test configuration



Click here to open the library.

Click here to open the configuration.



1.4. Configure the use of the correction factor for the directional coupler

■ Select "Calibration" first. Please note, it needs to be done also for "Test".

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

The screenshot displays the ICD.CONTROL software interface. The main window is titled 'ISO 11452-4 Edition 4 - Substitution_191031.nrm' and is in the 'Calibration' tab. It shows test parameters: Standard: ISO 11452-4 (Edition 4) - BCI - Substitution, Frequency: 1.000000 MHz to 400.000000 MHz, Step: 2.00%. A graph shows a current level of 200 mA. Below the graph are settings for Coupling Device (Teseq Current Probe CIP 9136), Current Monitor (Internal), Forward Power (Internal), and Reverse Power (None). To the right, two monitoring windows are visible: 'Internal Power Meter - Monitor: Current clamp' showing a graph of current [mA] vs frequency [MHz], and 'Internal Power Meter - Forward: Forward Power' showing a graph of power [dBm] vs frequency [MHz].

The 'Measuring Instrument Settings' dialog box is shown. It has the following fields and options: Name: Internal Power Meter - Forward.mcf, Type: Forward Power, Description: Forward power, Measuring Input: Forward Power (ch2) [dBm], Diagram: Y-Autoscale checked, Display Unit: dBm, Max: 0 dBm, Exponent: 0, Min: 0 dBm, Y-Digits: 4, X-Digits: 4, Corrections: DCP_0100A_SN49456_port2_4.los, Alarm Levels: High: 0.000 dBm, Low: 0.000 dBm, Measuring Time: Delay [s]: 0, Count: 1. The 'OK' button is highlighted at the bottom.

■ Select here the file which contains the correction data for the path used for measuring the forward power of the external directional coupler. Clicking on the icon  opens the file.

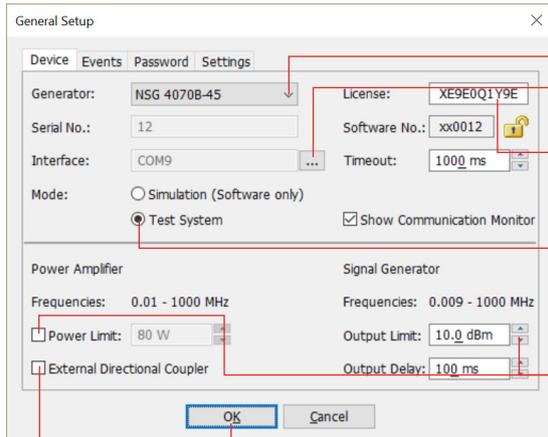
■ Click "OK" to save the settings.

2. USING INTERNAL DIRECTIONAL COUPLER AND AMPLIFIER

2.1. Basic Settings in the General Setup menu

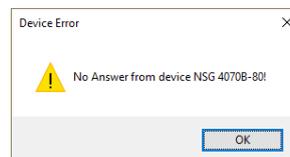


- Clicking on "General Setup" opens the generator settings menu.



- Select the appropriate generator model.
- If necessary, configure the interface.
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- 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.
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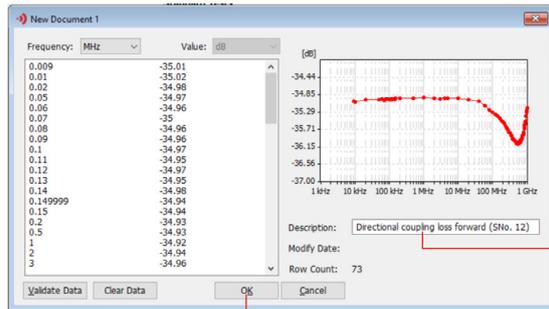
2.2. Way 1: Read-out the internal directional coupler by using the “Device Transfer” function



ATTENTION: Way 2 offers more comfort and goes faster.

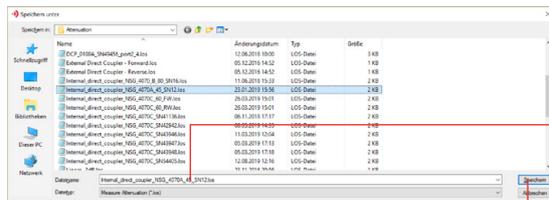


- Click on “Device Transfer” to read the directional coupler data of the NSG 4070 and open the following window.



- A comment can be inserted or changed.

- Clicking on “OK” allows the program to assign a file name.



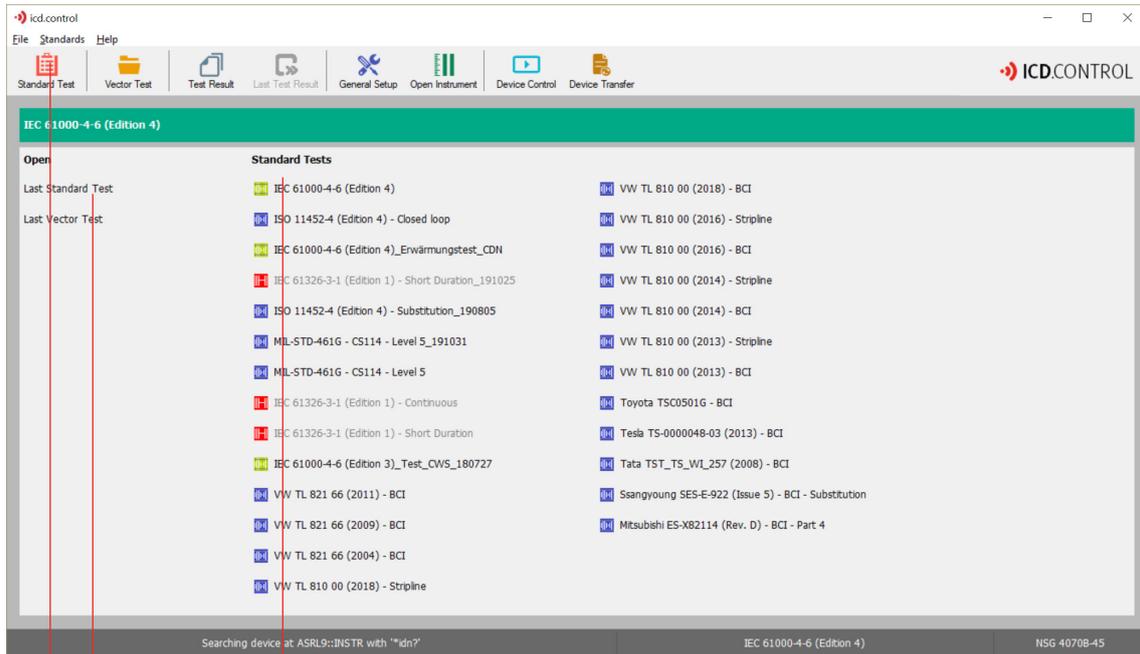
- A file name must be assigned. You can overwrite the content of Teseq NSG 4070 - Forward Coupler internal.los. This file is used by default. Please leave the file name as it is.

