

OPERATING MANUAL

PG5502 Disturbance Analyzer Pulse Generator

REVISION LEVEL 1.0
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GENERAL INFORMATION

The information contained herein, are provided in connection with the usage of AFJ PG5502 disturbance analyser pulse generator.

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All efforts have been made to ensure the accuracy of the contents of this document. However, the supplier can assume no liability whatsoever for any errors in this manual or their consequences, direct and/or indirect.

STATEMENT OF COMPLIANCE

The AFJ PG5502 disturbance analyser pulse generators are designed and built in accordance with CISPR Publications:

- CISPR 16-1-1: *Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus.*

WARRANTY

Systems, options and accessories thereof, manufactured and shipped under the AFJ Instruments brand name, are warranted to be free from manufacturing defects for a period of twelve (12) months from the date of shipment.

AFJ Instruments certifies that all products are tested and inspected to comply with the published specifications originating from the company.

Warranty is provided “Ex-Works”: therefore, AFJ Instruments will be responsible of the amendment of failures arising from ascertained manufacturing defects only.

- Warranty will not be applicable in case of mishandling, unauthorized opening of the cabinets, improper use, and unauthorized repairs. In such cases, the warranty will be terminated.
- A repair under warranty will not extend the original term of validity of the warranty itself.
- All products or parts thereof, to be subject to a warranty operation, shall be shipped to the appropriate AFJ Instruments Warranty Centre, at Customer’s charge.

If a delivery back to the supplier is necessary we recommends keeping the original transport case. In such case, refer to the following Return Procedure:

- Briefly describe the problem in writing (Service Requested form). Include the serial number of the item being returned;
- Give details regarding the observed symptom(s), and whether the problem is constant or intermittent in nature. If you have talked previously to AFJ representative about the problem, provide such information also;
- Package the unit carefully, using the original boxes and packing materials, if possible. If not, use the most protective envelope at disposal (Damages due to transport are not covered from any guarantee);
- Before return the system back to AFJ, wait for RMA number (Returned Material Authorization).

The SW provided with the systems, is released “as-is” and is not covered by any warranty, not expressed, nor implied. However, AFJ Instruments is committed to correct, in a reasonable timeframe, all possible discrepancies reported with respect to the product specifications, through appropriate SW releases, free-of-charge.

Any changes, additions, extensions of the SW or FW originally supplied, will render the system warranty invalid.

DISCLAIMER OF LIABILITY

In no event shall AFJ Instruments be held liable for incidental or consequential damages of any kind whatsoever caused, or alleged to be caused directly or indirectly by the usage and operation of products herein, to customers or any third party, including, but not limited to, loss of use, loss of profit or any commercial loss.

Products described herein, do not imply any stated or alleged fitness for use, or any feasibility for business purpose, or expectation of profit. AFJ Instruments sole and only commitment is the compliance with the published product specifications.

All information in this manual is given in good faith. However, AFJ Instruments shall not be liable for any loss or damage whatsoever arising from the use of this manual, or any errors or omissions herein.

WORKING CONDITIONS

The allowed temperature range during use of the device is +0°C to +45°C. In cases of storage or transport this range may exceed by -20°C to +70°C.

Working relative humidity shall be 30% to 75%, atmospheric pressure shall be 86kPa to 106kPa (860 to 1060mba). System is not influenced by direct solar radiation.

The equipment is to use in dry and clean rooms. Avoid conditions like dust, air-humidity, danger of explosion and aggressive chemical environment. During use a sufficient air circulation is to realize. It is possible that condense water originates inside the device due to storage or transport conditions. In this case realize a period of 2 hours for acclimatize without use.

NOTICE:

The equipment is supplied in proper special packaging due to its heavy weight. We strongly recommend you to save packaging for next transport.



MANUFACTURER DECLARATION OF CONFORMITY

The AFJ CISPR Disturbance Analyzer Pulse Generator model:

PG5502

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to:

– **Electromagnetic Compatibility, Directive 89/336/EEC**

IEC 61000-6-1

Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments "

IEC 61000-6-3

Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

IEC 61326-1

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

– **Low Voltage Equipment Directive (73/23/EEC) and EN61010-1 (“Safety of Electrical Measuring Apparatus”)**

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PG5502 – DISTURBANCE ANALYZER PULSE GENETATOR
OPERATING MANUAL

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Fig.1: AFJ PG5502 Disturbance Analyser Pulse Generator

SECTION A: GENERAL INFORMATION

AFJ PG5502 Disturbance Analyzer Pulse generator has been designed and manufactured for checking with standard impulses according to CISPR 16-1-1 Table 14 and CISPR 16-1-1 Annex F Table F.1 or CUSTOM impulses defined by the user the functionality of any brand click meter or analyzer full compliance to CISPR 16-1-1 and used for click measurements according to CISPR 14-1. The instrument can be used also like CW Generator. The equipment can be used in stand alone mode or remotely controlled by software through the PC.



