
User Manual

PMM

IMMUNITY SUITE

DATA ACQUISITION PROGRAM FOR RADIATED & CONDUCTED IMMUNITY TESTS

INSTRUMENT SERIAL NUMBER

The release number is located on the top title bar of the main window.
The version number appears as "Rel. X.XX" (month.year).

NOTE:

® Names and Logo are registered trademarks of Narda Safety Test Solutions GmbH – Trade names are trademarks of the owners.

Before using this product, the related documentation must be read with great care and fully understood to familiarize with all the safety prescriptions.

To ensure the correct use and the maximum safety level, the User shall know all the instructions and recommendations contained in this document.

The information contained in this document is subject to change without notice.

KEY TO THE SYMBOLS USED IN THIS DOCUMENT:



The **DANGER** sign draws attention to a serious risk to a person's safety, which, if not avoided, will result in death or serious injury. All the precautions must be fully understood and applied before proceeding.



The **WARNING** sign indicates a hazardous situation, which, if not avoided, could result in death or serious injury. All the precautions must be fully understood and applied before proceeding.



The **CAUTION** sign indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.



The **NOTICE** sign draws attention to a potential risk of damage to the apparatus or loss of data.



The **NOTE** sign draws attention to important information.

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1 – Installing the program

1.1 Introduction

Technological advancements and the increasingly widespread use of electronic equipment for telecommunications, data processing, industrial automation, etc. have led to a growing new field: *electromagnetic compatibility (EMC)*. Because many devices work in close contact with one another, they can generate electromagnetic interference and may therefore work less effectively. The PMM Immunity Test program will check for this on the basis of your equipment, setup and operating procedures.

1.2 Hardware requirements

- Pentium III processor
- At least 256 MB RAM
- At least 50 MB free hard disk space
- USB or RS232 port (or Bluetooth with optional adaptor)
- Windows™ 2000/XP/Vista operating system



Updates can be downloaded from www.narda-sts.it or obtained directly from our sales department.

1.3 Installation

The program has to be installed on the hard disk before using it. Go to My Computer, browse the Software Media and double-click the file **PMM Immunity Suite Setup.exe**.

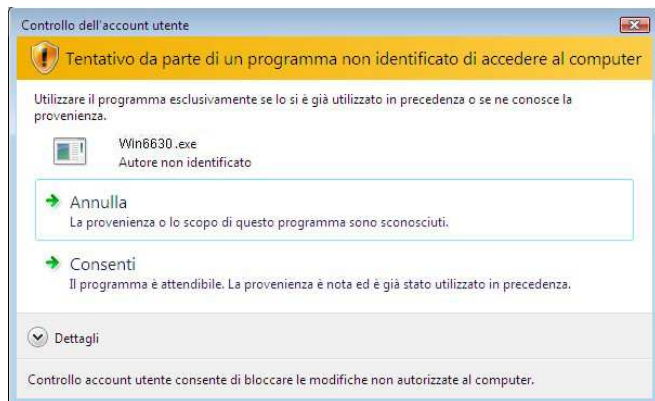


You can exit the installation by selecting **Cancel**. The following confirmation message will appear:

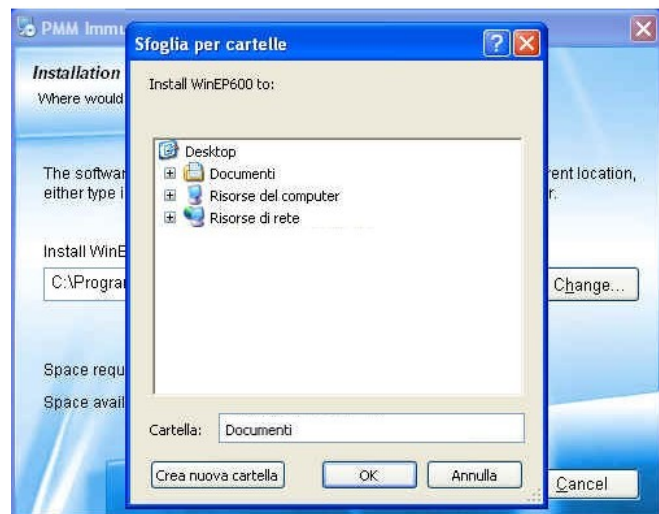
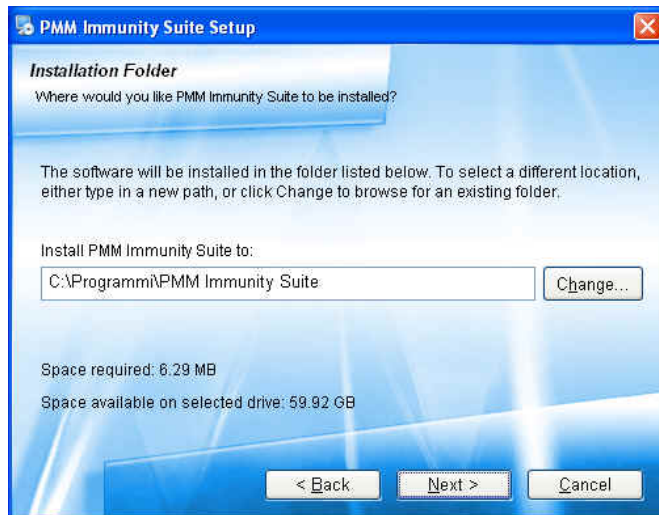




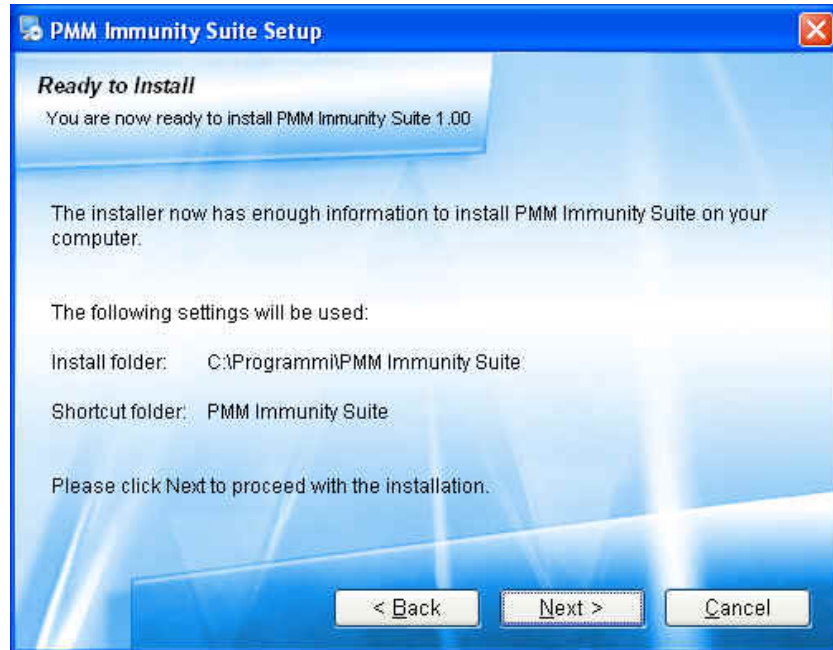
In Windows Vista, most programs are blocked to protect your computer. To start the installation, you may need to allow the program to communicate.



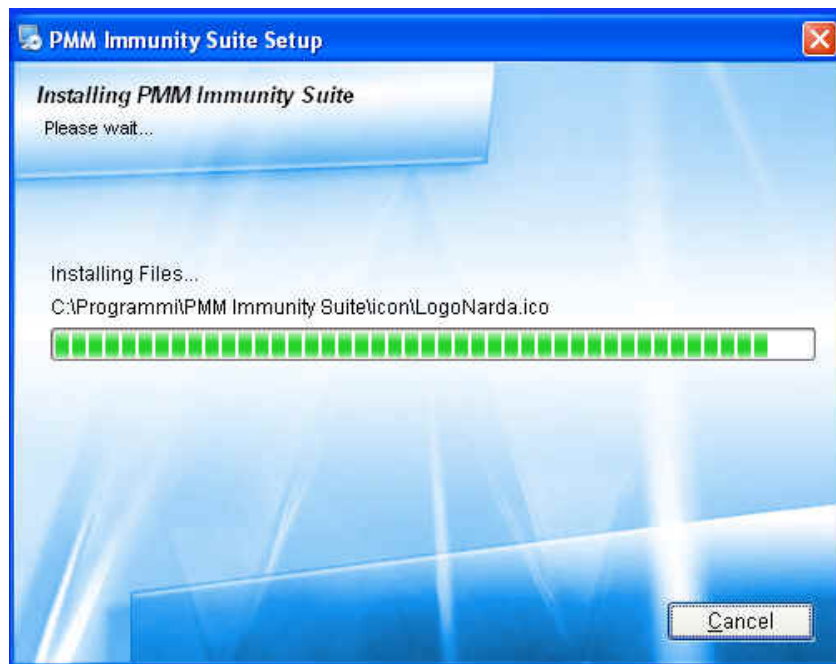
The program will ask you to confirm the installation folder. Choose **Next** to confirm the default directory, or **Change** to select a different folder.



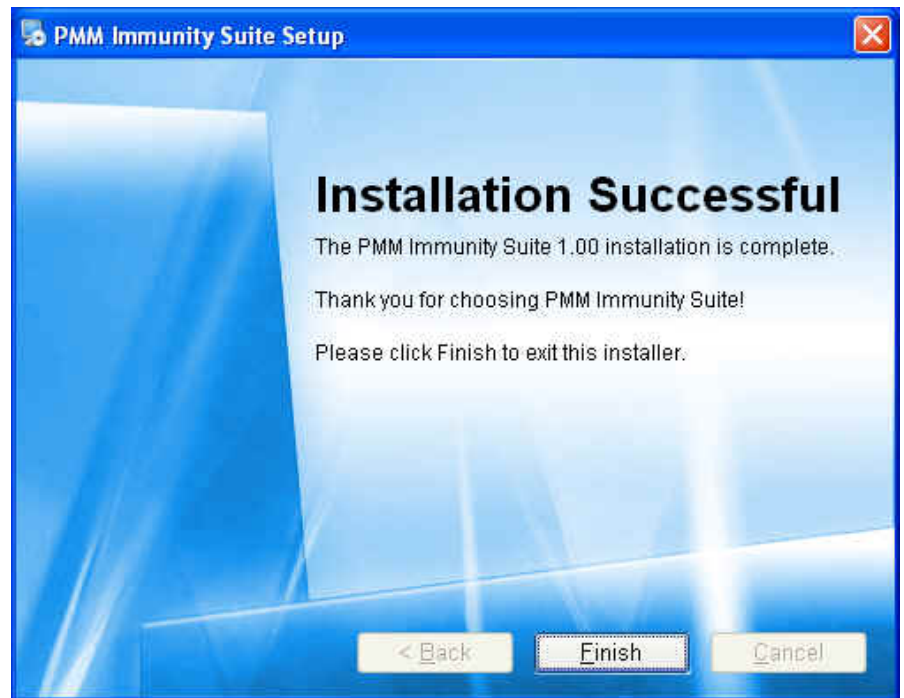
The software is now ready to be installed. Click **Next** to continue the installation.



A status window will appear, showing the percentage of files copied into the specified folder.



Once notified that the installation was successful, click **Finish** to complete the process. The folder **PMM Immunity Suite** will be created in your **Programs** folder.




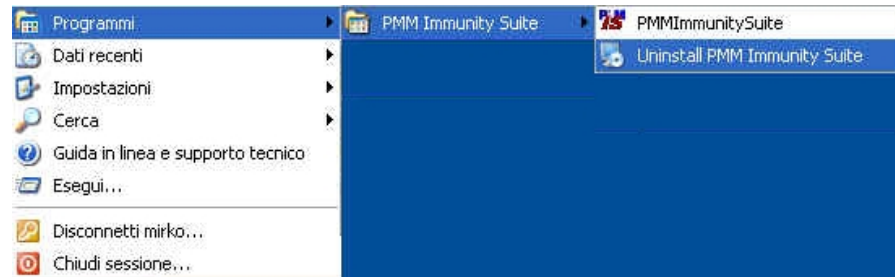
A shortcut will appear on your desktop to allow easy access to the program.



Removal

The recommended procedure for uninstalling the program is as follows: Disconnect the devices attached to the computer. In Windows XP, click

Start (in Windows Vista click the ) then **All Programs**, place the cursor on **PMM Immunity Suite**, and click **Uninstall PMM Immunity Suite**.

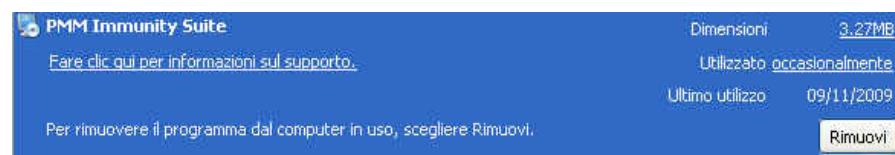


The program can also be uninstalled using the Control Panel.



Use this method if the Uninstall option is not available from Start -> All Programs.

Disconnect the devices attached to the computer. Click **Start, Control Panel, Programs and Features** (in Windows Vista). Select the program from the application list and click **Remove**.



Follow the instructions displayed on the screen.



When you are prompted to remove shared files, select No. If these files are deleted, other programs that use them may not work properly..

2 – Run the program



Before running the program, we recommend limiting the number of applications in use.

You can now start the program using the desktop icon.



or, from the Windows XP **Start** button, selecting **All Programs->PMM Immunity Suite->PMM Immunity Suite**.



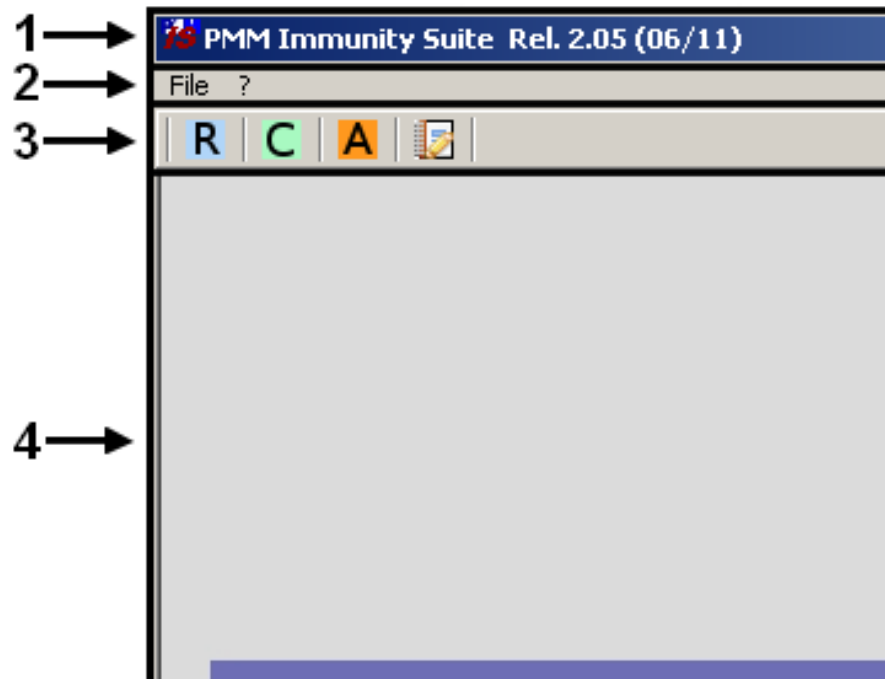
In Windows Vista, click the **Windows icon** () , then **All Programs->PMM Immunity Suite->PMM Immunity Suite**.

The title screen appears:



2.1 User interface

The title screen is followed by this interface:



The interface contains:

1. Title bar
2. Menu
3. Selection buttons
4. Main window

These are described in greater detail below.

2.1.1 Title bar

From left to right, the title bar presents the icon, the name of the program, and its release. The date and year of the release are shown in parentheses.



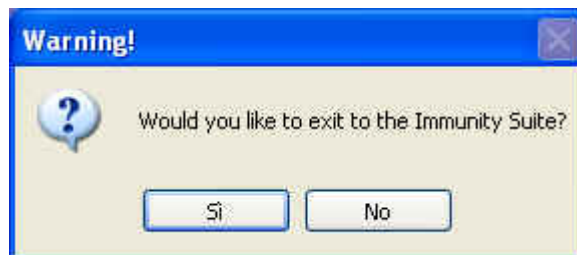
The window control buttons (minimize/maximize/close) are also available.



If the main window is minimized, the information will be displayed on the Windows taskbar at the bottom of the screen.



The program can be closed at any time, and the following confirmation message will appear:



2.1.2 Menù

The main menu contains these commands:

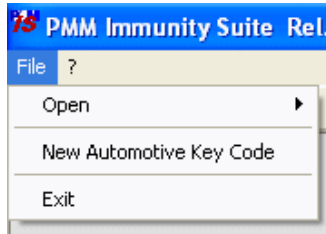


- **File:**

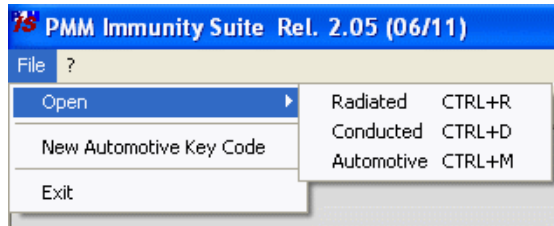
- **? (Info):**

2.1.2.1 File

The **File** dropdown menu includes:



- **Open:** Opens a new work session in Radiated or Conducted or Automotive mode.



- **New Automotive Key Code:**


- **Exit:** Exits the program at any time (subject to confirmation):

2.1.2.2 ? (Info)

The **?** dropdown menu includes:



- **About:** Information on the program creator and customer support.





Press  to close the window



2.1.3 Selection buttons



A new work session can also be opened using the selection buttons under the main menu. The third button activates the Editor.

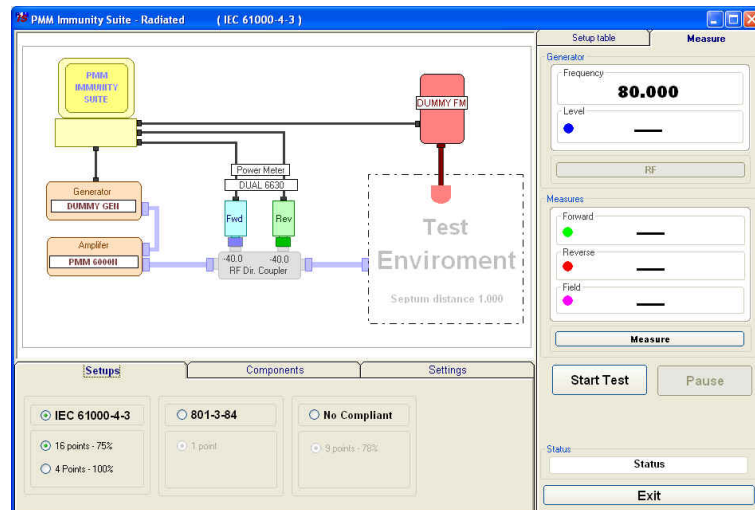
- Select  to open a new session in Radiated mode.
- Select  to open a new session in Conducted mode.
- Select  to open a new session in Automotive mode.
- Select  to open the Editor.

Detailed instructions for the different modes are provided below.

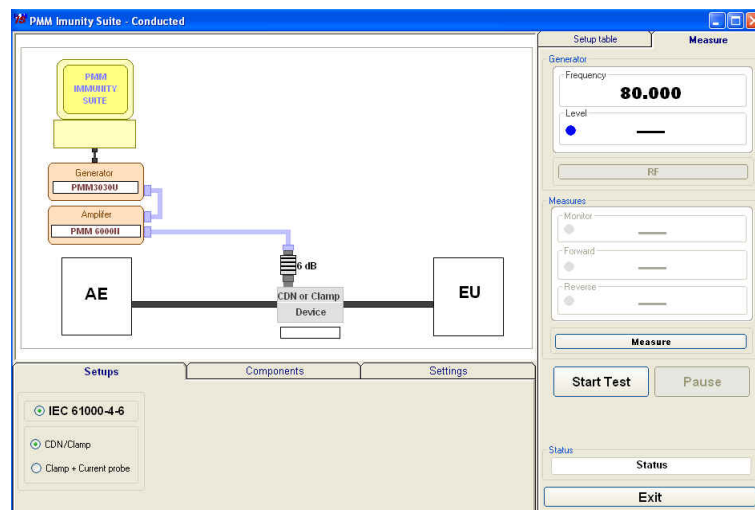
2.1.4 Main window

The main window displays the active work session or editor session.

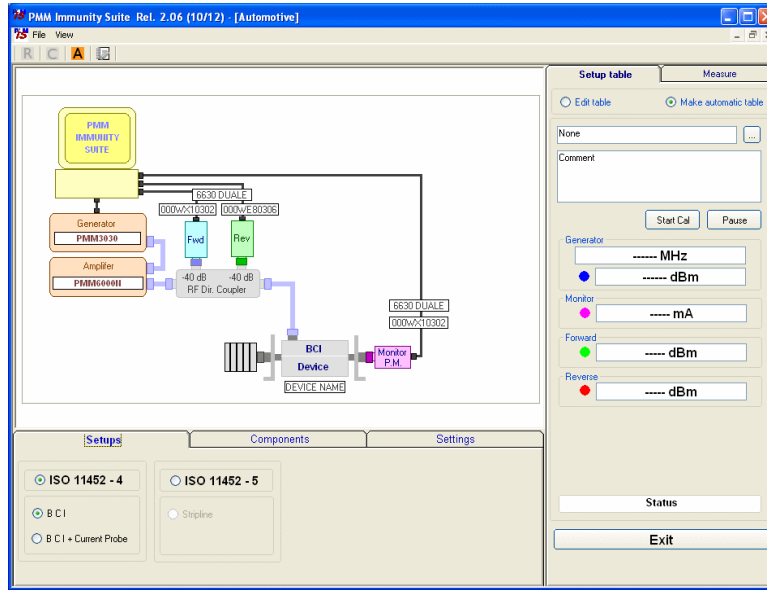
Radiated mode



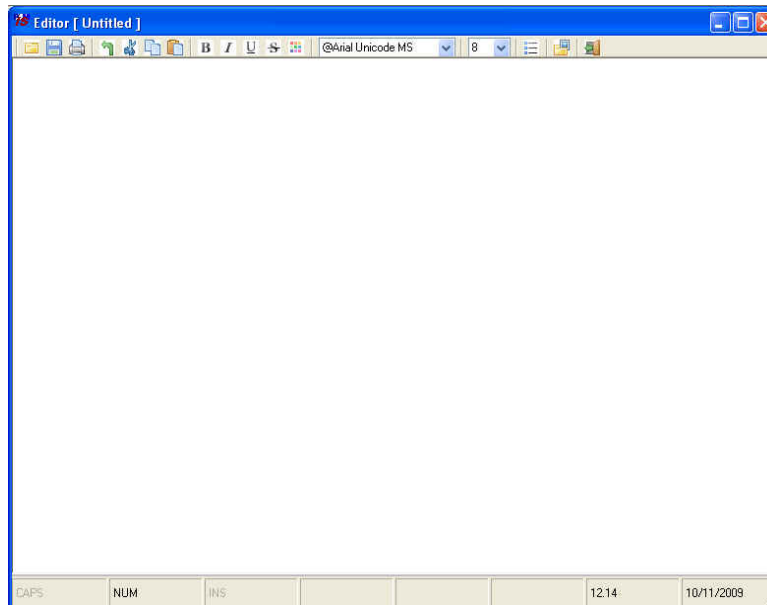
Conducted mode



Automotive



Editor



See below for further information on these windows

3 – PMM Immunity Test Radiated

3.1 Introduction to Radiated mode

Radiated mode tests your equipment's immunity to the magnetic fields produced by radio transmitters or any other device that emits radiated electromagnetic energy. This kind of radiation may be generated by portable transceivers, base stations, television transmitters, radio transmitters, and other electromagnetic or intermittent sources. To obtain reproducible results, the test should be performed in an anechoic chamber; the standard for equipment, setup and procedure is EN 61000-4-3.



R

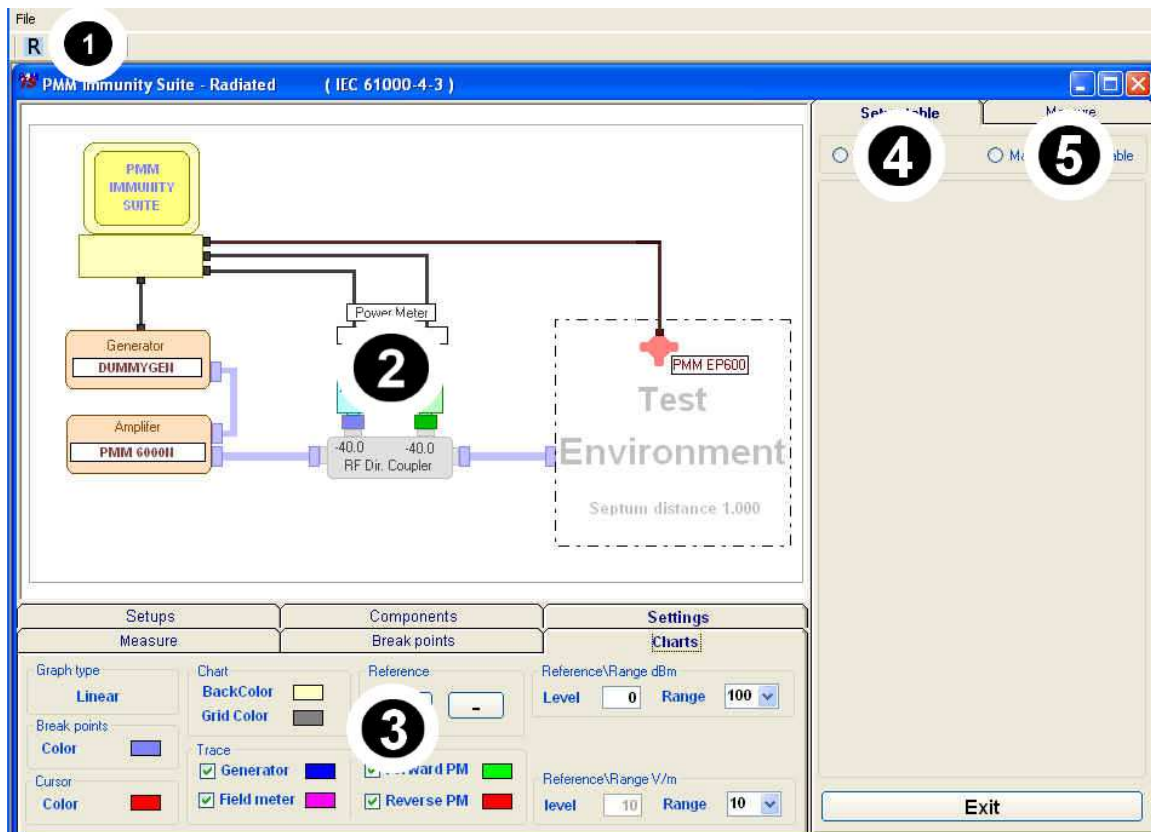


Fig. 3-1 Main window - Radiated

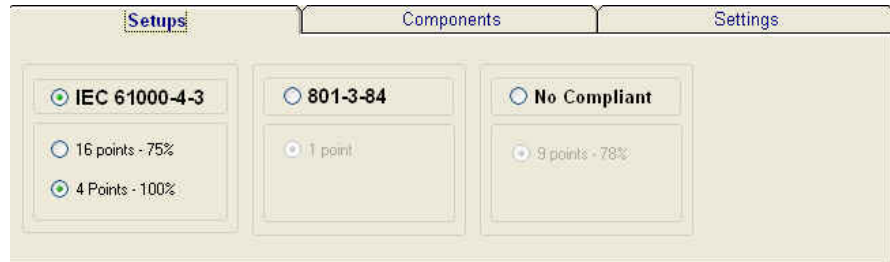
This window contains:

1. Menu
2. Diagram window
3. Function tabs
4. Setup table
5. Measure

3.2 Choosing the compliance standard (Setups)

Once Radiated mode is launched, the compliance standard needs to be chosen. The program offers a selection under the **Setups tab**.

- EN 61000-4-3
- 801-3-84
- No Compliant



3.3 Equipment selection (Components)

After selecting the compliance standard, choose the equipment to be used during calibration or testing.

The program divides equipment by type; for your convenience, drivers from the PMM family can be used.

To enable the desired module, double click the corresponding line (a \checkmark will appear next to the instrument selected).

- **Generators:** Lists the available field generators

Generators		Power Meters			Field Meters			
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY GEN	GPIB	X	0	0.01	20000	-100	20
	PMM 3000	RS232	X	3	0.01	1000	-80	10
	PMM 3030RS	RS232	X	1	0.009	3000	-107	10
\checkmark	PMM 3030USB	USB	X	X	0.009	3000	-107	10
	PMM 3010USB	USB	X	X	0.009	1000	-107	10
	PMM 3010RS	RS232	X	1	0.009	1000	-107	10

- **Power Meter:** Lists the available power meters

Generators		Power Meters			Field Meters			
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY PM	USB	0	0	0.01	6000	-40	30
	PMM 6630	USB	0	0	0.009	3000	-40	30
\checkmark	DUAL 6630	USB	0	0	0.009	3000	-40	30
	PMM 6600	RS485	1	1	0.01	1000	-40	27
	DUAL 6600	RS485	1	1	0.01	1000	-40	27

- **Field Meters:** Lists field probes, optical repeaters and field meters.

Generators		Power Meters			Field Meters				
Selected	Name	Bus type	Bus addr.	Comm. port	Probe name	Start freq. (MHz)	Stop freq. (MHz)	Min level (V/m)	Max level (V/m)
	DUMMY FM	GPIB	0	0		0.01	10000	0	200
\checkmark	PMM EP601	RS232	0	5	PMM EP601	0.01	9250	0.5	500
	PMM OR03	RS232	0	5	PMM EP330	0.1	3000	0.3	300
	PMM 8053	RS232	0	5	PMM EP330	0.1	3000	0.3	300
	PMM EP600	RS232	0	5	PMM EP600	0.1	9250	0.14	140

- **Others:** Lists the amplifier, directional coupler, TEM cell or GTEM antenna .

Generators	Power Meters	Field Meters	Others
RF Directional Coupler Forward Coupling: <input type="text" value="40"/> dB Reverse Coupling: <input type="text" value="40"/> dB		Test Environment TEM/GTEM Septum distance: <input type="text" value="1.000"/> m	
		Amplifier Name: <input type="text" value="PMM 6000N"/>	

From this tab, you can set the coupling factors of the directional coupler, the septum distance of the TEM or GTEM (if any), and the name of the amplifier used.

Additional devices can be added to each of these tables by right-clicking and selecting **Add new**.

Generators			Power Meters			Field Meters		
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY GEN	GPIB	X	0	0.01	20000	-100	20
	PMM 3000	RS232				1000	-80	10
	PMM 3030RS	RS232				3000	-107	10
V	PMM 3030USB	USB				3000	-107	10
	PMM 3010USB	USB				1000	-107	10
	PMM 3010RS	RS232				1000	-107	10

Immunity Suite - add Generator

Instruments name:

Instr. driver name:

Instr. brand:

Bus type: Bus Address:

Com Port num.:

Frequency range

From: to: MHz

Level limits

From: to: dBm

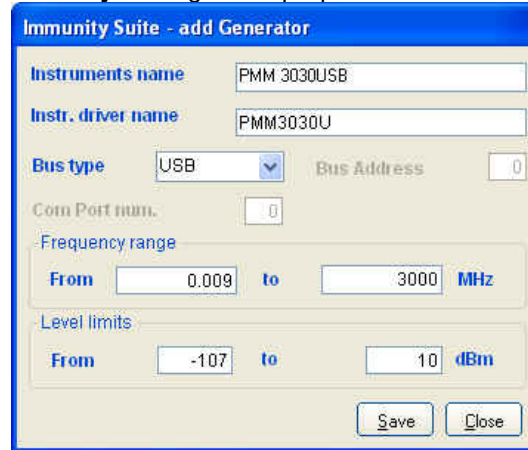
Devices can also be checked, modified or removed by right-clicking from the corresponding line:

Generators			Power Meters			
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop (M
	DUMMY GEN	GPIB	X	0	0.01	20
	PMM 3000	RS232	X	3	0.01	10
	PMM 3030RS	RS232	X	1	0.009	30
V	PMM 3030USB				0.009	30
	PMM 3010USB				0.009	10
	PMM 3010RS				0.009	10



For connecting and setting the COM port of fiber optic equipment, see the user manual supplied with the device.

- **Modify:** changes the properties of the device.



- **Remove:** removes the device and its driver from the list.

- **Check Device:** makes sure the driver is working and the device is properly connected. This option is only available for the device selected (√).

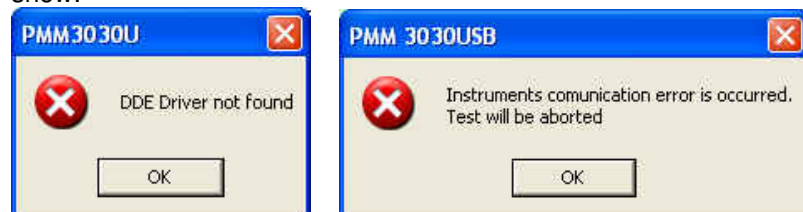
If the device is connected and the driver has been correctly installed, the following message will appear:



This message will appear if the device has not been connected properly to the work setup



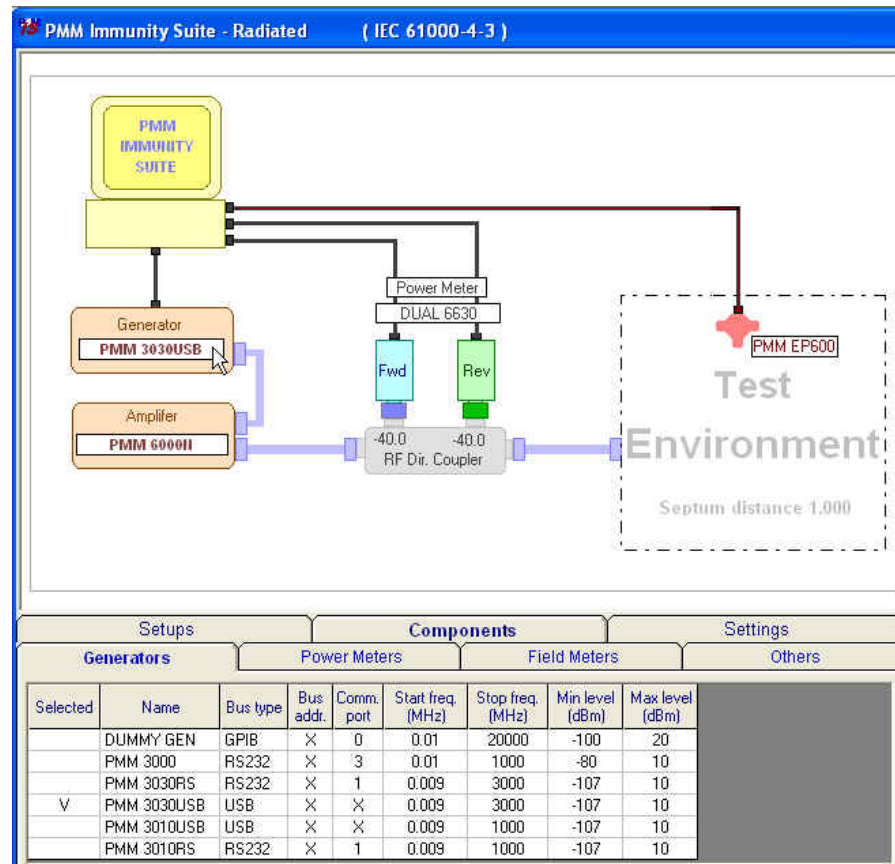
If the driver of the device has not been installed properly, the screen will show:



We recommend performing a device check before starting the calibration phase or immunity test. In any case, before calibration or testing, the program runs an automatic check and reports any errors as described above.