- Click on “Save”.



ATTENTION: Do similar for the reverse power measurement (requires NSG 4070C-60 or NSG 4070C-110).

2.3. Way 2: Using the automatized read-out at first use

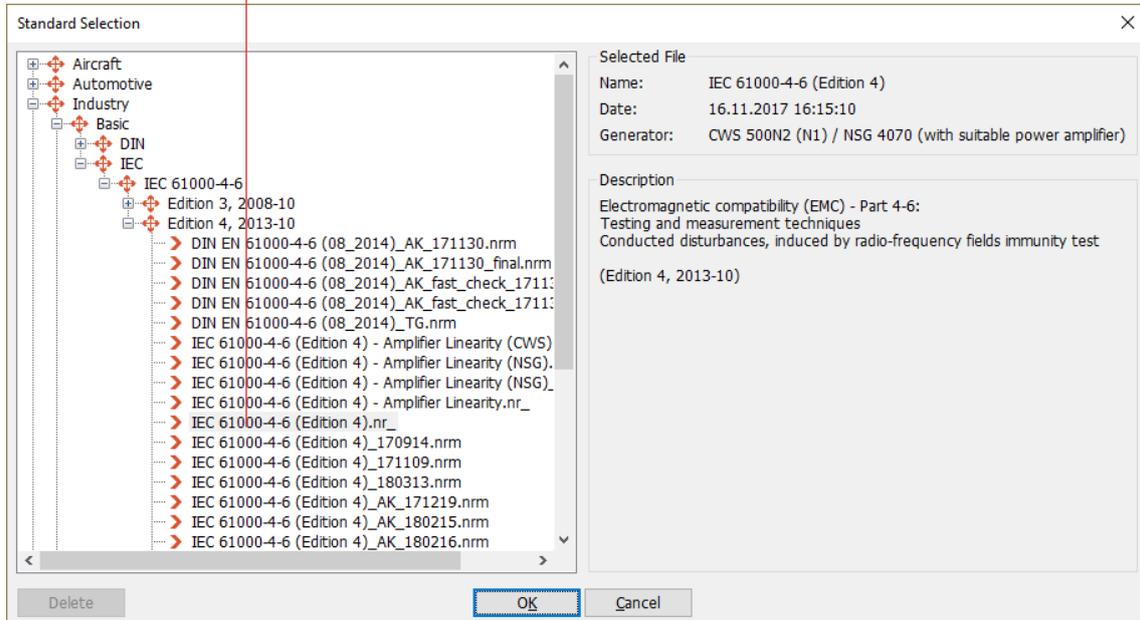


■ Click here to reopen a previously used test.

■ Click here to open the last standard or vector test.

■ Click here to open the library.

■ Click here to open the configuration.

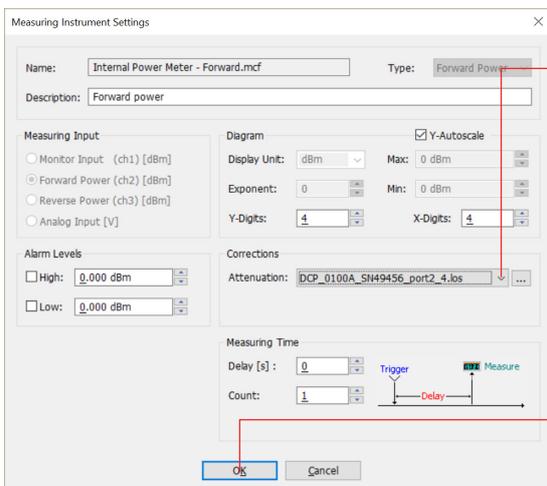


■ Select "Calibration" first. Please note, it needs to be done also for "Test".

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



■ A file name must be assigned. You can overwrite the content of Teseq NSG 4070 - Forward Coupler internal.los. This file is used by default.



■ Select here the file Teseq NSG 4070 - Forward Coupler internal.los. This file is used by default. Clicking on the icon  opens the file. The file content will be overwritten by first start with the data loaded from the connected NSG 4070.

■ Click "OK" to save the settings.



ATTENTION: Do similar for the reverse power measurement (requires NSG 4070C-60 or NSG 4070C-110).

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

■ Click „Yes” and the file content of the file Teseq NSG 4070 - Forward Coupler internal.los will be filled with the correction data from the NSG 4070. The same happens with NSG 4070C-60 and NSG 4070C-110 in case of the file Teseq NSG 4070 - Reverse Coupler internal.los

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