Fig.2: Front Panel

CISPR PULSE – IN: Input for CISPR pulses generator for performing tests with pulse 2 and pulse 3 of CISPR 16-1-1 Table 14 (Fig.5 and Fig. 42). See technical note at Section D for more information

USB: Input for service purpose only

CLICK PULSE – OUT: Output to connect to input of any brand click meter or analyzer to check



Fig.3: Rear Panel

- USB: Input for service purpose only
- 10MHz EXT REF IN: Input for 10MHz external reference signal
- LAN: Connector for connecting instrument to the PC connector, LAN interface (RJ-45 connector and Standard Category 5e cross-cable or better)
- LINE IN SELECTOR: Switch to change equipment power supply from AC 230V/50Hz to AC 115V/60Hz
- POWER ON/OFF – FUSE: Power-on switch, Socket for power cord (use Class I type only) and N.2 5x20mm, 1 A slow-blow fuses

AFJ PG5502 Disturbance Analyzer Pulse Generators are supplied with the following STANDARD ACCESSORIES:

ITEM	DESCRIPTION	QUANTITY
1	115/230V AC, 50/60Hz, 50VA Class I power cord	1
2	L=1m LAN CABLE (SFTP Crossover 1m)	1
3	TOUCH SCREEN PEN	1
4	AFJ CD-R (containing: Operating Manual, Operating Software)	1
5	CALIBRATION CERTIFICATE	1
6	PRODUCT CHECK LIST	1

SECTION B: STAND ALONE MODE

Turning on the equipment the display shows the following starting window (Fig.4):

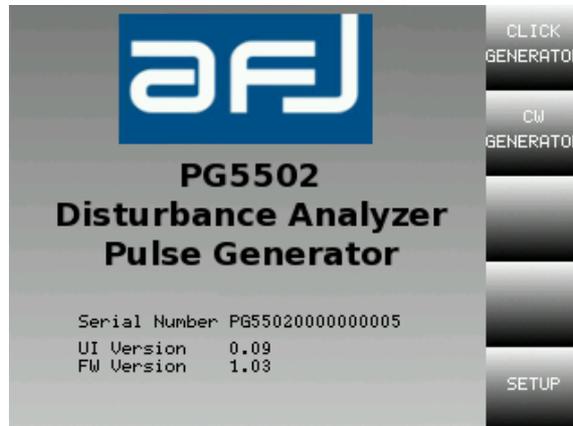


Fig.4: Starting window

Selecting “CLICK GENERATOR” the CISPR tests menu appears (Fig.5):



Fig. 5: CISPR tests menu

Push “TABLE” and use the knob to select the test table among CISPR 16-1-1 (T14) (Fig.7), CISPR 16-1-1 (F.1) (Fig.8) and CUSTOM. When “TABLE” or another button is pushed, the field that can be modified using the knob appears yellow (Fig. 6).

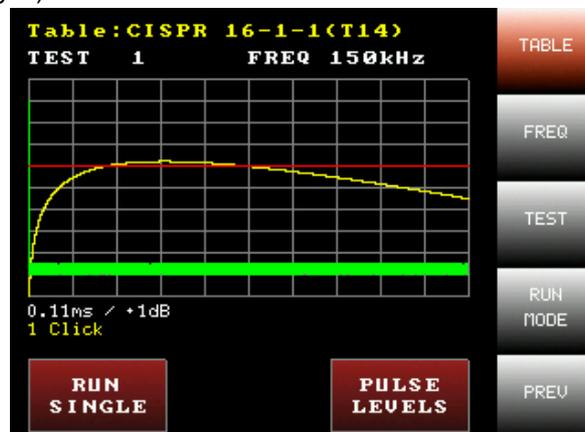


Fig. 6: CISPR 16-1-1 (T14) test

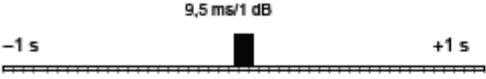
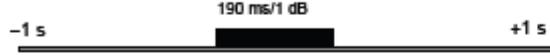
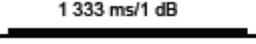
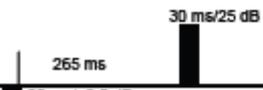
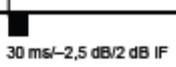
Test No.	Test signal	Evaluation by the analyzer
1	 0,11ms/1 dB	1 click
2	 9,5 ms/1 dB -1 s +1 s	1 click
3	Background: noise or CISPR pulses, 200 Hz: -2,5 dB (QP)  190 ms/1 dB -1 s +1 s	1 click
4	Background: noise or CISPR pulses, 200 Hz: -2,5 dB (QP)  1 333 ms/1 dB	Other than click
5	 210 ms/1 dB	Other than click
6	 30 ms/5 dB 180 ms 30 ms/5 dB	Other than click
7	 30 ms/5 dB 130 ms 30 ms/5 dB	1 click
8	 30 ms/5 dB 210 ms 30 ms/5 dB	2 clicks
9	 Min. 21 pulses/0,11 ms/periodicity 10 ms/1 dB	Other than click
10	 265 ms 30 ms/25 dB	1 click
11	 190 ms/25 dB Band B: 1034 ms/Band C: under consideration	2 clicks
12	 190 ms/25 dB Band B: 1 166 ms/Band C: under consideration	1 click
	 30 ms/-2,5 dB/2 dB IF 30 ms/-2,5 dB/2 dB IF	

Fig. 7: CISPR 16-1-1 Table 14 (T14)

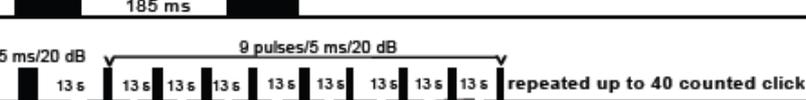
Test No	Test signal	Evaluation by the analyzer
1	 0,11 ms/1 dB	1 click ≤ 10 ms
2	 9,5 ms/1 dB	1 click ≤ 10 ms
3	 10,5 ms/1 dB	1 click > 10 ms, ≤ 20 ms
4	 19 ms/1 dB	1 click > 10 ms, ≤ 20 ms
5	 21 ms/1 dB	1 click > 20 ms
6	 190 ms/1 dB	1 click > 20 ms
7	 210 ms/5 dB 150 ms 210 ms/5 dB	1 click ≤ 600 ms (DUT programme-controlled)
8	 220 ms/5 dB 190 ms 220 ms/5 dB	Continuous ≥ 600 ms
9	 190 ms/5 dB 190 ms 190 ms/5 dB	1 click ≤ 600 ms (counted as 2 clicks refrigerator rule)
10	 50 ms/5 dB 185 ms 50 ms/5 dB	for $N < 5$ - 2 clicks for $N \geq 5$ - continuous, or 1 click ≤ 600 ms for programme controlled DUT
11	 15 ms/20 dB 13 s 9 pulses/5 ms/20 dB 13 s repeated up to 40 counted clicks	36 clicks ≤ 10 ms 4 clicks > 10 ms, ≤ 20 ms
12	 15 ms/20 dB 13 s 8 pulses/5 ms/20 dB 13 s repeated up to 40 counted clicks	35 clicks < 10 ms 5 clicks > 10 ms, ≤ 20 ms