3.4 Diagram window

The diagram window shows the setup to be followed on the basis of the compliance standard and equipment selected.



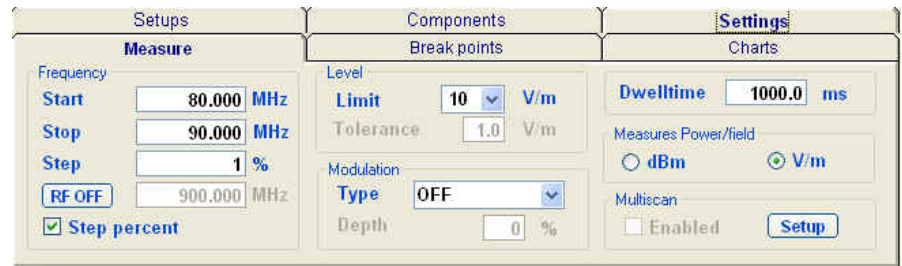
The selected devices (✓) are shown at the bottom of the panel.

In addition to using the **Components** tab, you can move from one type of equipment to another by clicking the label with the device's name

PMM 3030USB in the diagram window.

3.5 Settings

After performing the setup shown in the diagram window, the calibration and test parameters need to be set using the **Measure** tab:



The **Multiscan** feature allows you to modify measurement parameters within a given frequency range.



With the **Break points** tab, you can set the frequencies at which measurement will be temporarily suspended to allow a change in setup.

Measure		Break points	Charts
	Freq. MHz	Comment	
Stop 1	.22	Cambia Amplificatore	
Stop 2	.32	Cambia Amplificatore	
Stop 3	---	---	
Stop 4	---	---	
Stop 5	---	---	









Each time the stop frequency is reached, a message will display the scheduled action.



Click **OK** to continue measuring.

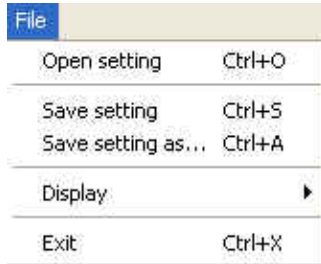
The **Charts** tab allows visual modifications to suit your preferences. For each element, click on the color shown, and change it using the Windows color box if desired.

In this tab, you can also move the reference level along the y-axis (+ and - buttons), or change the power level and range (in dBm) and the magnetic field range (in V/m).

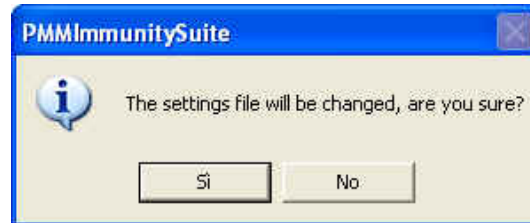
Setups	Components	Settings
Measure	Break points	Charts
Graph type Linear	Chart BackColor  Grid Color 	Reference <input type="button" value="+"/> <input type="button" value="-"/>
Break points Color 	Trace <input checked="" type="checkbox"/> Generator  <input checked="" type="checkbox"/> Field meter 	Reference\Range dBm Level <input type="text" value="0"/> Range <input type="text" value="100"/>
Cursor Color 	<input checked="" type="checkbox"/> Forward PM  <input checked="" type="checkbox"/> Reverse PM 	Reference\Range V/m level <input type="text" value="10"/> Range <input type="text" value="0"/>

3.6 Settings management

For each new session, the default file RadDefault.tst is loaded. To avoid having to re-enter preferred settings, they can be saved in a single .tst file:

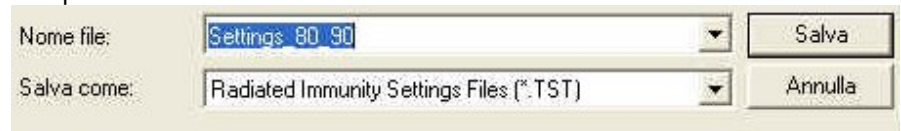


The command **File -> Save setting** overwrites the file in use. If no file was called up when the program was opened, the default file will be overwritten. The following message will appear:

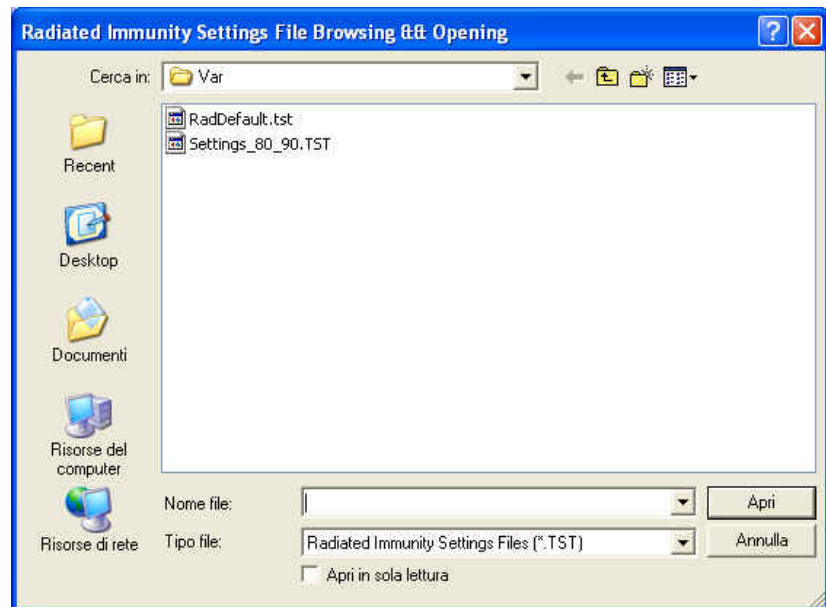


Choose **YES** to overwrite the file in use. Choose **NO** to cancel the operation and return to the main window.

File -> Save setting as... Enter the file name assigned to the work session and press **Save**.



The file can be called up at any time with the command **File -> Open setting**.



File -> Display -> Default colors is used to restore the original display.

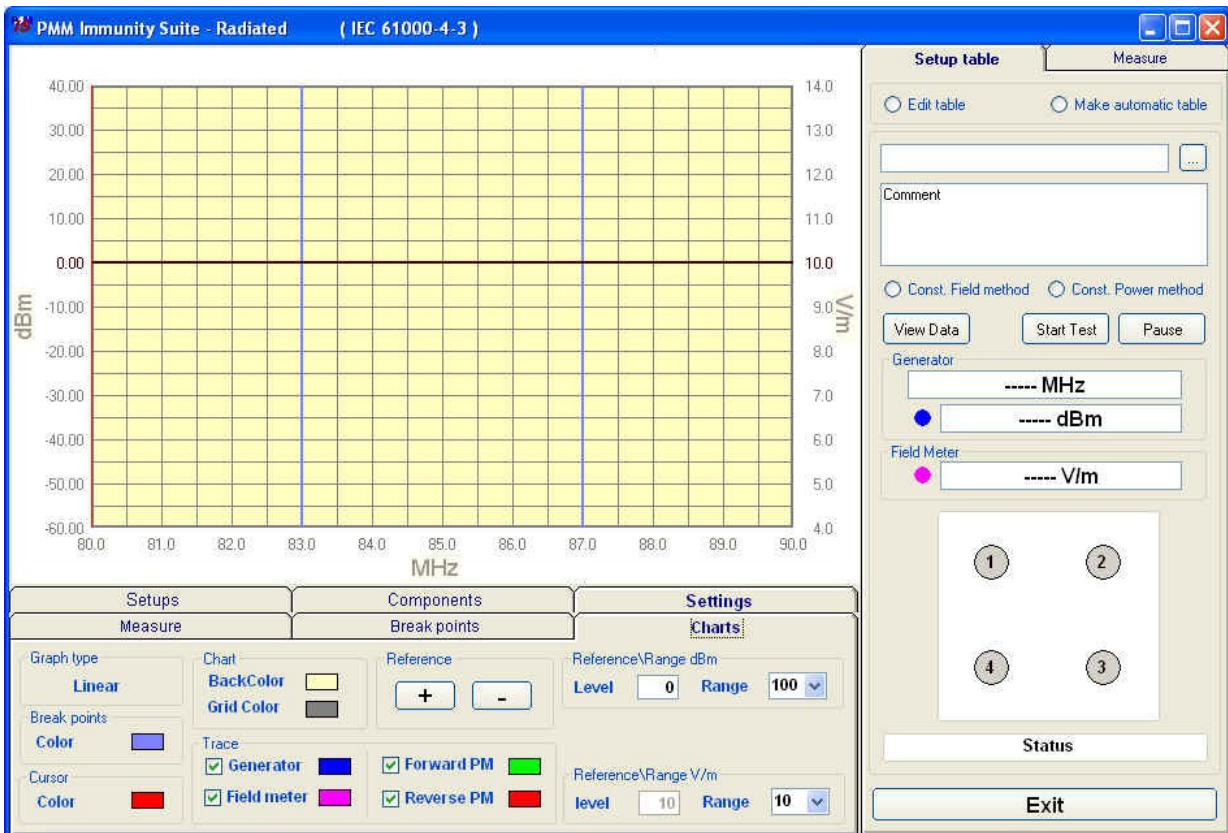
3.7 Setup table

You can now calculate the levels assigned to the generator in order to have a constant field value within the chosen frequency range.

There are different ways to create the table:

- Automatically (select **Make automatic table**)
- By adapting the automatically created table to the instrumentation used (select **Edit table**)
- By completing the entire table manually (select **Edit table**)


3.7.1 Automatic table creation



To create a table automatically:

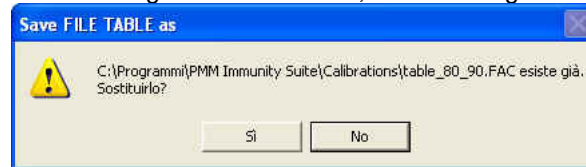
- Select **Make automatic table**



Select , assign a name to the table and press **Save**



If an existing table is selected, the following message will appear:



Choose **YES** to overwrite the table.

Choose **NO** to cancel the operation and return to the main window.

- A comment can be added, if desired.



- Calibration can be performed using the constant field strength method or the constant power method (consult EMC regulations for further details).



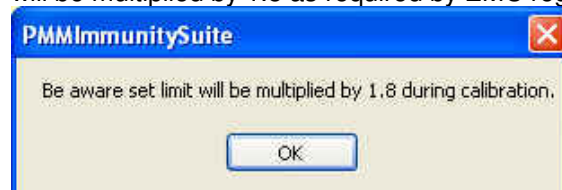
- Press **Start test**, then **Abort test** if you wish to terminate the process at any time.



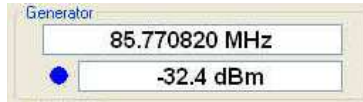
A **Pause** button is also available, and becomes **Continue** to resume the process.



Once the calibration has begun, a message will appear stating that the limit will be multiplied by 1.8 as required by EMC regulations.



The **Generator** window shows the level (in dBm) entered by the generator, at a given frequency (in MHz), to generate the chosen magnetic field level.



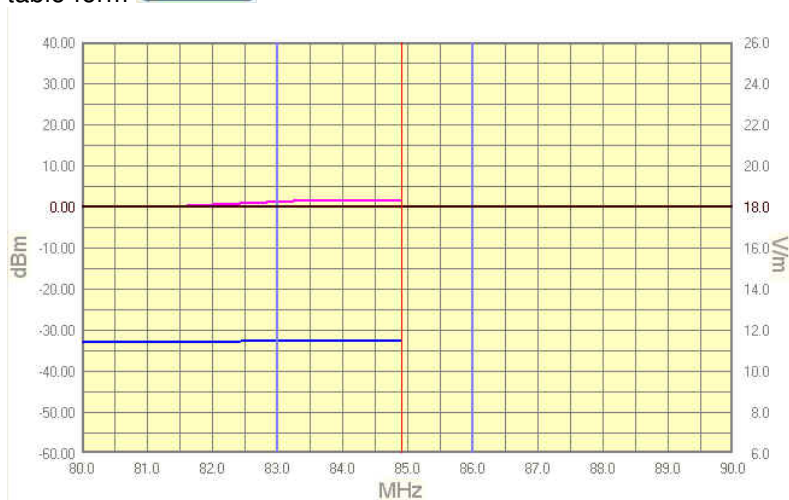
The color of the dot corresponds to the color of the line on the graph.

The field level generated inside the cell is displayed in the **Field Meter** window.



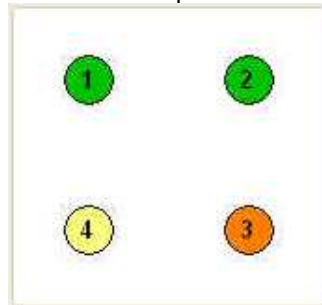
Values outside the selected tolerance will be shown in red; the generator will adjust the level to bring the magnetic field back into range. The color of the dot corresponds to the color of the line on the graph.

During the work session, the frequency range, the generator level, and the magnetic field produced can be viewed graphically [View Chart](#) or in table form [View Data](#)



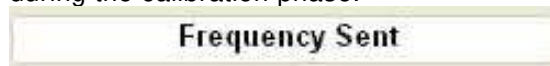
Frequency	Points 1	Points 2	Points 3	Points 4
80.0000	-32.8	.....	.....	.....
80.8000	-32.8	.....	.....	.....
81.6080	-32.8	.....	.....	.....
82.4241	-32.7	.....	.....	.....
83.2483	-32.6	.....	.....	.....
84.0808	-32.6	.....	.....	.....
84.9216	-32.6	.....	.....	.....
85.7708	-32.6	.....	.....	.....
86.6285	.....	.....	.....	.....
87.4948	.....	.....	.....	.....
88.3698	.....	.....	.....	.....
89.2535	.....	.....	.....	.....
90.0000	.....	.....	.....	.....

Because the immunity test is only valid if there is an area within the shielded chamber where field uniformity complies with the standard, the field sensor has to be arranged in different positions. The program keeps track of those positions in the following window:

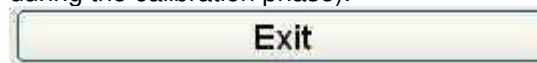


- A *Green* circle indicates that the calibration has been completed.
- An *Orange* circle indicates calibration in course.
- A *Yellow* circle shows where the next calibration will take place.

The Status window shows each operation performed by the program during the calibration phase.



Press the **Exit** button to leave **Radiated mode** (the button is deactivated during the calibration phase).



3.7.1.1 Amplifier saturation test

When constant field calibration is complete, you may choose to run the amplifier saturation test.

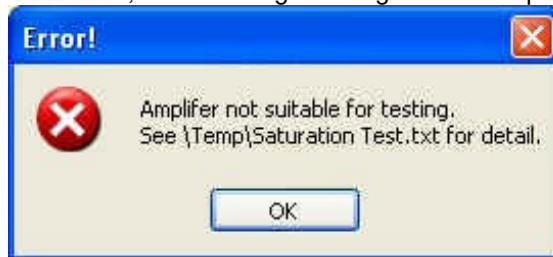


Select **YES** to run the saturation test within the frequency range.



The test verifies the difference specified in EMC regulations between the power calculated during the calibration phase with the limit 1.8 times that of the test (Pc) and the power to be applied during the testing phase (Pt). If the outcome is positive, the amplifier is not saturated and the system is suitable for the immunity test.

Otherwise, the following message will be displayed:

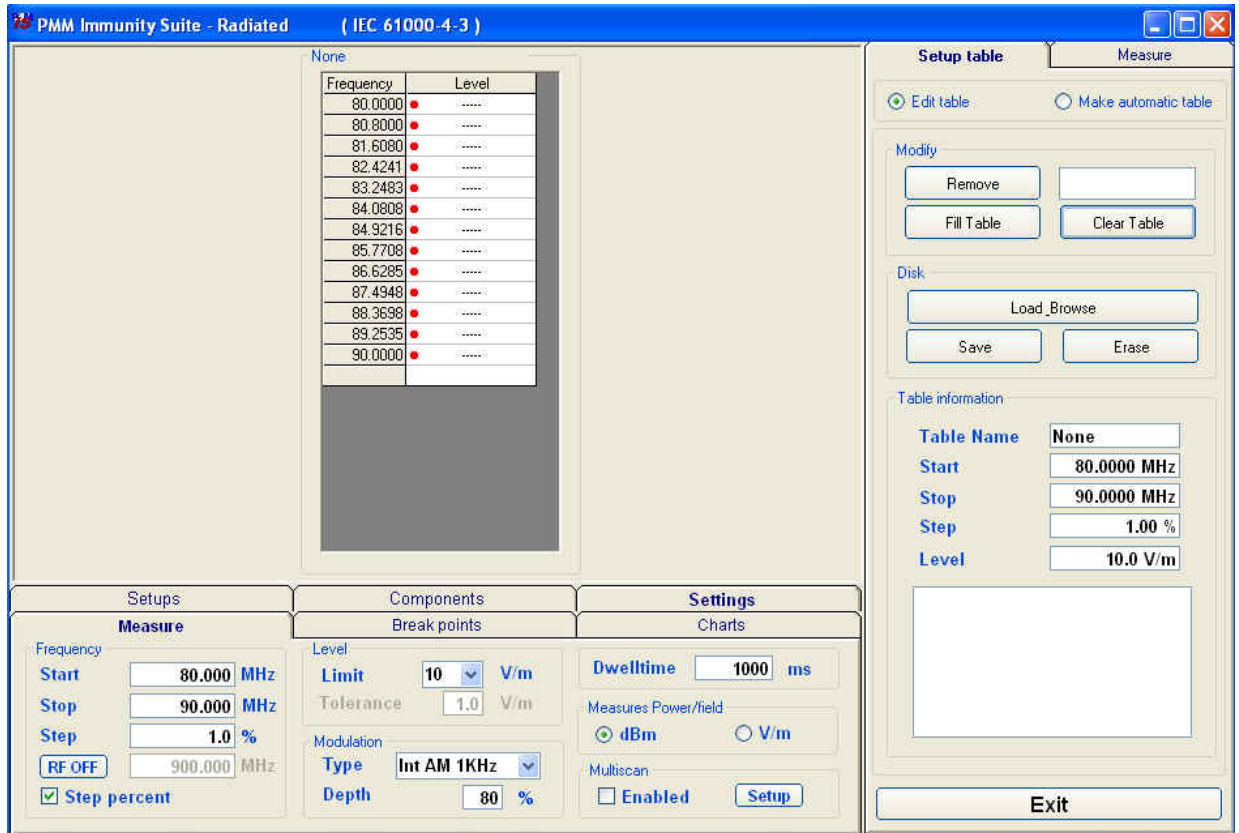


In both cases, a .txt file is generated at the end of the saturation test; the file is located in the folder **PMM Immunity Test/Temp** and can be viewed from the Editor feature (see the Editor section for further information).

table_80_90 : Saturation test - 12/11/2009 - 10.00.35					
Freq. MHz	Pc		Pt	=	Dif.
80.00	-31.31	-	-36.41	=	5.10
80.80	-31.47	-	-36.41	=	4.94
81.61	-31.31	-	-36.64	=	5.33
82.42	-31.23	-	-36.48	=	5.25
83.25	-31.31	-	-36.64	=	5.33
84.08	-31.14	-	-36.48	=	5.34
84.92	-31.31	-	-36.24	=	4.93
85.77	-31.23	-	-36.42	=	5.19
86.63	-31.39	-	-36.33	=	4.94
87.49	-31.39	-	-36.48	=	5.09
88.37	-31.47	-	-36.49	=	5.02
89.25	-31.31	-	-36.33	=	5.02
90.00	-31.23	-	-36.33	=	5.10

3.7.2 Manual table creation

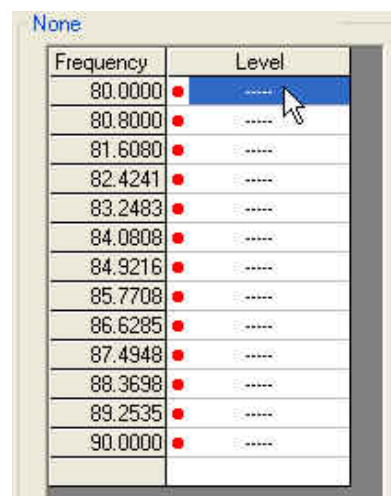
You may also fill in the entire table manually.



Check the information in **Setups**, **Components** and **Settings**.

Go to **Setup table** -> **Edit table**.

Select the desired cell, type in the value, and confirm by pressing ENTER.



The amount entered can be deleted by clicking **Remove**.



If several values need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

Frequency	Level
80.0000	✓ -32.1
80.8000	• ----
81.6080	• ----
82.4241	• ----
83.2483	• ----
84.0808	• ----
84.9216	• ----
85.7708	• ----
86.6285	• ----
87.4948	• ----
88.3698	• ----
89.2535	• ----
90.0000	✓ -33.1

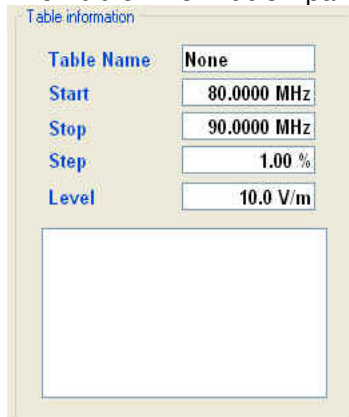
Frequency	Level
80.0000	✓ -32.1
80.8000	• -32.2
81.6080	• -32.3
82.4241	• -32.4
83.2483	• -32.4
84.0808	• -32.5
84.9216	• -32.6
85.7708	• -32.7
86.6285	• -32.8
87.4948	• -32.8
88.3698	• -32.9
89.2535	• -33.0
90.0000	✓ -33.1

The **Clear Table** command deletes all of the values entered. The command must be confirmed.

Frequency	Level
80.0000	✓ -32.1
80.8000	✓ -32.2
81.6080	✓ -32.2
82.4241	✓ -32.3
83.2483	✓ -32.4
84.0808	✓ -32.5
84.9216	• ----
85.7708	• ----
86.6285	• ----
87.4948	• ----
88.3698	• ----
89.2535	• ----
90.0000	• ----



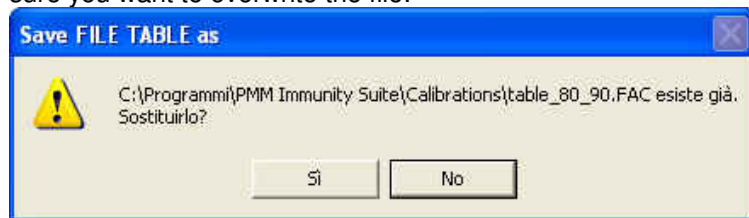
The **Table information** pane displays the main measurement settings.



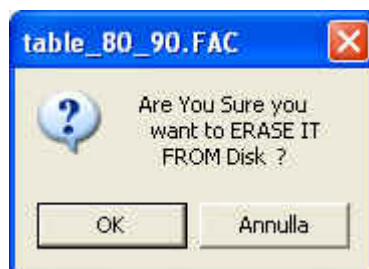
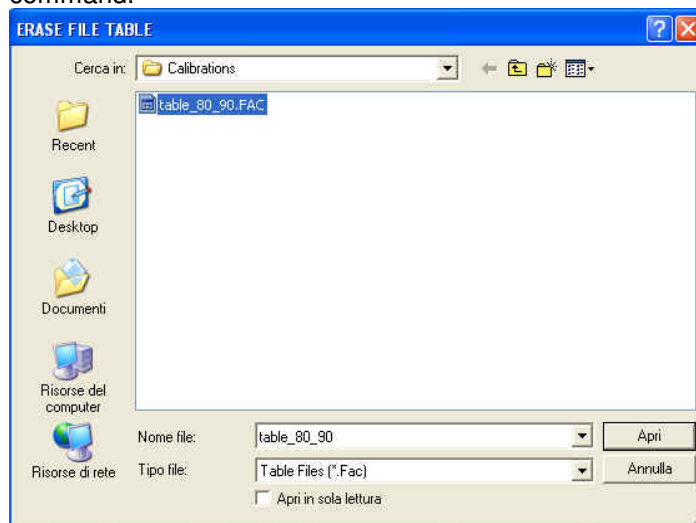
Once all values have been entered, click **Save**, then type in the name of the table and click **Save** again



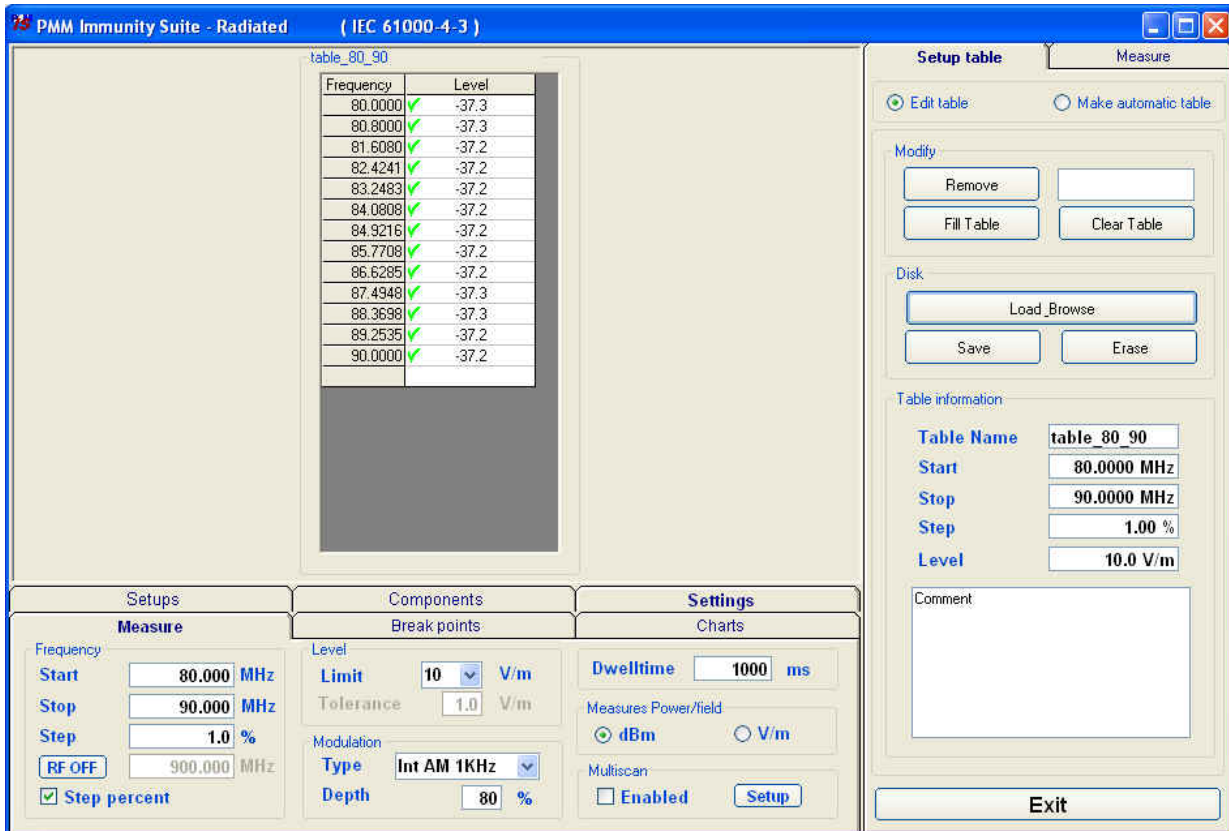
If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file:



The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**, then confirm the command.



3.7.3 Modifying an existing table



The screenshot shows the PMM Immunity Suite - Radiated software interface. The main window displays a table titled 'table_80_90' with the following data:

Frequency	Level
80.0000	-37.3
80.8000	-37.3
81.6080	-37.2
82.4241	-37.2
83.2483	-37.2
84.0808	-37.2
84.9216	-37.2
85.7708	-37.2
86.6285	-37.2
87.4948	-37.3
88.3698	-37.3
89.2535	-37.2
90.0000	-37.2

The interface includes several configuration panels:

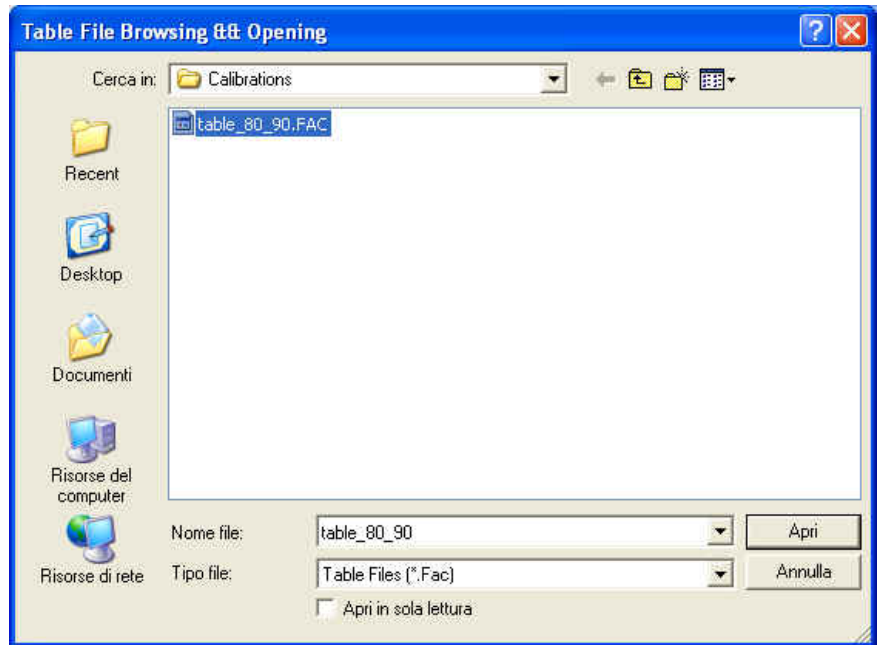
- Measure:** Frequency Start: 80.000 MHz, Stop: 90.000 MHz, Step: 1.0 %, RF OFF, 900.000 MHz, Step percent checked.
- Components:** Level Limit: 10 V/m, Tolerance: 1.0 V/m, Modulation Type: Int AM 1KHz, Depth: 80 %.
- Settings:** Dwelltime: 1000 ms, Measures Power/field: dBm selected, Multiscan: Enabled.
- Setup table:** Edit table selected, Table Name: table_80_90, Start: 80.0000 MHz, Stop: 90.0000 MHz, Step: 1.00 %, Level: 10.0 V/m, Comment field, Exit button.

An existing table can be adapted to the instrumentation used.

Check the information in **Setups**, **Components** and **Settings**.

Go to **Setup table** -> **Edit table**.

Call up a previously created table by clicking **Load_Browse**, then selecting the table in the *Table File Browsing & Opening* window and clicking **Open**.



Select the desired cell, click **Remove**, type in the new value, and confirm by pressing ENTER.

The interface shows a table editor for "table_80_90". The table has two columns: "Frequency" and "Level". The "Level" column contains values like -37.3 and -37.2, with green checkmarks in the adjacent column. A mouse cursor is over the cell containing -37.3. To the right, a "Modify" dialog box is open, showing a "Remove" button, a text field with "-37.2 dBm", a "Fill Table" button, and a "Clear Table" button.

Frequency	Level
80.0000	-37.3
80.8000	-37.3
81.6080	-37.2
82.4241	-37.2
83.2483	-37.2
84.0808	-37.2
84.9216	-37.2
85.7708	-37.2
86.6285	-37.2
87.4948	-37.3
88.3698	-37.3
89.2535	-37.2
90.0000	-37.2

To delete all data, select **Clear Table** and confirm



If several points need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

Frequency	Level
80.0000	-37.2 ✓
80.8000	-37.3 ✓
81.6080	-37.2 ✓
82.4241	---- ●
83.2483	---- ●
84.0808	---- ●
84.9216	---- ●
85.7708	---- ●
86.6285	---- ●
87.4948	-37.3 ✓
88.3698	-37.3 ✓
89.2535	-37.2 ✓
90.0000	-37.2 ✓

The **Table information** pane displays the main measurement settings.

Table information

Table Name

Start

Stop

Step

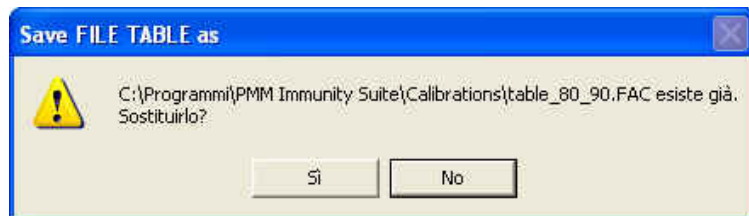
Level

Comment:

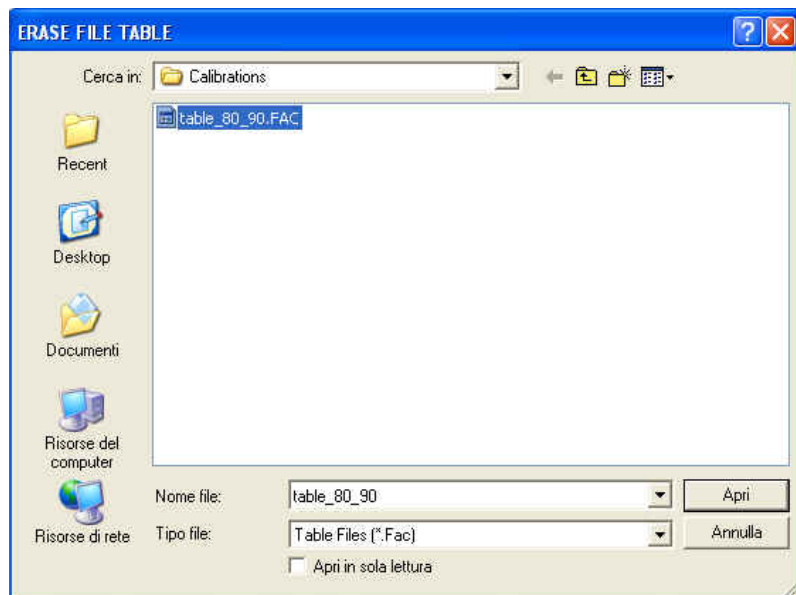
When all changes have been made, click **Save**, then type in the name of the table and click **Save** again.



If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file.



The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**.

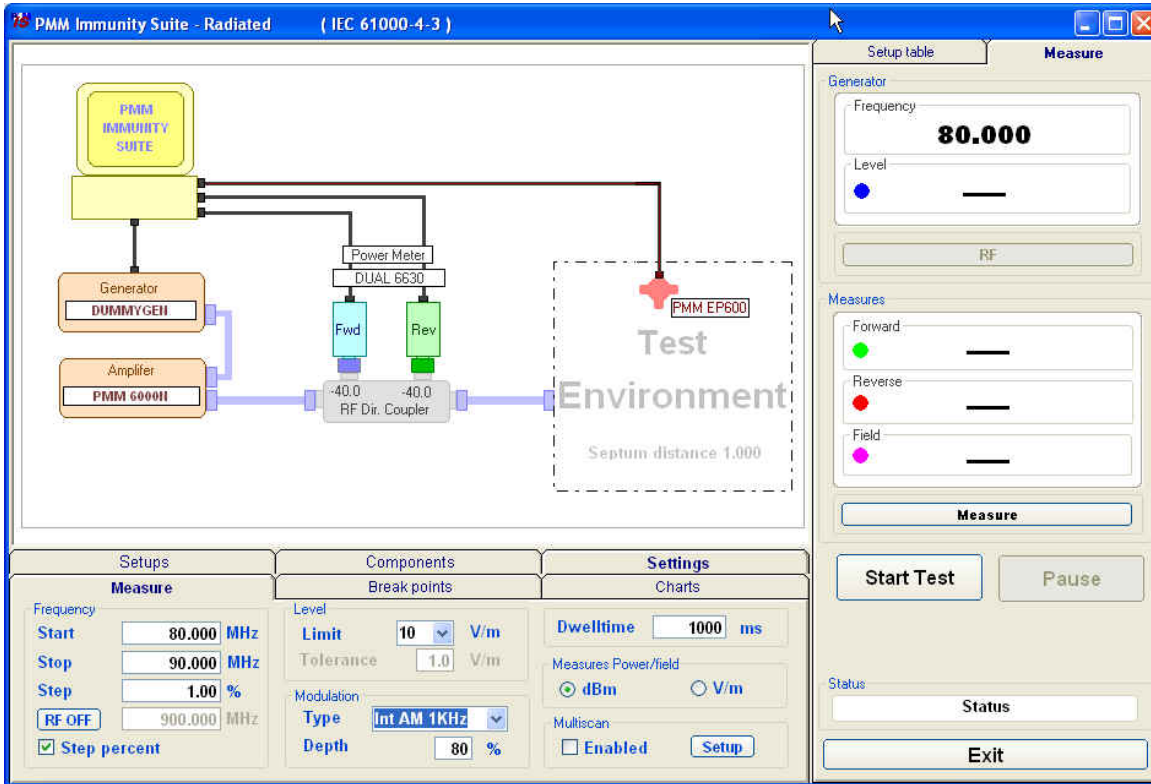


Confirm as requested.



3.8 Radiated immunity test

Once the setup table is ready, the radiated immunity test can be run. Go to **Measure**.

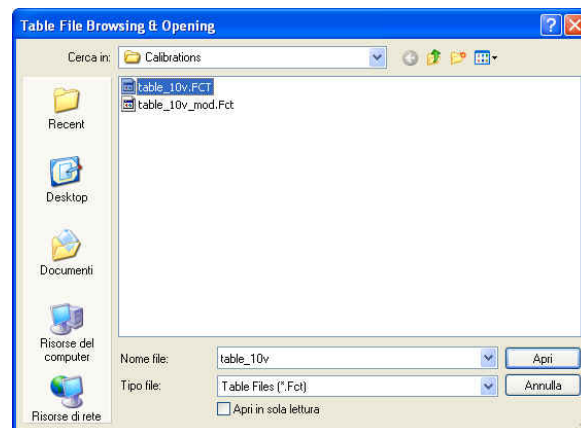


Click **Start Test**.

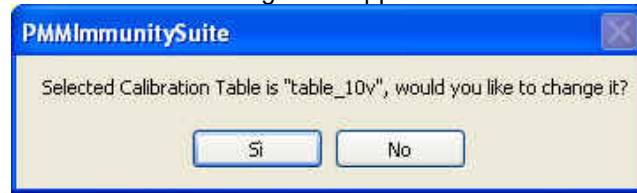
If no setup table has been selected, the following message will appear:



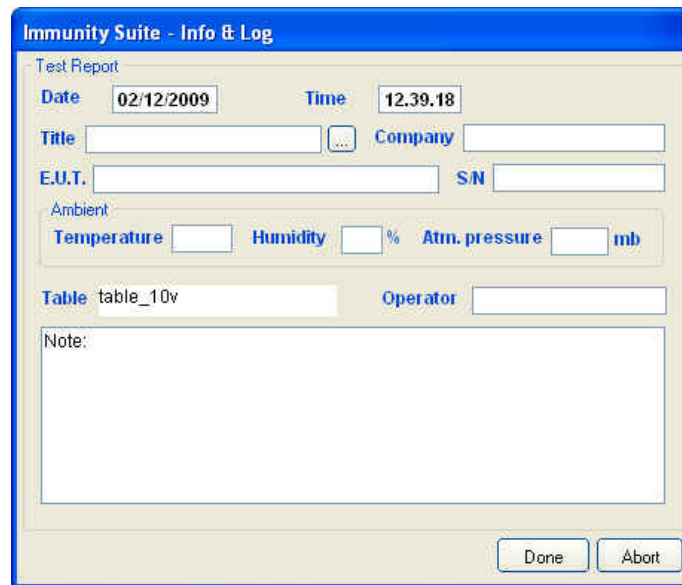
Click OK, then select the table and confirm with **Open**.



Otherwise the message that appears is as follows:



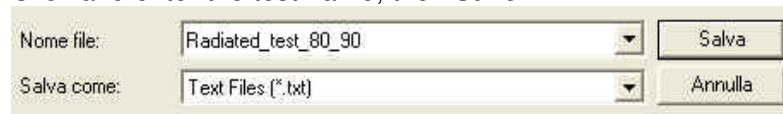
Choose **Yes** to view the *Table File Browsing & Opening* window and select a different table. Choose **No** to use the file shown and open the following data entry window (the date and time are entered automatically).



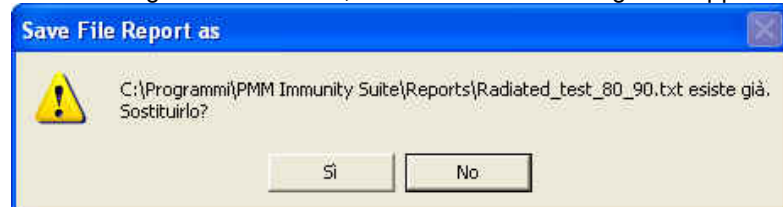
Enter the name of the immunity test.



Click and enter the test name, then **Save**.

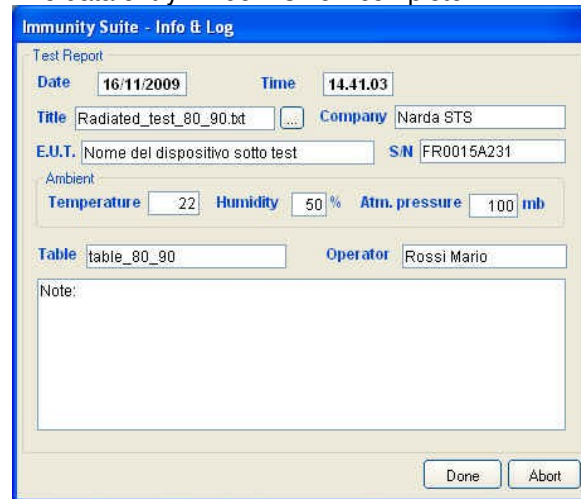


If an existing test is selected, a confirmation message will appear.



Fill in the fields **Company**, **E.U.T.**, **S/N**, **Temperature**, **Humidity**, **Atm. Pressure**, **Operator** and **Note**.

The data entry window is now complete:

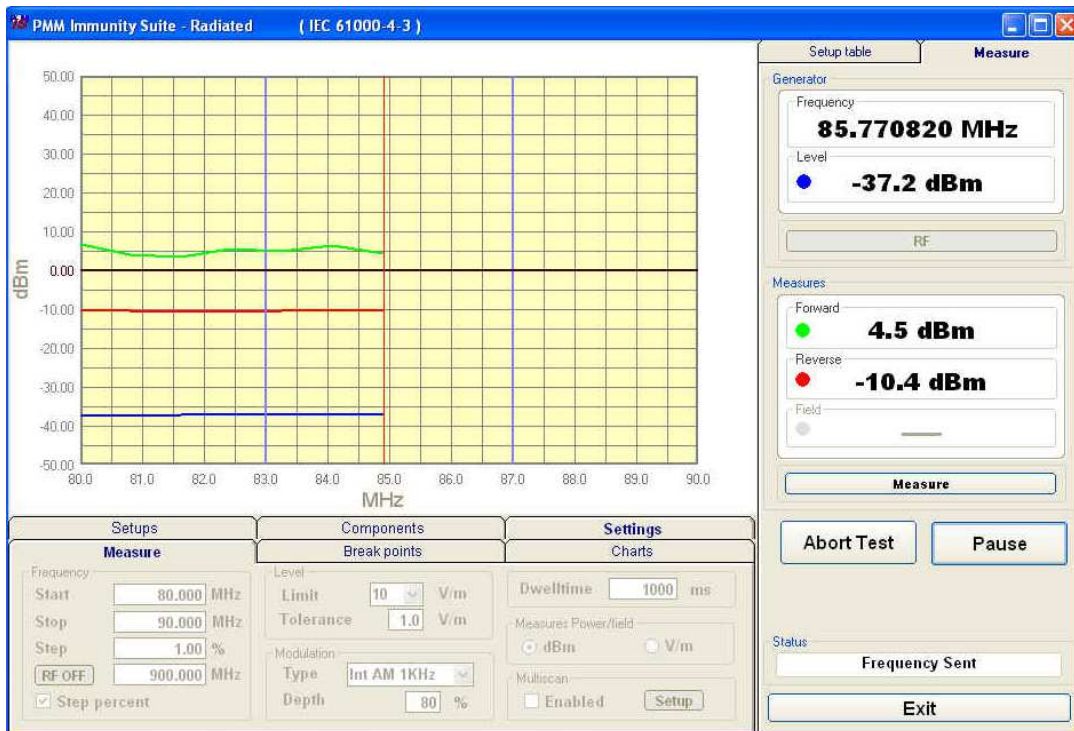


Confirm with **Done** to start the immunity test.

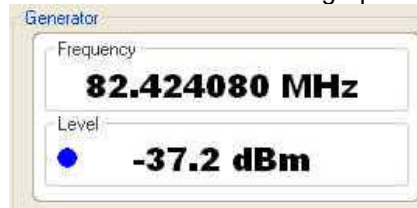
If an existing test is selected, a confirmation message will appear:



Choose **Yes** to overwrite the data with the test in course.
Choose **No** to append the new data.



During the test, the **Generator** window shows the level extrapolated from the setup table and used by the generator to obtain a constant magnetic field in the selected frequency range. The color of the dot corresponds to the color of the line on the graph.

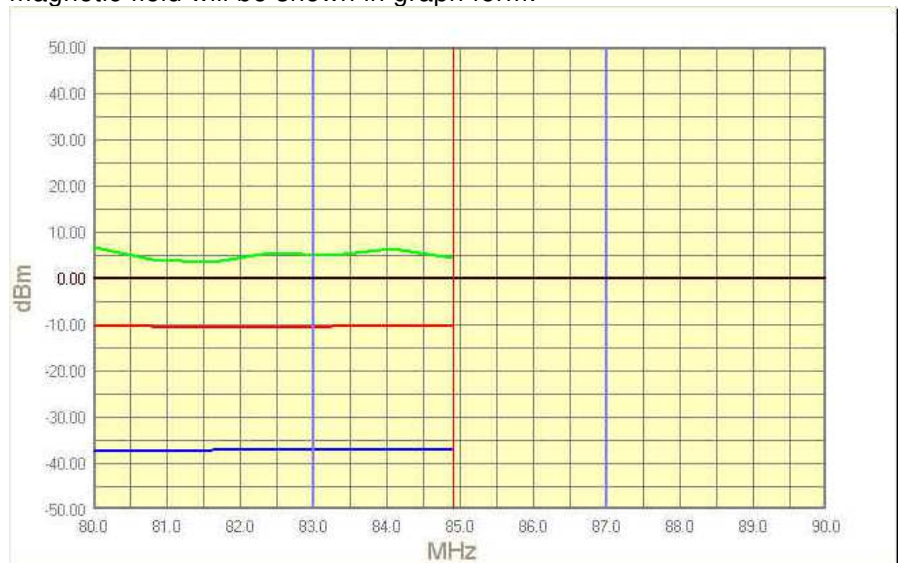


The **Measures** pane includes:

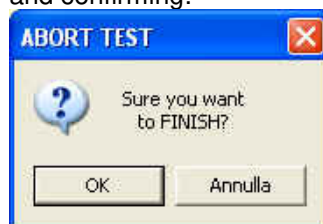
- **Forward:** shows the direct power measured by the power sensor.
 - **Reverse:** shows the reflected power measured by the power sensor.
 - **Field:** shows the magnetic field generated within the cell.
- The color of the dot corresponds to the color of the line on the graph.



During the immunity test, the frequency range, generator level and magnetic field will be shown in graph form.



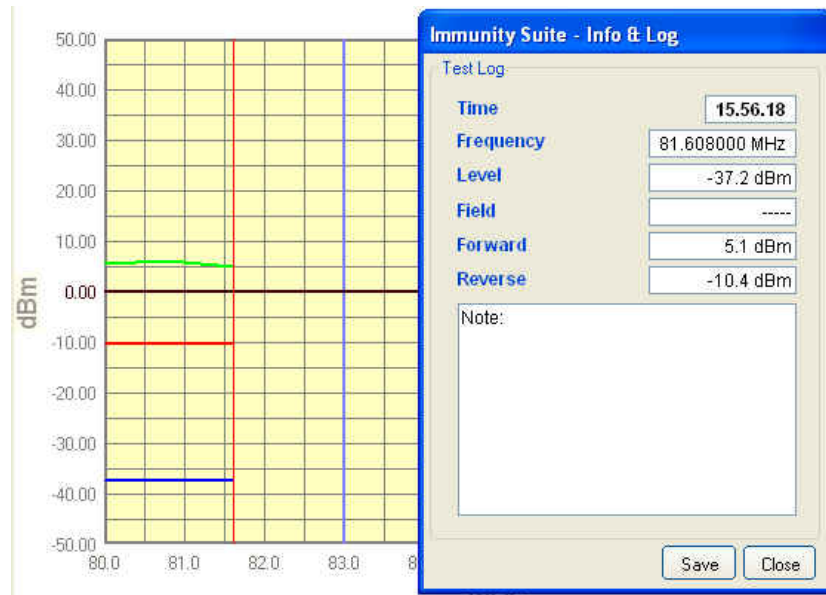
At any time, the test can be terminated by clicking the **Abort Test** button and confirming:



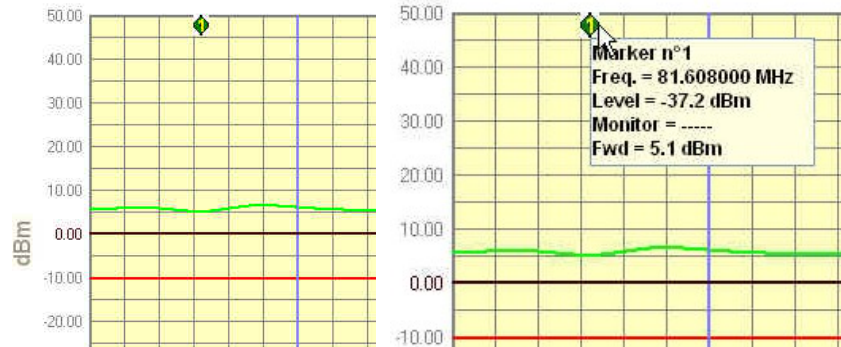
The **Pause** button can also be used at any time to stop the test momentarily (the generator is set to RF OFF). In this state, an earlier situation can be recreated or a later one can be simulated; click the RF button (the generator is set to RF ON), adjust the frequency and level, and click **Measure** to display the values.



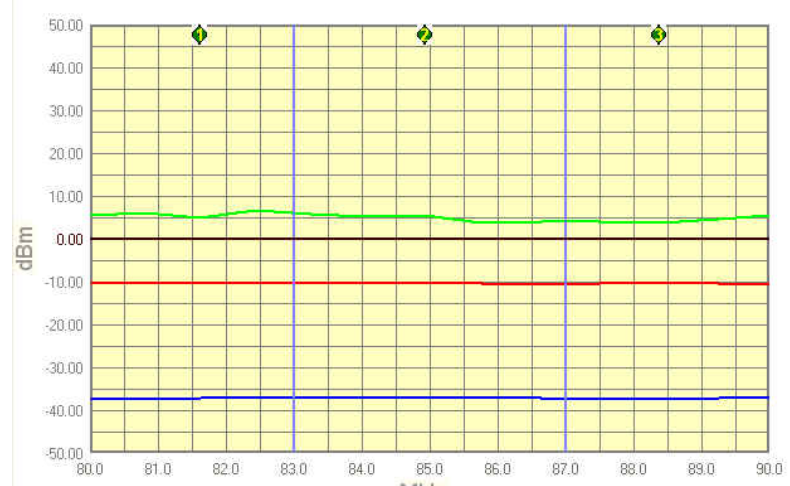
Each time the **Pause** button is clicked, the following window will appear:



Pressing **Save** assigns a marker to the current position for future reference. At the end of the test, the saved information can be viewed simply by hovering the cursor over the marker.



The button will now read **Continue** to resume the test.



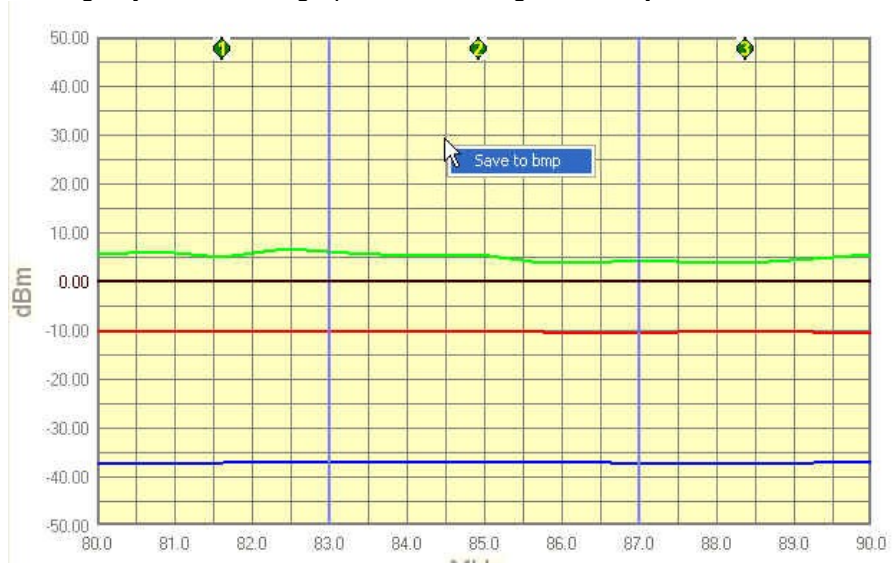
The status window shows each operation performed by the software during the test.

Frequency Sent

The end of the immunity test will be announced with the message:



When the test is over, the graph can be saved in .bmp format by right-clicking anywhere in the graph and selecting **Save bmp**.



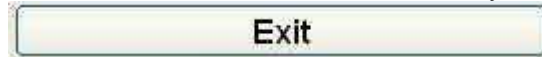
In the next window, assign a name to the graph and press **Save**.



The image shows a save dialog box with two input fields and two buttons. The first field is labeled 'Nome file:' and contains the text 'graph_test_80_90'. The second field is labeled 'Salva come:' and contains 'bitmap (*.bmp)'. To the right of the first field is a 'Salva' button, and to the right of the second field is an 'Annulla' button.

The saved graph can be inserted into a text file using the Editor feature (see the Editor section for details).

Press the **Exit** button to leave the immunity test.



4 – PMM Immunity Test Conducted

4.1 Introduction to conducted mode

The purpose of the test is to check the immunity of equipment, individual devices or systems to disturbances caused by radiofrequency electromagnetic fields to connection cables, power cords, signal lines and ground wires. The standard for equipment, setup and procedure is EN 61000-4-6

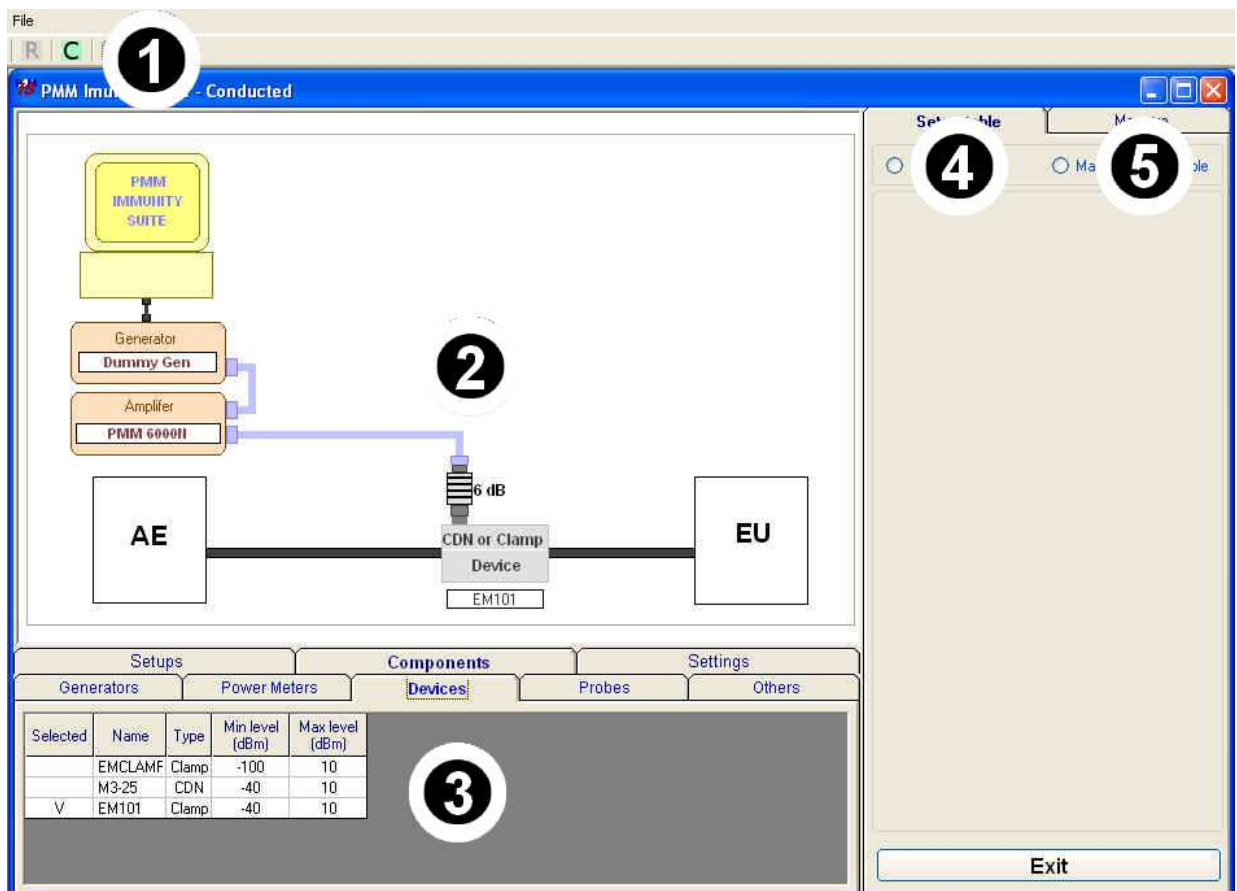


Fig. 4-1 Main window - Conducted

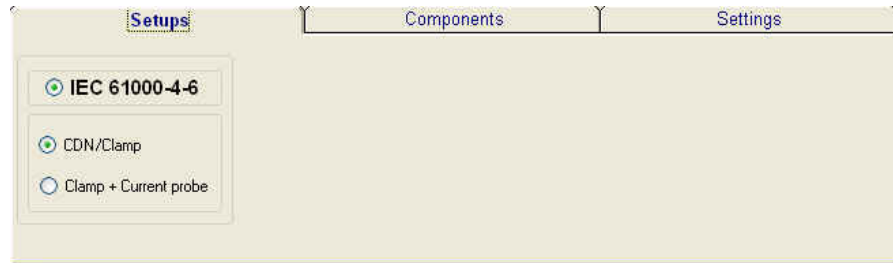
This window contains:

1. Menu
2. Diagram window
3. Function tabs
4. Setup table
5. Measure;

**4.2 EN 61000-4-6
Setups**

Once Conducted mode is launched, the type of setup needs to be chosen.
The program offers:

- **CDN/Clamp**
- **Clamp + Current probe**



4.3 Equipment selection (Components)

In this phase you will select the equipment to be used during calibration or testing. The program divides equipment by type; for your convenience, drivers from the PMM family can be used. To enable the desired module, double click the corresponding line (a √ will appear next to the instrument selected).

- **Generators:** Lists the available field generators

Generators								
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY GEN	GPIB	X	0	0.01	20000	-100	20
	PMM 3000	RS232	X	3	0.01	1000	-80	10
	PMM 3030RS	RS232	X	1	0.009	3000	-107	10
√	PMM 3030USB	USB	X	X	0.009	3000	-107	10
	PMM 3010USB	USB	X	X	0.009	1000	-107	10
	PMM 3010RS	RS232	X	1	0.009	1000	-107	10

- **Power Meter:** Lists the available power meters

Power Meters								
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY PM	USB	X	X	0.01	6000	-40	30
√	PMM 6630	USB	X	X	0.009	3000	-40	30
	PMM 6600	RS485	1	1	0.01	1000	-40	27

- **Device:** Includes all Clamp and CDN models.

Devices					
Selected	Name	Type	Min level (dBm)	Max level (dBm)	
	EMCLAMP	Clamp	-100	10	
	M3-25	CDN	-40	10	
√	EM101	Clamp	-40	10	

- **Current Probes:** Shows current probes with the names of their calibration files.

Probes		
Selected	Name	Cal. File
√	33_1_411	33_1_411.cpf

- **Others:** Shows the amplifier,

Others				
Environment impedance				
<input checked="" type="radio"/> 150 ohm <input type="radio"/> 50 ohm				
Amplifier				
Name		PMM 6000N		
Attenuator				6 dB

Additional devices can be added to each of these tables by right-clicking and selecting **Add new**.

Generators		Power Meters		Devices		Probes		
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY GEN	GPIB				20000	-100	20
	PMM 3000	RS232	X	3	0.01	1000	-80	10
	PMM 3030RS	RS232	X	1	0.009	3000	-107	10
V	PMM 3030USB	USB	X		0.009	3000	-107	10
	PMM 3010USB	USB	X		0.009	1000	-107	10
	PMM 3010RS	RS232	X		0.009	1000	-107	10

Immunity Suite - add Generator

Instruments name:

Instr. driver name:

Bus type: Bus Address:

Com Port num.:

Frequency range

From: to: MHz

Level limits

From: to: dBm

Devices can also be checked, modified or removed by right-clicking from the corresponding line:

Generators		Power Meters		Devices		
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)
	DUMMY GEN	GPIB	X	0	0.01	20000
	PMM 3000	RS232	X	3	0.01	1000
	PMM 3030RS	RS232	X	1	0.009	3000
V	PMM 3030USB	USB	X		0.009	3000
	PMM 3010USB	USB	X		0.009	1000
	PMM 3010RS	RS232	X		0.009	1000



For connecting and setting the COM port of fiber optic equipment, see the user manual supplied with the device.

- **Modify:** changes the properties of the device



- **Remove:** removes the device and its driver from the list.

- **Check Device:** makes sure the driver is working and the device is properly connected. This option is only available for the device selected (√).

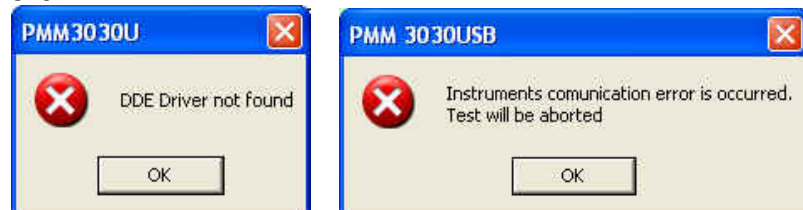
If the device is connected and the driver has been correctly installed, the following message will appear:



This message will appear if the device has not been connected properly to the work setup



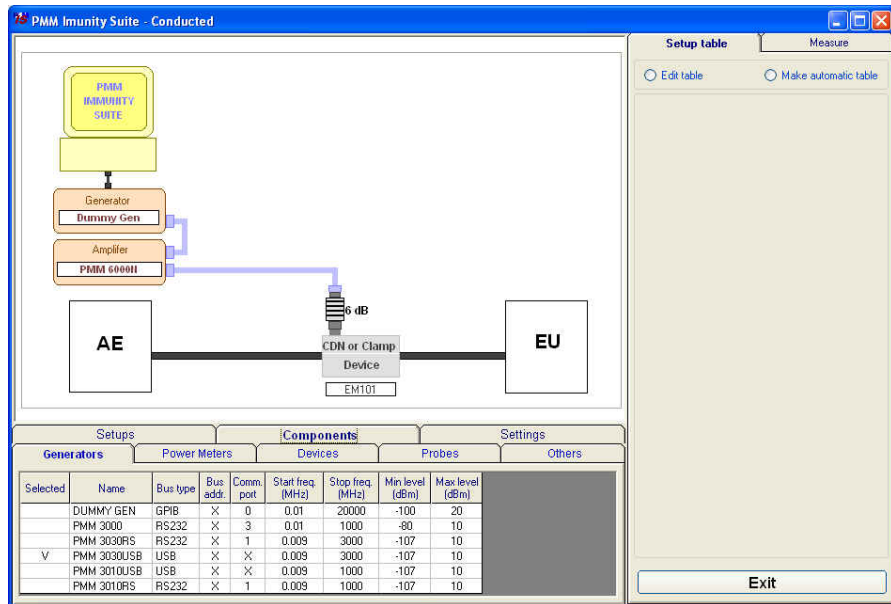
If the driver of the device has not been installed properly, the screen will show:



We recommend performing a device check before starting the calibration phase or immunity test. In any case, before calibration or testing, the program runs an automatic check and reports any errors as described above.

4.4 Diagram window

The diagram window shows the setup to be followed on the basis of the equipment selected.



The selected devices (✓) are shown at the bottom of the pane.

In addition to using the Components tab, you can move from one type of equipment to another by clicking the label with the device's name

PMM 3030USB in the diagram window

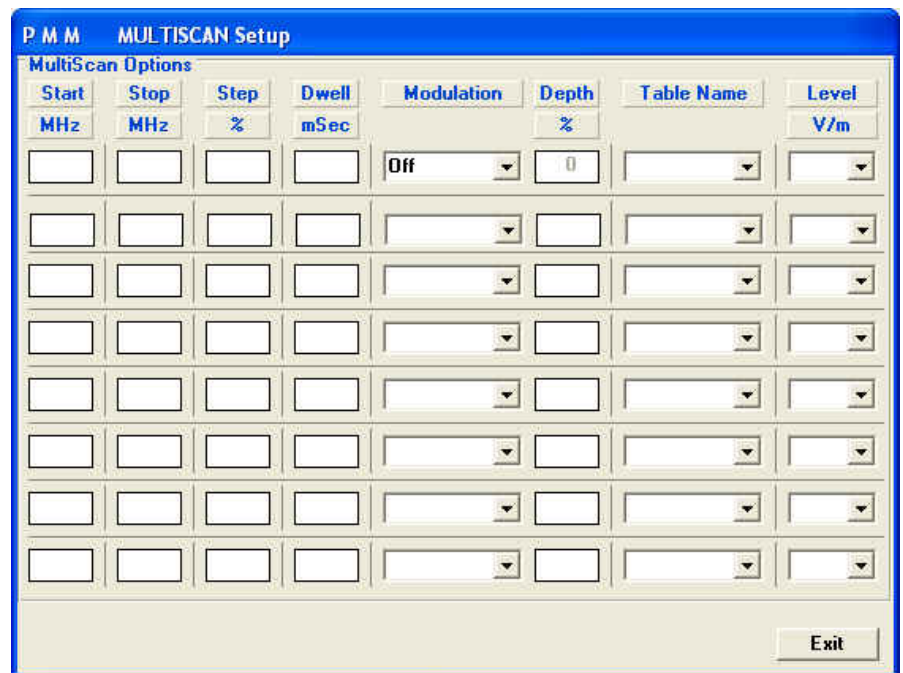
4.5 Settings

After performing the setup shown in the diagram window, the calibration test parameters need to be set using the **Measure** tab:



Measure		Break points		Charts	
Frequency:		Level:	10 V	Dwelltime:	100 ms
Start:	0.150 MHz	Tolerance:	2.50 V		
Stop:	200.000 MHz	Modulation Type:	OFF	Multiscan:	<input type="checkbox"/> Enabled <input type="button" value="Setup"/>
Step:	1.000 %	Depth:	80 %		
<input type="button" value="CW"/>	900.000 MHz				
<input checked="" type="checkbox"/> Step percent					

The **Multiscan** feature allows you to modify measurement parameters within a given frequency range.