Fig. 8: CISPR 16-1-1 Annex F Table (F.1)

Push “FREQ” and use the knob to select the running frequency test (Fig. 9).



Fig. 9: 150kHz running frequency test

Push “TEST” and use the knob to select test (Fig. 10).

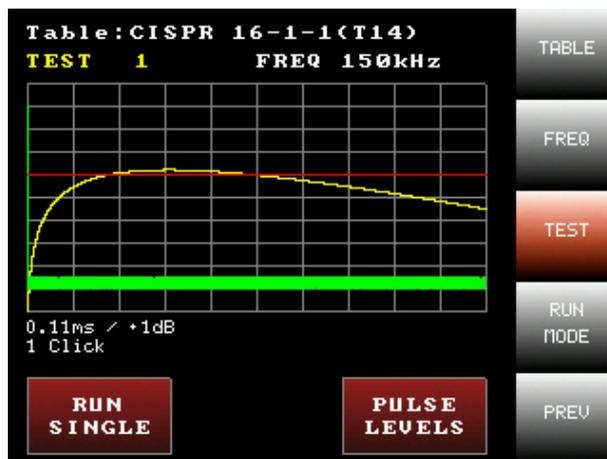


Fig. 10: Test 1

Push “RUN MODE” to select the running test mode (Fig. 11). According to the selected “RUN MODE”, the text of the running test mode changes (RUN SINGLE, RUN CONT. or SCAN TABLE).

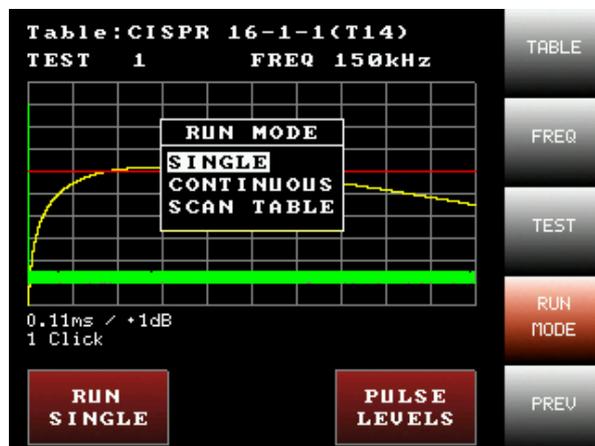


Fig.11: RUN MODE menu

As per Fig.11, push “RUN SINGLE” to start the test, a “TEST RUNNING...” message appears on the display. It is possible to stop the test pushing “STOP” (Fig. 12).

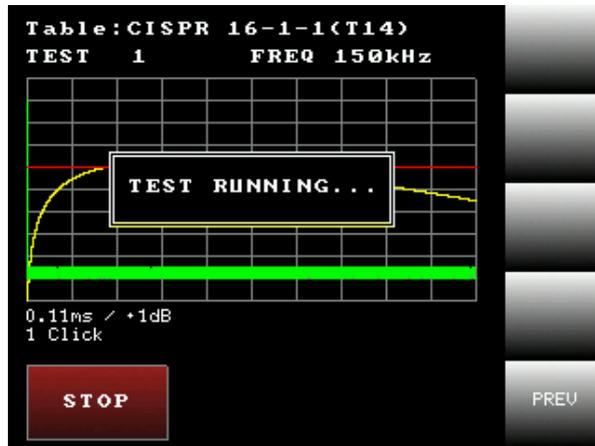


Fig.12: TEST RUNNING

Pushing “PULSE LEVELS” it is possible to adjust the test levels (Fig.13).

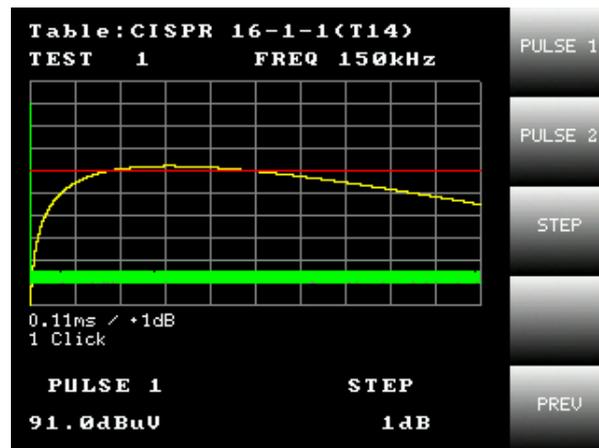


Fig.13: PULSE LEVELS adjustment

Push “PULSE 1” and use the knob to adjust the level of the first pulse and repeat the same procedure pushing “PULSE 2” if the test foresees the adjustment of two pulses. Push “STEP” and use the knob to adjust the step to use to modify the levels.

From starting window (Fig.4) push “CW GENERATOR” to select the continuous sine wave signal generator (Fig.14).



Fig.14: CW GENERATOR menu

Push “RF OUT” to enable / disable the output. Push “FREQ” and use the knob to adjust the frequency of the signal (Fig.15).