MULTISCAN Setup							
MultiScan Options							
Start	Stop	Step	Dwell	Modulation	Depth	Table Name	Level
MHz	MHz	%	mSec		%		V/m
				Off	0		

With the **Break Points** tab, you can set the frequencies at which measurement will be temporarily suspended to allow a change in setup.

Measure		Break points	Charts
	Freq. MHz	Comment	
Stop 1	.22	Cambia Amplificatore	
Stop 2	.32	Cambia Amplificatore	
Stop 3	---	---	
Stop 4	---	---	
Stop 5	---	---	

Each time the stop frequency is reached, a message will display the scheduled action.











The break points are shown as vertical stripes in the graph.

Click **OK** to continue measuring.

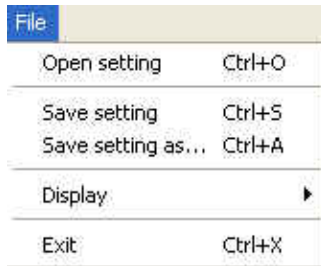
The **Charts** tab allows visual modifications to suit your preferences. For each element, click on the color shown, and change it using the Windows color box if desired.

In this tab, you can also move the reference level along the y-axis (+ and - buttons), or change the power level and range (in dBm), the voltage (in V) and the current (in mA).

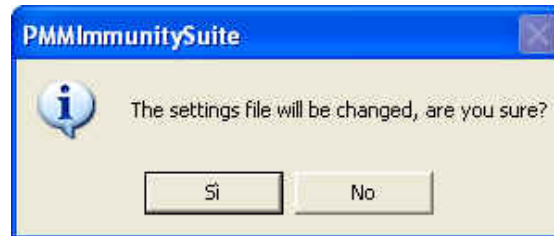
Measure	Break points	Charts
Graph type <input checked="" type="radio"/> Linear Break points Color  Cursor Color 	Chart: BackColor  Grid Color  Trace <input checked="" type="checkbox"/> Generator  <input type="checkbox"/> Monitor  <input type="checkbox"/> Forward PM  <input type="checkbox"/> Reverse PM 	Reference position <input type="button" value="+"/> <input type="button" value="-"/> Reference\Range dBm Value <input type="text" value="0"/> dBm Range <input type="text" value="100"/> dB Reference\Range V Value <input type="text" value="10"/> V Range <input type="text" value="10"/> V I _{max} \Range A Value <input type="text" value="66.7"/> mA Range <input type="text" value="100"/> mA

4.6 Settings management

For each new session, the default file CondDefault.tsc is loaded. To avoid having to re-enter preferred settings, they can be saved in a single .tsc file:

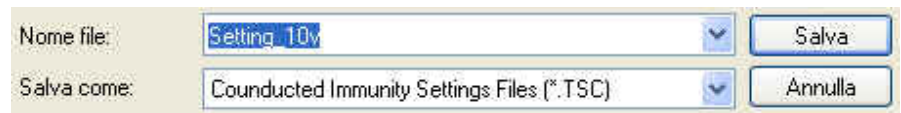


The command **File -> Save setting** overwrites the file in use. If no file was called up when the program was opened, the default file will be overwritten: The following message will appear

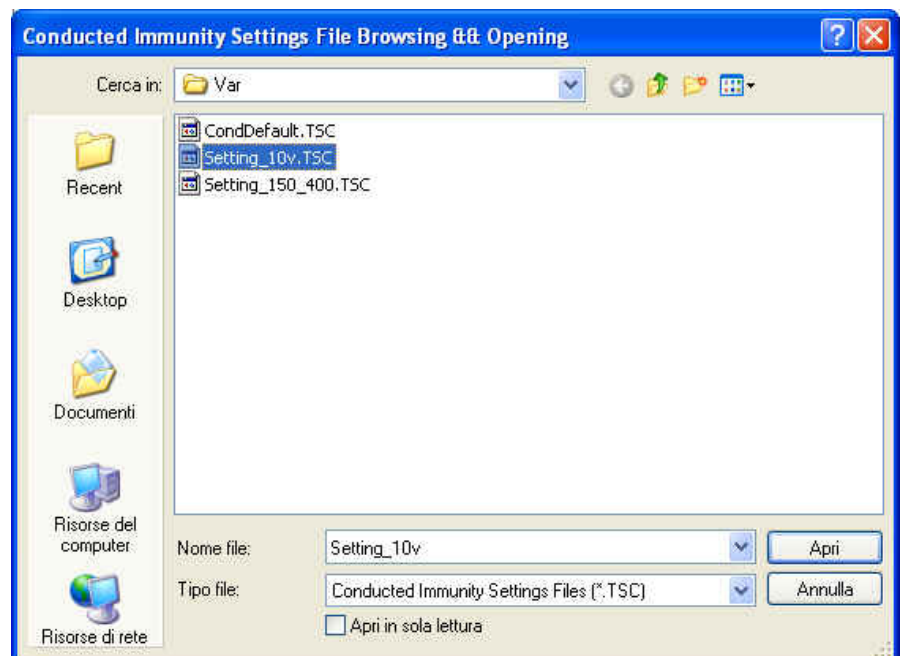


Choose **YES** to overwrite the file in use. Choose **NO** to cancel the operation and return to the main window.

File -> Save setting as... Enter the file name assigned to the work session and press **Save**.



The file can be called up at any time with the command **File -> Open setting**.

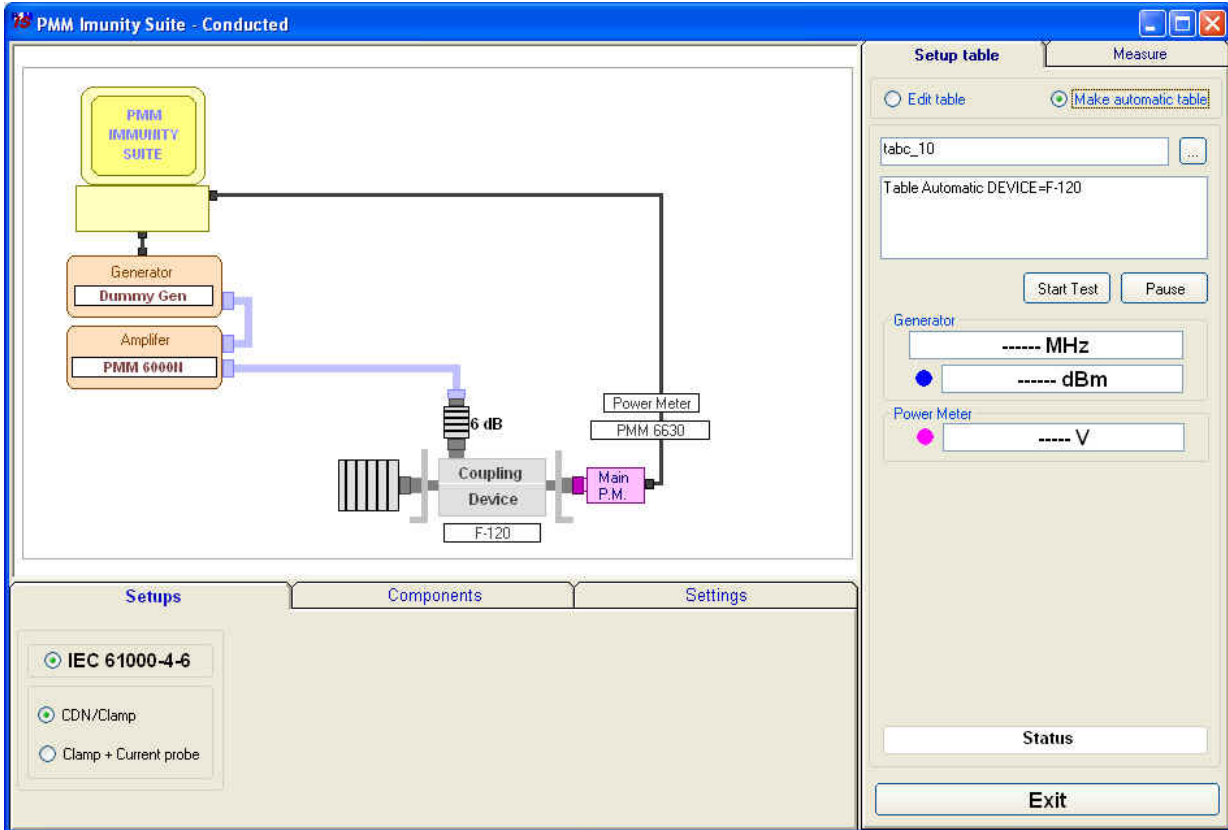


File -> Display -> Default colors is used to restore the original display.

4.7 System calibration

You can now calculate the levels assigned to the generator in order to have a constant voltage within the chosen frequency range.

Arrange the setup as shown in the graph:



4.7.1 Setup table

There are different ways to create the table:


- Automatically (select **Make automatic table**)
- By adapting the automatically created table to the instrumentation used (select **Edit table**)
- By completing the entire table manually (select **Edit table**)

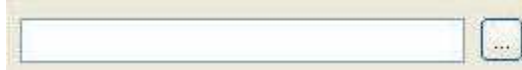
4.7.1.1 Automatic table creation

To create a table automatically:

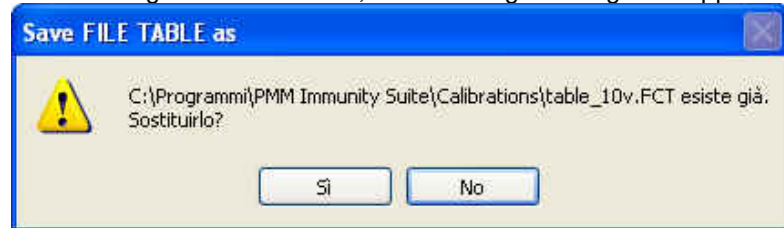
- Select **Make automatic table**



- Select , assign a name to the table and press **Save**.



If an existing table is selected, the following message will appear:



Choose **YES** to overwrite the table.

Choose **NO** to cancel the operation and return to the main window.

- A comment can be added, if desired.



- Press **Start test**, then **Abort test** if you wish to terminate the process at any time.



A **Pause** button is also available, and becomes **Continue** to resume the process.



The **Generator** window shows the level (in dBm) entered by the generator, at a given frequency (in MHz), to generate the voltage required.



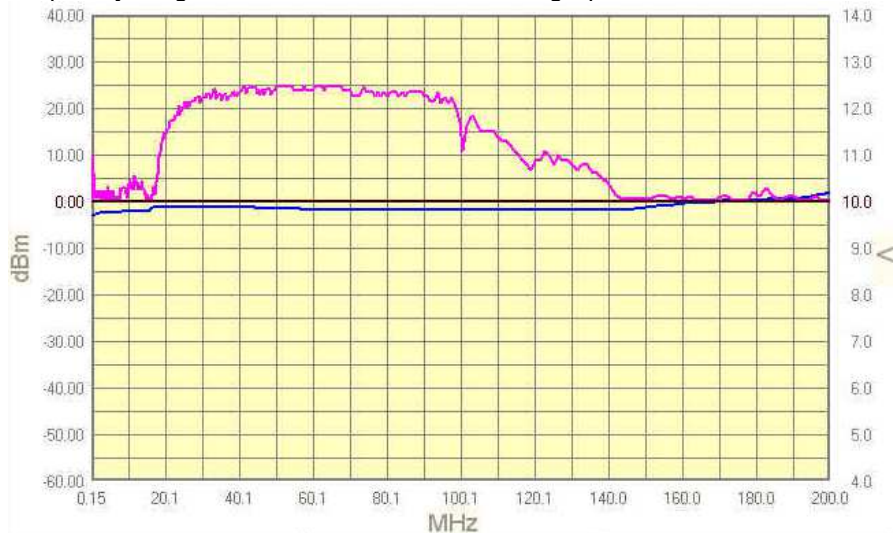
The color of the dot corresponds to the color of the line on the graph.

The voltage applied will be shown in the **Power Meter** window.

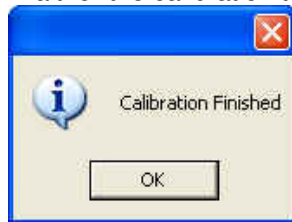


Values outside the selected tolerance will be shown in red; the generator will adjust the level to bring the voltage back into range. The color of the dot corresponds to the color of the line on the graph.

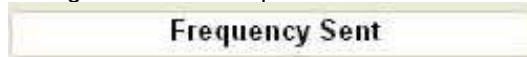
During the work session, the generator level and voltage within the frequency range selected will be shown as a graph.



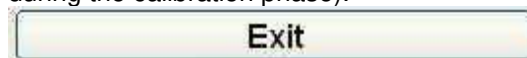
Wait for the calibration to finish.



The Status window shows each operation performed by the program during the calibration phase.

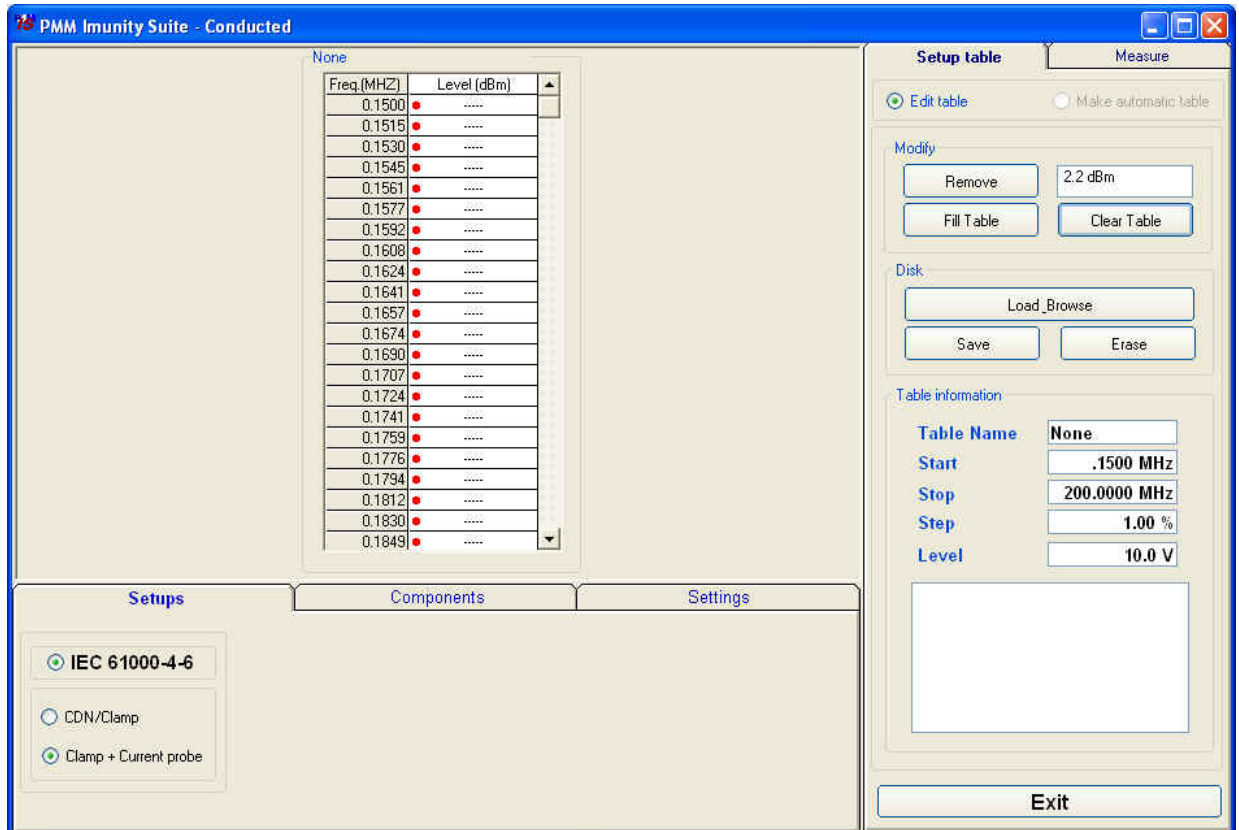


Press the **Exit** button to leave **Conducted mode** (the button is deactivated during the calibration phase).



4.7.1.2 Manual table creation

You may also fill in the entire table manually.



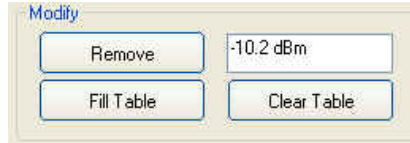
Check the information in **Setups**, **Components** and **Settings**.

Go to **Setup table** -> **Edit table**.

Select the desired cell, type in the value, and confirm by pressing ENTER.

Freq.(MHZ)	Level (dBm)
0.1500
0.1515
0.1530
0.1545
0.1561
0.1577
0.1592
0.1608
0.1624
0.1641
0.1657
0.1674
0.1690

The amount entered can be deleted by clicking **Remove**.

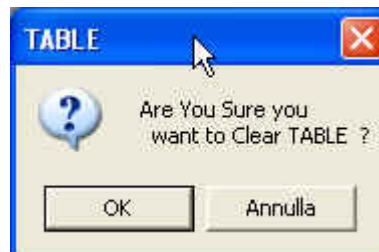


If several values need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

Freq.(MHZ)	Level (dBm)	Freq.(MHZ)	Level (dBm)
0.1500	✓ -10.2	0.1500	✓ -10.2
0.1575	• -----	0.1575	• -10.3
0.1654	• -----	0.1654	• -10.4
0.1736	• -----	0.1736	• -10.5
0.1823	• -----	0.1823	• -10.6
0.1914	• -----	0.1914	• -10.7
0.2010	• -----	0.2010	• -10.7
0.2111	• -----	0.2111	• -10.8
0.2216	• -----	0.2216	• -10.9
0.2327	• -----	0.2327	• -11.0
0.2443	• -----	0.2443	• -11.1
0.2566	• -----	0.2566	• -11.2
0.2694	• -----	0.2694	• -11.3
0.2828	• -----	0.2828	• -11.4
0.2970	• -----	0.2970	• -11.5
0.3118	• -----	0.3118	• -11.6
0.3274	• -----	0.3274	• -11.6
0.3438	• -----	0.3438	• -11.7
0.3610	• -----	0.3610	• -11.8
0.3790	• -----	0.3790	• -11.9
0.3980	• -----	0.3980	• -12.0
0.4000	✓ -12.1	0.4000	✓ -12.1

The **Clear Table** command deletes all of the values entered. The command must be confirmed.

Freq.(MHZ)	Level (dBm)
0.1500	✓ -10.2
0.1575	✓ -10.2
0.1654	✓ -10.2
0.1736	✓ -10.2
0.1823	✓ -10.2
0.1914	✓ -10.2
0.2010	✓ -10.2
0.2111	✓ -10.2
0.2216	• -----
0.2327	• -----
0.2443	• -----
0.2566	• -----
0.2694	• -----
0.2828	• -----



The **Table information** pane displays the main measurement settings:

Table information

Table Name: None

Start: .1500 MHz

Stop: 200.0000 MHz

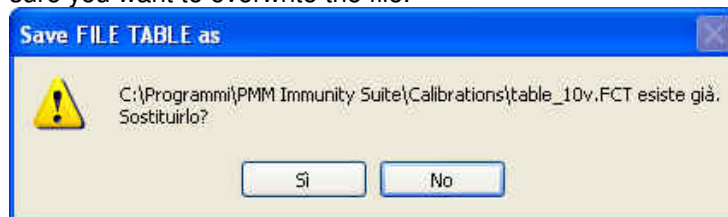
Step: 1.00 %

Level: 10.0 V

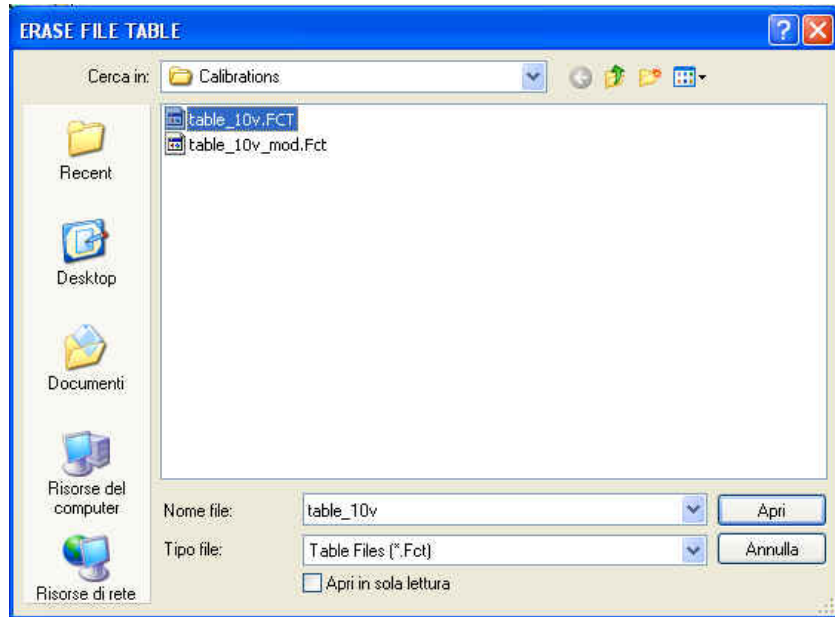
Once all values have been entered, click **Save**, then type in the name of the table and click **Save** again.



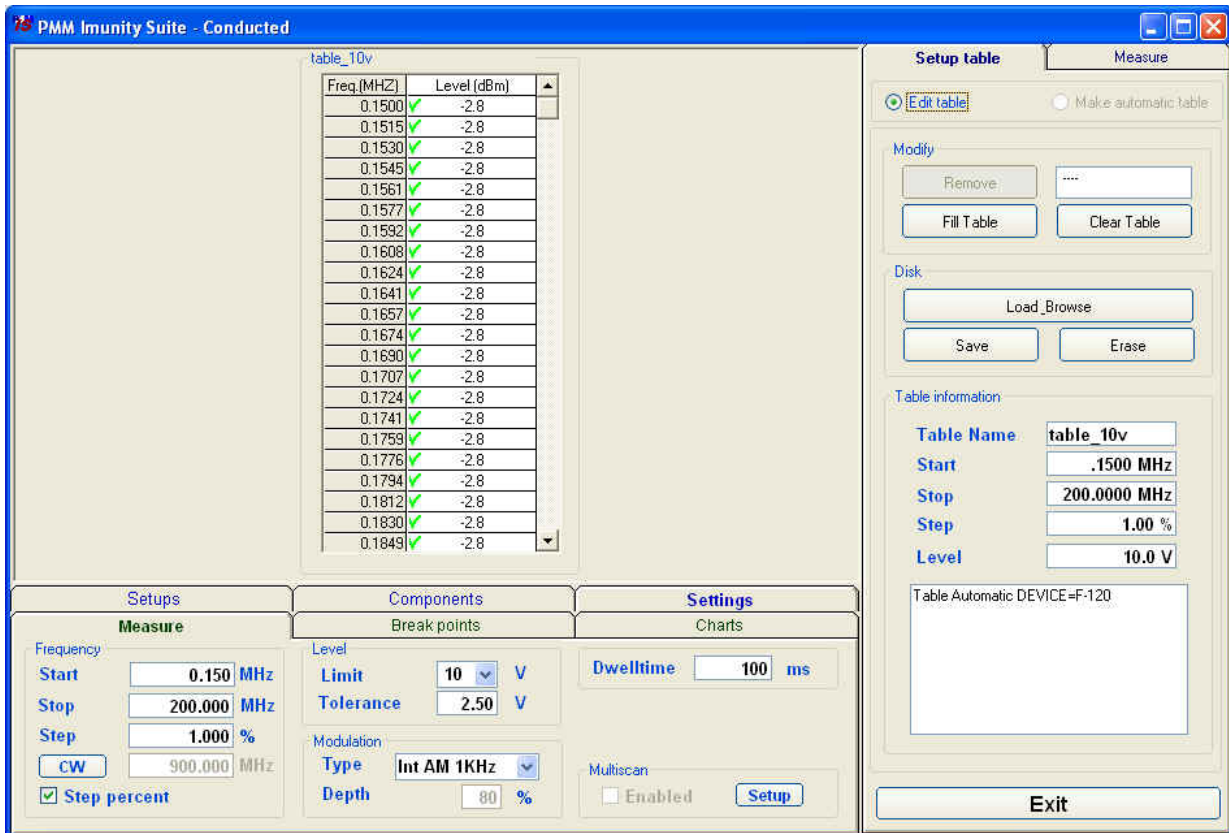
If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file.



The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**, then confirm the command.



4.7.1.3 Modifying an existing table

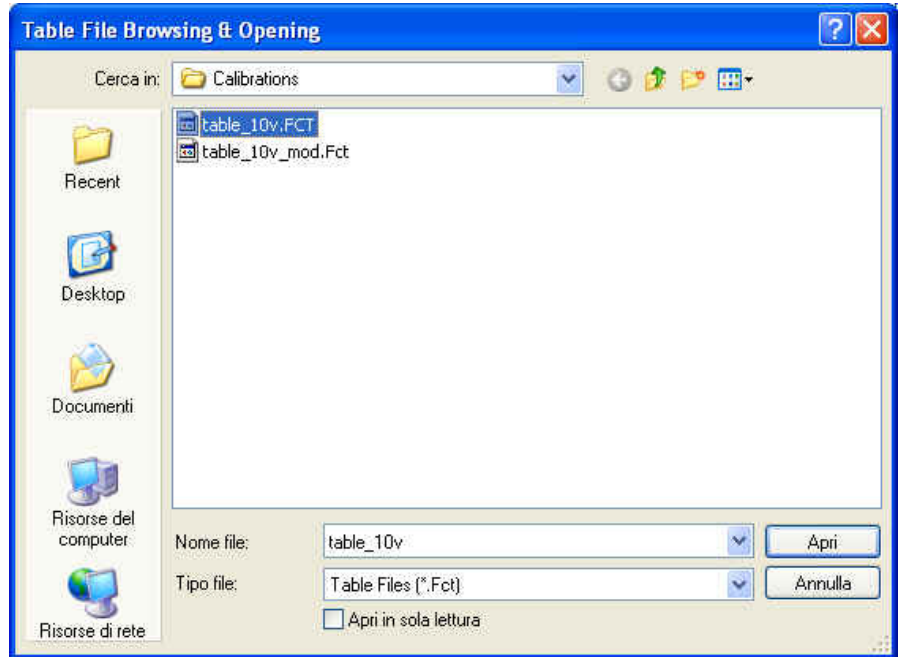


An existing table can be adapted to the instrumentation used.

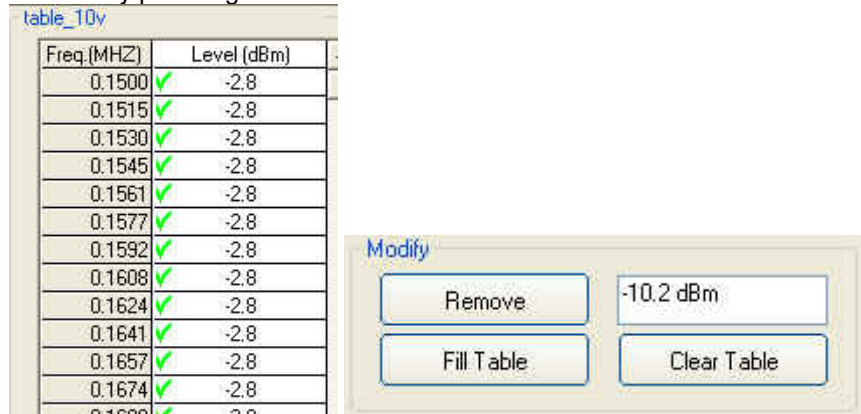
Check the information in **Setups**, **Components** and **Settings**.

Go to **Setup table** -> **Edit table**.

Call up a previously created table by clicking **Load_Browse**, then selecting the table and clicking **Open**.



Select the desired cell, click **Remove**, type in the new value, and confirm by pressing ENTER.



To delete all data, select **Clear Table** and confirm.



If several values need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

table_150_400	table_150_400		
Freq.(MHZ)	Level (dBm)	Freq.(MHZ)	Level (dBm)
0.1500 ✓	-10.2	0.1500 ✓	-10.2
0.1575 ✓	-10.2	0.1575 ✓	-10.2
0.1654 ✓	-10.2	0.1654 ✓	-10.2
0.1736 ✓	-10.2	0.1736 ✓	-10.2
0.1823 ●	----	0.1823 ●	-10.4
0.1914 ●	----	0.1914 ●	-10.7
0.2010 ●	----	0.2010 ●	-10.9
0.2111 ●	----	0.2111 ●	-11.2
0.2216 ✓	-11.4	0.2216 ✓	-11.4
0.2327 ✓	-11.4	0.2327 ✓	-11.4
0.2443 ✓	-11.4	0.2443 ✓	-11.4
0.2566 ✓	-11.4	0.2566 ✓	-11.4
0.2694 ✓	-11.4	0.2694 ✓	-11.4
0.2828 ✓	-11.4	0.2828 ✓	-11.4
0.2970 ✓	-11.4	0.2970 ✓	-11.4
0.3118 ✓	-11.4	0.3118 ✓	-11.4
0.3274 ✓	-12.1	0.3274 ✓	-12.1
0.3438 ✓	-12.1	0.3438 ✓	-12.1
0.3610 ✓	-12.1	0.3610 ✓	-12.1
0.3790 ✓	-12.1	0.3790 ✓	-12.1
0.3980 ✓	-12.1	0.3980 ✓	-12.1
0.4000 ✓	-12.1	0.4000 ✓	-12.1

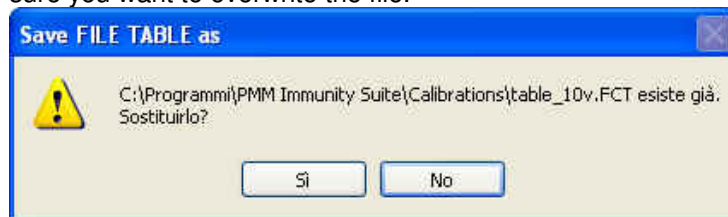
The **Table information** pane displays the main measurement settings.

Table information	
Table Name	None
Start	.1500 MHz
Stop	200.0000 MHz
Step	1.00 %
Level	10.0 V

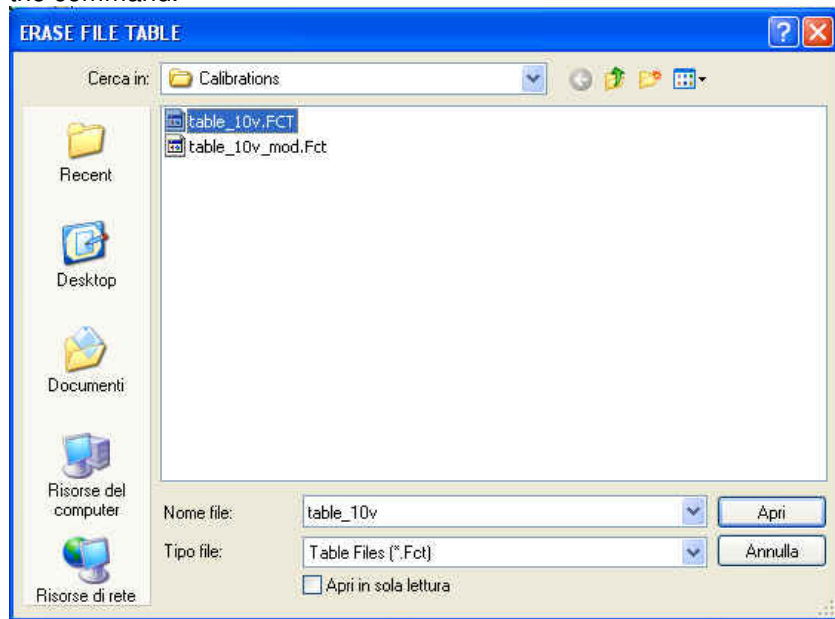
Once all values have been entered, click **Save**, then type in the name of the table and click **Save** again.



If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file.



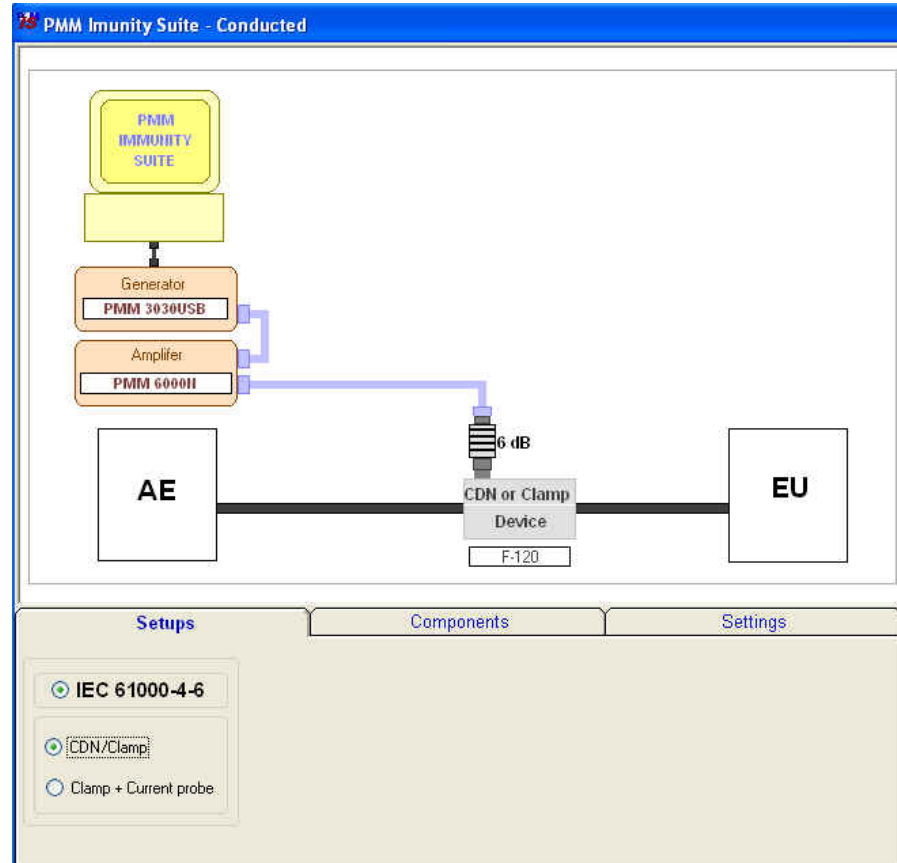
The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**, then confirm the command.



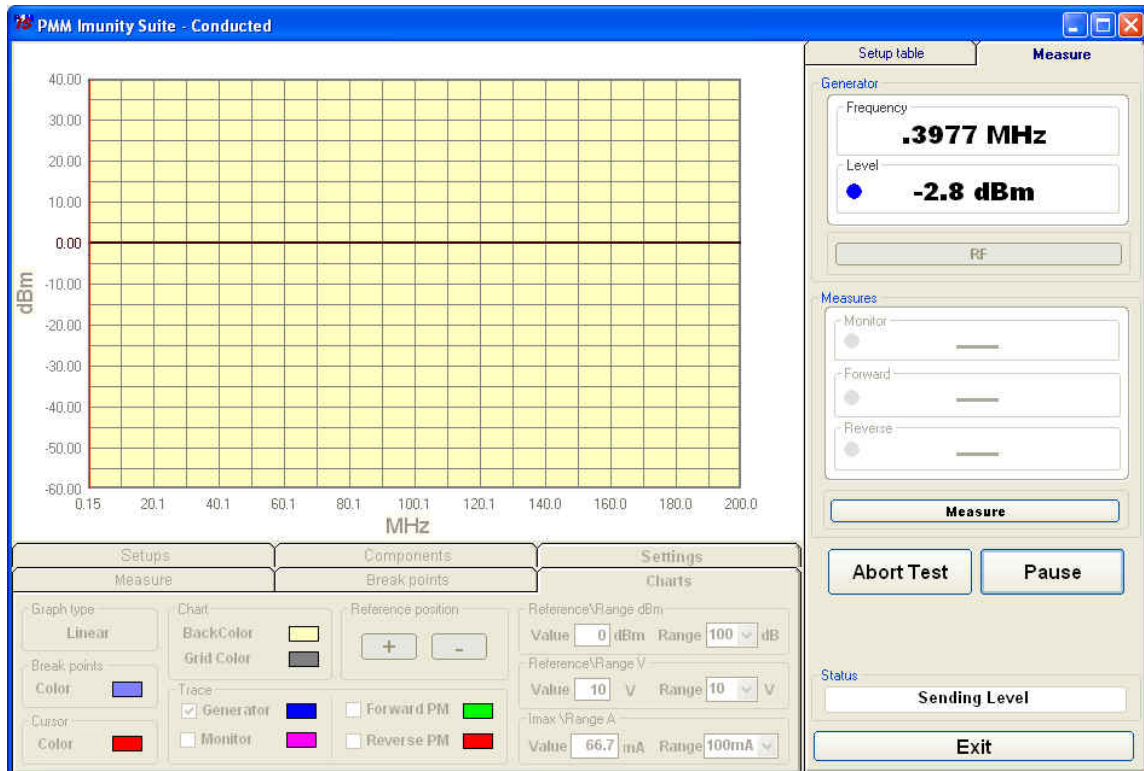
4.8 Immunity test WITH Impedance Requirements (Setups)

If an injection clamp is used, the AE configuration must present common-mode impedance (consult EMC regulations for further details).

If the impedance requirements are satisfied, select **CDN/Clamp**.



4.8.1 Starting the test Go to **Measure**.

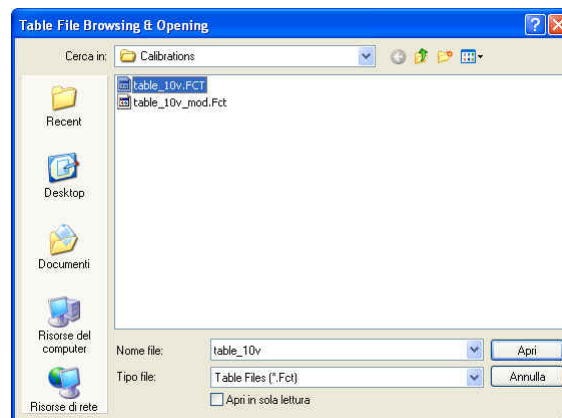


Click **Start Test**.

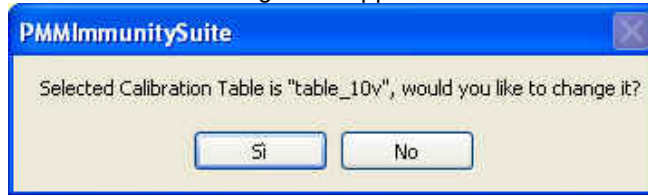
If no setup table has been selected, the following message will appear:



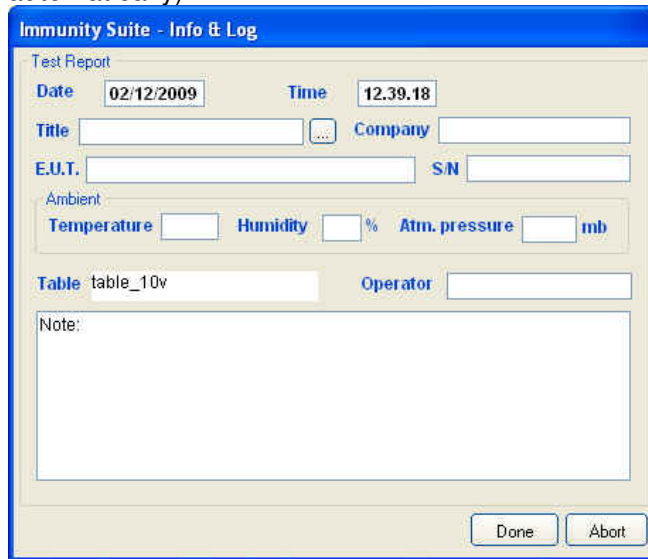
Click OK, then select the table and confirm with **Open**.



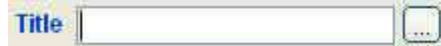
Otherwise the message that appears is as follows:




Choose **Yes** to view the *Table File Browsing & Opening* window and select a different table. Choose **No** to use the file shown and open the following data entry window (the date and time are entered automatically).



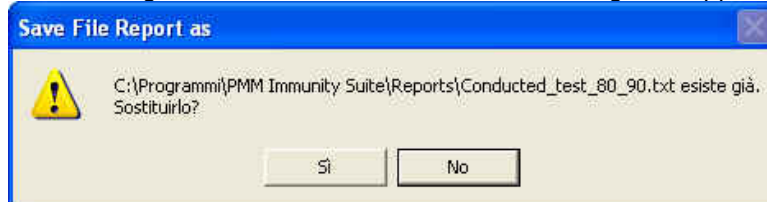
Enter the name of the immunity test.



Click  and enter the test name, then **Save**.

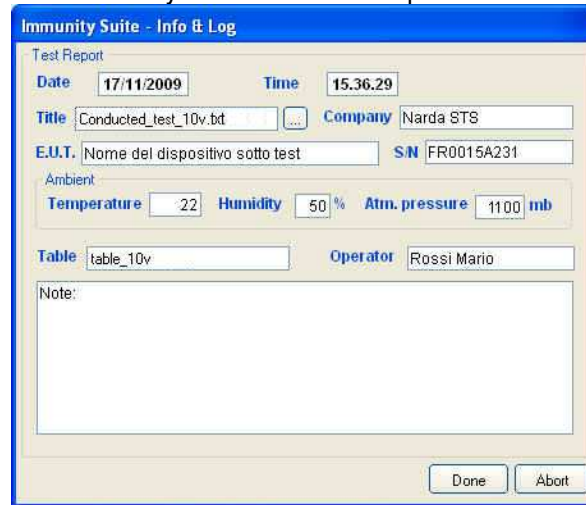


If an existing test is selected, a confirmation message will appear.



Fill in the fields **Company**, **E.U.T.**, **S/N**, **Temperature**, **Humidity**, **Atm. Pressure**, **Operator** and **Note**.

The data entry window is now complete:



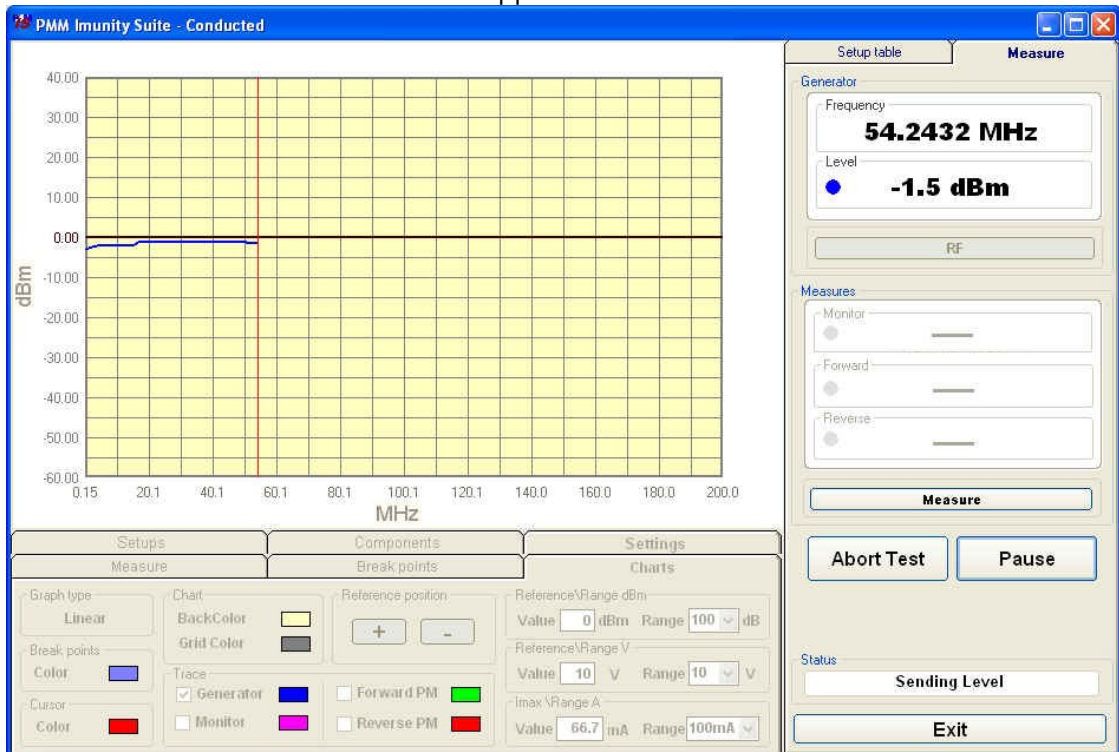
Confirm with **Done** to start the immunity test.

If an existing test is selected, a confirmation message will appear:



Choose **Yes** to overwrite the data with the test in course.

Choose **No** to append the new data.

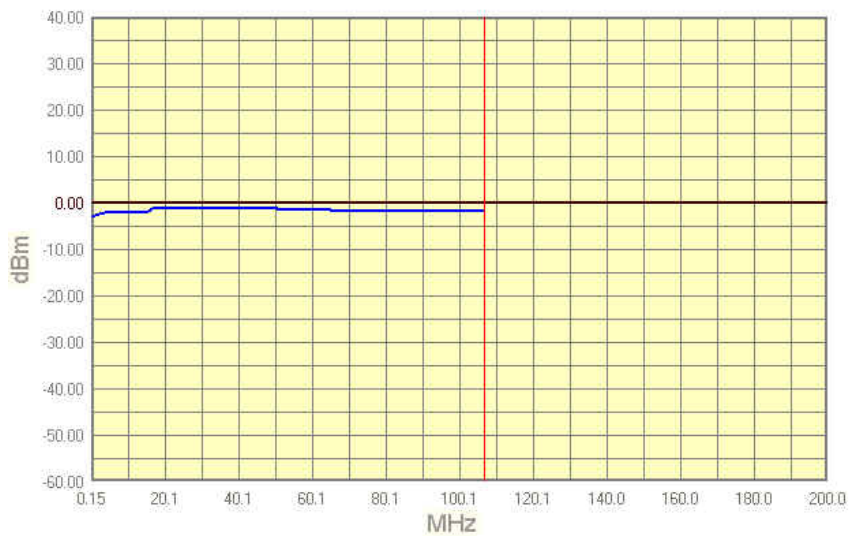


During the test, the **Generator** window shows the level extrapolated from the setup table and used by the generator to obtain the required voltage.

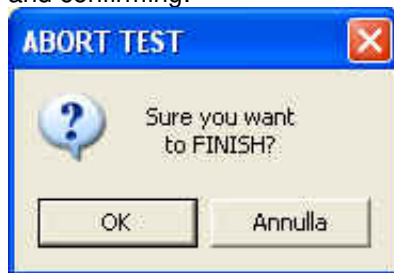
The color of the dot corresponds to the color of the line on the graph



During the test, the frequency range and generator level will be shown in graph form.

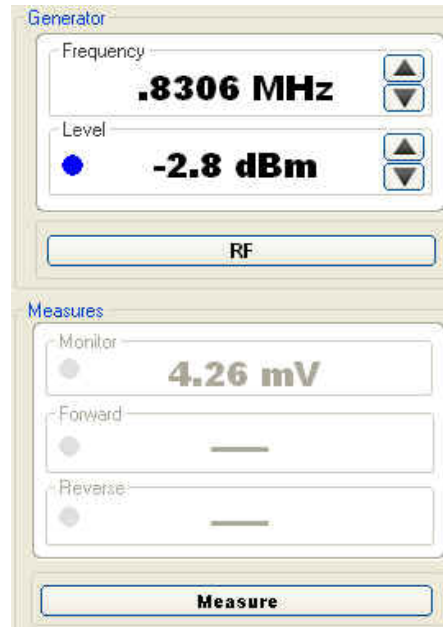


At any time, the test can be terminated by clicking the **Abort Test** button and confirming:

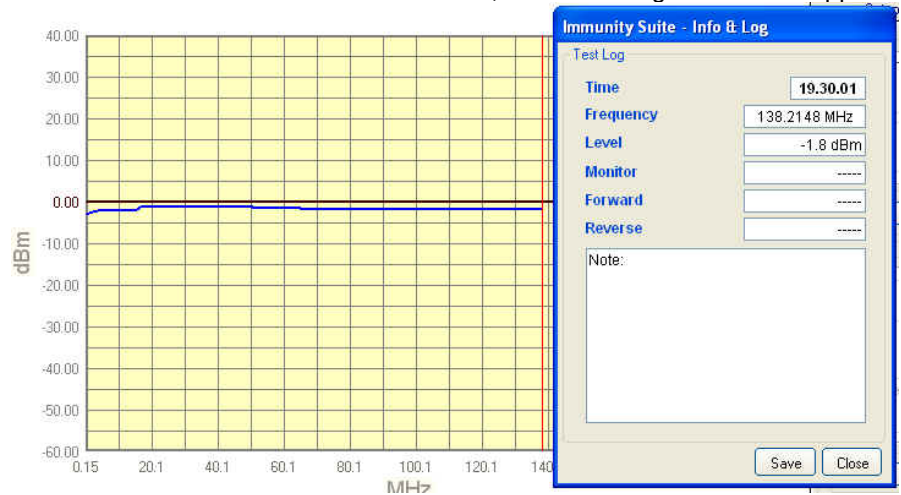


The **Pause** button can also be used at any time to stop the test momentarily (the generator is set to RF OFF).

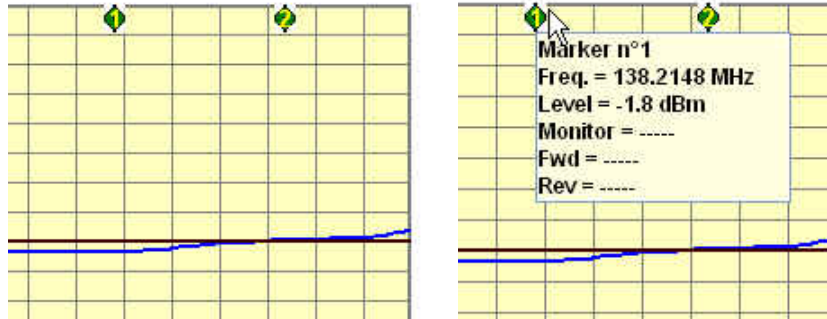
In this state, an earlier situation can be recreated or a later one can be simulated; click the RF button (the generator is set to RF ON), adjust the frequency and level with the arrows, and click **Measure** to display the voltage.



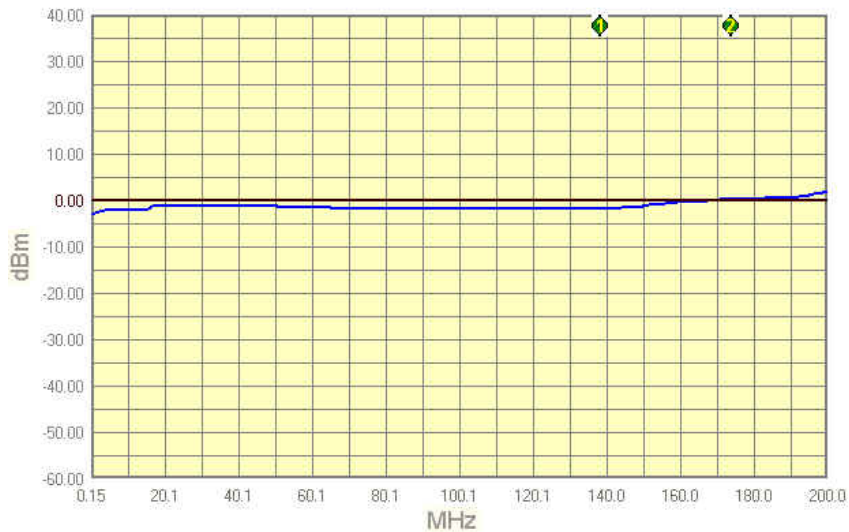
Each time the **Pause** button is clicked, the following window will appear:



Pressing **Save** assigns a marker to the current position for future reference. At the end of the test, the saved information can be viewed simply by hovering the cursor over the marker.



The button will now read **Continue** to resume the test.



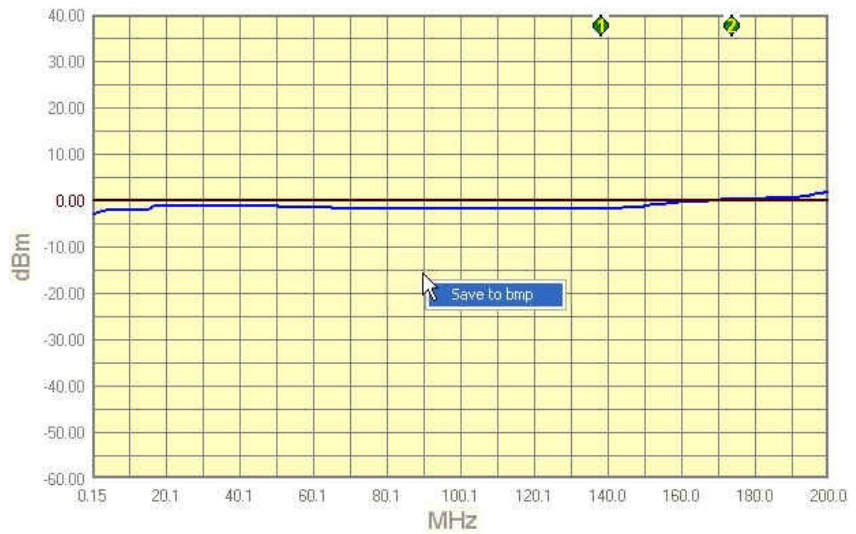
The status window shows each operation performed by the software during the test.



The end of the immunity test will be announced with the message:



When the test is over, the graph can be saved in .bmp format by right-clicking anywhere in the graph and selecting **Save bmp**.

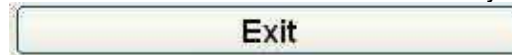


In the next window, assign a name to the graph and press **Save**.

Nome file:	<input type="text" value="graph_test 80-90"/>	<input type="button" value="Salva"/>
Salva come:	<input type="text" value="bitmap (*.bmp)"/>	<input type="button" value="Annulla"/>

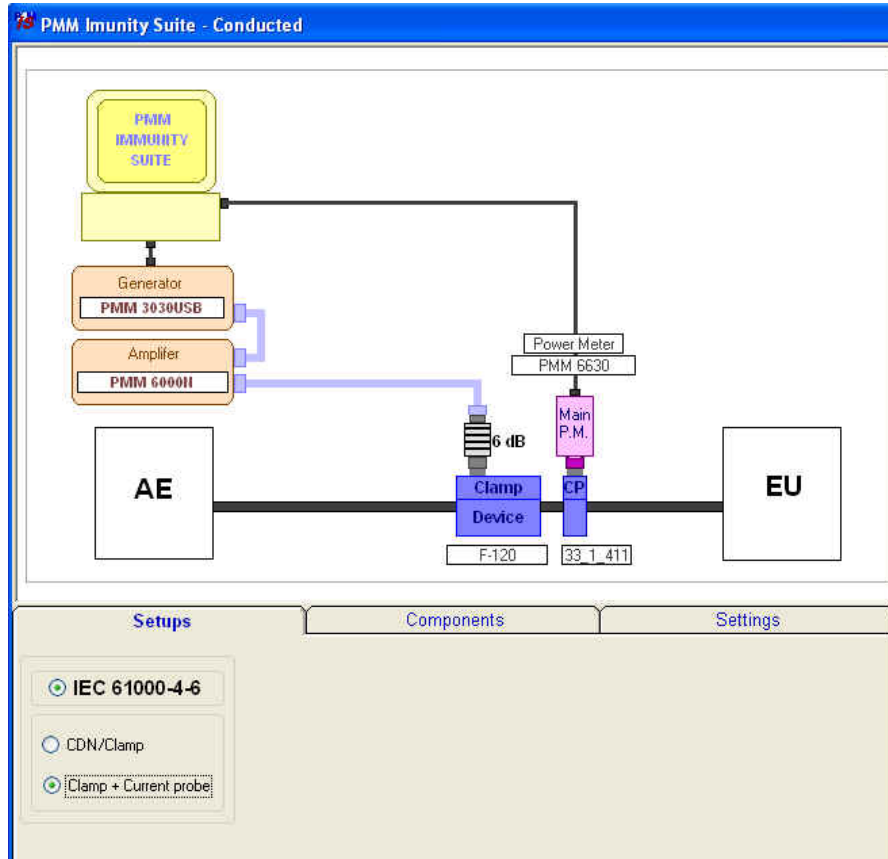
The saved graph can be inserted into a text file using the Editor feature (see the Editor section for details).

Press the Exit button to leave the immunity test..



**4.9 Immunity test
WITHOUT impedance
requirements (Setups)**

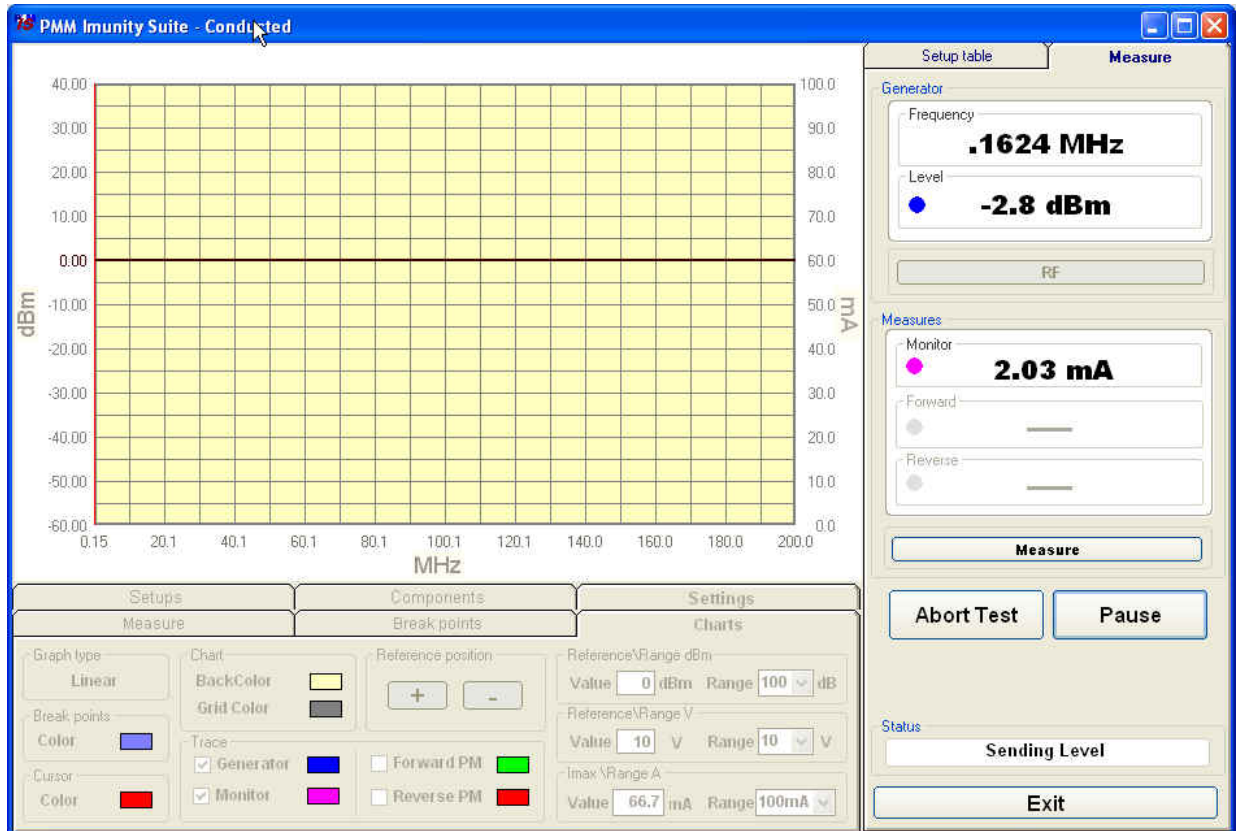
If the impedance requirements cannot be met, the current produced by the induced voltage must be checked using a supplementary probe placed between the injection clamp and the EUT (see EMC regulations for further details). For this configuration, select **Clamp + Current probe**.



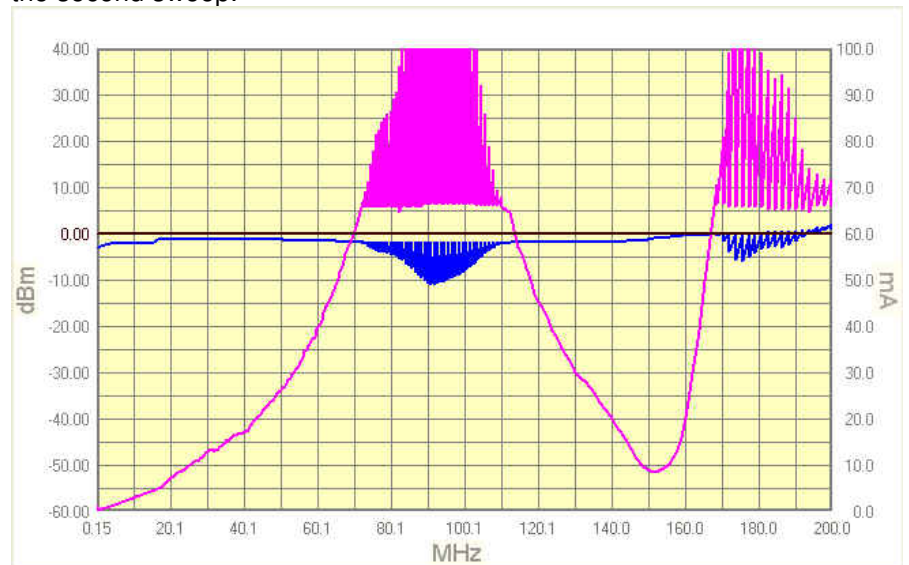
This procedure provides only significant differences with respect to the previous test.

4.9.1 Monitoring the current

Go to **Measure**.



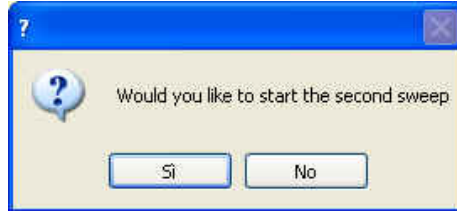
The example below shows the current and the generator level during a test in which the current limit is exceeded and then brought back into range by the software. The correct generator levels will be saved and used during the second sweep.



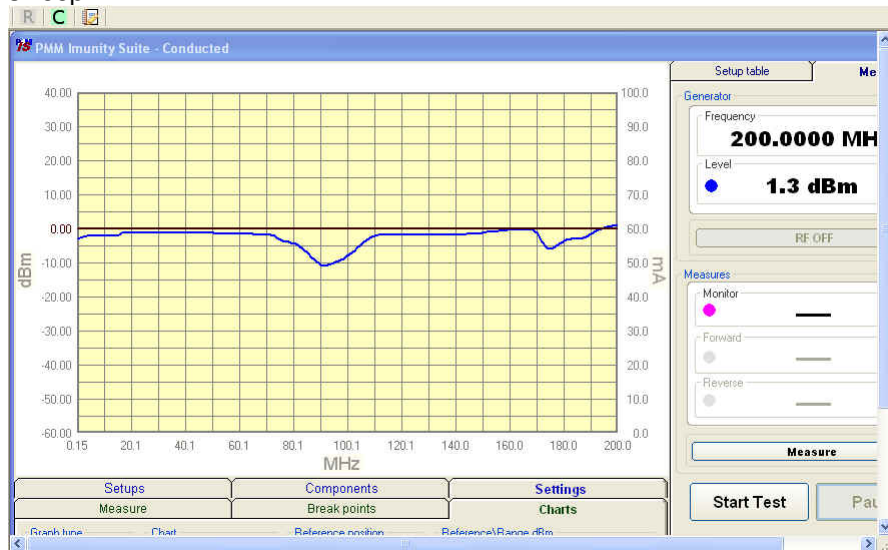
4.9.2 Second Sweep

When the process has finished, you can save the new table calculated during the first sweep. If no name is assigned, the program will use the name of the previous table and add "*_ modified*" (e.g. *tabc_10v_modified.fct*).

After the file is saved, a prompt will appear to conduct a second sweep with the new table.



The graph below shows the new generator levels applied during the second sweep.



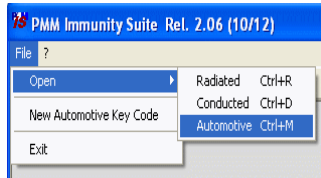
At the end of the test, the table will appear with the new values marked by a red dot.

0.1654	✓	-10.2
0.1736	✓	-10.2
0.1823	●	-10.4
0.1914	●	-10.7
0.2010	●	-10.9
0.2111	●	-11.2
0.2212	✓	-11.4

5 – PMM Immunity Test Automotive

5.1 Introduction to conducted mode

The purpose of the test is to check the immunity of equipment, individual devices or systems to disturbances caused by radiofrequency electromagnetic fields to connection cables, power cords, signal lines and ground wires. The standard for equipment, setup and procedure is EN 61000-4-6.



A

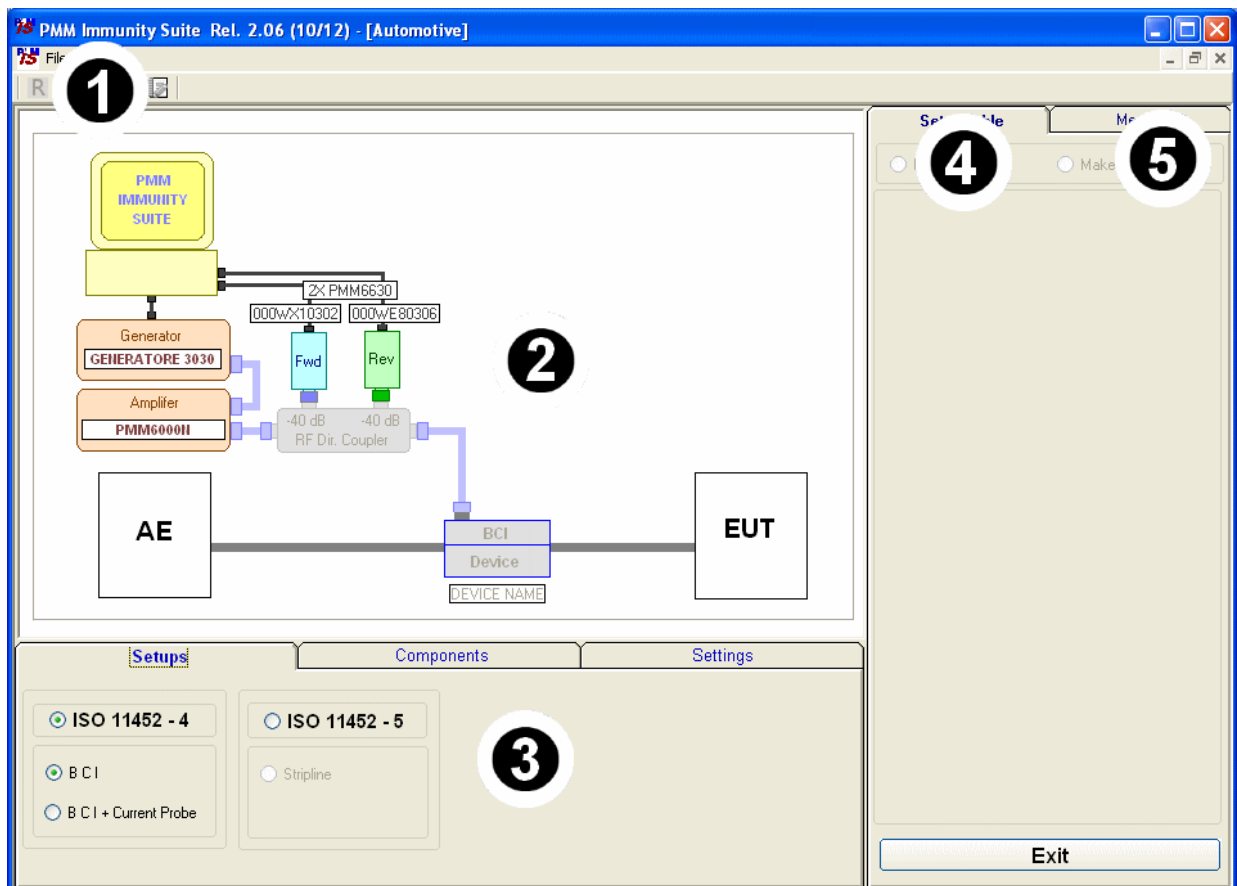
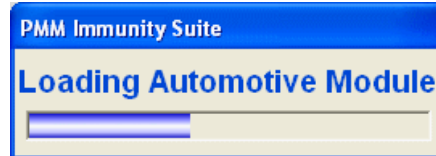


Fig. 5-1 Main window - Automotive

This window contains:

1. Menu
2. Diagram window
3. Function tabs
4. Setup table
5. Measure;

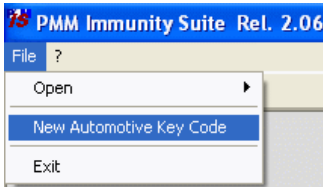
5.1.1 Automotive option activation

The **Automotive** section of the **Software suite** is an **optional feature**.