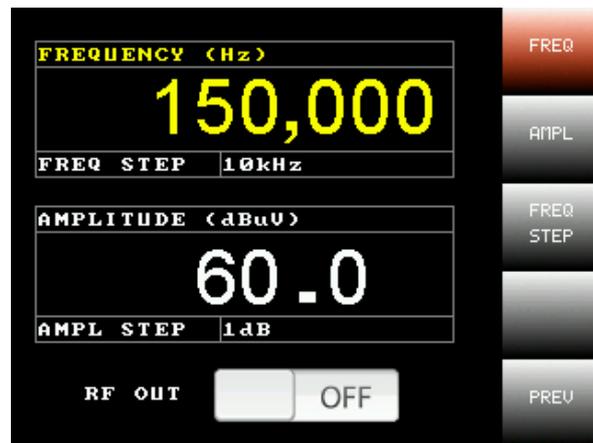


Fig.15: FREQUENCY adjustment

When frequency adjustment is selected, push “FREQ STEP” to adjust the step to use to modify the frequency (Fig.16).



Fig.16: FREQUENCY STEP adjustment

Push “AMPL” and use the knob to adjust the amplitude of the signal (Fig.17).

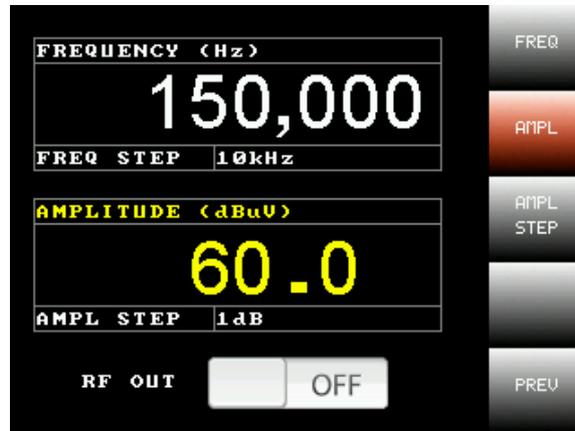


Fig.17: AMPLITUDE adjustment

When amplitude adjustment is selected, push “AMPL STEP” to adjust the step to use to modify the amplitude (Fig.18).



Fig.18: AMPLITUDE STEP adjustment

Push “OFF” to turn on the continuous sine wave signal generator. “ON” indication appears on the display (Fig.19). Push “ON” to turn off the continuous sine wave signal generator.



Fig.19: CW GENERATOR ON

From starting window (Fig.4) push “SETUP” to select equipment settings menu (Fig. 20).



Fig.20: SETUP menu

Push “TEST PAUSE” and use the knob to adjust the time among the repetitions of the running test if the “CONTINUOUS” running mode is selected (Fig. 21). Push “SAVE” to save the settings.



Fig.21: TEST PAUSE settings

From “SETUP” menu (Fig.20) push “CUSTOM FREQ” to select custom frequencies settings menu (Fig.22).



Fig.22: CUSTOM FREQ settings menu

Push “CUSTOM FREQ 1” to select the custom frequency N.1 and use the knob to adjust its value (Fig.23).



Fig.23: CUSTOM FREQUENCY 1 settings

Push “CUSTOM FREQ 2” to select the custom frequency N.2 and use the knob to adjust its value (Fig.24).



Fig.24: CUSTOM FREQUENCY 2 settings

Push “STEP” and use the knob to adjust the step to use to modify the frequency (Fig.25). Push “SAVE” to save the settings.



Fig.25: STEP settings

From “SETUP” menu (Fig.20) push “CUSTOM TEST” to select custom test parameters settings menu (Fig.26).

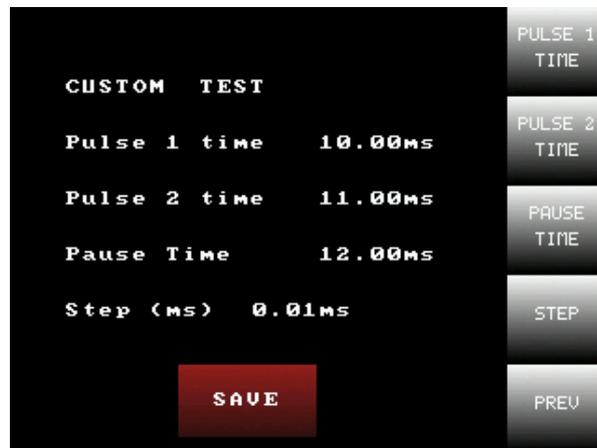


Fig.26: CUSTOM TEST settings menu

Push “PULSE 1 TIME” and use the knob to adjust the duration of the pulse N.1 (Fig.27).

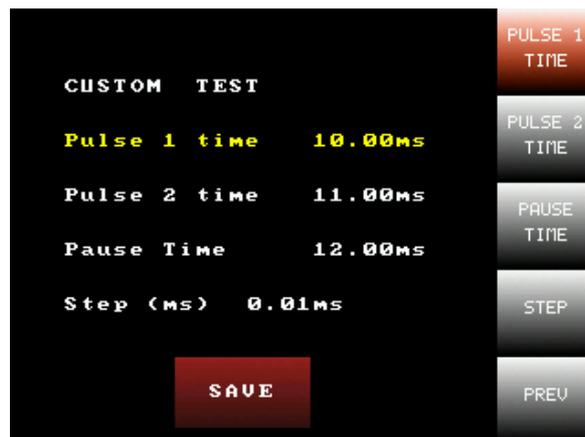


Fig.27: PULSE 1 TIME settings

Push “PULSE 2 TIME” and use the knob to adjust the duration of the pulse N.2 (Fig.28). Push “SAVE” to save the settings.



Fig.28: PULSE 2 TIME settings

Push “PAUSE TIME” and use the knob to adjust the time between pulse N.1 and pulse N.2 (Fig.29).



Fig.29: PAUSE TIME settings

Push “STEP” and use the knob to adjust the step to use to modify the time (Fig.30). Push “SAVE” to save the settings.



Fig.30: STEP settings

From “SETUP” menu (Fig.20) push “LAN SETUP” to select network configuration menu (Fig.31).

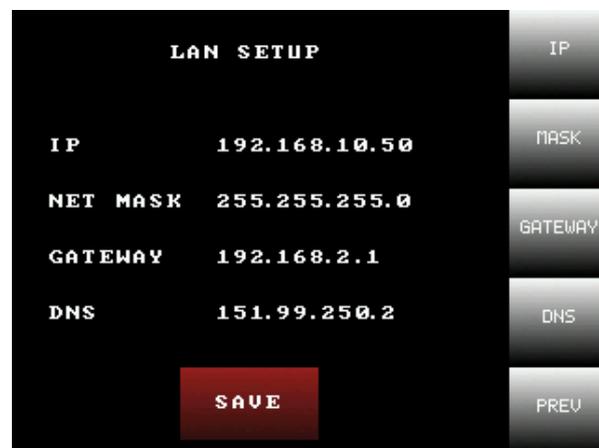


Fig.31: LAN SETUP menu

Push “IP”, use “+” and “-“ keys to adjust the selected range and then “->” key to access to the next range to adjust the IP address of the equipment (Fig.32).



Fig.32: IP address settings

Push “MASK”, use “+” and “-“ keys to adjust the selected range and then “->” key to access to the next range to adjust the NET MASK address of the equipment (Fig.33).



Fig.33: NET MASK address settings

Push “GATEWAY”, use “+” and “-“ keys to adjust the selected range and then “->” key to access to the next range to adjust the GATEWAY address of the equipment. Push “NONE” to not have any GATEWAY address (Fig.34).



Fig.34: NET MASK address settings

Push “DNS”, use “+” and “-“ keys to adjust the selected range and then “->” key to access to the next range to adjust the DNS address of the equipment. Push “NONE” to not have any DNS address (Fig.35). Push “SAVE” to save settings.



Fig.35: DNS address settings

SECTION C: REMOTE CONTROL MODE

Running the software the starting window appears (Fig.36). Insert the IP address of the equipment and then select DEMO (software used in demo mode), RUN (software used for remotely control the equipment) or EXIT (to close the software).



Fig.36: Starting window

Selecting “RUN” the equipment is automatically recognized by the software and “REMOTE CONTROL” message appears on the equipment display (Fig.37).



Fig.37: REMOTE CONTROL message

The first window to appear is the menu for CISPR 16-1-1 and CUSTOM tests (Fig.38).

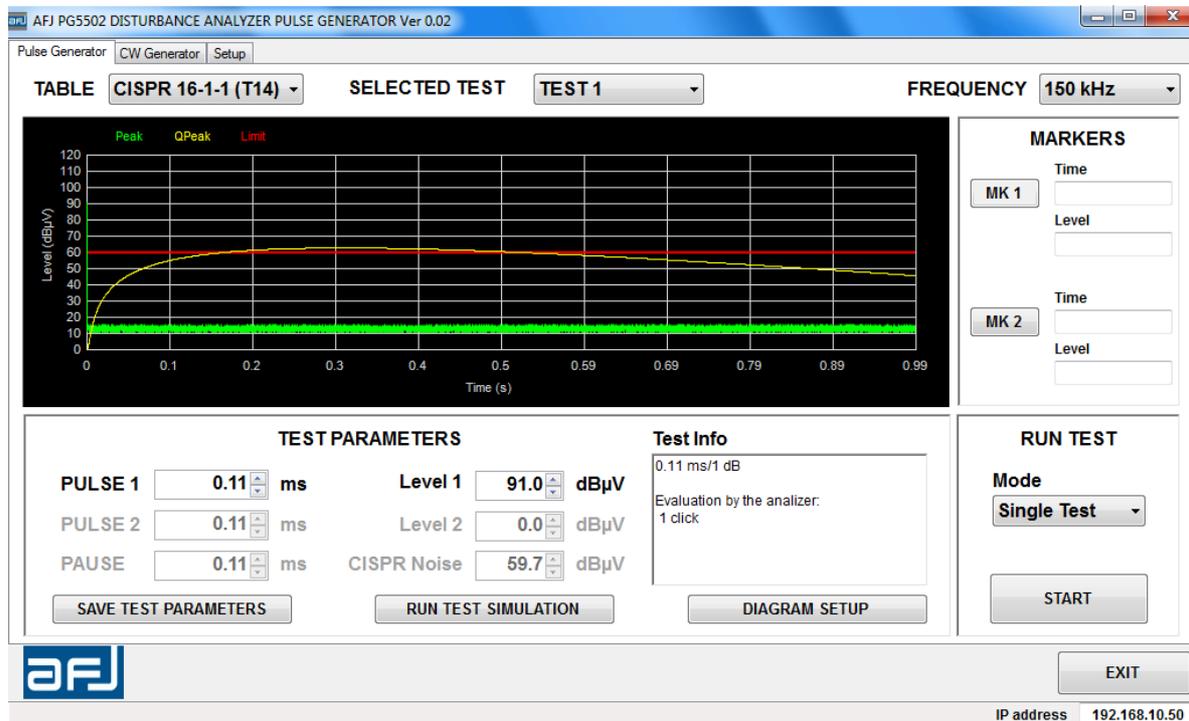


Fig.38: CISPR 16-1-1 tests menu

On this menu it is possible to select the table (CISPR 16-1-1 (T14), CISPR 16-1-1 (F.1) or CUSTOM defined by the end user), the number and the running frequency of the test to perform.