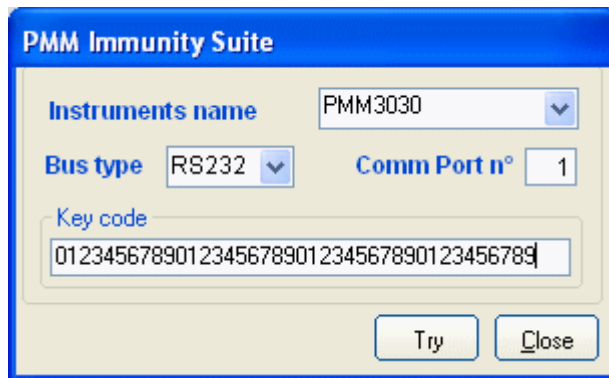
To enable the Automotive test, use the Automotive Key Code tool in the program.



For further information on software installation refer to the “Installing the program” chapter.

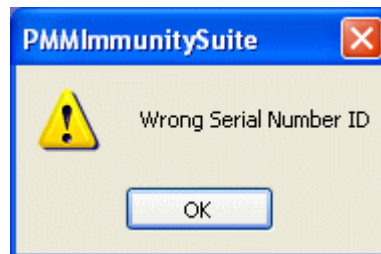


Click on “**File**” and choose “**New Automotive Key code**” for running the Set code utility, so getting the following window:

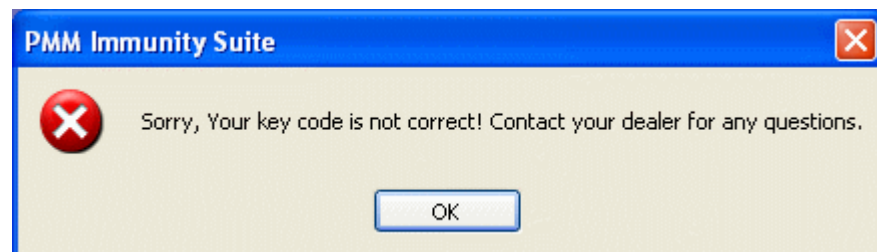


Select the proper instrument model, the bus type and eventually the port for communicating with it, and simply copy the 40 Digit Serial Code in the Key Code text box, then select Window and select the **Try** button.

This message appears when the Key code is not valid.



Or it is not the right code for your instrument:



It will be shown the following progress bar indicating the module is being loaded.



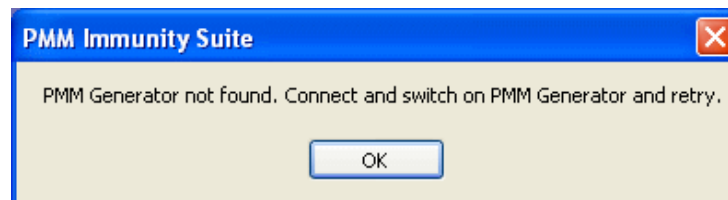
This means also the Key Code has been successfully stored.

Then the module is ready to be used.



To use the Automotive tool, the registered PMM signal generator must be correctly connected to the PC running the software and switched on.

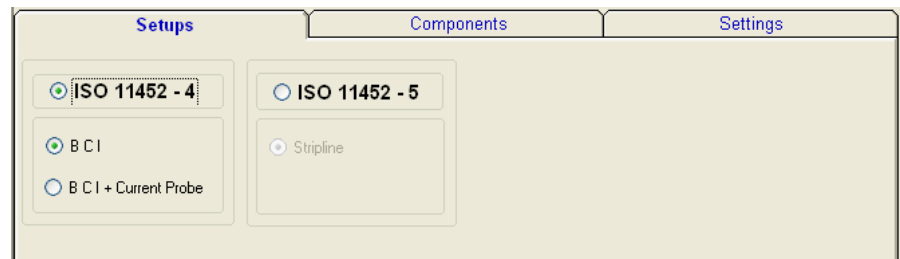
If the generator is unconnected or switched off the following message appears:



5.2 EN 61000-4-6 Setups

Once Automotive mode is run, the type of setup needs to be chosen. The program offers:

- ISO 11452-4 with BCI and, in case, Current Probe
- ISO 11452-5 with Stripline



5.3 Equipment selection (Components)

In this phase you will select the equipment to be used during calibration or testing. The program divides equipment by type; for your convenience, drivers from the PMM family can be used. To enable the desired module, double click the corresponding line (a \checkmark will appear next to the instrument selected).

- **Generators:** Example list of the available field generators

Generators		Power Meters	Field Meters	Devices		Current Probes	Others		
Selected	Name	S/N	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
<input checked="" type="checkbox"/>	GENERATORE 3030	000WE70204	RS232	X	1	0.009	3000	-107	10
<input type="checkbox"/>	STUB3030	STUB3030	USB	X	X	0.009	3000	-107	10
<input type="checkbox"/>	PMM 3000	PMM 3000	RS232	X	2	0.01	3000	-80	10
<input type="checkbox"/>	PMM 3010	PMM 3010	USB	X	X	0.009	1000	-107	10

- **Power Meter:** Lists the available power meters

Generators		Power Meters		Field Meters	Devices		Current Probes	Others		
Selected	Name	Position	S/N	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
<input type="checkbox"/>	3xPMM6630	Monitor Forward Reverse	000WX10317 000WX10302 000WE80306	USB	X	X	0.009	3000	-40	30
<input checked="" type="checkbox"/>	2xPMM6630	Forward Reverse	000WX10302 000WE80306	USB	X	X	0.009	3000	-40	30
<input type="checkbox"/>	DUAL 6600	Forward Reverse	PRIMARY SECONDARY	RS485	0	3	0.01	1000	-40	27

- **Device:** Includes all BCI models.

Generators		Power Meters		Field Meters		Devices	
Selected	Name	S/N	Type	Min level (dBm)	Max level (dBm)		
<input checked="" type="checkbox"/>	DEVICE NAME	Device S/N	B.C.I.	-30	0		

- **Current Probes:** Shows current probes with the names of their calibration files.

Generators		Power Meters		Devices		Probes	
Selected	Name	Cal. File					
<input checked="" type="checkbox"/>	33_1_411	33_1_411.cpf					

- **Others:** Shows the amplifier,

Generators	Power Meters	Devices	Probes	Others
Environment impedance				
<input checked="" type="radio"/> 150 ohm <input type="radio"/> 50 ohm				
Amplifier				
Name: <input type="text" value="PMM 6000N"/>				
Attenuator: <input type="text" value="6 dB"/>				

Additional devices can be added to each of these tables by right-clicking and selecting **Add new**.

Generators		Power Meters		Devices		Probes		
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)
	DUMMY GEN	GPIOB			0.01	20000	-100	20
	PMM 3000	RS232			1000	1000	-80	10
	PMM 3030RS	RS232			3000	3000	-107	10
V	PMM 3030USB	USB			3000	3000	-107	10
	PMM 3010USB	USB			1000	1000	-107	10
	PMM 3010RS	RS232			1000	1000	-107	10

Immunity Suite - add Generator

Instruments name:

Instr. driver name:

Bus type: Bus Addr: Comm Port n°:

S/N:

Frequency range

From: to: MHz

Level limits

From: to: dBm

Devices can also be checked, modified or removed by right-clicking from the corresponding line:

Generators		Power Meters		Devices		
Selected	Name	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)
	DUMMY GEN	GPIOB	X	0	0.01	20000
	PMM 3000	RS232	X	3	0.01	1000
	PMM 3030RS	RS232	X	1	0.009	3000
V	PMM 3030USB	USB	X		0.009	3000
	PMM 3010USB	USB	X		0.009	1000
	PMM 3010RS	RS232	X		0.009	1000



For connecting and setting the COM port of fiber optic equipment, see the user manual supplied with the device.

- **Modify:** changes the properties of the device



It is possible to modify any of the parameters but the name.

- **Remove:** removes the device and its driver from the list.

- **Check Device:** makes sure the driver is working and the device is properly connected. This option is only available for the device selected (✓).

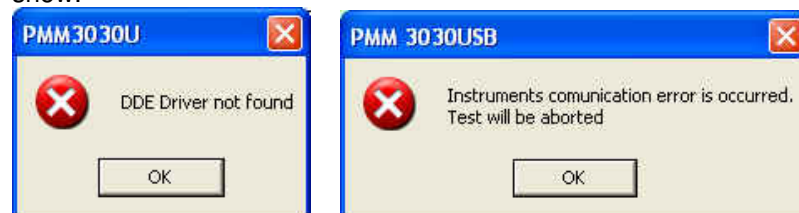
If the device is connected and the driver has been correctly installed, the following message will appear:



This message will appear if the device has not been connected properly to the work setup



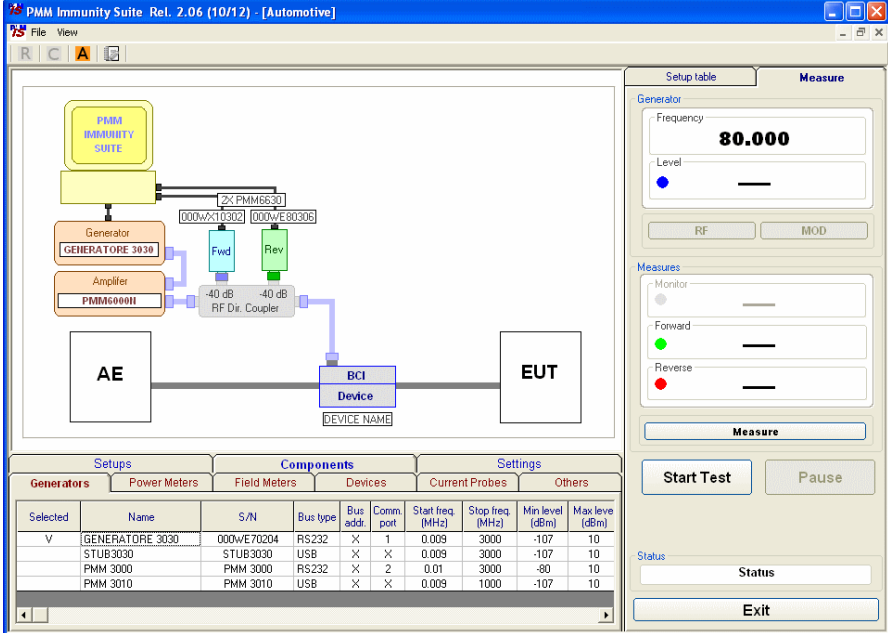
If the driver of the device has not been installed properly, the screen will show:



We recommend performing a device check before starting the calibration phase or immunity test. In any case, before calibration or testing, the program runs an automatic check and reports any errors as described above.

5.4 Diagram window

The diagram window shows the setup to be followed on the basis of the equipment selected.



The screenshot shows the PMM Immunity Suite software interface. The main window displays a test setup diagram with the following components and connections:

- PMM IMMUNITY SUITE** (yellow box) connected to a **Generator GENERATORE 3030** (orange box).
- The **Generator** is connected to an **Amplifier PMM6000H** (orange box).
- The **Amplifier** is connected to an **RF Dir. Coupler** (grey box) with two **-40 dB** ports.
- The **RF Dir. Coupler** is connected to a **BCI Device** (blue box).
- The **BCI Device** is connected to the **EUT** (Equipment Under Test, white box).
- The **BCI Device** is also connected to an **AE** (Antenna Element, white box).
- There are also **Fwd** and **Rev** (green boxes) indicators connected to the RF Dir. Coupler.

Below the diagram is a **Components** table with the following data:

Generators		Power Meters		Field Meters		Devices		Settings		
Selected	Name	S/N	Bus type	Bus addr.	Comm. port	Start freq. (MHz)	Stop freq. (MHz)	Min level (dBm)	Max level (dBm)	
V	GENERATORE 3030	000wE70204	RS232	X	1	0.009	3000	-107	10	
	STUB3030	STUB3030	USB	X	X	0.009	3000	-107	10	
	PMM 3000	PMM 3000	RS232	X	2	0.01	3000	-80	10	
	PMM 3010	PMM 3010	USB	X	X	0.009	1000	-107	10	

On the right side of the interface, there is a **Measure** panel with the following settings:

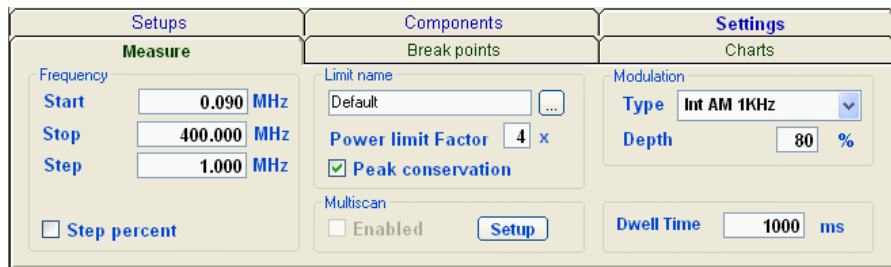
- Generator** section: Frequency is set to **80.000**.
- Measures** section: Monitor, Forward, and Reverse indicators are shown.
- Buttons: **Start Test**, **Pause**, **Status**, and **Exit**.

The selected devices (√) are shown at the bottom of the pane.

In addition to using the Components tab, you can move from one type of equipment to another by clicking the label with the device's name **PMM 3030USB** in the diagram window

5.5 Settings

After performing the setup shown in the diagram window, the calibration test parameters need to be set using the **Measure** tab:

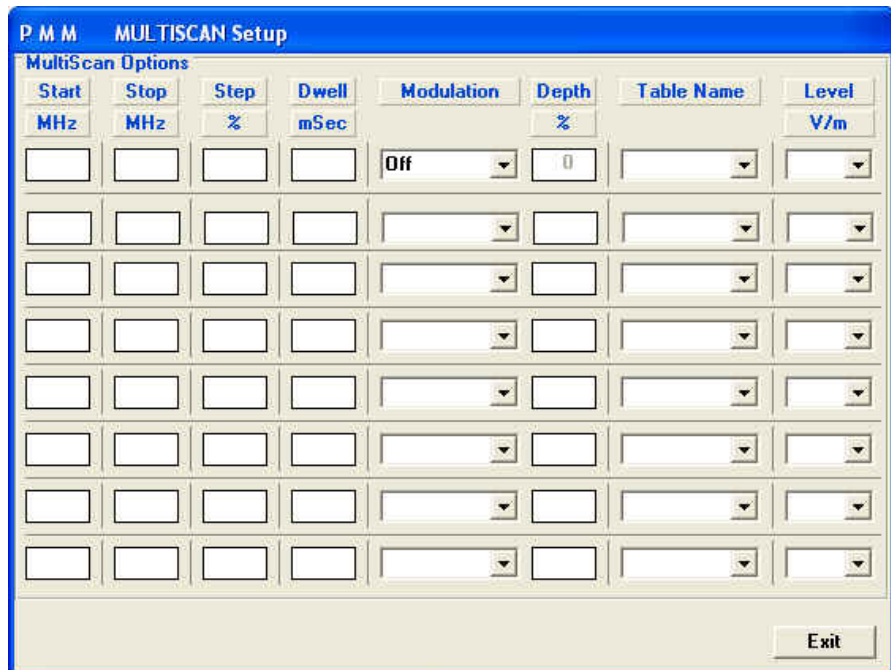


The screenshot shows the 'Measure' tab of the software interface. It is divided into three main sections: 'Frequency', 'Limit name', and 'Modulation'.
 - **Frequency:** Includes input fields for 'Start' (0.090 MHz), 'Stop' (400.000 MHz), and 'Step' (1.000 MHz). There is a checkbox for 'Step percent'.
 - **Limit name:** Includes a 'Limit name' dropdown (set to 'Default'), a 'Power limit Factor' (4 x), a checked 'Peak conservation' checkbox, and a 'Multiscan' section with an 'Enabled' checkbox and a 'Setup' button.
 - **Modulation:** Includes a 'Modulation' dropdown (set to 'Int AM 1KHz') and a 'Depth' input field (80 %).
 - **Dwell Time:** An input field set to 1000 ms.

In the limit box there is also the choice for the **Peak conservation**. This is useful to satisfy those regulations requiring that under the condition of amplitude modulated signals the peak level must be the same of the unmodulated ones used for system calibration. It works both for AM and Pulse modulations.

All the modulation types, most common in the standards, are available depending on the model of the generator in use.

The **Multiscan** feature allows you to modify measurement parameters within a given frequency range.



The screenshot shows the 'MULTISCAN Setup' dialog box. It features a table for 'MultiScan Options' with columns for Start, Stop, Step, Dwell, Modulation, Depth, Table Name, and Level. The units for these columns are MHz, MHz, %, mSec, %, and V/m respectively. The first row is populated with 'Off' for Modulation and '0' for Depth. An 'Exit' button is located at the bottom right of the dialog.

Start	Stop	Step	Dwell	Modulation	Depth	Table Name	Level
MHz	MHz	%	mSec		%		V/m
				Off	0		

With the **Break Points** tab, you can set the frequencies at which measurement will be temporarily suspended to allow a change in setup.

	Freq. MHz	Comment
Stop 1	.22	Cambia Amplificatore
Stop 2	.32	Cambia Amplificatore
Stop 3	...	...
Stop 4	...	...
Stop 5	...	...

Each time the stop frequency is reached, a message will display the scheduled action.











The break points are shown as vertical stripes in the graph.

Click **OK** to continue measuring.

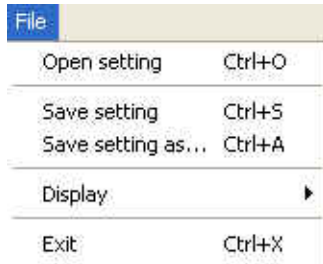
The **Charts** tab allows visual modifications to suit your preferences. For each element, click on the color shown, and change it using the Windows color box if desired.

In this tab, you can also move the reference level along the y-axis (+ and - buttons), or change the power level and range (in dBm), the voltage (in V) and the current (in mA).

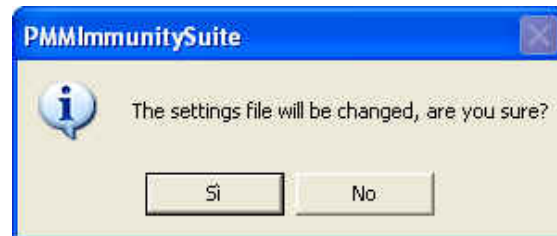
Measure	Break points	Charts
Graph type Linear	Chart: BackColor  Grid Color 	Reference position: <input type="button" value="+"/> <input type="button" value="-"/>
Break points Color 	Trace: <input checked="" type="checkbox"/> Generator  <input type="checkbox"/> Monitor 	Reference\Range dBm: Value <input type="text" value="0"/> dBm Range <input type="text" value="100"/> dB
Cursor: Color 	<input type="checkbox"/> Forward PM  <input type="checkbox"/> Reverse PM 	Reference\Range V: Value <input type="text" value="10"/> V Range <input type="text" value="10"/> V
		Inas\Range A: Value <input type="text" value="66.7"/> mA Range <input type="text" value="100mA"/>

5.6 Settings management

For each new session, the default file CondDefault.tsc is loaded. To avoid having to re-enter preferred settings, they can be saved in a single .tsc file:

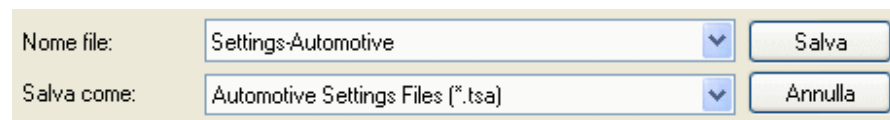


The command **File -> Save setting** overwrites the file in use. If no file was called up when the program was opened, the default file will be overwritten: The following message will appear

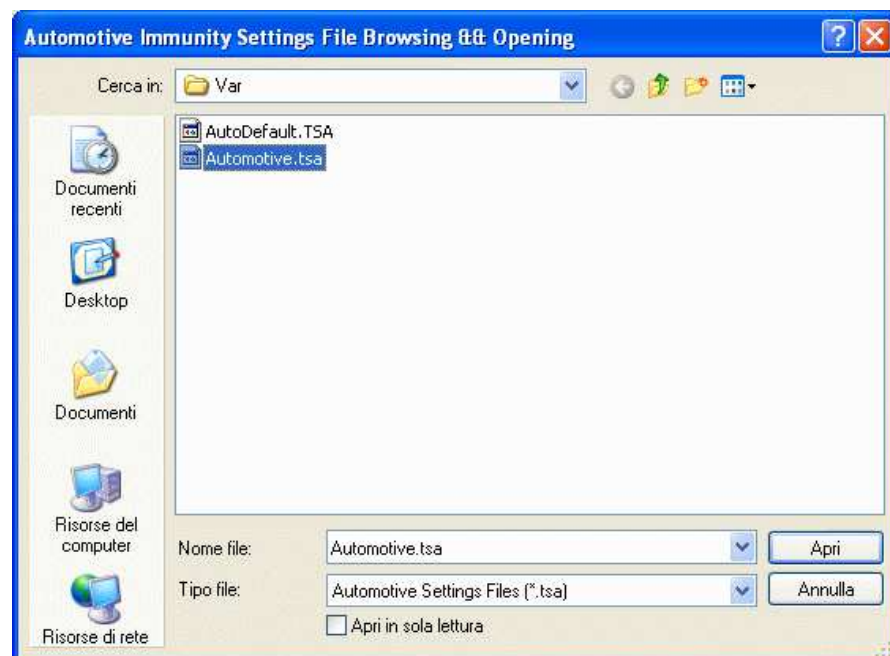


Choose **YES** to overwrite the file in use. Choose **NO** to cancel the operation and return to the main window.

File -> Save setting as... Enter the file name assigned to the work session and press **Save**.



The file can be called up at any time with the command **File -> Open setting**.

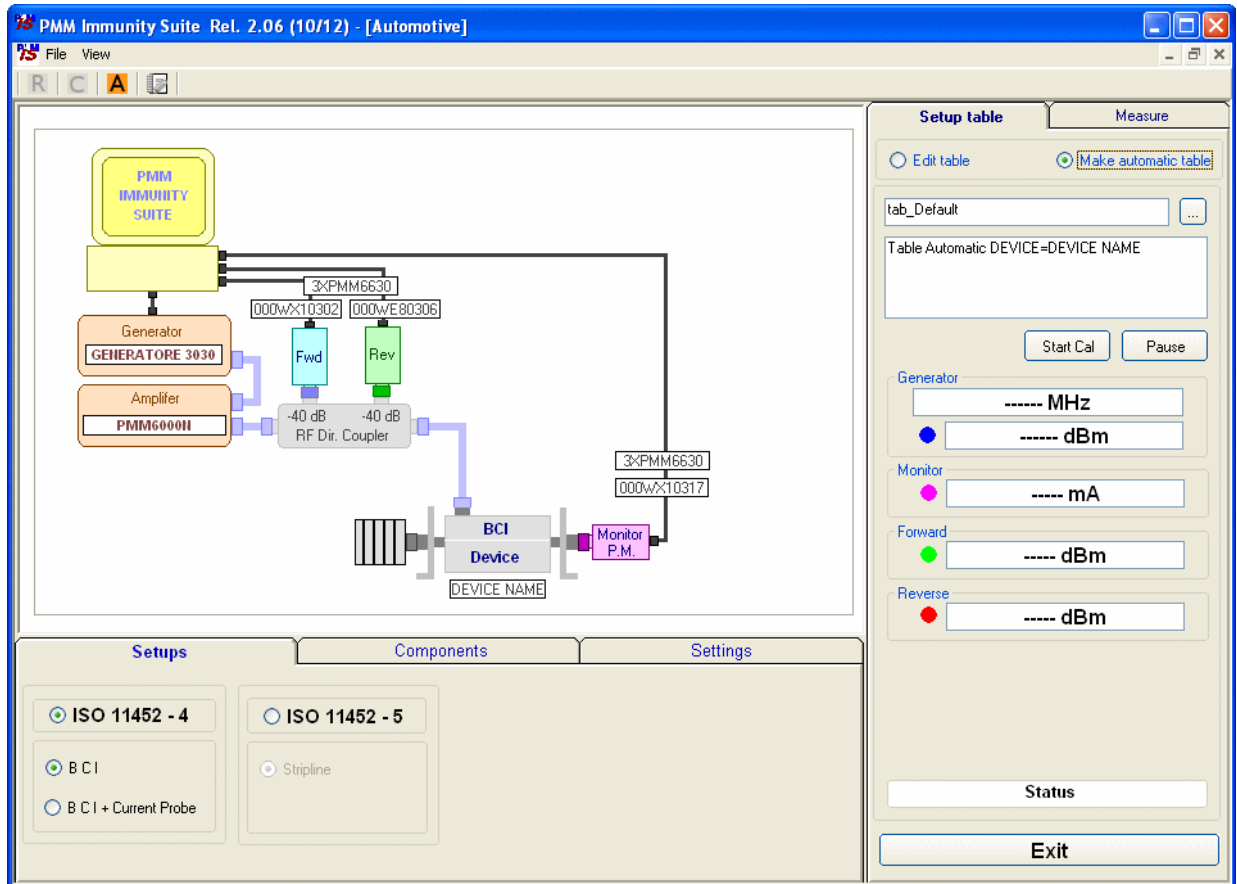


File -> Display -> Default colors is used to restore the original display.

5.7 System calibration

You can now calculate the levels assigned to the generator in order to have a constant voltage within the chosen frequency range.

Arrange the setup as shown in the graph:



5.7.1 Setup table

There are different ways to create the table:


- Automatically (select **Make automatic table**)
- By adapting the automatically created table to the instrumentation used (select **Edit table**)
- By completing the entire table manually (select **Edit table**)

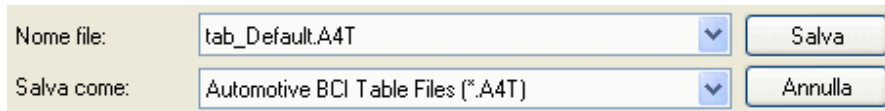
5.7.1.1 Automatic table creation

To create a table automatically:

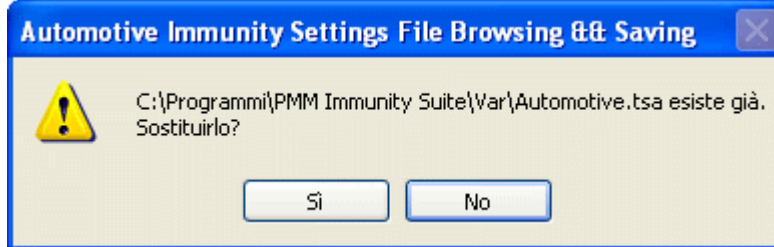
- Select **Make automatic table**



- Select , assign a name to the table and press **Save**.



If an existing table is selected, the following message will appear:



Choose **YES** to overwrite the table.

Choose **NO** to cancel the operation and return to the main window.

- A comment can be added, if desired.



- Press **Start test**, then **Abort test** if you wish to terminate the process at any time.



A **Pause button is also available**, and becomes **Continue** to resume the process.



The **Generator** window shows the level (in dBm) entered by the generator, at a given frequency (in MHz), to generate the voltage required.



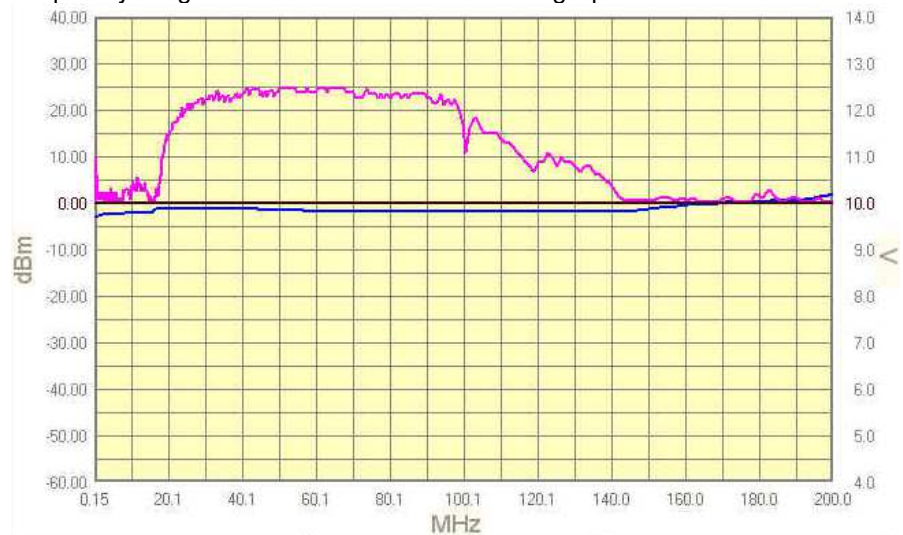
The color of the dot corresponds to the color of the line on the graph.

The voltage applied will be shown in the **Power Meter** window.

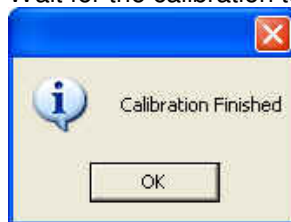


Values outside the selected tolerance will be shown in red; the generator will adjust the level to bring the voltage back into range. The color of the dot corresponds to the color of the line on the graph.

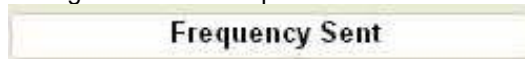
During the work session, the generator level and voltage within the frequency range selected will be shown as a graph.



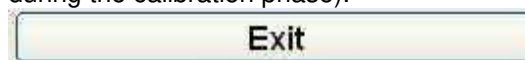
Wait for the calibration to finish.



The Status window shows each operation performed by the program during the calibration phase.

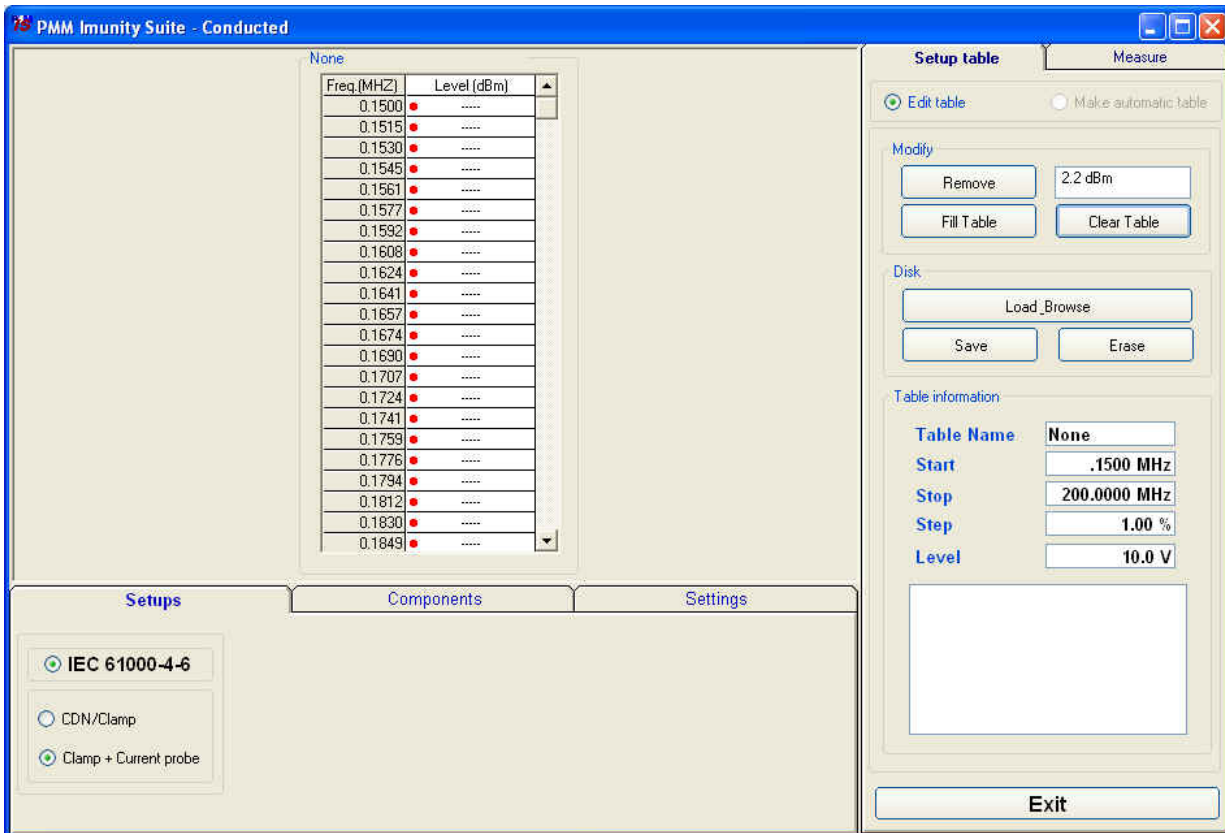


Press the **Exit** button to leave **Conducted mode** (the button is deactivated during the calibration phase).



5.7.1.2 Manual table creation

You may also fill in the entire table manually.



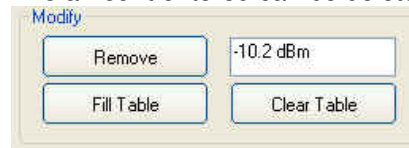
Check the information in **Setups**, **Components** and **Settings**.

Go to **Setup table** -> **Edit table**.

Select the desired cell, type in the value, and confirm by pressing ENTER.

Freq.(MHZ)	Level (dBm)
0.1500
0.1515
0.1530
0.1545
0.1561
0.1577
0.1592
0.1608
0.1624
0.1641
0.1657
0.1674
0.1690

The amount entered can be deleted by clicking **Remove**.

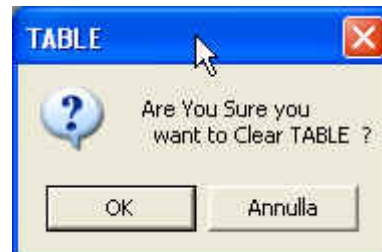


If several values need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

Freq.(MHz)	Level (dBm)	Freq.(MHz)	Level (dBm)
0.1500	✓ -10.2	0.1500	✓ -10.2
0.1575	• -----	0.1575	• -10.3
0.1654	• -----	0.1654	• -10.4
0.1736	• -----	0.1736	• -10.5
0.1823	• -----	0.1823	• -10.6
0.1914	• -----	0.1914	• -10.7
0.2010	• -----	0.2010	• -10.7
0.2111	• -----	0.2111	• -10.8
0.2216	• -----	0.2216	• -10.9
0.2327	• -----	0.2327	• -11.0
0.2443	• -----	0.2443	• -11.1
0.2566	• -----	0.2566	• -11.2
0.2694	• -----	0.2694	• -11.3
0.2828	• -----	0.2828	• -11.4
0.2970	• -----	0.2970	• -11.5
0.3118	• -----	0.3118	• -11.6
0.3274	• -----	0.3274	• -11.6
0.3438	• -----	0.3438	• -11.7
0.3610	• -----	0.3610	• -11.8
0.3790	• -----	0.3790	• -11.9
0.3980	• -----	0.3980	• -12.0
0.4000	✓ -12.1	0.4000	✓ -12.1

The **Clear Table** command deletes all of the values entered. The command must be confirmed.

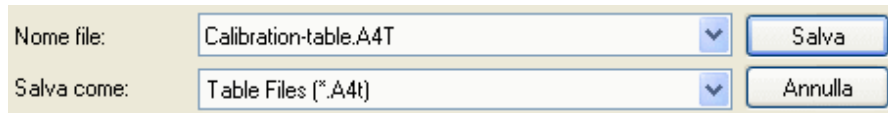
Freq.(MHz)	Level (dBm)
0.1500	✓ -10.2
0.1575	✓ -10.2
0.1654	✓ -10.2
0.1736	✓ -10.2
0.1823	✓ -10.2
0.1914	✓ -10.2
0.2010	✓ -10.2
0.2111	✓ -10.2
0.2216	• -----
0.2327	• -----
0.2443	• -----
0.2566	• -----
0.2694	• -----
0.2828	• -----



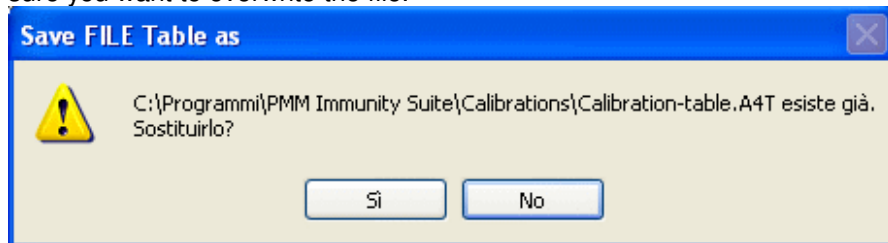
The **Table information** pane displays the main measurement settings:



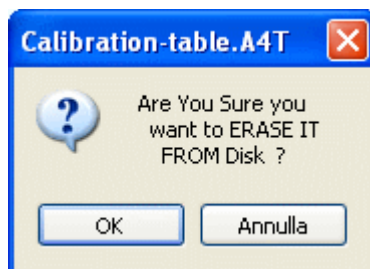
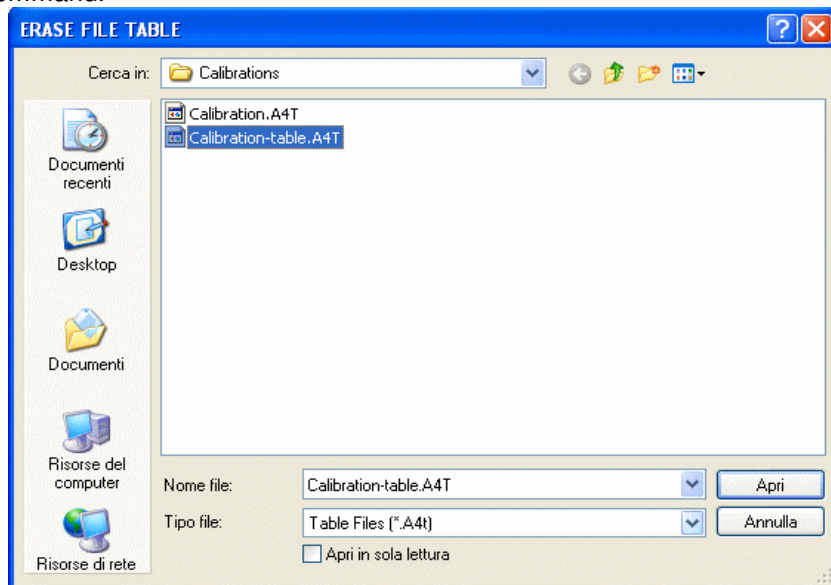
Once all values have been entered, click **Save**, then type in the name of the table and click **Save** again.



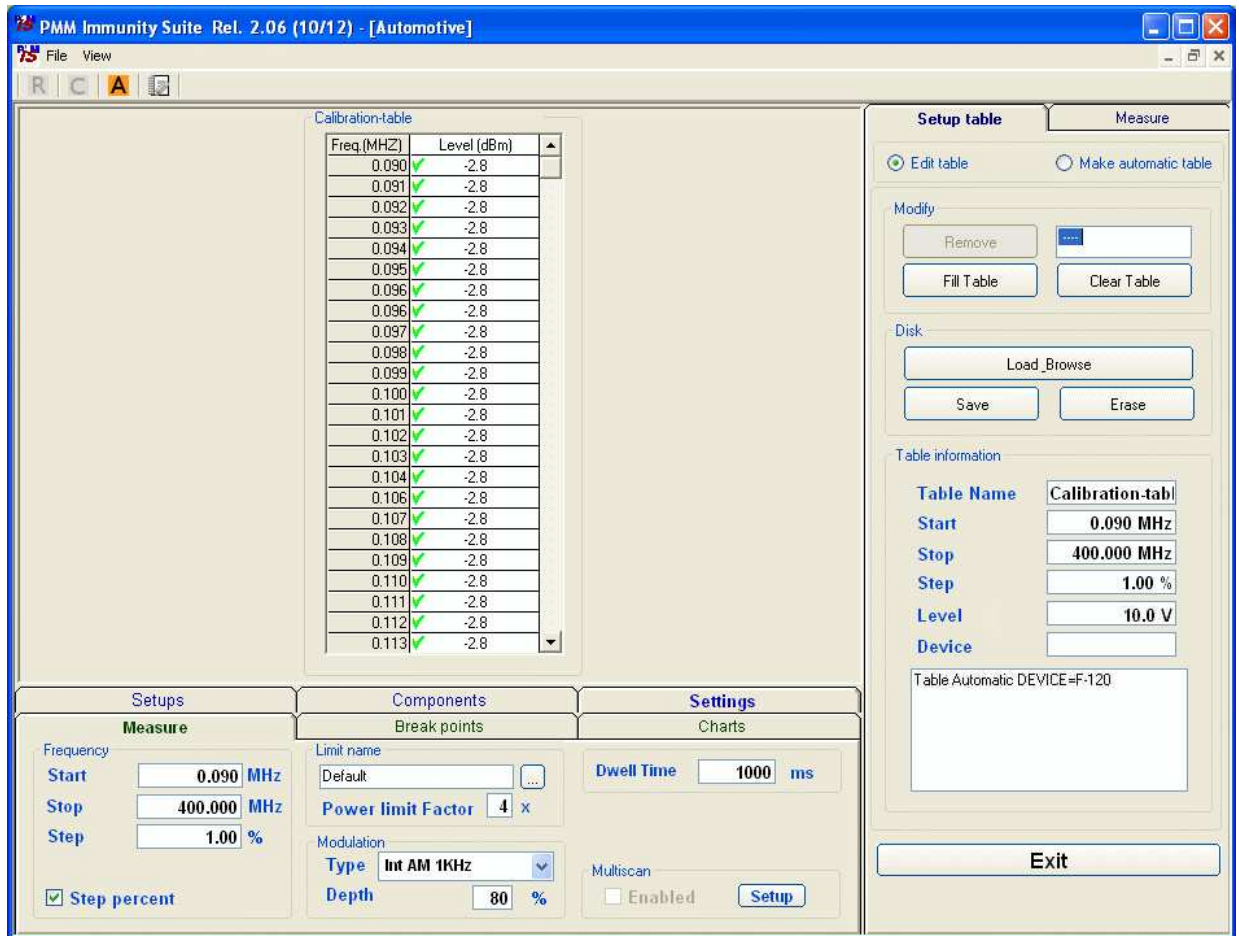
If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file.



The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**, then confirm the command.



5.7.1.3 Modifying an existing table

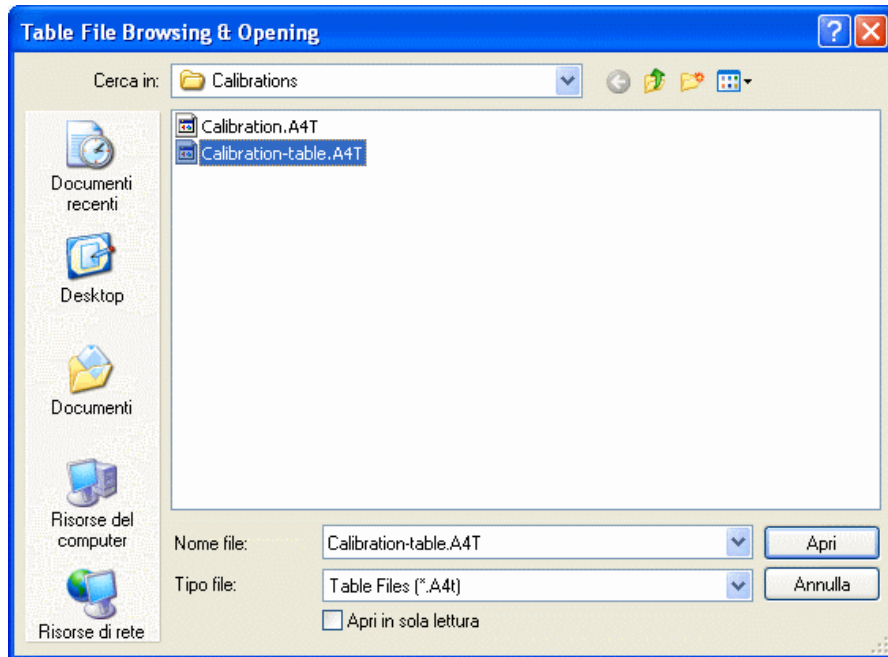


An existing table can be adapted to the instrumentation used.

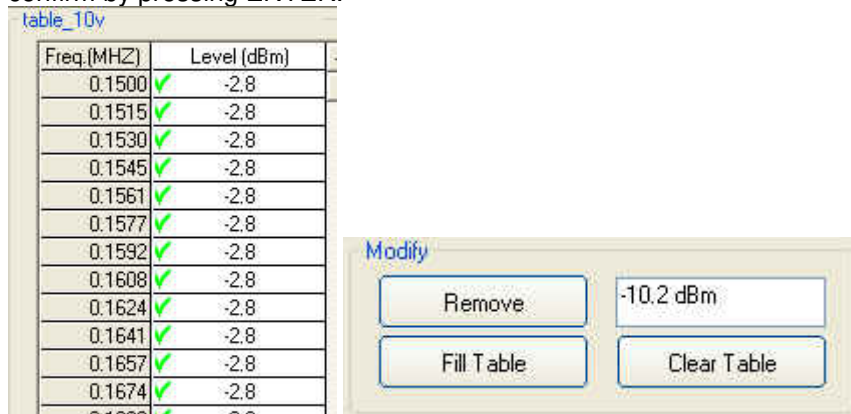
Check the information in **Setups, Components** and **Settings**.

Go to **Setup table -> Edit table**.

Call up a previously created table by clicking **Load_Browse**, then selecting the table and clicking **Open**.



Select the desired cell, click **Remove**, type in the new value, and confirm by pressing ENTER.



To delete all data, select **Clear Table** and confirm.



If several values need to be entered between two end points, use the **Fill Table** command. The required values are generated by a mathematical formula and marked with a red dot.

Freq.(MHZ)	Level (dBm)
0.1500	✓ -10.2
0.1575	✓ -10.2
0.1654	✓ -10.2
0.1736	✓ -10.2
0.1823	• ----
0.1914	• ----
0.2010	• ----
0.2111	• ----
0.2216	✓ -11.4
0.2327	✓ -11.4
0.2443	✓ -11.4
0.2566	✓ -11.4
0.2694	✓ -11.4
0.2828	✓ -11.4
0.2970	✓ -11.4
0.3118	✓ -11.4
0.3274	✓ -12.1
0.3438	✓ -12.1
0.3610	✓ -12.1
0.3790	✓ -12.1
0.3980	✓ -12.1
0.4000	✓ -12.1

Freq.(MHZ)	Level (dBm)
0.1500	✓ -10.2
0.1575	✓ -10.2
0.1654	✓ -10.2
0.1736	✓ -10.2
0.1823	• -10.4
0.1914	• -10.7
0.2010	• -10.9
0.2111	• -11.2
0.2216	✓ -11.4
0.2327	✓ -11.4
0.2443	✓ -11.4
0.2566	✓ -11.4
0.2694	✓ -11.4
0.2828	✓ -11.4
0.2970	✓ -11.4
0.3118	✓ -11.4
0.3274	✓ -12.1
0.3438	✓ -12.1
0.3610	✓ -12.1
0.3790	✓ -12.1
0.3980	✓ -12.1
0.4000	✓ -12.1

The **Table information** pane displays the main measurement settings.

Table information

Table Name

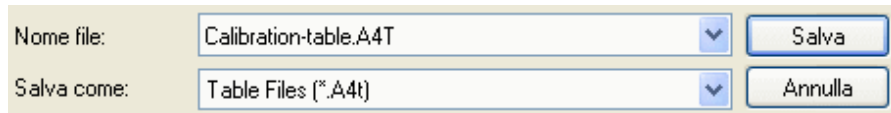
Start

Stop

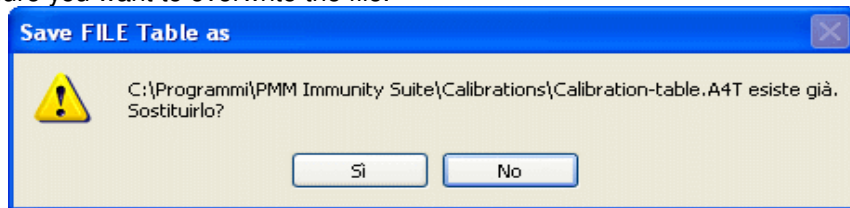
Step

Level

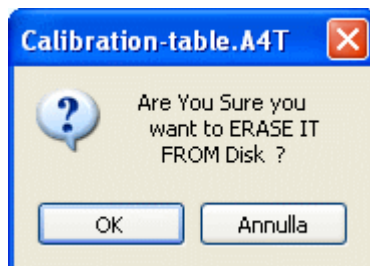
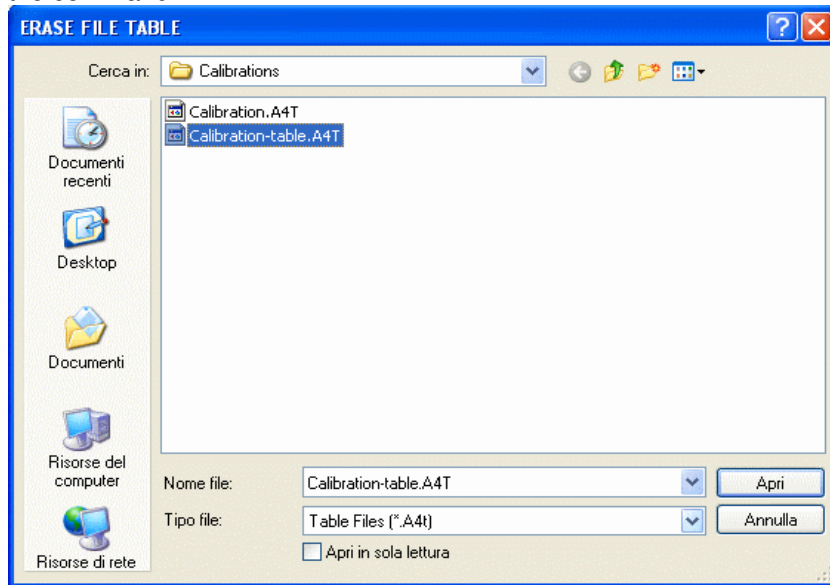
Once all values have been entered, click **Save**, then type in the name of the table and click **Save** again.



If an existing table is selected, a confirmation message will appear to make sure you want to overwrite the file.



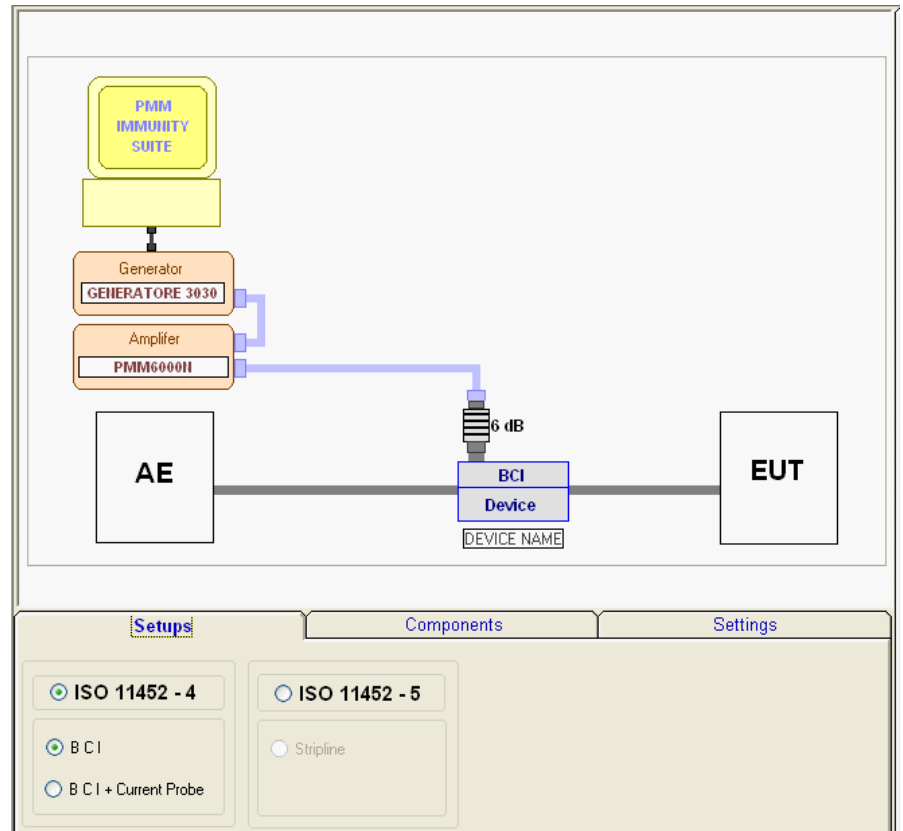
The **Erase** command deletes all data in an existing table. Select the table in the *ERASE FILE TABLE* window and click **Open**, then confirm the command.



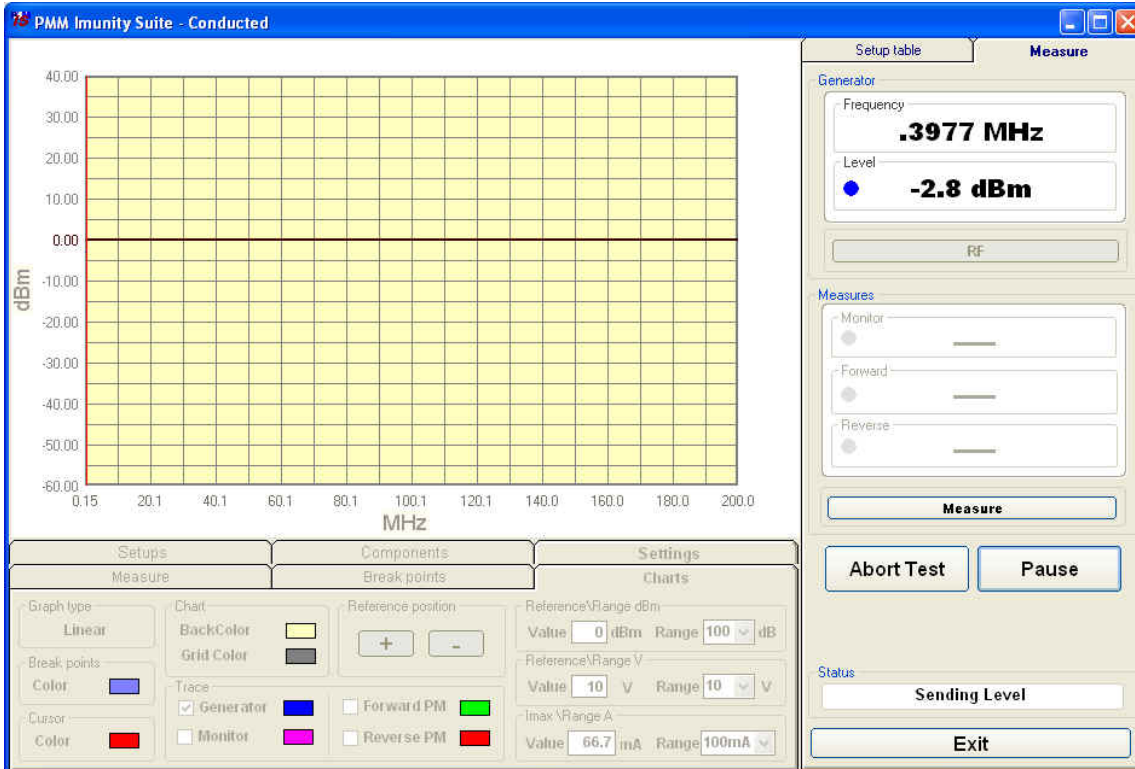
5.8 Immunity test WITH Impedance Requirements (Setups)

If a bulk current injector is used, the AE configuration must present common-mode impedance (consult EMC regulations for further details).

If the impedance requirements are satisfied, select **BCI**.



5.8.1 Starting the test Go to **Measure**.

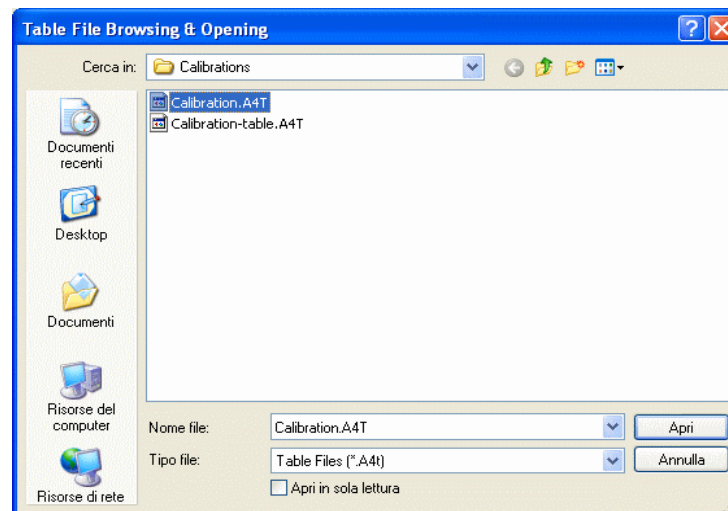


Click **Start Test**.

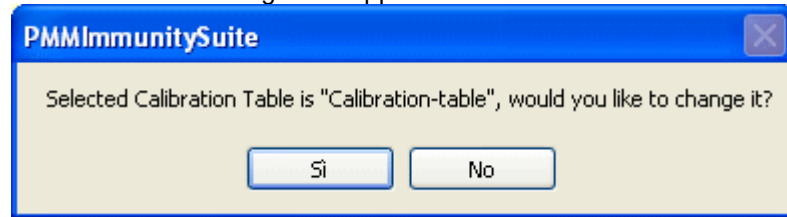
If no setup table has been selected, the following message will appear:



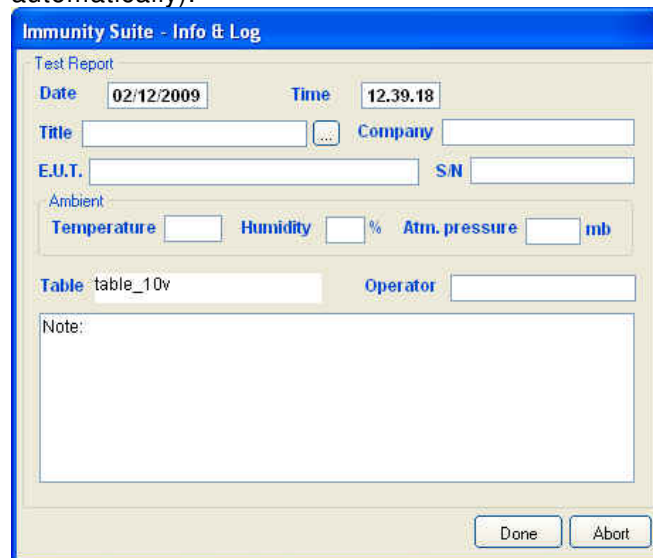
Click OK, then select the table and confirm with **Open**.



Otherwise the message that appears is as follows:




Choose **Yes** to view the *Table File Browsing & Opening* window and select a different table. Choose **No** to use the file shown and open the following data entry window (the date and time are entered automatically).



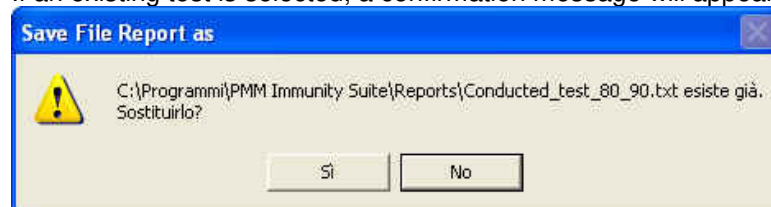
Enter the name of the immunity test.



Click  and enter the test name, then **Save**.

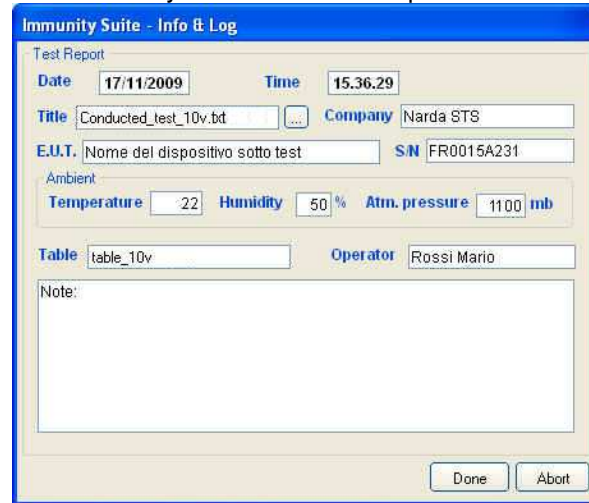


If an existing test is selected, a confirmation message will appear.



Fill in the fields **Company**, **E.U.T.**, **S/N**, **Temperature**, **Humidity**, **Atm. Pressure**, **Operator** and **Note**.

The data entry window is now complete:



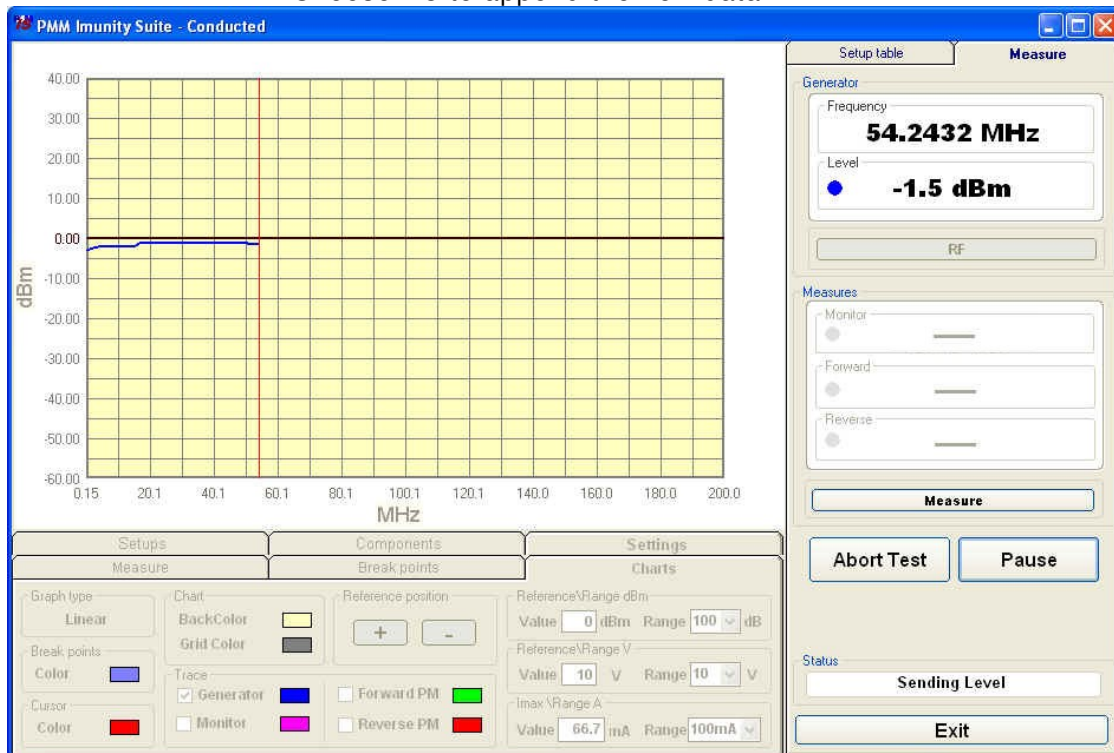
Confirm with **Done** to start the immunity test.

If an existing test is selected, a confirmation message will appear:



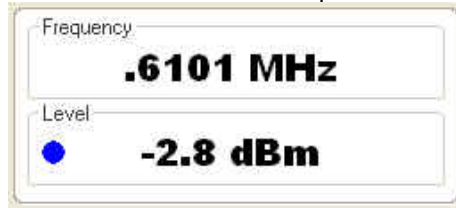
Choose **Yes** to overwrite the data with the test in course.

Choose **No** to append the new data.

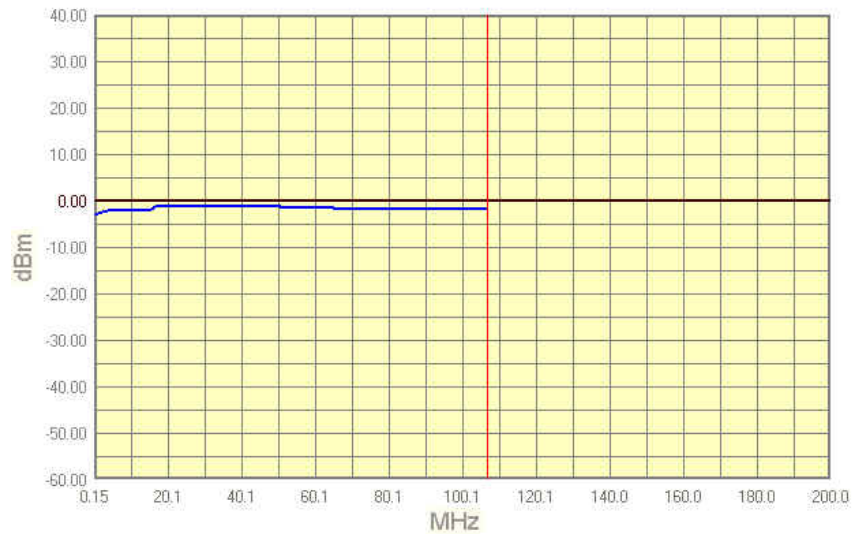


During the test, the **Generator** window shows the level extrapolated from the setup table and used by the generator to obtain the required voltage.

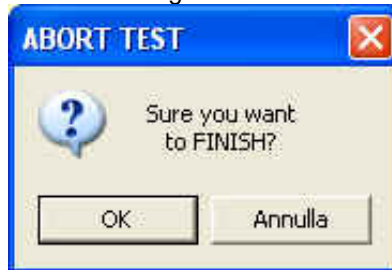
The color of the dot corresponds to the color of the line on the graph



During the test, the frequency range and generator level will be shown in graph form.

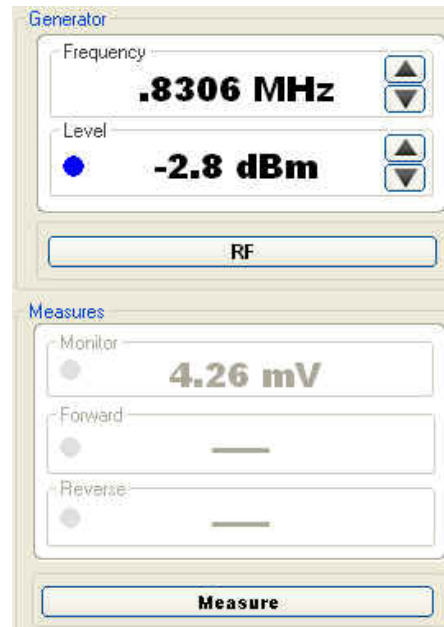


At any time, the test can be terminated by clicking the **Abort Test** button and confirming:

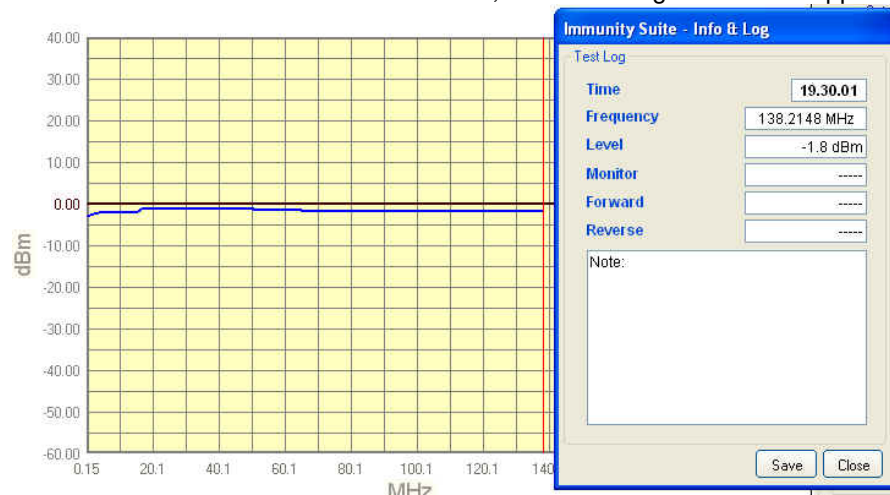


The **Pause** button can also be used at any time to stop the test momentarily (the generator is set to RF OFF).