The diagram shows just an indicative simulation of the measurement of the click analyzer. On the “TEST PARAMETERS” section all parameters and info of the selected test are shown. The pulses levels can be adjusted and then saved selecting “SAVE TEST PARAMETERS”. The pulses duration can be adjusted for custom test only. Pushing “RUN TEST SIMULATION” the modification of the measurement of the click analyzer according to the variation of the pulses can be checked. “DIAGRAM SETUP” allows to set the properties of the diagram.

The “MARKERS” section allows to use two markers on the diagram to check the shown waveform in detail. The “RUN TEST” section allows to run the test pushing “START” after setting the operative mode among “Single Test”, “Continuous” and “Scan Table”.

Push “EXIT” to close the software.

When “CUSTOM” table is selected (Fig.39), it is possible to run the test either stored into the generator selecting “Default from PG5502” or to load a test saved on the remote control PC pushing the “Load >>” key. In this case it appears a window where it is possible to manage the list of the custom tests (Fig.40).

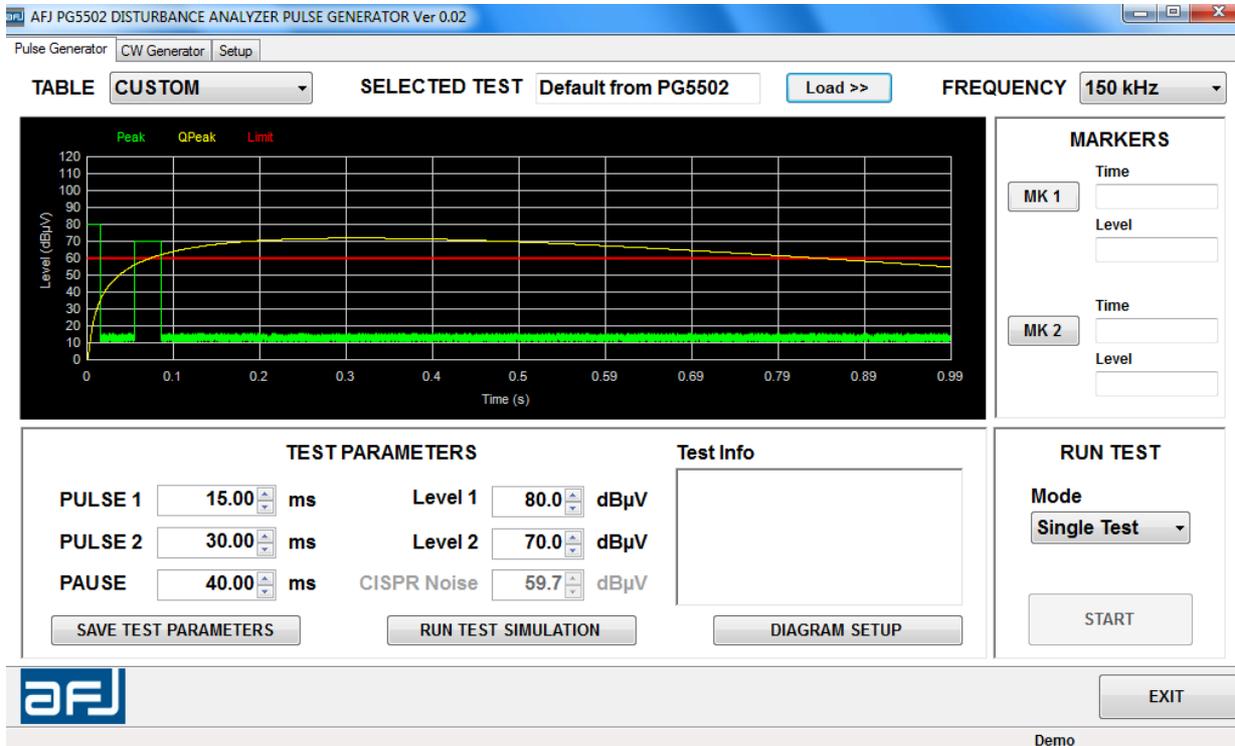


Fig.39: CUSTOM tests menu

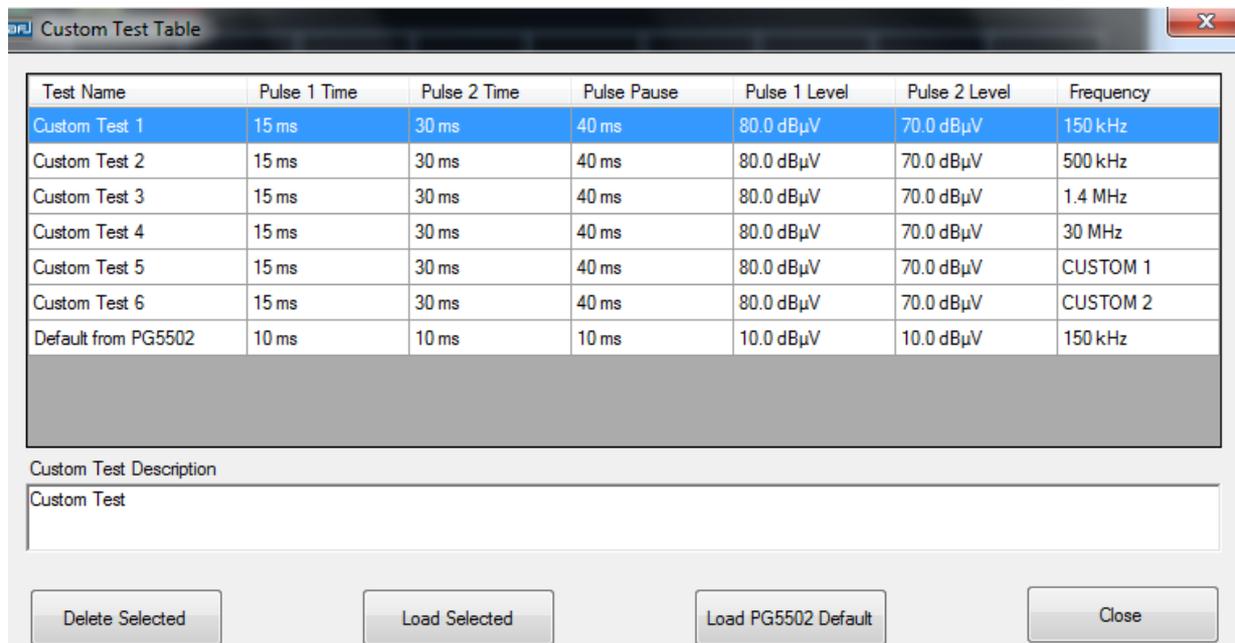


Fig.40: CUSTOM tests list

To insert a test into the list it is necessary to select the “CUSTOM” table mode and push “SAVE TEST PARAMETERS”.

The following window with save options appears (Fig.41):

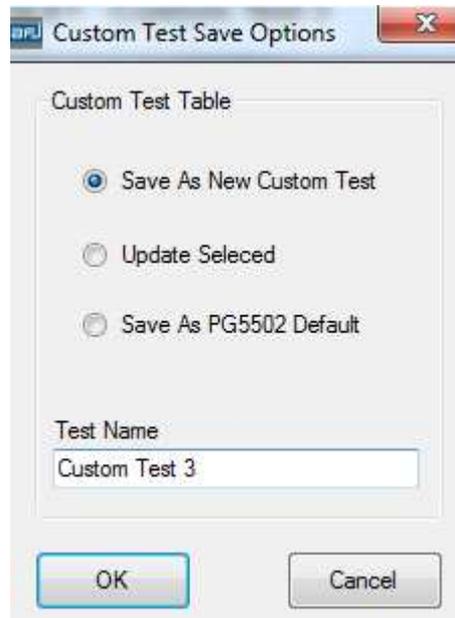


Fig.41: CUSTOM test save options

There are three available options:

- “Save As New Custom Test” insert a new test on the list of the custom tests;
- “Update Selected” (active only if previously a test from the list of custom tests was been loaded) update the loaded test;
- “Save As PG5502 Default” save the test as the custom test into the generator.

Selecting “CW GENERATOR”, the continuous sine wave signal generator menu appears (Fig.42). Push “SET GENERATOR” to adjust the generator settings.

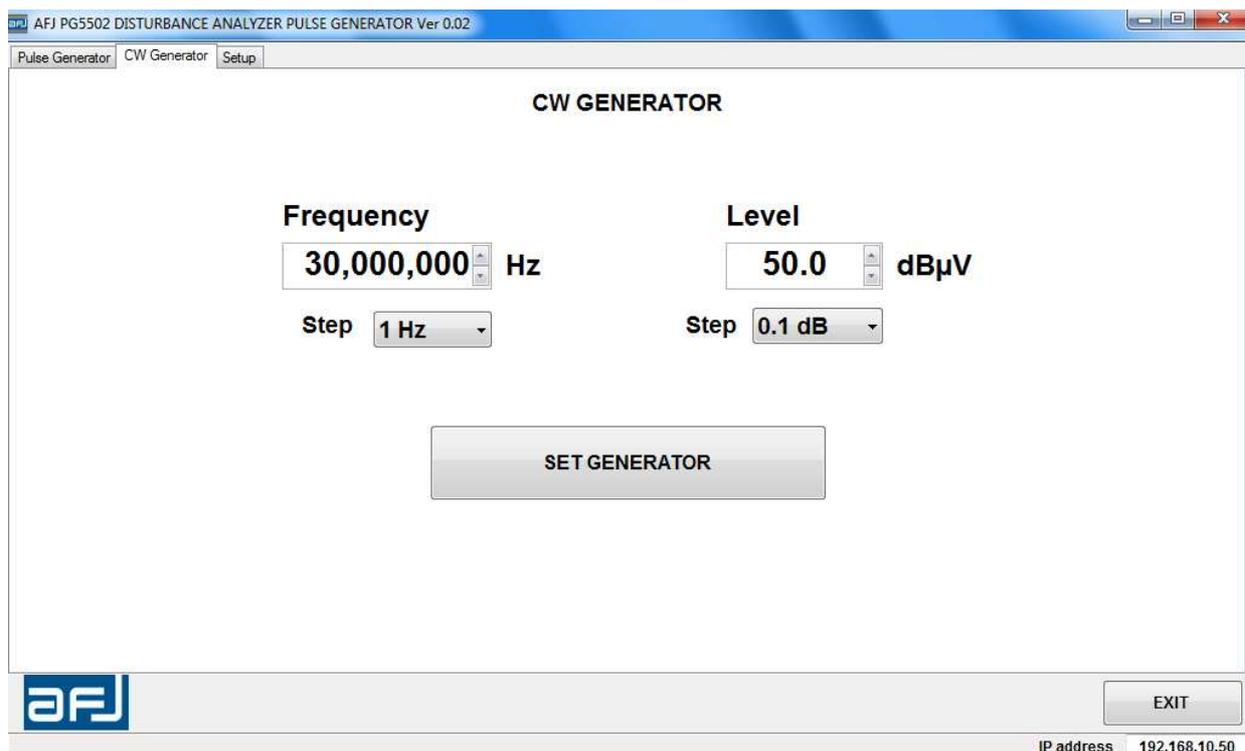


Fig.42: CW GENERATOR menu

Selecting “SETUP”, the SETUP menu appears (Fig.43).

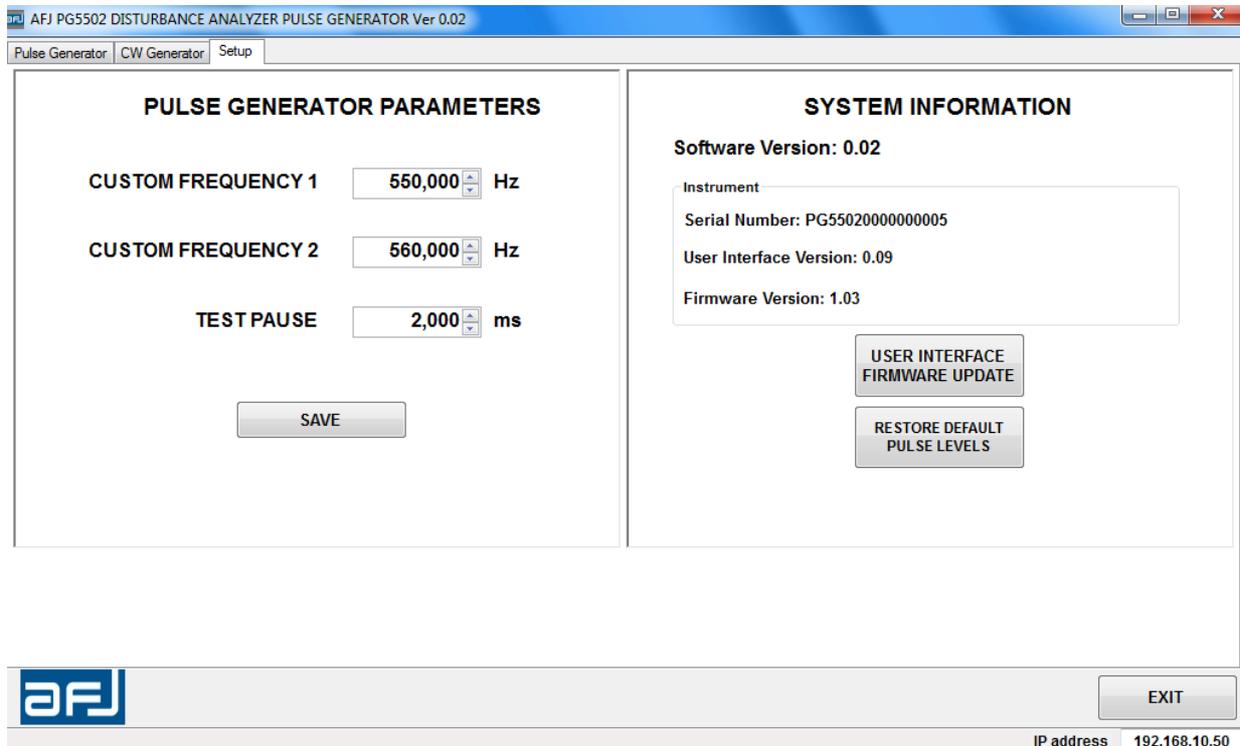


Fig.43: SETUP menu

With the “PULSE GENERATOR PARAMETERS” section it is possible to set the custom frequencies, the pause among the repetitions of the test if the “CONTINUOUS” mode is selected. Push “SAVE” to save the settings.

The “SYSTEM INFORMATION” section shows information about the software and the connected equipment. Pushing “USER INTERFACE FIRMWARE UPDATE” it is possible to update the graphical interface of the equipment. Pushing “RESTORE DEFAULT PULSE LEVELS” it is possible to reload the default values of the pulses levels.

SECTION D: TECHNICAL NOTE

Pulse 2 and pulse 3 of CISPR 16-1-1 Table 14 (Fig. 44) shall be performed with background noise consisting of 200Hz CISPR pulses at a level 2.5dB below the Quasi-Peak threshold level.

These pulses should be present commencing at least 1s before the test pulse and lasting until at least 1s after the test pulse.

Enter this background noise by through RF IN connector in the front panel of PG5502, max input level is 63dB μ V.

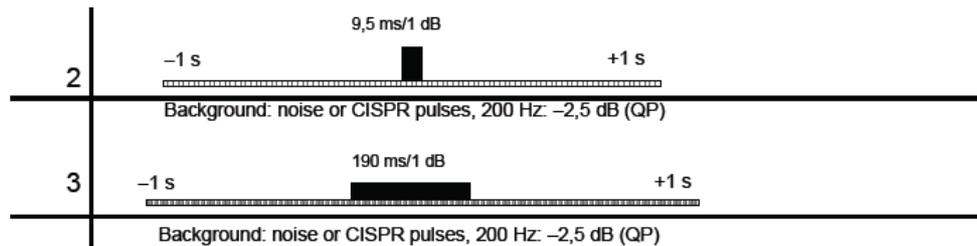


Fig. 44: CISPR 16-1-1 Table 14 Pulse 2 and pulse 3 with background noise

SECTION E: TECHNICAL SPECIFICATION

CISPR16-1-1 Full Compliance Disturbance Analyzer Pulse Generator

Duration of the pulses: 110 μ s \div 1.3s (Accuracy \pm 3%)

Rise Time of the pulses: <1 μ s

Click analyser test level: 60dB μ V

RF Level: 30 \div 112dB μ V

Frequency range: 150kHz \div 30MHz

Frequency precision: <30 \times 10⁻⁶

Impedance: 50Ohm

Power Supply: AC 230V/50Hz 115V/60Hz