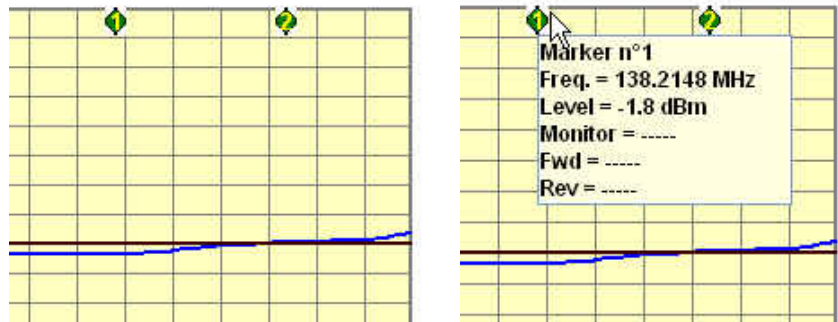
In this state, an earlier situation can be recreated or a later one can be simulated; click the RF button (the generator is set to RF ON), adjust the frequency and level with the arrows, and click **Measure** to display the voltage.



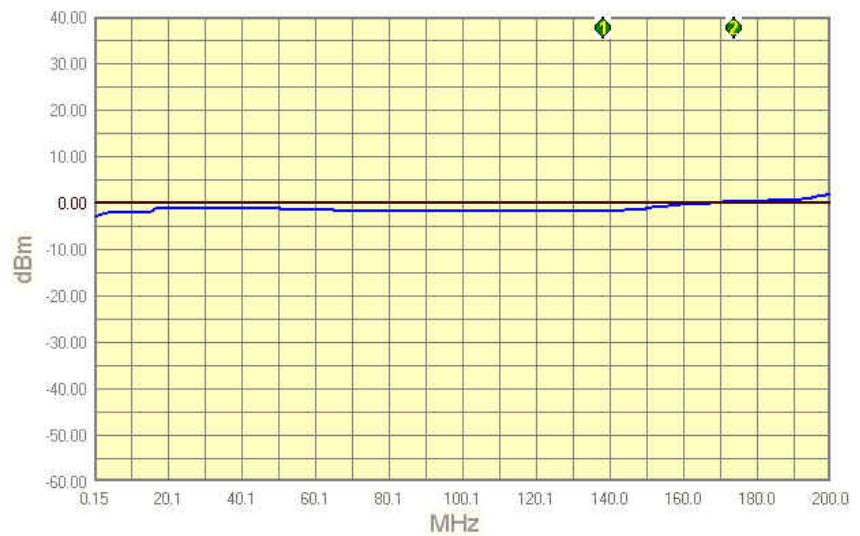
Each time the **Pause** button is clicked, the following window will appear:



Pressing **Save** assigns a marker to the current position for future reference. At the end of the test, the saved information can be viewed simply by hovering the cursor over the marker.



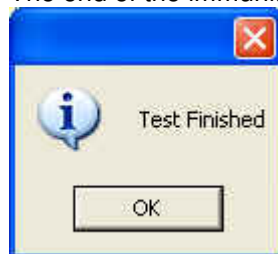
The button will now read **Continue** to resume the test.



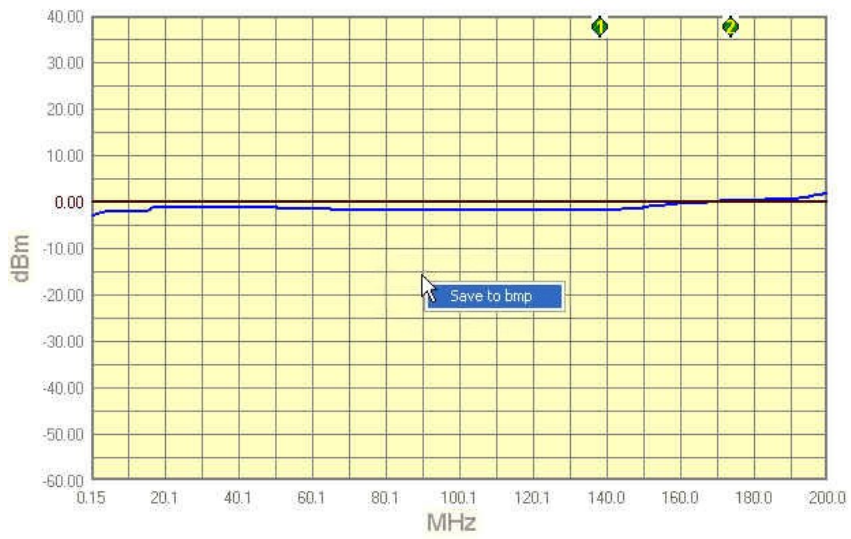
The status window shows each operation performed by the software during the test.



The end of the immunity test will be announced with the message:



When the test is over, the graph can be saved in .bmp format by right-clicking anywhere in the graph and selecting **Save bmp**.

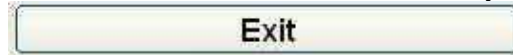


In the next window, assign a name to the graph and press **Save**.

Nome file:	<input type="text" value="graph_test_80_90"/>	<input type="button" value="Salva"/>
Salva come:	<input type="text" value="bitmap (*.bmp)"/>	<input type="button" value="Annulla"/>

The saved graph can be inserted into a text file using the Editor feature (see the Editor section for details).

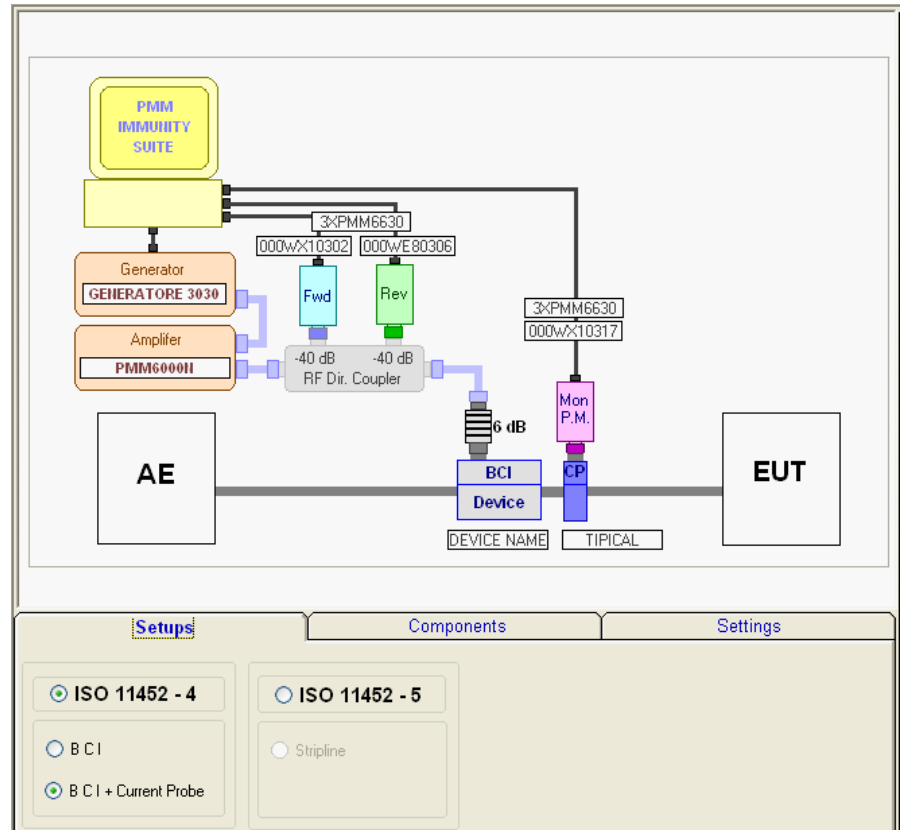
Press the Exit button to leave the immunity test..



**5.9 Immunity test
WITHOUT impedance
requirements (Setups)**

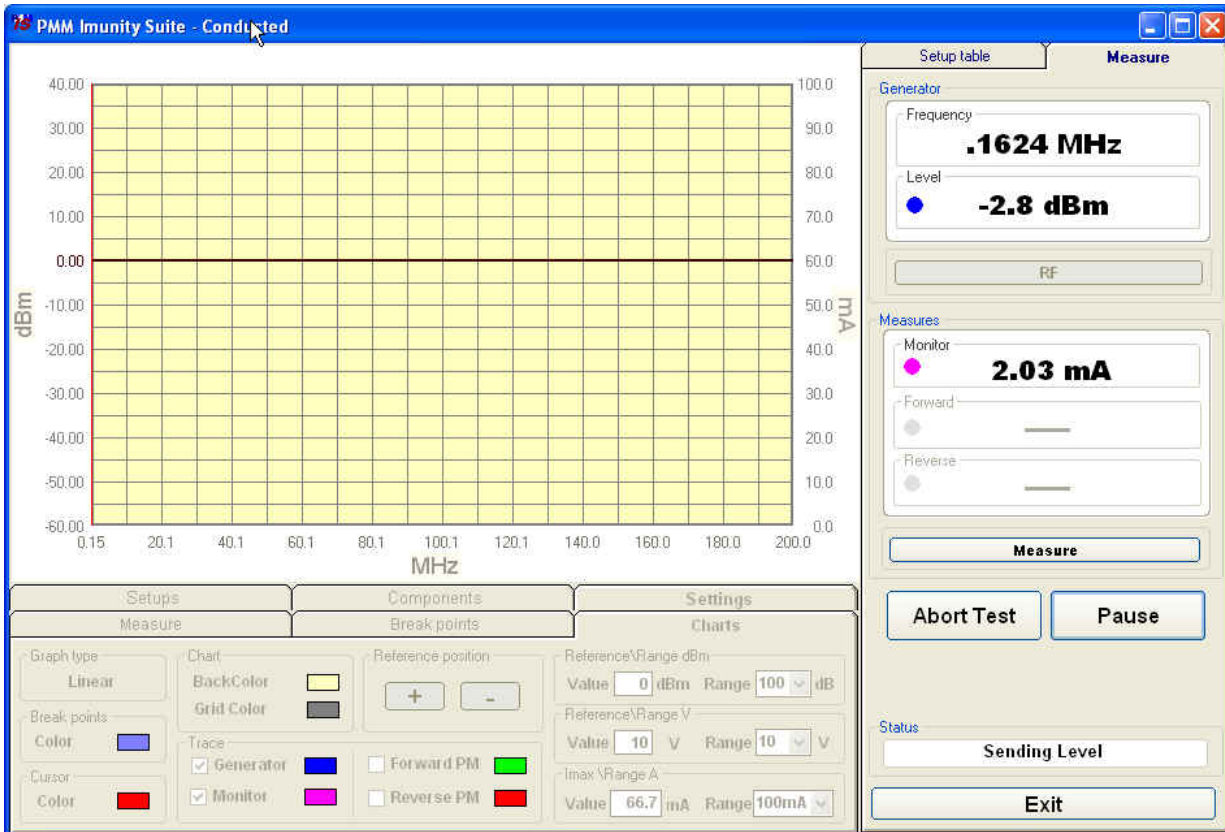
If the impedance requirements cannot be met, the current produced by the induced voltage must be checked using a supplementary probe placed between the Bulk Current Injector and the EUT (see EMC regulations for further details).

For this configuration, select **BCI + Current probe**.

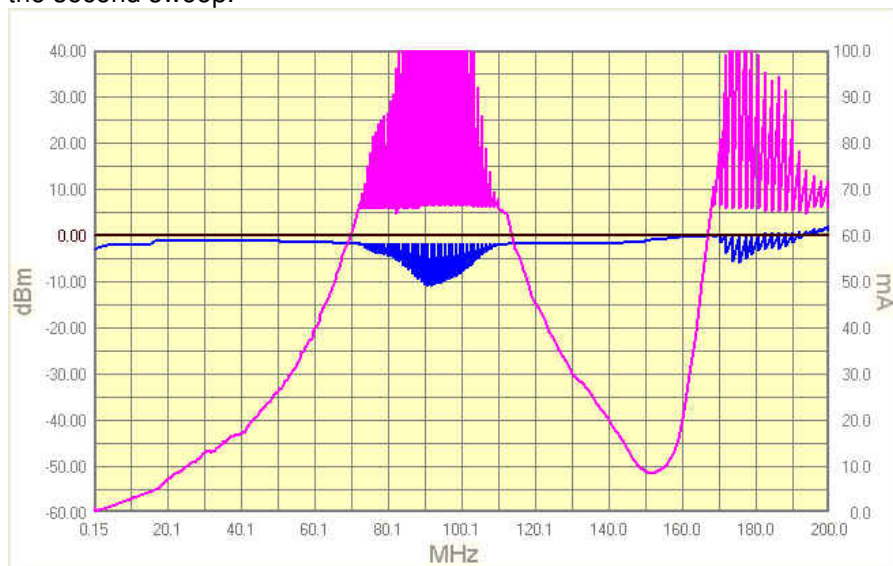


This procedure provides only significant differences with respect to the previous test.

5.9.1 Monitoring the current Go to **Measure**.



The example below shows the current and the generator level during a test in which the current limit is exceeded and then brought back into range by the software. The correct generator levels will be saved and used during the second sweep.



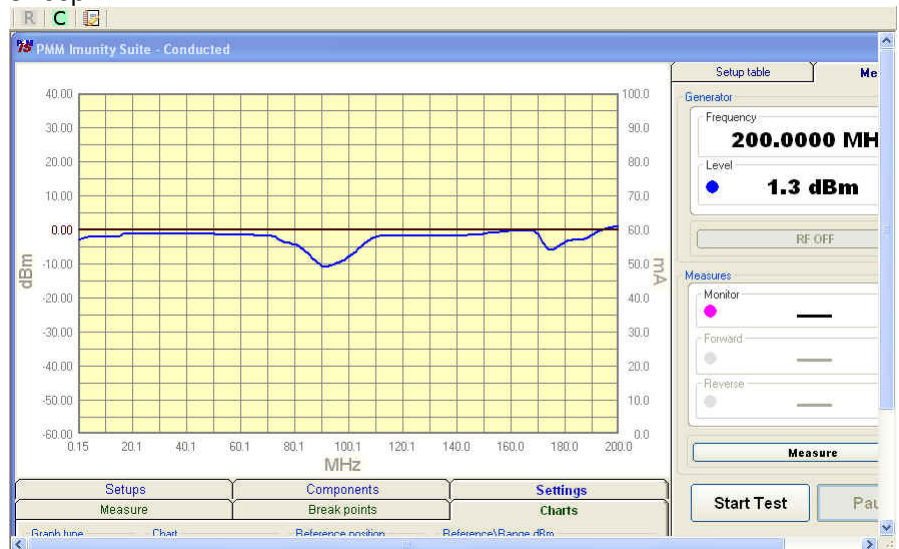
5.9.2 Second Sweep

When the process has finished, you can save the new table calculated during the first sweep. If no name is assigned, the program will use the name of the previous table and add "_ modified" (e.g. *tabc_10v_modified.fct*).

After the file is saved, a prompt will appear to conduct a second sweep with the new table.



The graph below shows the new generator levels applied during the second sweep.



At the end of the test, the table will appear with the new values marked by a red dot.

0.1654	✓	-10.2
0.1736	✓	-10.2
0.1823	●	-10.4
0.1914	●	-10.7
0.2010	●	-10.9
0.2111	●	-11.2
0.2210	✓	-11.4

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6 – PMM Immunity Test Editor

6.1 Introduction to Editor This section explains how to view and correctly interpret the data acquired by the immunity tests.

Start Editor by clicking the button .

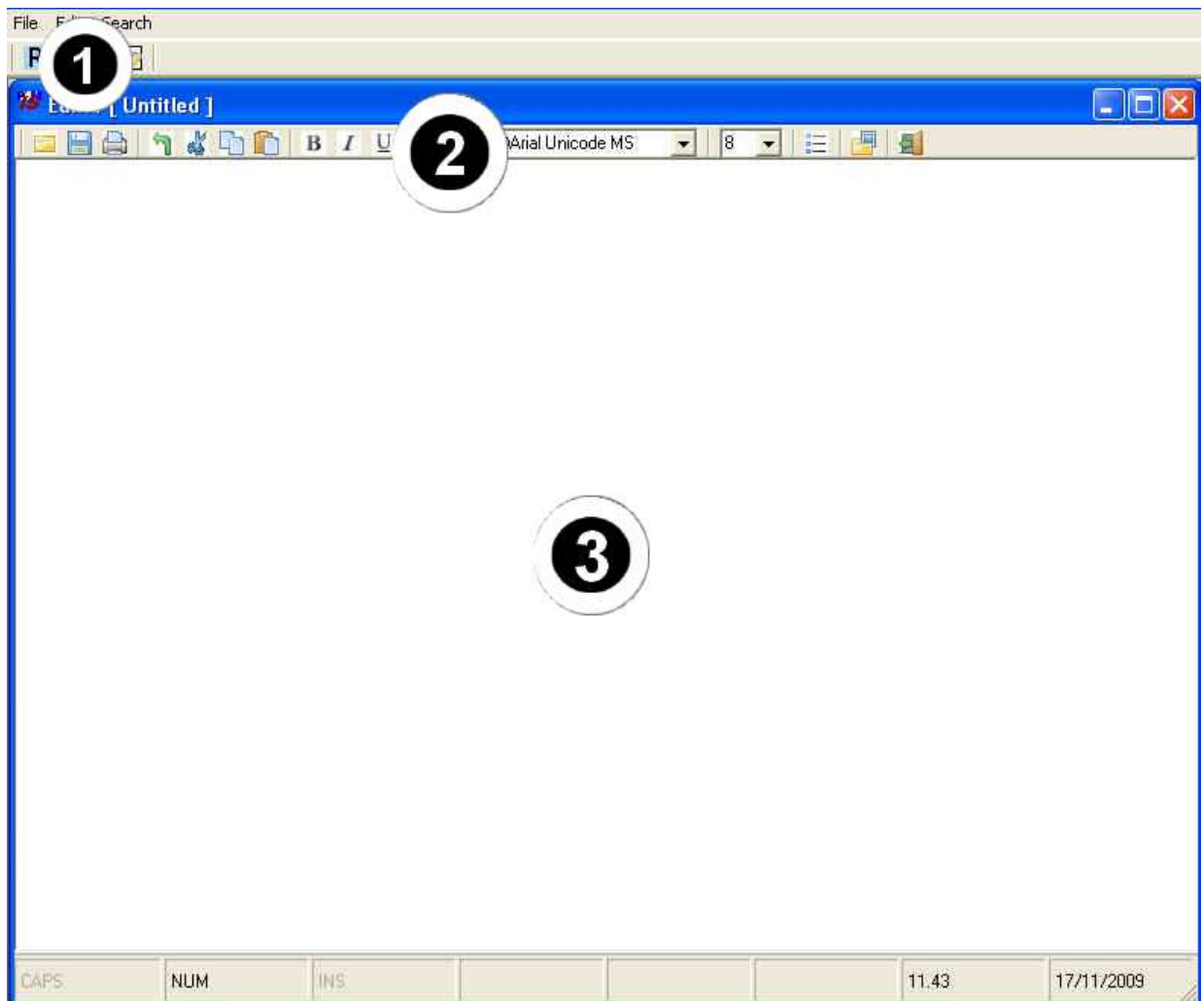


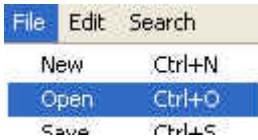
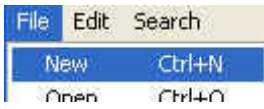
Fig. 6-1 Main window – Editor

This window contains:

1. Menu
2. Command bar
3. Main window

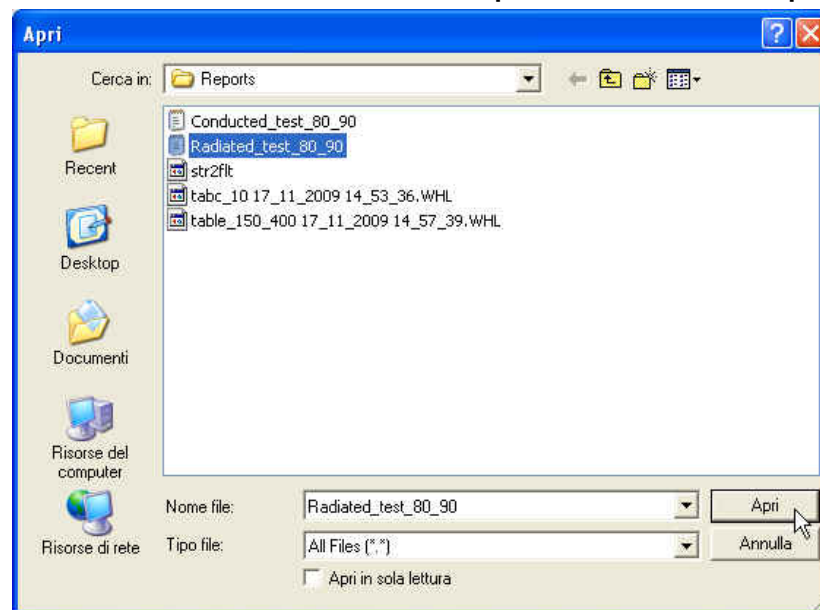
6.2 Creating or opening a report

To create a new report, select **File -> New**

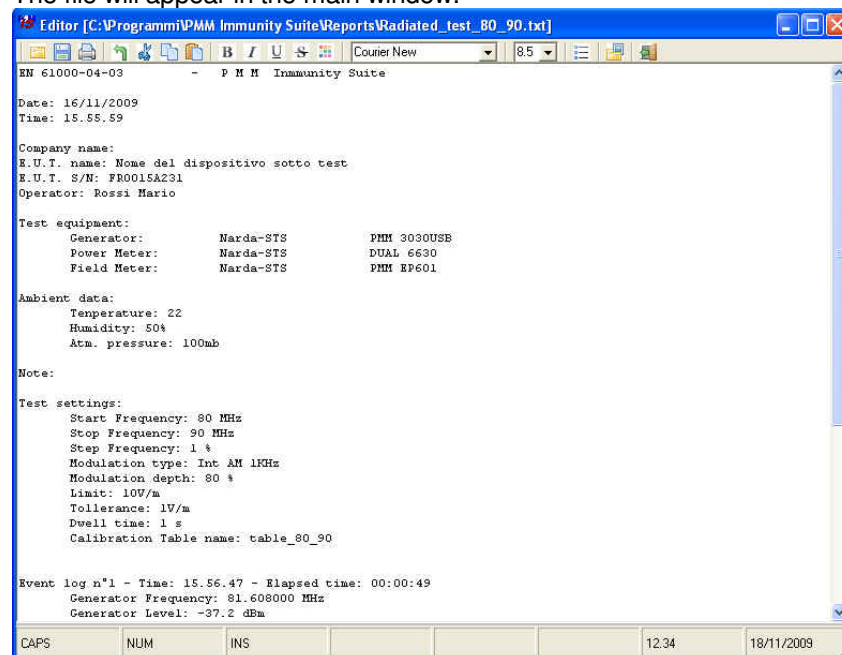


To open an existing report, select **File -> Open** or use the  button on the command bar.

In the window, select the file in the **Reports** folder and click **Open**.

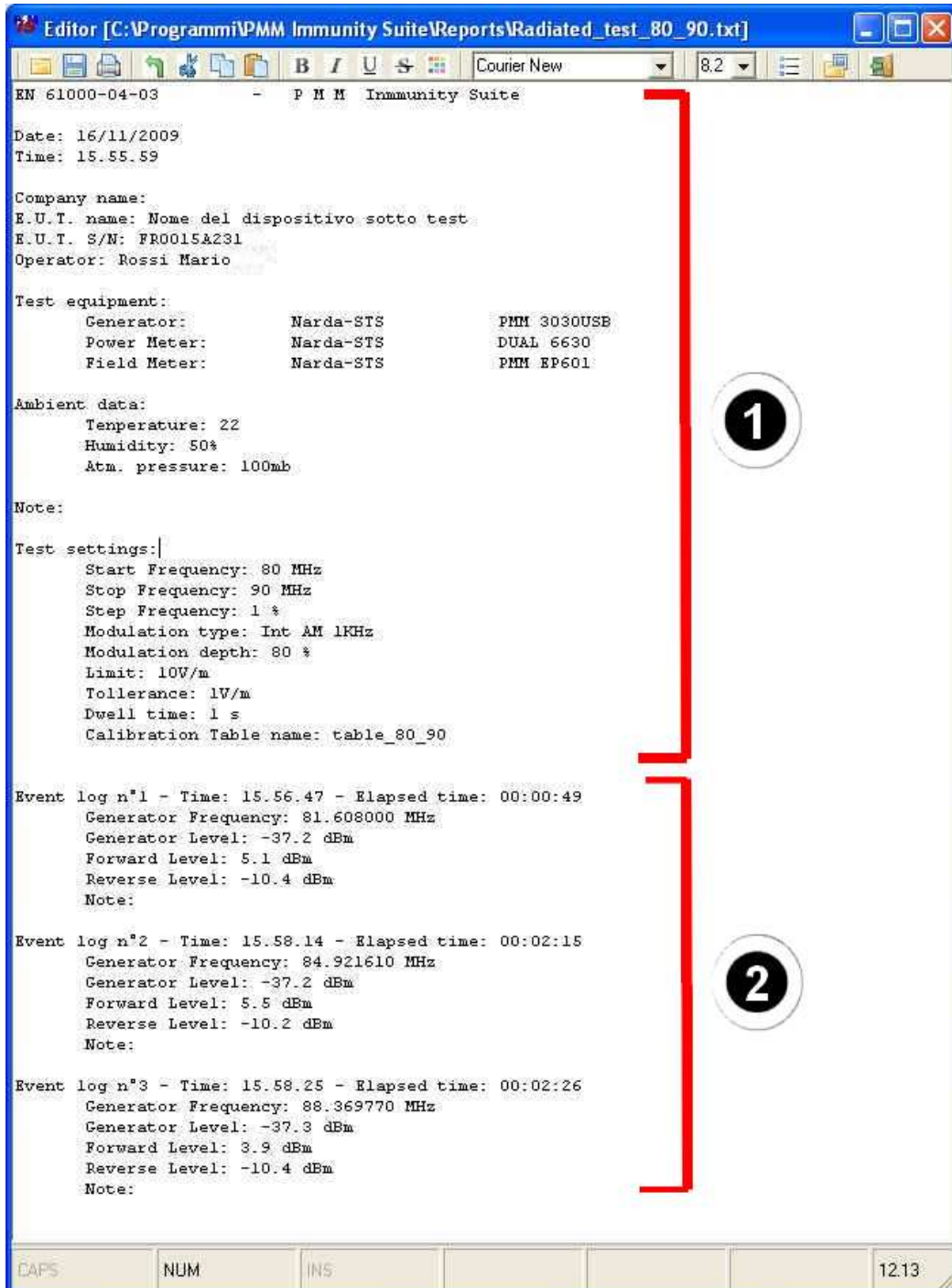


The file will appear in the main window.



6.3 Report format

Below is an example of the report generated at the end of the immunity test:



```

Editor [C:\Programmi\PMM Immunity Suite\Reports\Radiated_test_80_90.txt]
EN 61000-04-03 - P M M Immunity Suite
Date: 16/11/2009
Time: 15.55.59
Company name:
E.U.T. name: Nome del dispositivo sotto test
E.U.T. S/N: PR0015A231
Operator: Rossi Mario
Test equipment:
  Generator:      Narda-ST5      PMM 3030USB
  Power Meter:   Narda-ST5      DUAL 6630
  Field Meter:   Narda-ST5      PMM EP601
Ambient data:
  Temperature: 22
  Humidity: 50%
  Atm. pressure: 100mb
Note:
Test settings:
  Start Frequency: 80 MHz
  Stop Frequency: 90 MHz
  Step Frequency: 1 %
  Modulation type: Int AM 1KHz
  Modulation depth: 80 %
  Limit: 10V/m
  Tolerance: 1V/m
  Dwell time: 1 s
  Calibration Table name: table_80_90
Event log n°1 - Time: 15.56.47 - Elapsed time: 00:00:49
  Generator Frequency: 81.608000 MHz
  Generator Level: -37.2 dBm
  Forward Level: 5.1 dBm
  Reverse Level: -10.4 dBm
  Note:
Event log n°2 - Time: 15.58.14 - Elapsed time: 00:02:15
  Generator Frequency: 84.921610 MHz
  Generator Level: -37.2 dBm
  Forward Level: 5.5 dBm
  Reverse Level: -10.2 dBm
  Note:
Event log n°3 - Time: 15.58.25 - Elapsed time: 00:02:26
  Generator Frequency: 88.369770 MHz
  Generator Level: -37.3 dBm
  Forward Level: 3.9 dBm
  Reverse Level: -10.4 dBm
  Note:
CAPS NUM INS 12.13
  
```

The format is highly user-friendly and clearly presents all of the information gathered during the test. The information in bracket 1 concerns the equipment under test, the instrumentation used and the ambient data. The rest includes all events that interrupted the test; they are listed in chronological order along with the data acquired at the time of the interruption.


6.4 Modifying the report The report can be adapted to your needs through a series of commands:

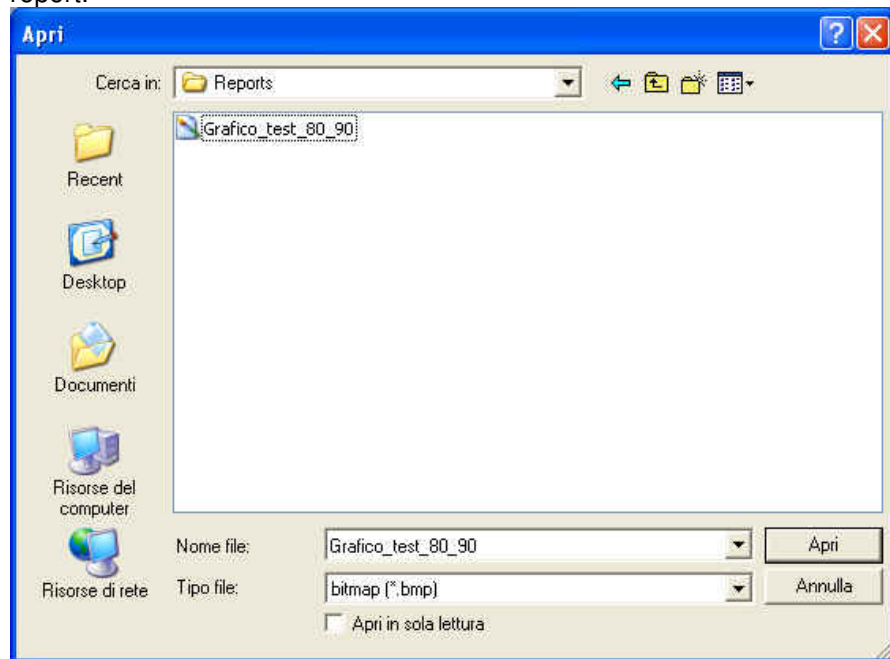
- *To modify the contents.*



The **Edit** menu allows you to **Copy**, **Cut**, **Paste**, and **Clear** text. The entire text can be selected with the **Select All** command. In case of error, the **Undo** feature will reverse unwanted modifications.

- *To add images:*

Click the  icon on the command bar to insert .bmp images into the report.



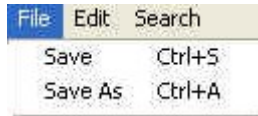
Select the file and press **Open**.

-- *To change text and color formatting.*

Select the part to be modified (by holding down the left mouse button) or the entire report (**Edit ->Select All**, then change the appearance of the text using the buttons and dropdown menus on the command bar:



6.5 Saving the report

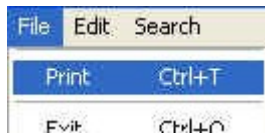



To save the report, click:

- **Save**: to overwrite the document in use, or.
- **Save As** : to save in one of three formats:
 - Calibration log Files (*.WHL)
 - Text files (*.txt)
 - Rich Text Files (*.rtf)

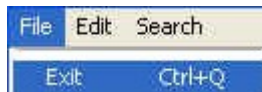
All files saved in .txt can be viewed by other applications. In Word or Excel, search for the report using the Open file command with File type: All files (*.*). Select the report from your folders and click Open.


6.6 Printing the report



Print the report by clicking **File -> Print** or the  button on the command bar

6.7 Leaving Editor



Close the file with **File -> Exit** or the  button on the command bar.

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Servizio richiesto: *Service needed:*

Solo taratura Riparazione Riparazione & Taratura Taratura SIT Altro:
 Calibration only Repair Repair & Calibration Certified Calibration Other:

Ditta:

Company:

Indirizzo:

Address:

Persona da contattare:

Technical contact person:

Telefono:

Phone n.

Modello:

Equipment model:

Numero di serie:

Serial n.

Accessori ritornati con l'apparecchiatura: **Nessuno** **Cavo(i)** **Cavo di alimentazione** **Altro:**
 Accessories returned with unit: None Cable(s) Power cable Other:

Sintomi o problemi osservati: *Observed symptoms / problems:*

Guasto: **Fisso** **Intermittente** **Sensibile a:** **Freddo** **Caldo** **Vibrazioni** **Altro**
 Failure: Continuous Intermittent *Sensitive to:* Cold Heat Vibration Other

Descrizione del guasto/condizioni di funzionamento:

Failure symptoms/special control settings description:

Se l'unità è parte di un sistema descriverne la configurazione:

If unit is part of system please list other interconnected equipment and system set up:

Suggerimenti / Commenti / Note:
Suggestions / Comments / Note:
