



# **OPERATING MANUAL**

## **Discontinuous Disturbances Analyser DDA55+**

REVISION LEVEL 2.4

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## GENERAL INFORMATION

The information contained herein, are provided in connection with the usage of AFJ DDA55+ Discontinuous Disturbances Analyser and his options only. All information contained herein, is subject to change without prior notice and cannot be duplicated, copied or reproduced in whole or part, without prior written consent of the owner:

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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.

## SCOPE AND ORGANIZATION OF THE MANUAL

This Manual contains information and procedures required to install and operate AFJ DDA55+ Click Analyser. The contents are generic for all models of Discontinuous Disturbances Analysers: specific paragraphs, or parts thereof, will describe functionalities and operating modes pertinent to the single models (DDA55+; DDA55+ with VCCI and DENAN Option), whenever appropriate.

The manual is divided into six sections as follows:

Section A	Discontinuous Interferences Analysis
Section B	General Information
Section C	System Installation
Section D	Operating instructions
Section E	Application Notes
Section F	Verification Protocol

## STATEMENT OF COMPLIANCE

The AFJ DDA55+ Click Analyser is designed and built in accordance with:

- CISPR Publication 16-1-1: "Specification for radio interference measuring apparatus"; CISPR Publication 14-1: "Limits and methods of measurements of radio disturbance characteristics of electrical motor operated and thermal appliances for household and similar purposes, electric tools and similar electric 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. Calibration procedure includes Calculation of uncertainty using ISO model and Traceability.

- The Warranty is provided "Ex-Works": therefore, AFJ Instruments will be responsible of the amendment of failures arising from ascertained manufacturing defects only.
- The 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 AFJ Instruments recommends keeping the original transport case. In such case, refer to the following Return Procedure.

## Return Procedure (RMA number)

To return the DDA55+ Click Analyser to AFJ Instruments, use the following 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 click analyser 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.

Do not cover the ventilation holes. A distance of about 20cm must be maintained between the rear panel of DDA55+ and any wall and about 5cm between the sides of DDA55+ and any equipment or walls.

### NOTICE:

The DDA55+ Click Analyser is supplied in proper special packaging due to its heavy weight. We strongly recommend you to save packaging for next transport.



## CE MANUFACTURER DECLARATION OF CONFORMITY

Manufacturer	AFJ INSTRUMENTS SRL Via Gavirate 16 20148 Milano Italy
Product Type	Click Analyser model DDA55+

We hereby declare that the aforementioned equipment complies with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to:

- Electromagnetic Compatibility, Directive 2014/30/EC  
IEC 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
  - IEC 61326-1 Class B (Emission)
  - IEC 61326-1 (Immunity, laboratory)
- Low Voltage Equipment Directive (2014/35/EC) and EN 61010-1 ("Safety of Electrical Measuring Apparatus").



## UKCA DECLARATION OF CONFORMITY

Manufacturer	AFJ INSTRUMENTS SRL Via Gavirate 16 20148 Milano Italy
Product Type	Click Analyser model DDA55+

We hereby declare that the aforementioned equipment complies with the relevant requirements of the below referenced specifications. The unit complies with all applicable essential requirements of the directives.

Electromagnetic Compatibility Regulations 2016

Electrical Equipment (Safety) Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

EN 61326-1:2021 Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General requirements

- EN / IEC 61326-1 Class B (Emission)
- EN / IEC 61326-1 (Immunity, Laboratory)

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

## DDA55+ OPERATING MANUAL

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## SECTION A: DISCONTINUOUS INTERFERENCES ANALYSIS

### A.1 • CISPR 14-1

Domestic appliances, power tools and certain other products need to be measured for discontinuous interference in the frequency range of 150kHz to 30MHz. Because the interference generated by this product family is non periodic, the limits are relaxed compared to continuous limits of conducted emissions.

The CISPR 14-1 standard applies to the conduction and the radiation of radio frequency disturbances from appliances whose main functions are performed by motors and switching or regulating devices, unless RF energy is intentionally generated (CISPR 11) or intended for illumination (CISPR 15). It includes such equipment as household electrical appliances, electric tools, regulating controls using semiconductor devices, motor driven electro-medical apparatus, electric toys, automatic dispensing machines as well as cine and slide projectors. Also included in this standard are: separate parts of the above mentioned equipment such as motors, switching devices e.g. (power or protective) relays, however no emission requirements apply unless formulated in this standard.

The CISPR 14-1 standard was designed to allow products interference level to be suppressed according to annoyance level and emission shall be measured in terms of their amplitude, duration and repetition. Once the discontinuous interference has been quantified, correct limits have to be applied.

### A.2 • DEFINITIONS

#### A.2.1 • CLICK

A disturbance which exceeds the limit of continuous disturbance not longer than 200ms (Fig. A.1) and which is separated from a subsequent disturbance by at least 200ms (Fig. A.2). Both intervals are related to the level of the limit of continuous disturbance. A click may contain a number of impulses (Fig. A.3) in which case the relevant time is that from the beginning of the first to the end of the last impulse.

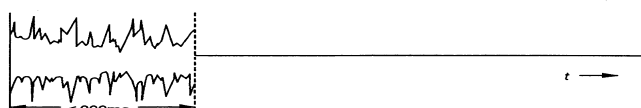


Fig. A.1

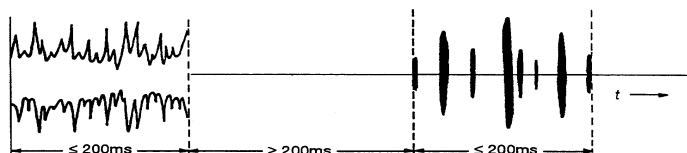


Fig. A.2

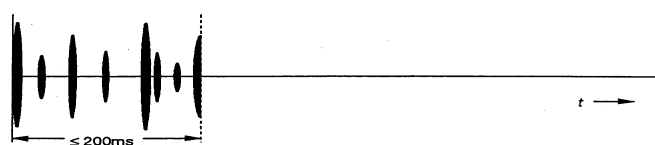


Fig. A.3



## **A.2.2 • OBSERVATION TIME**

The observation time T is the time used for the calculation of the click rate N.

### **A.2.2.1 • CISPR 14-1 ED. 6.0**

According to Sub Clause 5.4.2.1 of CISPR 14-1 Ed. 6.0 standard, the minimum observation time T shall be determined at both frequencies specified for determining the click rate N and according to the equipment operation, as follows:

- a) If the EUT does not stop automatically, T is the shorter time of either:
  - the time in minutes to register 40 clicks, or, where relevant, 40 switching operations, or
  - 120 min
- b) If the EUT does stop automatically, T is:
  - the sum of the durations of the minimum number of complete programmes necessary to produce 40 clicks or, where relevant, 40 switching operations; or
  - if after 120 min from the beginning of the test 40 clicks or, where relevant, 40 switching operations have not been recorded, the sum of the durations of the minimum number of complete programmes that exceeds 120 min.

If the measurement of the clicks is carried out simultaneously at 150 kHz and 500 kHz, it is sufficient to register 40 clicks at one of the frequencies.

The interval between the end of one programme and the start of the next programme shall be excluded from the minimum observation time, except for those EUT for which an immediate re-start is inhibited. For such EUT, the minimum time required to re-start the programme shall be included in the minimum observation time.

### **A.2.2.2 • CISPR 14-1 ED. 7.0**

According to Sub Clause 5.4.2.2 of CISPR 14-1 Ed. 7.0 standard, the observation time T shall be determined only at 150 kHz and 500 kHz under the operating conditions specified in the document. The following procedure shall be used for determining the minimum observation time:

- a) If the equipment does not operate according to a programme, the minimum observation time is the shorter of:
  - the time in minutes to count 40 clicks at one of the two frequencies, or
  - 120 min
- b) If the EUT does operate according to a programme, the minimum observation time is the duration of a complete programme if the click rate obtained from the complete programme is less than or equal to 0,5 and the programme duration is more than 20 min. Otherwise it is either:
  - the sum of the durations of the minimum number of complete programmes necessary to count 40 clicks at one of the two frequencies, or
  - the sum of the durations of the minimum number of complete programmes that exceeds 120 min, if 120 min after the beginning of the test 40 clicks have not been recorded,

The same procedure shall be applied when, instead of counting the clicks, the click rate is determined by counting the switching operations.

When case b) applies, the interval between the end of one programme and the manual start of the next programme shall be excluded from the minimum observation time.

However, it is permitted to extend the observation time beyond the minimum and use that value as T.

When counting 40 clicks (or switching operations) with a 4-channel-analyser, the minimum observation time is the shorter observation time to reach 40 clicks at either 150 kHz or at 500 kHz. This observation time T shall be applied to the evaluation at all 4 frequencies.

The test report shall clearly state the used observation time for each frequency.

### **A.2.3 • CLICK RATE**

The click rate N is number of clicks or switching operations per minute.

#### **A.2.3.1 • CISPR 14-1 ED. 6.0**

According to Sub Clause 5.4.2.2 of CISPR 14-1 Ed. 6.0 standard, the click rate N shall be determined:

- a) under the operating conditions specified in Clause 6 of CISPR 14-1, unless specific operating conditions are given in Annex A of CISPR 14-1;
- b) at 150 kHz and 500 kHz. The click rate determined at 500 kHz shall also be used for the analysis at 1,4 MHz and 30 MHz.

The click rate N is in general the number of clicks per minute determined from the formula  $N = n_1/T$ , where  $n_1$  is the number of clicks during the observation time T minutes.

In alternative, for certain equipment the click rate N may be determined from the formula  $N = n_2 \times f/T$ , where  $n_2$  is the number of switching operations during the observation time T and f is a factor depending on the particular equipment, as given in Annex B, Table B.1 of the standard (Table A.1).

For equipment for which Annex A and Annex B permit this alternative, the choice of the method for determining the click rate is the responsibility of the manufacturer. The factor f is only applicable when the second method is used.

#### **A.2.3.2 • CISPR 14-1 ED. 7.0**

According to Sub Clause 5.4.2.3 of CISPR 14-1 Ed. 7.0 standard, the click rates shall be calculated separately for each of the four frequencies specified in Sub Clause 5.4.2.1 (150 kHz, 500 kHz, 1,4 MHz, 30 MHz) using the observation time(s) determined according to Sub Clause 5.4.2.2.

The click rate  $N_c$  is the number of clicks per minute determined from the formula  $N_c = n_c/T_c$ , where  $n_c$  is the number of clicks during the observation time  $T_c$  (in minutes).

For certain equipment the click rate N may be alternatively determined from the formula  $N_s = n_s \times f/T_s$ , where  $n_s$  is the number of switching operations during the observation time  $T_s$  and f is a factor depending on the particular equipment, as given in Annex B, Table B.1 of the standard (Table A.1).

The factor f shall only be applied when the method of counting switching operations is used. For equipment for which it is permitted to determine the click rate from either counting the number of switching operations or measuring the clicks, the user may choose between the two methods.

Type of equipment	Operating conditions subclause	Factor <i>f</i>
Thermostats for portable or removable room heating equipment	A.5	1,00
Refrigerators, freezers	A.1.9	0,50
Cooking ranges with automatic plates	A.4.2	0,50
Equipment with one or more boiling plates controlled by thermostats or energy regulators	A.4.2	0,50
Irons	A.4.11	0,66
Sewing machine speed controls and starter switches	A.10.1.2	1,00
Dental drill speed control and starter switches	A.10.1.2	1,00
Electro-mechanical office machines	A.1.16	1,00
Slide projector picture change devices	A.1.17, A.1.17.2	1,00

**Table A.1 – Special equipment for which the click rate *N* is derived from the number of switching operations**

#### **A.2.4 • LIMIT**

The relevant click limit *L<sub>q</sub>* for discontinuous disturbance is determined according to the formula given in Sub Clause 4.4.2.3 of CISPR 14-1 Ed. 6.0 and CISPR 14-1 Ed. 7.0 standards: The click limit *L<sub>q</sub>* is calculated by increasing the relevant quasi-peak Limit *L* for continuous disturbances (Table A.2) increased by 44 dB for  $N < 0.2$ , or  $20\log(30/N)$  dB for  $0.2 \leq N < 30$ .

Frequency (MHz)	Limit Quasi-Peak (dBμV)
0.15-0.50	66-56
0.50-5	56
5-30	60

**Table A.2: Limit *L* for household appliances**

#### **A.2.5 • SWITCHING OPERATION**

One opening or one closing of a switch or contact. Independent of whether clicks are observed or not. The measurement of disturbance generated by switching operations shall be performed with the same program as has been chosen when determining the click rate *N* at the following restricted number of frequencies: 150kHz, 500kHz, 1.4MHz and 30MHz.

#### **A.2.6 • ASSESSMENT OF COMPLIANCE**

The EUT is assessed for compliance with the limit *L<sub>q</sub>* in accordance with the upper quartile method, for a time not less than the minimum observation time *T*.

- If the click rate *N* is determined from the number of clicks, the EUT shall be deemed to comply with the limit if not more than a quarter of the number of clicks registered during the observation time *T* exceeds the click limit *L<sub>q</sub>*.
- If the click rate *N* is determined from the number of switching operations (Table A.1), the EUT shall be deemed to comply with the limit if not more than a quarter of the number of switching operations registered during the observation time *T* produce clicks exceeding the click limit *L<sub>q</sub>*.

## SECTION B: GENERAL INFORMATION

This Section contains a general description of the AFJ DDA55+ Click Analyser, including: associated and optional accessories, equipment specifications and safety precautions.

### REFER TO MANUAL.

**THIS MANUAL IS AN INTEGRAL PART OF THE DDA55+ CLICK ANALYSER.**

**THE SAFETY RULES AND PRECAUTIONS IN THE MANUAL MUST BE OBSERVED.**

**AFJ INSTRUMENTS AND THEIR REPRESENTATIVES ACCEPT NO RESPONSIBILITY FOR DAMAGES TO PERSONS AND EQUIPMENT AS RESULTS OF NON-OBSERVATION OF THE RULES PRECAUTIONS IN THIS MANUAL.**

### B.1 • EQUIPMENT DESCRIPTION

DDA55+ (Fig. B.1) is fully digital, microprocessor-controlled, super heterodyne-type automatic test analyser covering the frequency range from 9kHz to 30MHz in accordance with the requirements of CISPR 16-1-1 and CISPR 14-1 standards.



**Fig. B.1: DDA55+ Click Analyser**

DDA55+ is a 4 Digital Direct Sampling Receivers in parallel with Digital Receivers NCO Frequencies (150kHz, 500kHz, 1.4MHz, 30MHz). Each channel is provided with Peak and Quasi Peak detectors fully comply with CISPR 16-1-1 standard. The way the Quasi Peak detectors are designed, enables to automatically perform tests in full compliance with the requirements of CISPR 14-1 standard, where requesting to test using an oscilloscope (time-domain operation).

For the purpose of functional self-assessment, the analyser has a built-in pulse generator, that can produce the entire set of single and multiple disturbance pulses, in the various timing and shift configurations, as required by Tables 14 and F.1 of CISPR 16-1-1. Powerful and user-friendly control software enables it to perform all tests, standard and customized, in a very easy and fully automatic way. Based on a PC integrated architecture with WINDOWS 10 Embedded OS, DDA55+ click analyser is ready to operate through 10.1" LCD display and advanced software for EMC testing for automatic test setup, running and consistent report generation.

The PC totally controls the analyzer through a friendly application software, enabling the operator to set all parameters according to CISPR 14-1 requirements or any other specific needs.

All information collected by the DDA55+ during the test are displayed in real time on 10.1" LCD display, divided into a number of windows corresponding to the number of internal RF channels. The main characteristic of the click analyser, is its ability to sample, in parallel, the peak and quasi-peak levels of the four channels, to recognise and count all clicks (short, long, continuous noise and switching operations), and store all numeric and graphic data, like waveforms, in the PC hard disk. The PC-based operation of the analyzer, means practically unlimited memory capabilities, and the ability to generate assisted, or fully-automatic test reports.

## B.2 • STANDARD SUPPLIED ACCESSORIES

The AFJ DDA55+ Click Analyser is supplied with the following STANDARD ACCESSORIES:

Item	Description	Qty
1	110 / 230Vac, 50 / 60Hz, 50VA Class I power cord	1
2	Unit-to-PC, LAN cross – cable, L=1.0 m (communication cable)	1
3	Stylus pen for Click Analyser touch screen display	1
4	F 3,15A FUSE	2
5	AFJ EMI Software USB-key (containing: Operating Manual & Operating SW)	1
6	DDA55+ Certificate of Calibration	1
7	Keyboard	1
8	Mouse	1

## B.3 • OPTIONAL ACCESSORIES

To fulfil all set-up requirements, as specified in the relevant sections of CISPR 16-1-1 and CISPR 14-1 standards, the following OPTIONAL ACCESSORIES are made available:

ITEM	DESCRIPTION	ORDER CODE
1	LISN, 9kHz to 30MHz single-phase, 2 x 16A, including current variation counter for EN55014 (switching operation).	LS16C/10
2	LISN, 9kHz to 30MHz three-phase, 4 x 32A, including current variation counter for EN55014 (switching operation).	LT32C/10
3	Switching box to be connected with DDA55+ and LISN (any brand) for switching operation measurements, In=32A three phase.	SW04/32
4	Switching box to be connected with DDA55+ and LISN (any brand) for switching operation measurements, In=100A three phase.	SW04/100

## B.4 • RELATED DOCUMENTS

The DDA55+ Click Analyser, perform electromagnetic compatibility measurements in the domain of discontinuous interferences, in accordance with (but not limited to) the following Harmonized European EMC Standards:

**CISPR 14-1: Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and electric apparatus - Part 1: Emission.** This Standard applies to the conduction and the radiation of radio-frequency disturbances from appliances whose main functions are performed by motors and switching or regulating devices, unless the r.f. energy is intentionally generated or intended for illumination. It includes such equipment as: household electrical appliances, electric tools, regulating controls using semiconductor devices, motor-driven electro-medical apparatus, electric toys, automatic dispensing machines as well as cinema or slide projectors. The frequency range covered extends from 9 kHz to 400 GHz.

**CISPR 16-1-1: Specification for radio disturbance and immunity measuring apparatus and methods Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus.** This part of CISPR 16 is designated a basic standard, which specifies the characteristics and performance of equipment for the measurement of radio disturbance voltages, currents and fields in the frequency range 9 kHz to 18 GHz. In addition, requirements are specified for specialized equipment for discontinuous disturbance measurements. The requirements include the measurement of broadband and narrowband types of radio disturbance. The requirements include the measurement of broadband and narrowband types of radio disturbance.

**CISPR 16-1-2: Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances.**

This part of CISPR 16 is designated a basic standard, which specifies the characteristics and performance of equipment for the measurement of radio disturbance voltages and currents in the frequency range 9 kHz to 1 GHz. Specifications for ancillary apparatus are included for: artificial mains networks, current and voltage probes and coupling units for current injection on cables.

**IEC 61000-6-3: Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments.**

This part of IEC 61000 for EMC emission requirements applies to electrical and electronic apparatus intended for use in residential, commercial and light-industrial environments. Emission requirements in the frequency range 0 Hz to 400 GHz are covered. No measurement needs to be performed at frequencies where no requirement is specified.

**IEC 61000-6-4: Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments.**

This part of IEC 61000 for EMC emission requirements applies to electrical and electronic apparatus intended for use in industrial environments as described below. Emission requirements in the frequency range 0 Hz to 400 GHz are covered. No measurement needs to be performed at frequencies where no requirement is specified. This generic EMC emission standard is applicable if no relevant dedicated product or product-family EMC emission standard exists. This standard applies to a apparatus intended to be connected to a power network supplied from a high or medium voltage transformer dedicated to the supply of an installation feeding manufacturing or similar plant, and intended to operate in or in proximity to industrial locations.

## B.5 • DDA55+ FRONT PANEL CONTROLS AND INDICATORS

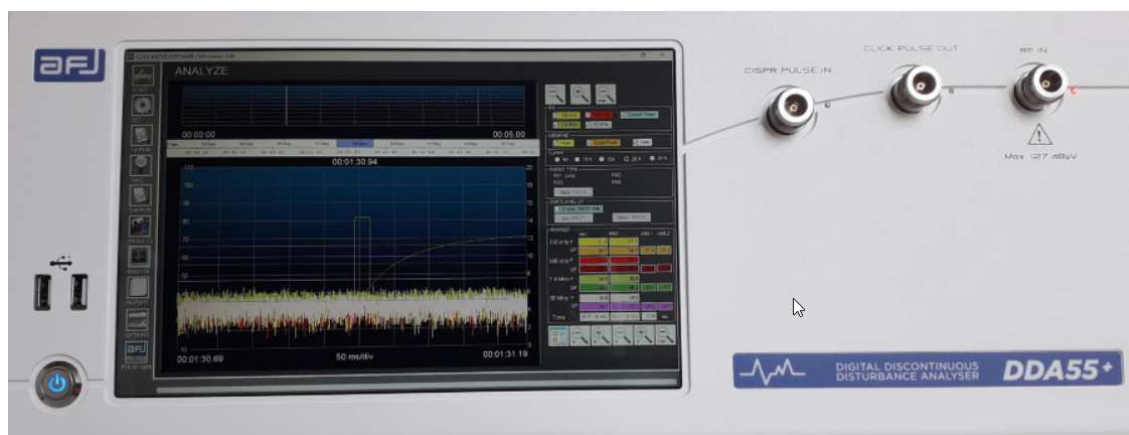


Fig. B.2: Front Panel

1 – STATUS INDICATORS LEDs (from left to right):

COLOUR	NAME	FUNCTION
RED	CISPR PULSE IN	The LED is lit when pulse generator input is activated
RED	CLICK PULSE OUT	The LED is lit when pulse generator output is activated
RED	RF IN	The LED is lit during measurements

2 – CISPR PULSE IN: Pulse generator input for CISPR pulses generator for performing tests with pulse 2 and pulse 3 of CISPR 16-1-1 Table 14. See technical note at Section D.12.1 for more information.

3 – CLICK PULSE OUT: Pulse generator output.

To avoid wrong connection of input signals, at the delivery the output connector is closed with a plug showing the warning label: “REMOVE ONLY WHEN USING INTERNAL SIGNAL GENERATOR” (Fig. B.3).



Fig. B.3

4 – RF IN: N-type female 50Ω input connector for LISN connecting purposes.

5 – 10.1” LCD display.

6 – USB interfaces for connecting external keyboard and mouse.



## B.6 • DDA55+ REAR PANEL CONNECTIONS



**Fig. B.5: Rear Panel**

1 – POWER ON/OFF - FUSE, including power-on switch and two 5x20mm, 1 A slow-blow fuses and Socket for power cord (use Class I type only).

2 – PC board with VGA/DVI interfaces, 4 USB ports, 3 audio jacks, 2 PS2-ports for mouse and keyboard, LAN port (RJ-45 connector + Standard Category 5e cross – cable or better) for connecting the instrument to an external PC.

3 – WARNING Labels: Maintain Ground Line to Avoid Electrical Shock & Line Voltage Selector Inside; No User Serviceable Parts Inside; Do Not Remove Covers; Refer Servicing to Trained Personnel; Replace Fuse Only with Fuse of Specified Type and Rating. Recycling Warning; CE marking; Made in Italy statement.

4 – REMOTE CONTROL CONNECTOR for AFJ external devices (e.g. LS16C/10 and LT32C/10).

5 – AFJ Product Label showing equipment Model, Serial Number, rated voltage and frequency of power supply.

6 – EXT. REF. 10MHz IN and OUT (signal amplifier).

7 – COOLING FAN.

**NOTE:** ALWAYS leave sufficient space behind the instrument to allow enough air circulation. Do not cover the ventilation holes. A distance of about 20 cm must be kept between the rear panel of DDA55+ Click Analyser and any wall.



## SECTION C: SYSTEM INSTALLATION

Check the outside of the carton package to assess possible shipping damage: in case of damage, possibly remove the device from the packaging, in presence of the Carrier. Keep the packaging material available for further inspection with the Carrier, in case the damage shows up after unpacking. In case of damage, immediately notify Carrier and local AFJ Distributor or Sales Office, for report. Do not try to install a damaged unit. After checking for device integrity, verify that all items listed and ticked on the CHECK LIST put inside the packaging, are duly present. If not, send immediate report to your vendor. If everything is OK, proceed in the INSTALLATION routine.

### C.1 • PREVENTION AND SAFETY NOTE

The test instrument is SAFETY CLASS I equipment and must be connected to an approved power supply socket, with proper earth wiring. Never interpose an extender cable without earth wire, between the socket and the device. The protection fuses must be replaced exclusively with fuses of the same type, rating and speed specifications.

Any adjustment, maintenance or repair operation on the receiver, implying opening of the case, should possibly be carried out without power: if this turns impossible, such operations should be carried out by an authorized person, well aware of the hazards involved.

The user is sole responsible of undertaking all necessary provisions for the safe usage of the receiver.

Power source check: On the rear panel, you will find a type plate. Please check whether the receiver has been prepared for the correct power line voltage of your public power. If the power supply voltage is different please inform AFJ Instruments or your AFJ representatives.

Connecting the equipment to the power line: please use the supplied power cord for connecting the DDA55+ Click Analyser to your public power supply. The power supply must have an earth safety wire. Please check the earth connection on your power outlet before you connect and turn on DDA55+.

### C.2 • INSTALLATION PROCEDURE

#### C.2.1 • SYSTEM REQUIREMENTS

The DDA55+ Click Analyser receiver incorporates a last generation PC with WINDOWS 10 Embedded OS. Regardless of Click Analyser model and software version selected, a USB-stick is provided. Please contact AFJ Instruments or your local AFJ distributor for information about software updates and upgrades.

The calibration data of the equipment are stored directly on NVM (non-volatile memory) of the DDA55+ Click Analyser, so they do not need to be managed by the user.

For the processing of test data coming from AFJ DDA55+ Click Analyser the minimal system requirements for external PC are:

- PC®- compatible system, with PENTIUM IV® or AMD® processor, 400 MHz or above
- 512 MB-RAM or higher
- 1024 x 768 pixel monitor (suggested)
- LAN port
- OS VERSIONS: Windows 8 (Home Premium, Professional and Ultimate) and Windows 10 (Pro, Enterprise).

## C.2.2 • CONNECTION PROCEDURE

The AFJ DDA55+ Click Analyser needs to be connected to external keyboard and mouse to be ready to operate through 10.1" LCD display (alternatively the connection of an external monitor output (VGA/DVI) is also possible) for stand alone usage (preferred mode), as well a direct connection via LAN-Ethernet to hosting PC, through a Category 5 cross-cable (Cross cable is included in the delivery) as shown in Fig. C.1.

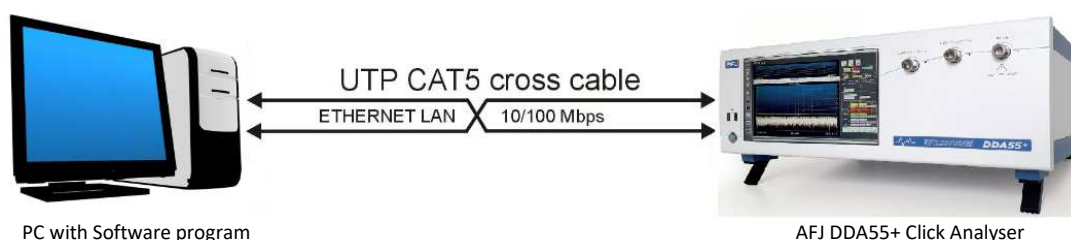


Fig. C.1: DDA55+ Click Analyser connection procedure

### C.2.2.1 • STAND ALONE USAGE

Once connected to external keyboard and mouse for stand alone usage, a working version of the operating software is already installed on the PC integrated in the AFJ DDA55+ Click Analyser. The operating software consists of two parts: the server and the client software. The server software starts automatically by itself at the start-up of the operative system (Fig. C.2):

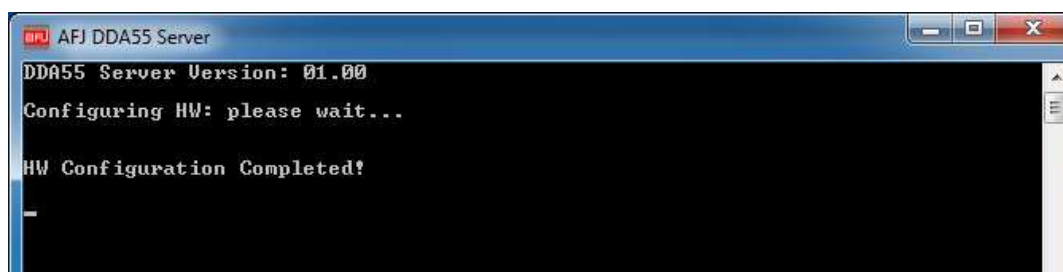


Fig. C.2: DDA55+ Click Analyser system start-up

When the server software has completed the hardware configuration (Fig. C.2), in order to run the DDA55+ client software you have just to start it by double clicking the Click Meter Software CMS blue icon on the Windows desktop or as an alternative, selecting *Start => Programs => Click Meter Software CMS* under the Windows graphic user interface (Fig. C.3).

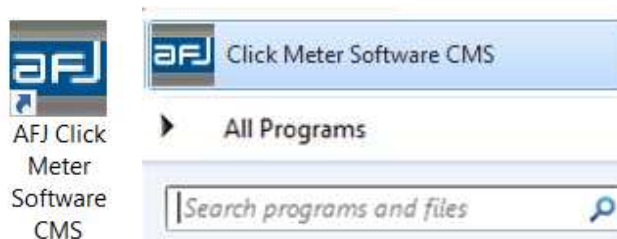
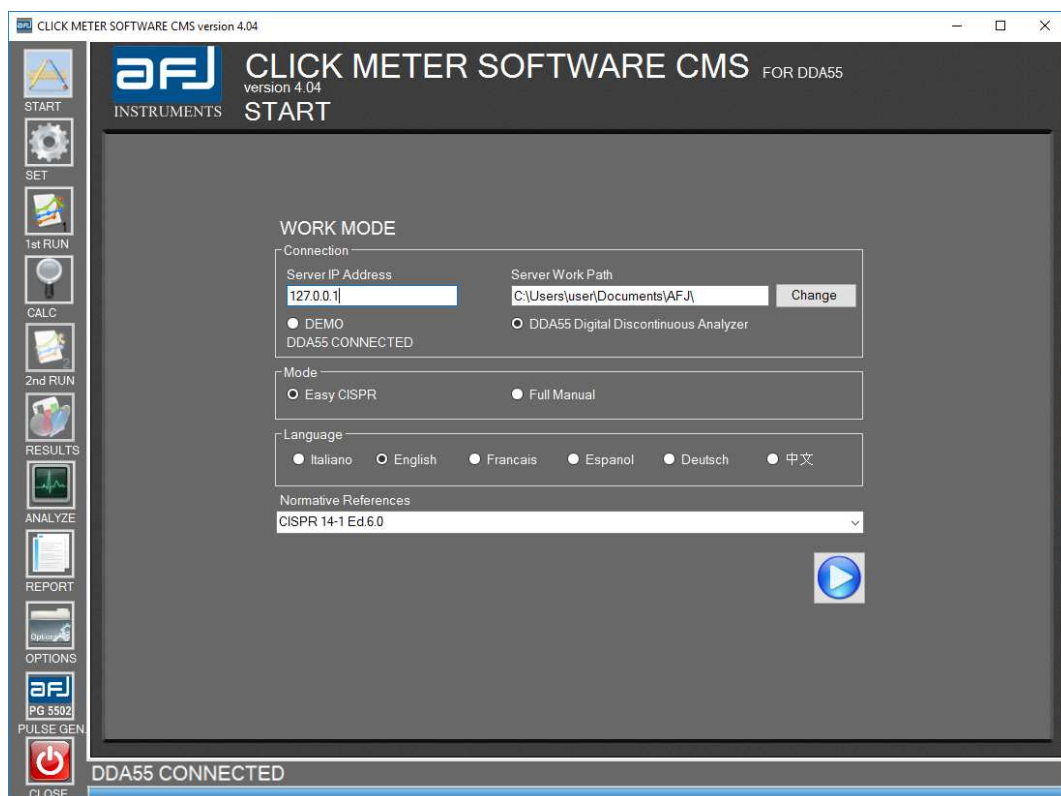


Fig. C.3: Click Meter Software CMS icon

The following software window appears (Fig. C.4):



**Fig. C.4: Click Meter Software CMS start-up**

The “Server IP Address” of AFJ DDA55+ Click Analyser is set by default to “127.0.0.1” and it does not need to be modified by the end user. This address is called “localhost” and it indicates “this equipment”, so it automatically informs the software which unit is controlling (AFJ DDA55+ Click Analyser itself).

The “C:\Users\utente\Documents\AFJ” is the server working directory of the software for all DDA55+ Click Analysers and it shall be introduced on the “Server Work Path” section.

You can now safely run the AFJ DDA55+ software for the first time (refer to next section D).

### C.2.2.2 • REMOTE CONTROL USAGE

In order to install the program to a remote PC with Ethernet port, please follow the next steps:

#### PERFORM THE FOLLOWING STEPS

**STEP 1** - After connecting the Analyser to an appropriately grounded mains, ensure that all the electrically powered devices connected to the DDA55+ in the measurement set-up, be connected to a common ground. Connect the PC power cord to a grounded outlet, too. Connect via LAN-Ethernet the DDA55+ to an external remote control PC through either a UTP Category 5 cross cable or a standard Ethernet LAN 10/100 MB cable.

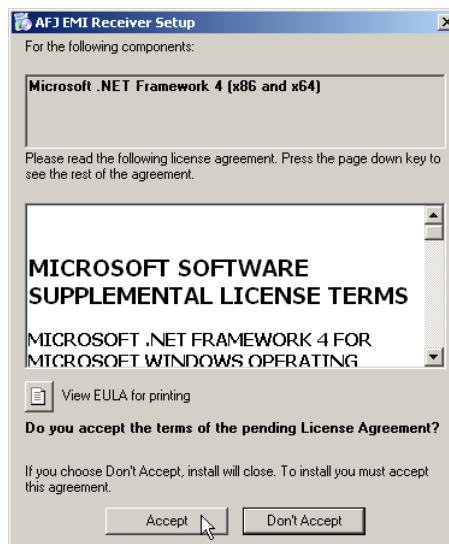
**STEP 2** – If the software is not already installed, insert USB-stick in an USB port, from Windows Explorer locate the “DDA55+ Click Analyser/Operating SW” folder on your AFJ USB-stick and double click on “AFJ\_Click Meter Software CMS\_X.XX” file (Fig. C.5).



**Fig. C.5 – Windows Explorer of AFJ USB-key**

**STEP 3** – AFJ DDA55+ Click Analyser software installation.

Now the Installation Wizard starts automatically: please click “Accept” on next window, as it appears (Fig. C.6).



**Fig. C.6: Installation of .NET Framework 4.0**

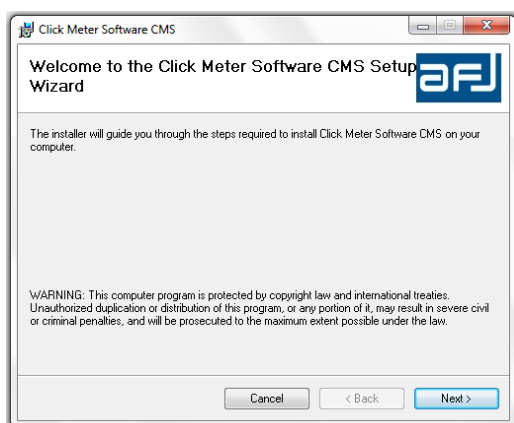
The installation of the last complementary application installs .NET Framework 4.0. Wait until the procedure will forward you to the proper receiver installation, in the next step.

#### STEP 4 – AFJ Click Meter Software CMS installation.

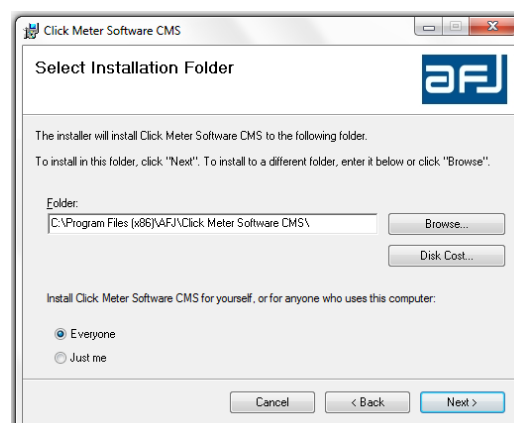
The *Installation Wizard* starts automatically.

On next window (Fig. C.7), to proceed forward click “Next >” (click “Cancel” to exit installation).

On next window (Fig. C.8), you can accept the default parameters or as alternative “Browse...” a different path (or write directly a different folder name) for storing the installation files.



**Fig. C.7: AFJ Click Meter Software CMS Setup Wizard window**



**Fig. C.8: Select Installation Folder window**

Here you can also calculate the necessary disk space by clicking “Disk Cost” (about 31.9 Mb for AFJ Click Meter Software CMS).

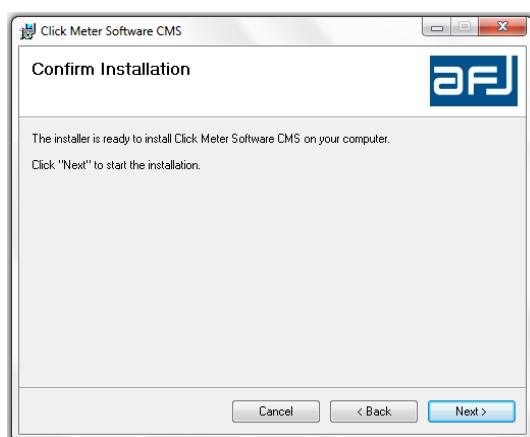
You can install AFJ Click Meter Software CMS for Everyone (all *User Accounts* listed in the *Control Panel*) as suggested, or only for the current user (not recommended).

Now the installer is ready to install AFJ CMS Click Meter Software on your computer.

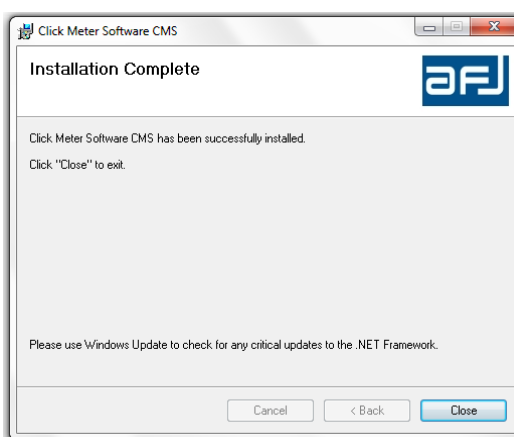
You can also go back to revise previous step by clicking “< Back” (or click “Cancel” to exit installation: this is the last warning).

Please click “Next >” to complete the installation (Fig. C.9).

At the end, the message “Click Meter Software CMS has been successfully installed” appears, The *Installation Complete* window appears (Fig. C.10).



**Fig. C.9: Confirm Installation window**



**Fig. C.10: Installation Complete window**

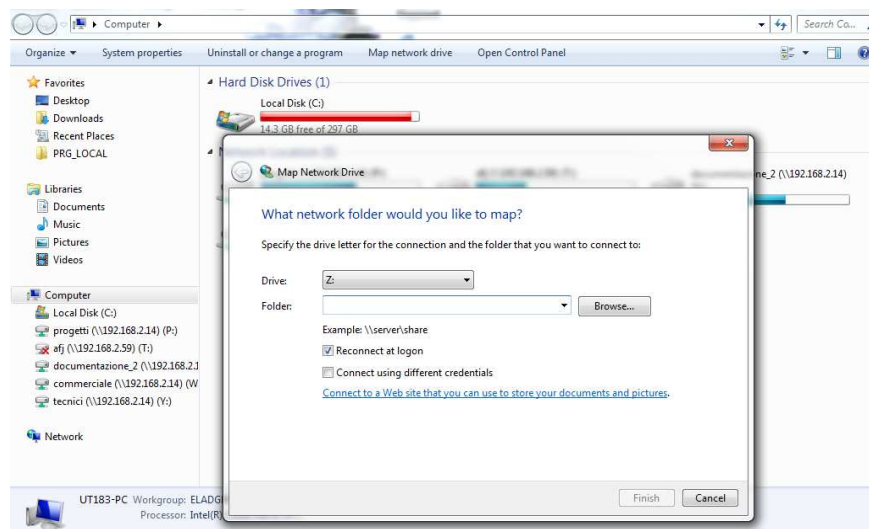
Now click “Close” to exit the installation procedure.

Please use *Windows Update* to check for any critical updates to the .NET Framework, which time to time are released to fix security issues, software bugs, etc.

# STEP 5 – DDA55+ Server Work directory mapping.

Once the installation of AFJ Click Meter Software CMS has completed on the remote control PC, it is necessary the mapping of the shared "C:\Users\utente\Documents\AFJ" DDA55+ Server Work directory on the same PC.

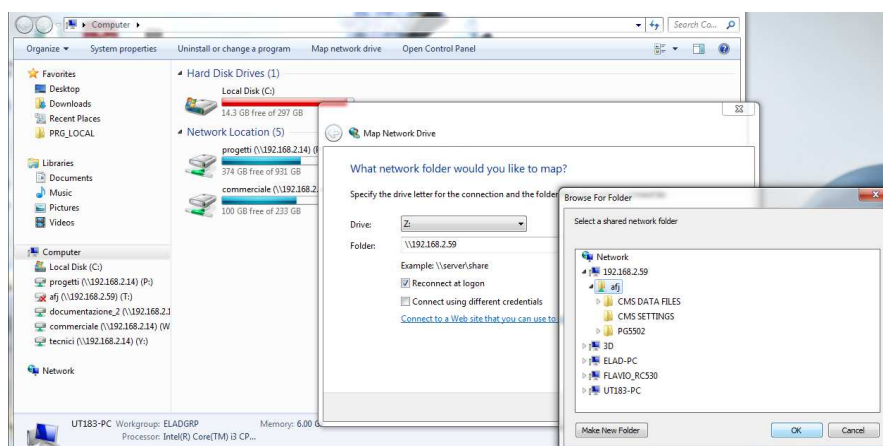
Open "Windows Explorer" on the remote control PC, click on "Computer" icon and then click on "Map network drive" button (Fig. C.11).



**Fig. C.11: Map Network Drive window**

Select the desired "Drive" label (for example "Z") and insert the Server IP Address of the DDA55+ Click Analyser in the "Folder" field (for example "\\192.168.2.59").

Press "Browse..." button, select "AFJ" directory and press "OK" button (Fig. C.12).



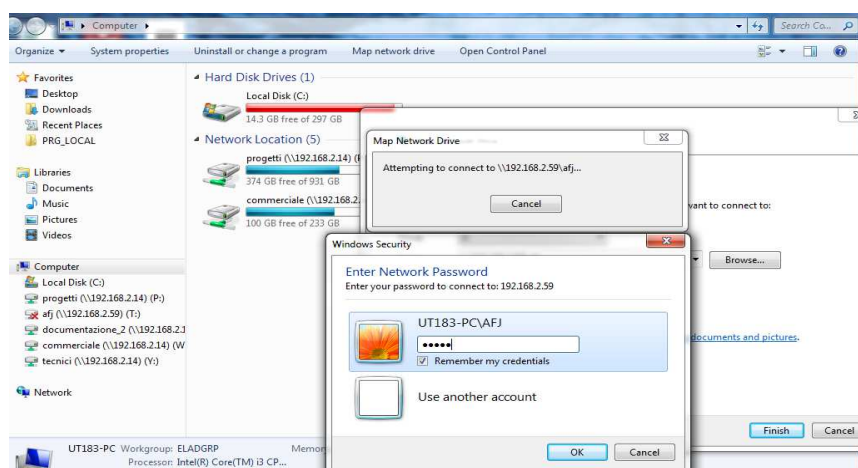
**Fig. C.12: AFJ directory selection**

Insert the following credentials:

- User = "AFJ"

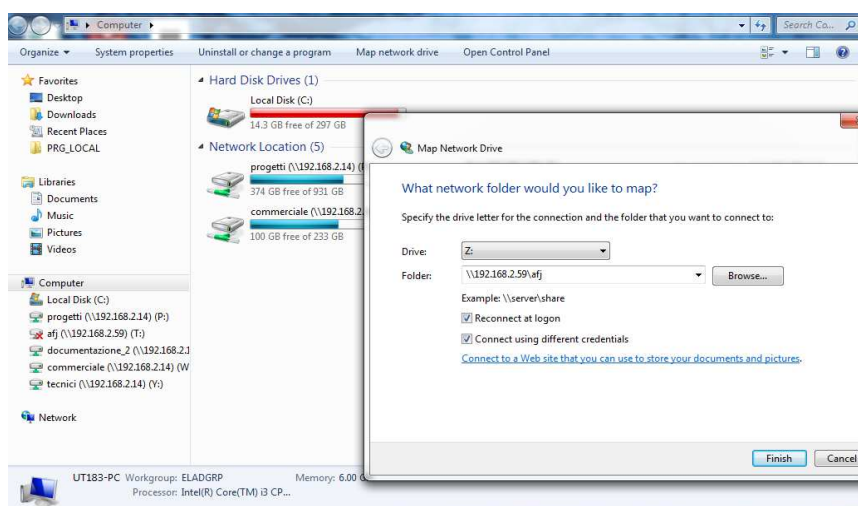
- Password = "DDA55"

Flag "Remember my credentials" and press OK (Fig. C.13).



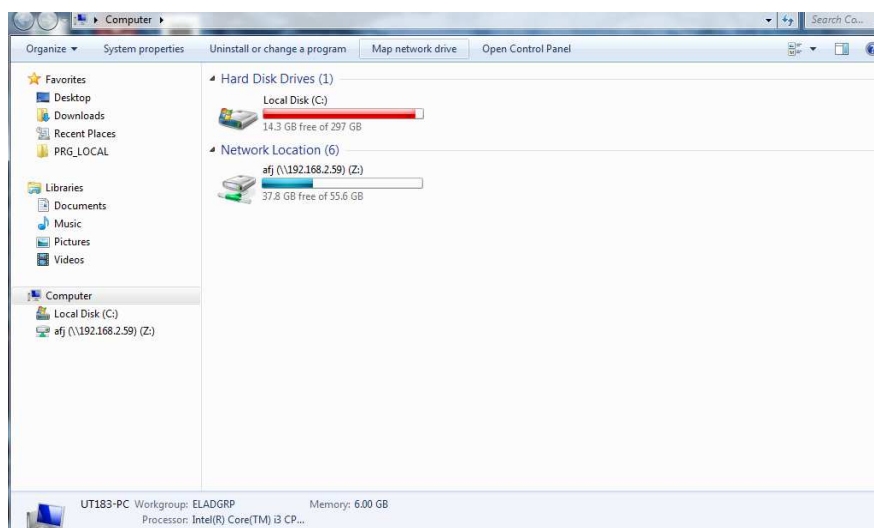
**Fig. C.13: Credentials network confirmation**

Flag "Reconnect at login", "Connect using different credentials" and press Finish (Fig. C.14).



**Fig. C.14: End of the procedure**

Now you can see on the remote control PC the new network "Z:" mapped to the DDA55+ Server Work directory (Fig. C.15).



**Fig. C.15: Network mapped to DDA55+ Server Work directory**



Run the AFJ Click Meter Software CMS on the remote control PC and set the following parameters (Fig. C.16):

- Server IP Address -> IP of the DDA55+ Machine (for example “192.168.2.59”);
- Server Work Path -> the network drive we have mapped in the previous steps (for example “Z”).

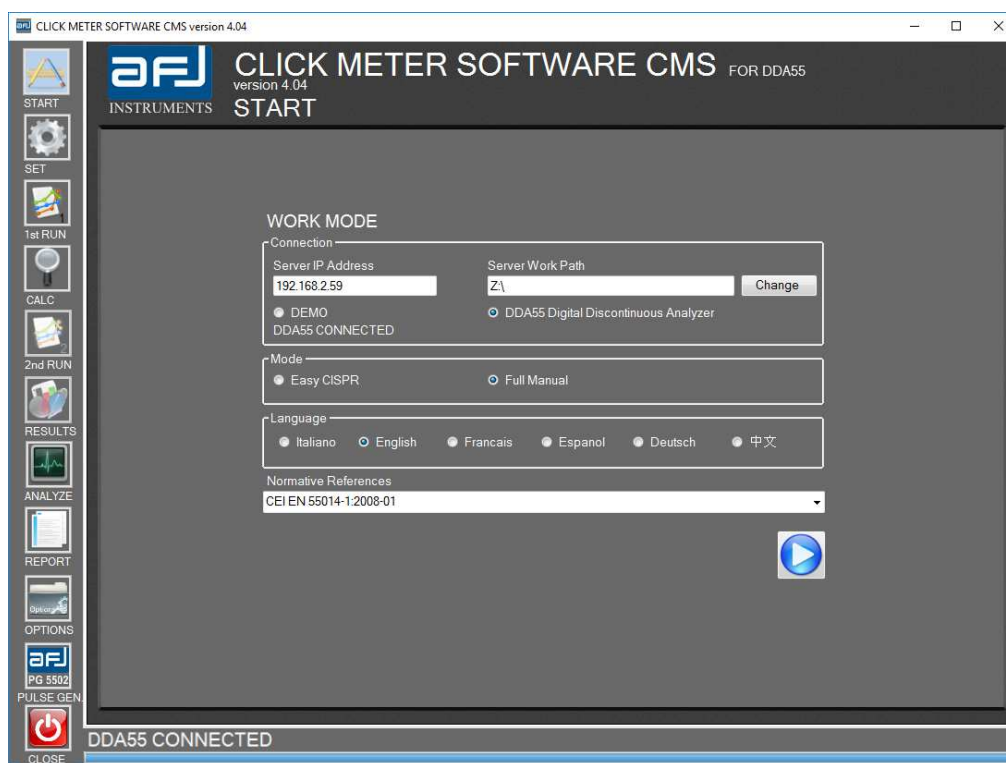


Fig. C.16: AFJ Click Meter Software CMS settings

**NOTE:** When DDA55+ Click Analyser is connected via LAN cable (either cross or standard), it is normal to receive a Limited or no connectivity warning: anyhow the communication between PC and equipment is active and running properly (Fig. C.17).



Fig. C.17: Limited or no connectivity warning indication

You can now safely run the AFJ DDA55+ software for the first time (refer to next section D).



## SECTION D: OPERATING INSTRUCTIONS

### D.1 • START OF THE APPLICATION

Once the installation procedure has been successfully completed, the start of the application will result from the following sequence.

You can find a link to the AFJ Click analyser Software CMS directly as a Windows Desktop *icon* or as an alternative, selecting *Start => Programs => Click Meter Software CMS* under the Windows graphic user interface (Fig. D.1):



Fig. D.1: Starting the AFJ DDA55+ application

When the program is loaded, the MAIN COCKPIT window appears (Fig. D.2):

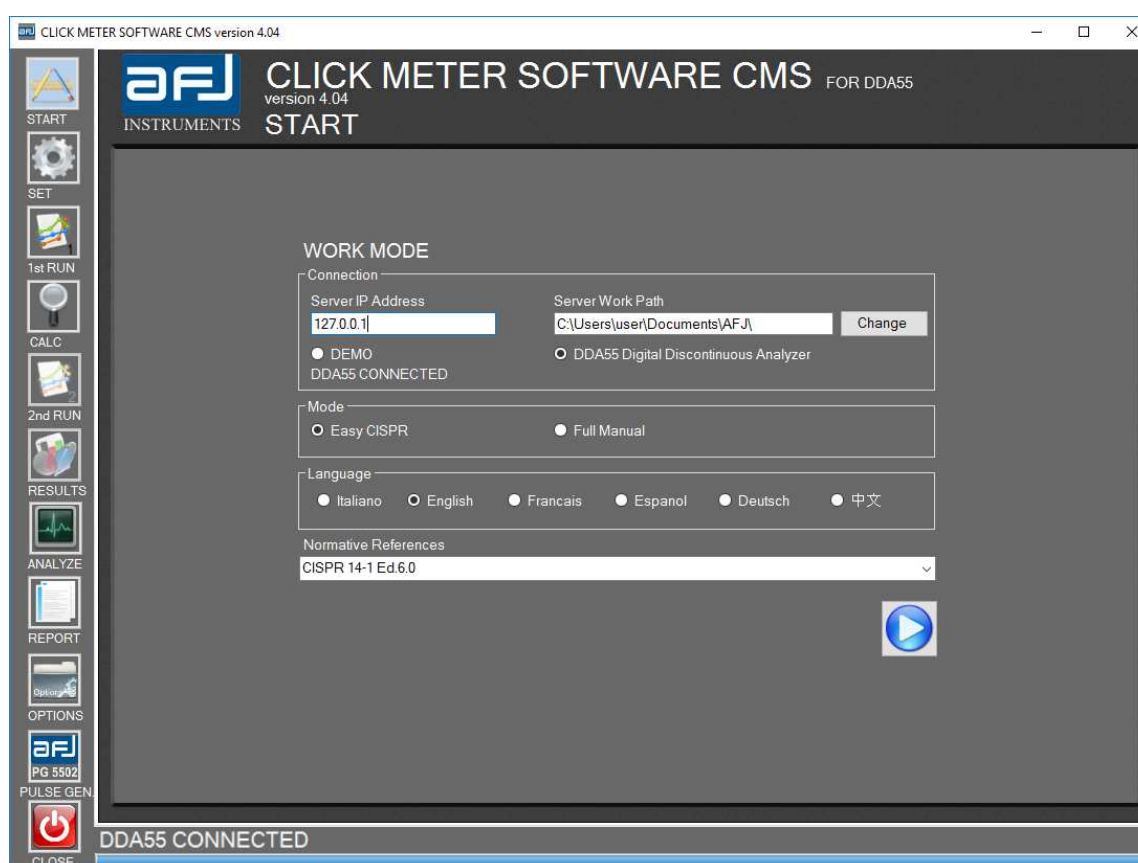
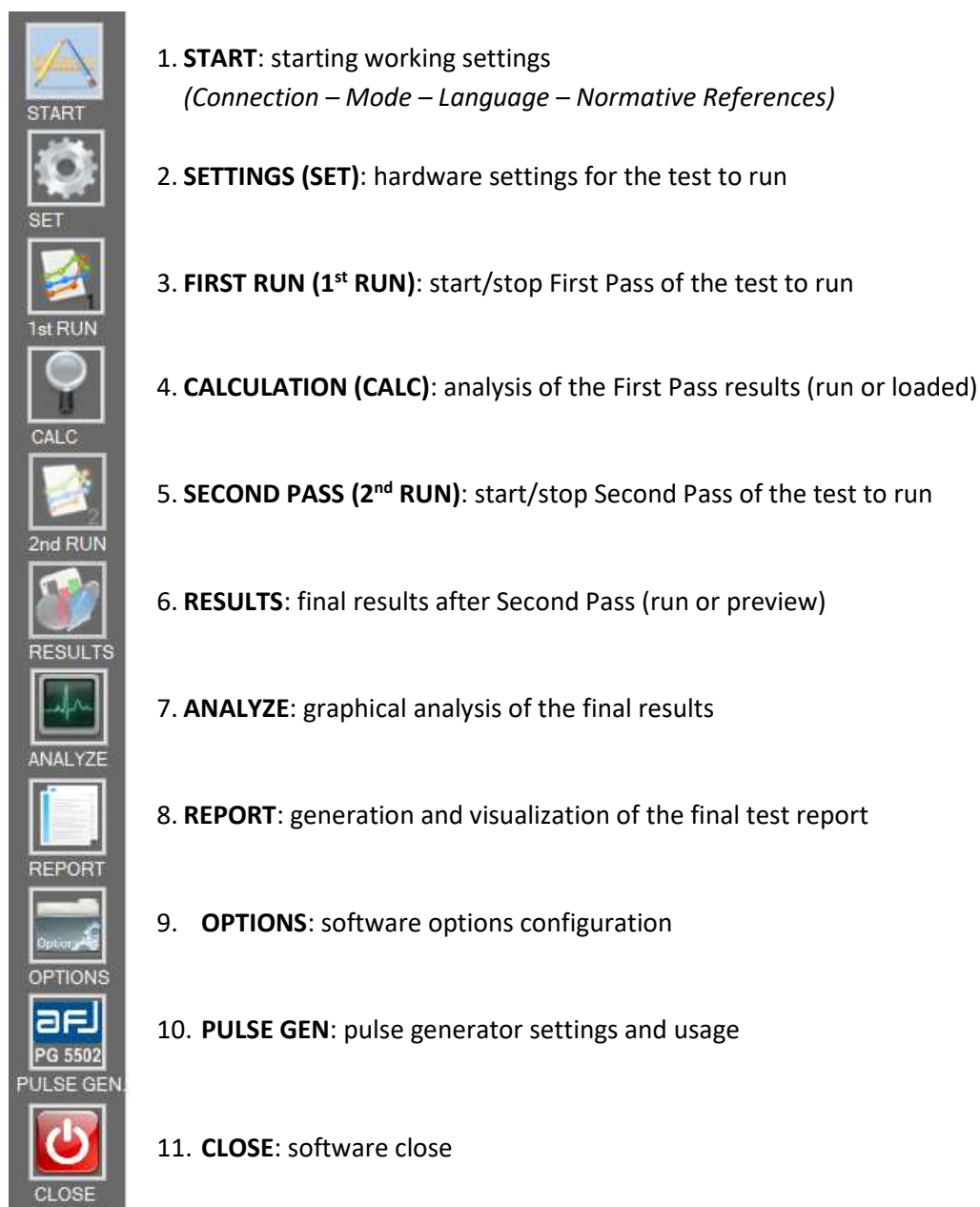


Fig. D.2: MAIN COCKPIT window

The picture above refers to the DDA55+ stand alone usage. The functions of the software are the same when the equipment is used with a remote control PC.

The software is organized with the following pages (Fig. D.3):



**Fig. D.3: Software organization window**

## D.2 • START

The START page (Fig. D.4) is accessed by pressing the START button on the left side of the MAIN COCKPIT window (Fig.D.2) and it is organized in the following way:

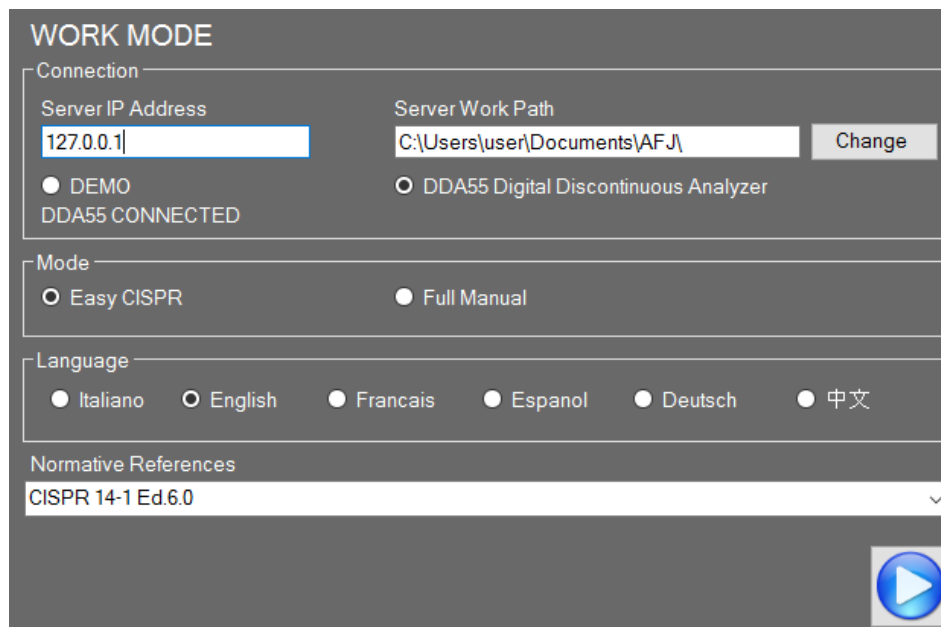


Fig. D.4: START page

### D.2.1 • Connection

After turning on, the equipment is automatically connected to the Server IP address “127.0.0.1” and to the Server Work Path “C:\Users\utente\Documents\AFJ” and so the software runs on DDA55+ Digital Discontinuous Analyzer mode directly and this configuration appears on the START page where it is possible to select two different modes to operate: DEMO and DDA55+ Digital Discontinuous Analyzer (Fig. D.5).



Fig. D.5: Connection mode selection window

In this case the software shows the DDA55+ CONNECTED message to indicate that the equipment is properly connected and recognized by PC.

### D.2.2 • Mode

It is possible to select between two different working modes: *Easy CISPR* mode and *Full Manual* mode (Fig. D.6).



Fig. D.6: Working mode selection window

Selecting *Easy CISPR* mode, the software will load in the SETTINGS page the limits according to the standard and it will not allow any modification. Selecting a type of EUT requiring the calculation of the N click rate from the number of switching operations, the f factor will be automatically set (see chapter D.3.1. for detailed information). The internal attenuators will be set by default to 20dB for each channel and limited modification will be allowed according to the set value of the external attenuator after checking the dynamic range.

All these restrictions are not applied selecting *Full Manual* mode, where the end user can set the software according to his specific needs.

### D.2.3 • Language

It is possible to select the language of the software and the reference standard for the measurements (Fig. D.7).

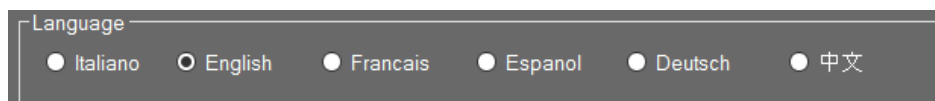


Fig. D.7: Language selection window

### D.2.4 • Normative References

Selection of the reference standard for the measurements among the previous CISPR 14-1 Ed. 5.2, the last CISPR 14-1 Ed. 6.0 and the next CISPR 14-1 Ed. 7.0 (Fig. D.8).



Fig. D.8: Standard selection window

Push GO to access to the next page.

## D.3 • SETTINGS

The SETTINGS page is accessed by pressing the SET button on the left side of the MAIN COCKPIT window (Fig. D.2) and it allows to set all the hardware parameters of the device for a new measurement.

### D.3.1 • CISPR 14-1 ED. 6.0

Selecting CISPR 14-1 Ed. 6.0 standard, the following SETTINGS page appear (Fig. D.9):

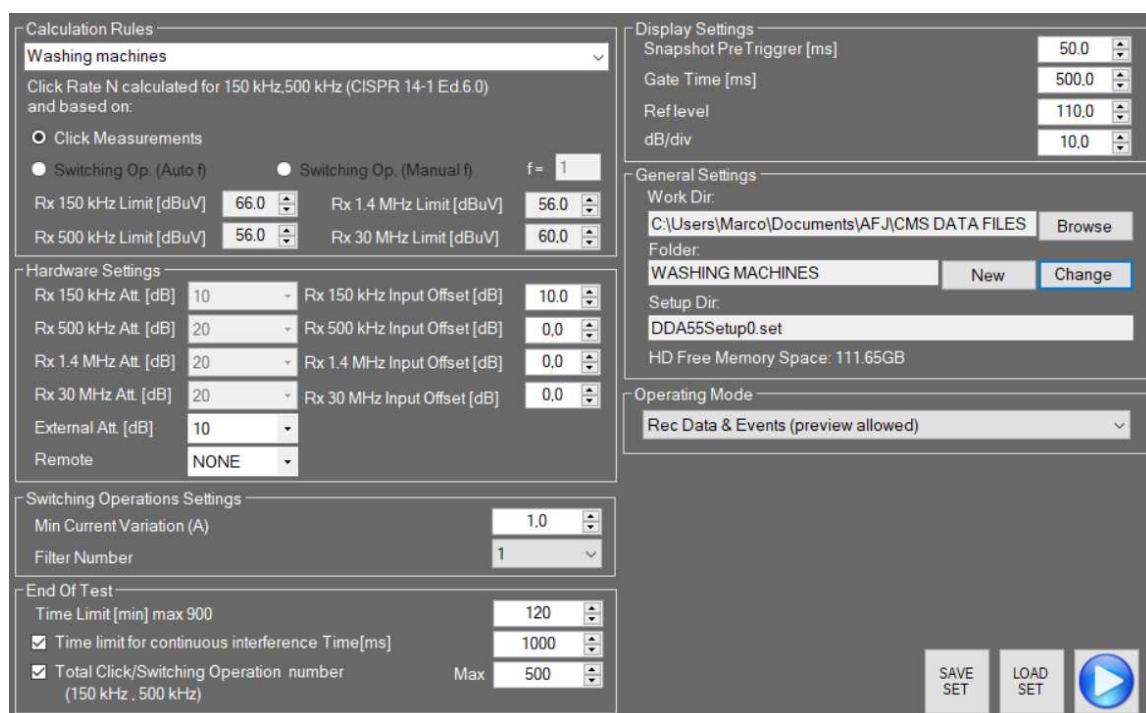


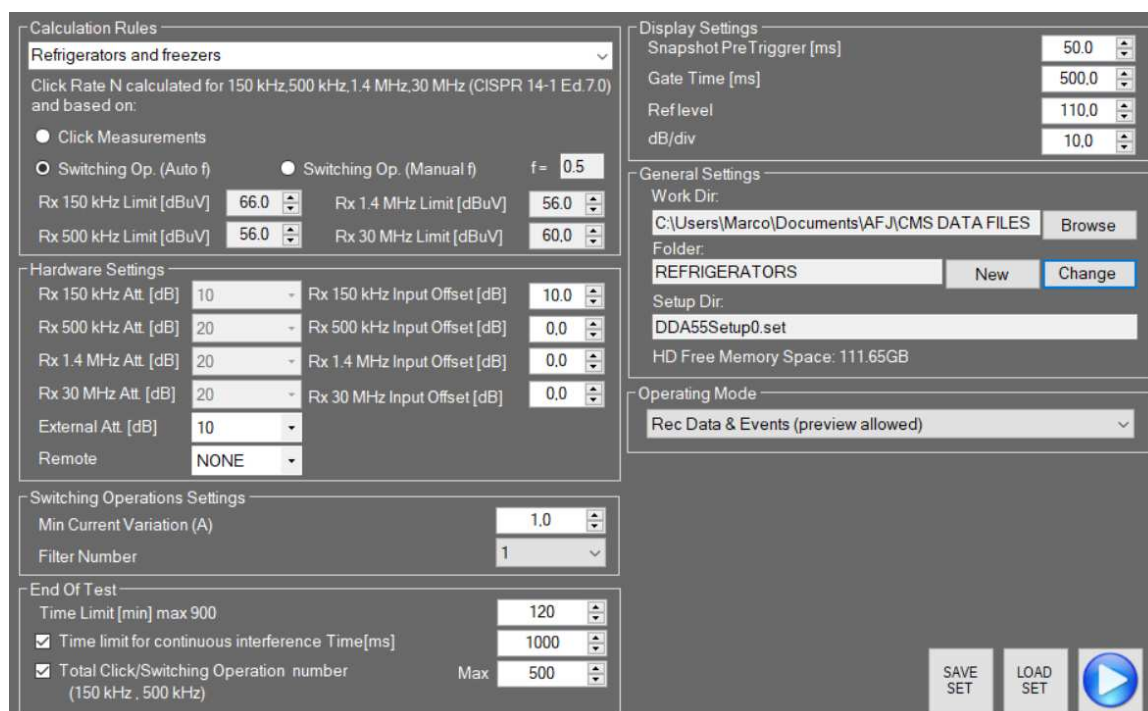
Fig. D.9: SETTINGS page for CISPR 14-1 Ed. 6.0

According to Sub Clause 5.4.2.2b of CISPR 14-1 Ed. 6.0 standard, the click rate N shall be determined at 150 kHz and 500 kHz. The click rate determined at 500 kHz shall also be used for the analysis at 1,4 MHz and 30 MHz (See Chapter A.2.3.1 for detailed information).

The values of all hardware parameters are saved into the *setup.set* file. By default it is present the *Setup0.set* file, anyhow it is possible to create, save and load many Setup files. See Chapter D.3.5.2 for detailed information.

### D.3.2 • CISPR 14-1 ED. 7.0

Selecting CISPR 14-1 Ed. 7.0 standard, the following SETTINGS page appear (Fig. D.10):



**Calculation Rules**  
 Refrigerators and freezers  
 Click Rate N calculated for 150 kHz, 500 kHz, 1.4 MHz, 30 MHz (CISPR 14-1 Ed. 7.0) and based on:  
☒ Click Measurements  
☐ Switching Op. (Auto f) ☐ Switching Op. (Manual f) f = 0.5  
 Rx 150 kHz Limit [dBuV] 66.0 Rx 1.4 MHz Limit [dBuV] 56.0  
 Rx 500 kHz Limit [dBuV] 56.0 Rx 30 MHz Limit [dBuV] 60.0

**Display Settings**  
 Snapshot Pre Trigger [ms] 50.0  
 Gate Time [ms] 500.0  
 Ref level 110.0  
 dB/div 10.0

**General Settings**  
 Work Dir: C:\Users\Marco\Documents\AFJ\CMS DATA FILES Browse  
 Folder: REFRIGERATORS New Change  
 Setup Dir: DDA55Setup0.set  
 HD Free Memory Space: 111.65GB

**Hardware Settings**  
 Rx 150 kHz Att. [dB] 10 Rx 150 kHz Input Offset [dB] 10.0  
 Rx 500 kHz Att. [dB] 20 Rx 500 kHz Input Offset [dB] 0.0  
 Rx 1.4 MHz Att. [dB] 20 Rx 1.4 MHz Input Offset [dB] 0.0  
 Rx 30 MHz Att. [dB] 20 Rx 30 MHz Input Offset [dB] 0.0  
 External Att. [dB] 10  
 Remote NONE

**Switching Operations Settings**  
 Min Current Variation (A) 1.0  
 Filter Number 1

**End Of Test**  
 Time Limit [min] max 900 120  
☒ Time limit for continuous interference Time [ms] 1000  
☒ Total Click/Switching Operation number Max 500 (150 kHz, 500 kHz)

SAVE SET LOAD SET

Fig. D.10: SETTINGS page for CISPR 14-1 Ed. 7.0

According to Sub Clause 5.4.2.3 of CISPR 14-1 Ed. 7.0 standard, the click rate N shall be calculated separately for each of the four frequencies specified in Sub Clause 5.4.2.1 (150 kHz, 500 kHz, 1,4 MHz, 30 MHz) using the observation time(s) determined according to Sub Clause 5.4.2.2 (See Chapter A.2.3.2 for detailed information).

The values of all hardware parameters are saved into the *setup.set* file. By default it is present the *Setup0.set* file, anyhow it is possible to create, save and load many Setup files. See Chapter D.3.5.2 for detailed information.

### D.3.3 • CALCULATION RULES

For each selected standard (either CISPR 14-1 Ed. 6.0 or CISPR 14-1 Ed. 7.0), before measuring it is possible to set the calculations rules to follow selecting the type of EUT from the list (Fig. D.11), specifying if the calculation of the N click rate is determined either from the number of clicks (Click Measurement checkbox) (Fig. D.12) or from the number of switching operations (Switching Op. (Auto f) checkbox for automatic setting of the f factor; Switching Op. (Manual f) checkbox for manual setting of the f factor when using DENAN OPTIONS) (Fig. D.13).

If Switching Op. (Auto f) checkbox is flag, the software will consider the f factor of the selected EUT during calculation.

If the *Easy CISPR* mode is selected, selecting a type of EUT requiring the calculation of the N click rate from the number of switching operations the f factor will be automatically set.

For each of the four channels the IF threshold limit in dB $\mu$ V, that must be exceeded to detect a signal, can be set (i.e. Rx 150 kHz Limit [dB $\mu$ V]).

If the *Easy CISPR* mode is selected, the limits will be automatically set to the values defined into the standard and it will not be possible to modify them.

If the *Full Manual* mode is selected the limits can be manually set by the operator according to his needs.

It is possible to create a First Pass Preview (Simulation) just setting the calculation of the N click rate from the number of switching operations. See Chapter D.3.5.2 for detailed information.

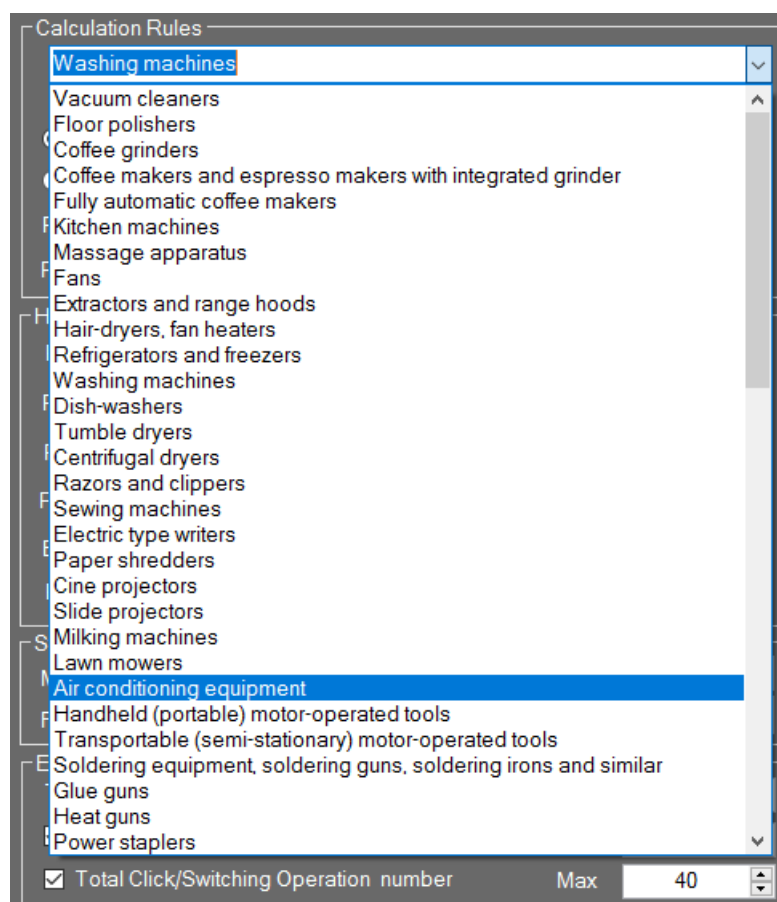
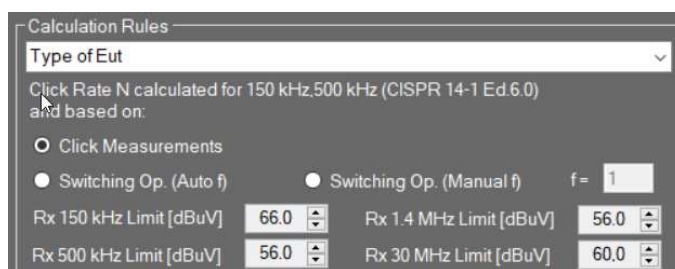
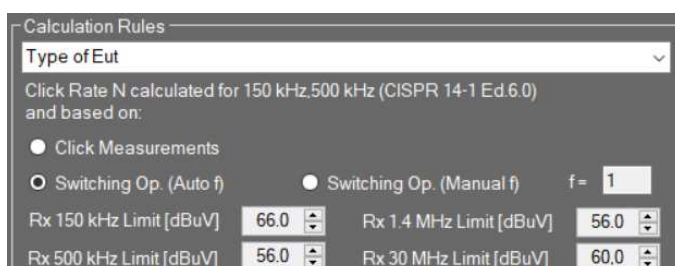


Fig. D.11: EUT selection window



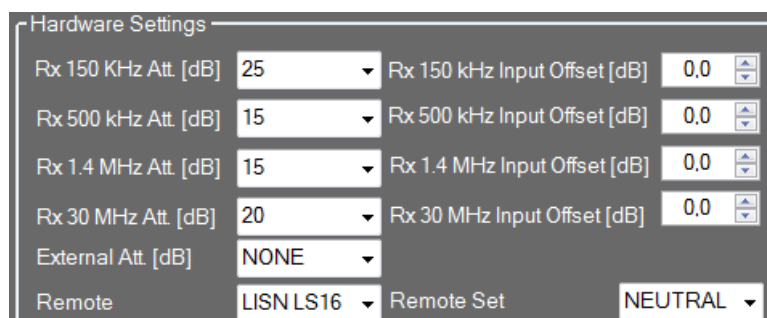
**Fig. D.12: Calculation Rules window from the number of clicks**



**Fig. D.13: Calculation Rules window from the number of switching operations**

### D.3.4 • HARDWARE SETTINGS

The internal attenuation level can be set for each channel (i.e. Rx 150 kHz Att. [dB]) (Fig. D.14). This means that, if a value of 20dB is selected for a channel, a hardware attenuator of 20dB is set at the input of each channel, and the software keeps account of such value during the display.



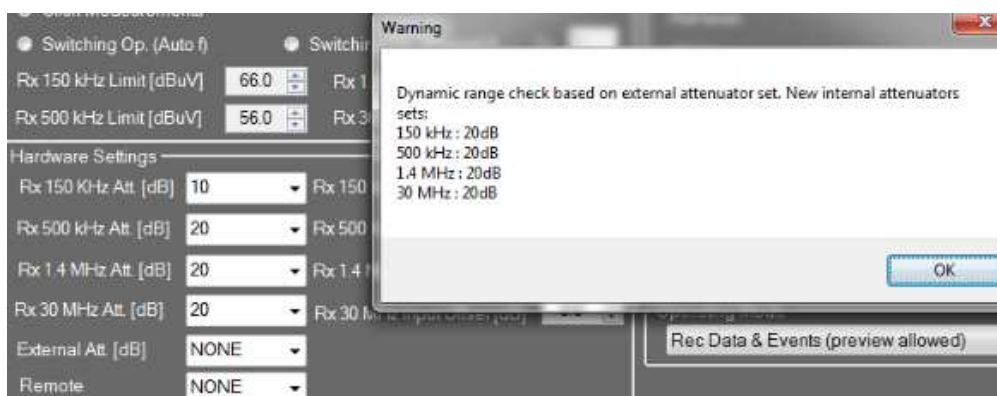
**Fig. D.14: Hardware Settings window**

If the *Easy CISPR* mode is selected, the value of internal attenuation level for each channel will be automatically set by default to 20dB and limited modification will be allowed according to the set value of the external attenuator to guarantee the proper the dynamic range: this will allow to work in the linear zone of each channel and then to get correct measurements, avoiding possible saturations of the input stage of the equipment and so to get wrong results.

For example if the value of the external attenuator is set to 0dB (NONE), the value of the internal attenuation level for each channel can be set either to 20dB or to 30dB; if the value of the external attenuator is set to 10dB, the value of the internal attenuation level for each channel can be set either to 10dB or to 20dB. In case of wrong settings the software will automatically set the value of the internal attenuation level for each channel to guarantee the proper dynamic range.

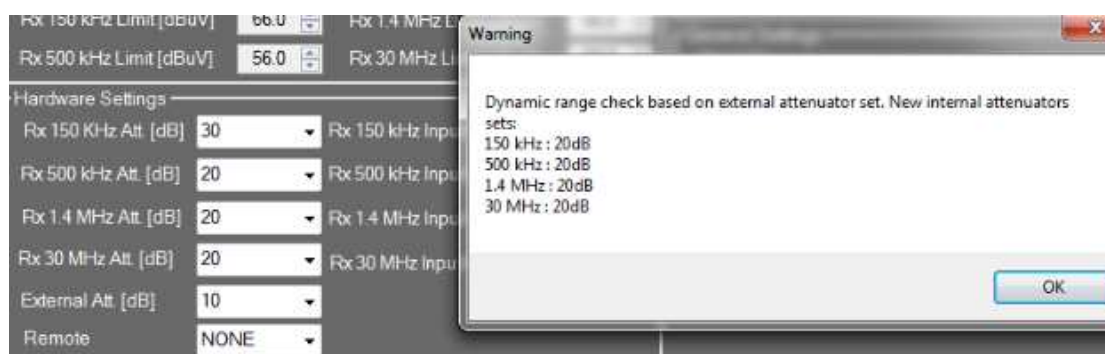
In Fig. D.15 the value of the external attenuator is set to 0dB (NONE) and if the operator sets the value of the internal attenuation level for the 150kHz channel to 10dB, before starting the measurement the software automatically gives a warning message with the automatic setting of that internal attenuation level to 20dB.





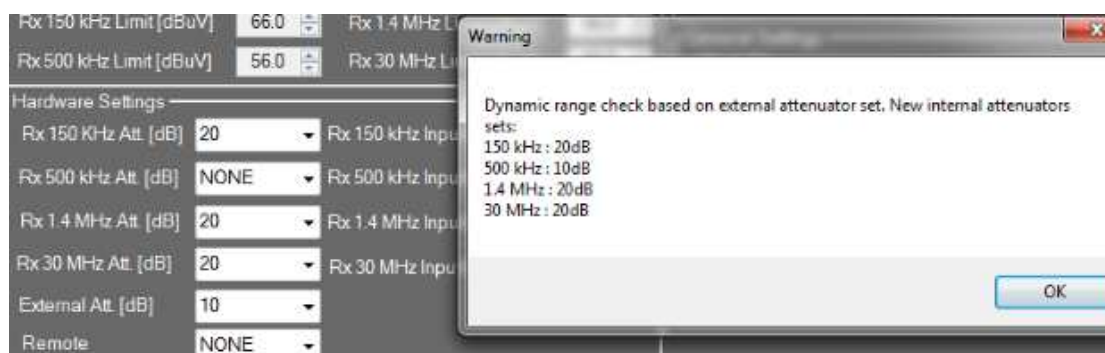
**Fig. D.15: Example of automatic settings of internal attenuation levels with Easy CISPR mode**

In Fig. D.16 the value of the external attenuator is set to 10dB and if the operator sets the value of the internal attenuation level for the 150kHz channel to 30dB, before starting the measurement the software automatically gives a warning message with the automatic setting of that internal attenuation level to 20dB.



**Fig. D.16: Example of automatic settings of internal attenuation levels with Easy CISPR mode**

In Fig. D.17 the value of the external attenuator is set to 10dB and if the operator sets the value of the internal attenuation level for the 500kHz channel to NONE (0dB), before starting the measurement the software automatically gives a warning message with the automatic setting of that internal attenuation level to 10dB.



**Fig. D.17: Example of automatic settings of internal attenuation levels with Easy CISPR mode**

If the *Full Manual* mode is selected, the value of internal attenuation level for each channel can be manually set by the operator and the software does not give any warning message with any automatic setting.



In case the signal at the input of the equipment should not exactly match the actual value of the disturbance (e.g.: IF output of an EMI receiver), an offset value can be set for each channel, in order to equalize the two readings (i.e. Rx 150 kHz Input Offset [dB]).

The purpose of the External Att. [dB] is to correct the displayed value in case an attenuator is placed between the disturbance source and DDA55+. It works in a way similar to that of an OFFSET, but the attenuation value is fixed.

With Remote it is possible to select the appropriate AFJ remote device model:

- LS16C/10 and LT32C/10 LISNs;
- SW04/32 and SW04/100 Switching Boxes.

When the appropriate remote device model is selected, the remote settings key is made available. Click on it to open phase selection window (Fig. D.18).

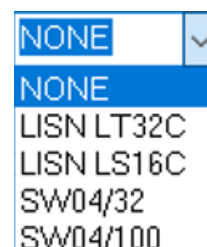


Fig. D.18: Phase selection window

### D.3.5 • SWITCHING OPERATIONS SETTINGS

The Switching Operation Settings box (Fig. D.19) allows to set the parameters necessary for the detection of the number of the EUT switching operations.



Fig. D.19: Switching Operation Settings window

- The **Min Current Variation (A)** allows to set the minimum value of the EUT current variation suitable for the detection of a switching operation;
- The **Filter Number** allows to select the digital filter for the detection of a switching operation. This number is set by default to 1 with reference to the actual filter designed on the equipment. The future introduction of new filters will allow to increase the list of the selectable filters.

### D.3.6 • END OF THE TEST

The End Of The Test parameters (Fig. D.20) can also be set. Therefore, the operator can decide how the automatic stop of the test can be programmed:

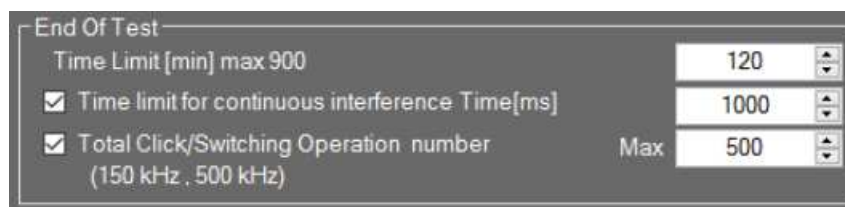


Fig. D.20: End Of The Test window

- By the time limit in minutes: Time Limit (min);
- If the continuous disturbances exceed a set time value: Time Limit For Continuous Interference Time (ms);
- If a set maximum number of clicks / switching operations are reached either at 150kHz or at 500kHz: Total Click / Switching Operation number (150 kHz, 500 kHz).

**NOTE:** the automatic stop of the test is possible reaching the maximum number of switching operations if the calculation of the N click rate is determined from the number of switching operations (Switching Op. (Auto f) checkbox for automatic setting of the f factor; Switching Op. (Manual f) checkbox for manual setting of the f factor when using DENAN OPTIONS) (Fig. D.13). If the *Easy CISPR* mode is selected, selecting a type of EUT requiring the calculation of the N click rate from the number of switching operations the f factor will be automatically set. If the test stops because the maximum number of clicks is reached, the following warning message will appear, indicating that the parameters of Switching Operations Settings box (Fig. D.19) need to be adjusted:

*Warning. Sw. Op selected: Automatic stop, Tot clicks RX1>MAX*

### D.3.7 • DISPLAY SETTINGS

The Display Settings box (Fig. D.21) allows to set the real time display for each channel on the FIRST RUN and SECOND RUN pages.

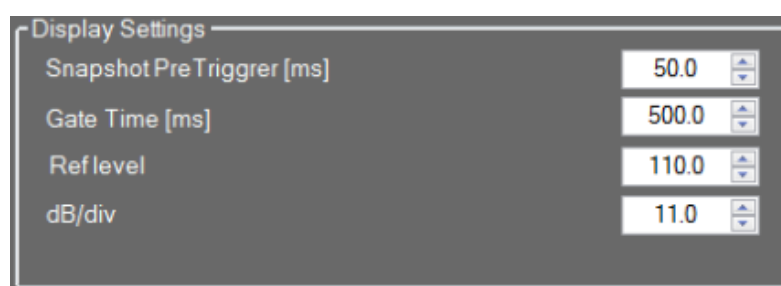


Fig. D.21: Display Settings window

- Snapshot Pre Trigger (ms): it defines into the snapshot the time before the discontinuous disturbance to check the measurement before the discontinuous disturbance itself;
- Gate Time (ms): it defines the refresh time for Peak and Quasi Peak detectors during measurement (similar to dwell time for EMI receiver);
- Ref level: definition of the maximum reference level;
- dB/div: number of dB per division.

### D.3.8 • GENERAL SETTINGS

At the first turning on, the software will ask for setting the working directory (Fig. D.22). By default the “C:\Users\utente\Documents\AFJ\CMS DATA FILES” working directory will be created, including all the subfolders defined by the operator for the different tests (Fig. D.23).

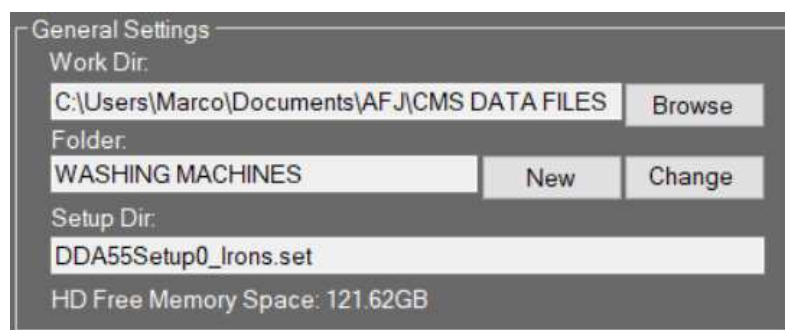


Fig. D.22: General Settings window



Fig. D.23: Folder of the Tests

Selecting **New** button the operator can create a new subfolder (Fig. D.24).

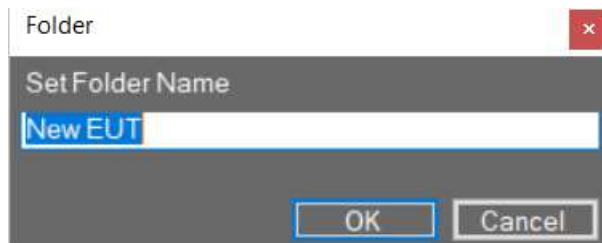


Fig. D.24: New Folder Creation

The new subfolder will be added to the list of the existing subfolders that can be selected pushing **Change** button (Fig. D.25).



Fig. D.25: Existing Folders Selection

Each subfolder created by the operator includes all the “Test\_n” subfolders for the different tests. An automatic “n” counter test will be always set and added at the end of the name of the created subfolder. This counter is saved on the *Default.xml* configuration file and it will be increased any time a new measurement is performed (file saved on the “C:\Users\utente\Documents\AFJ\CMS SETTINGS” folder).

The counter will be increased just at the First Pass running. For any running test there will be just one First Pass and many Second Pass, further te Second Pass Preview (Simulation).

It is possible to create a First Pass Preview (Simulation) selecting the calculation of the N click rate from the number of switching operations on Calculation Rules window (Fig. D.13): in this case at the selection of FIRST RUN page the software will asked for performing either a real measurement or a simulated pass (Calculation of N click rate in manual mode or not) (Fig. D.26).

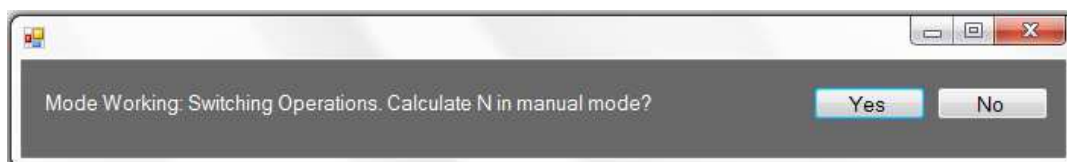
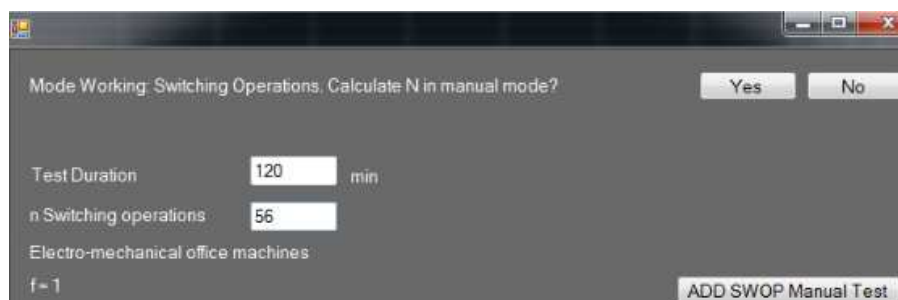


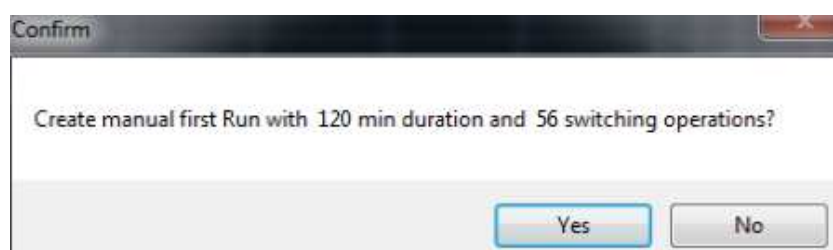
Fig. D.26: First Pass Preview selection window

For creating a First Pass Preview the software will ask for setting the two necessary parameters to calculate the N click rate: the measurement duration and the number of switching operations (Fig. D.27).



**Fig. D.27: First Pass Preview parameters settings window**

After parameters settings, the confirmation of those values is given pushing ADD SWOP Manual Test button. The following First Pass Preview confirmation message appears (Fig. D.28):



**Fig. D.28: First Pass Preview confirmation message**

Proceeding in this way the software will create a new “\1stSwop\_Manual” folder including the created xml files of the First Pass Preview.

For each test it will be always possible to have a single First Pass either simulated or real: on the software it will be possible to recognize if the loaded First Pass is either simulated or real from a label with either “Manual sw. op. 1st Pass” or “Click 1st Pass” indication located at the upper right side on the form of the measurement results (First Run box in CALCULATION page) (Fig. D.36 or D.37).

The Second Pass Preview will not be possible in case of First Pass Preview and if this one gave the value of  $N \geq 30$  the software will give a FAIL on the test and it will ask for a real first pass.

Inside the working directory the end user will find either “\1st” or “\1stSwop\_Manual” folder for the first pass, “\preview” folder for the Second Pass Preview if required, “\2nd” folder for the last performed second pass and the possible “\2nd\_oldn” folders for the past performed second pass.

It is possible to load a previous test selecting it through the “Load Test” button present on the CALCULATION page and choosing the main directory of the test (with inside the “\1st”, “\2nd”... subfolders). This operation will not affect and modify the working directory sets on the SETTINGS page.

The text files with the main information of the performed tests are inside on the xml files like “TEST1RX0.xml”, “TEST1RX1.xml”, “TEST1RX2.xml” and “TEST1RX3.xml”.

Setup Dir: shows the current setup file.

To save it the SAVE SET button must be selected (the software will ask for the confirmation of the name and of the saving “C:\ Users\utente\Documents \AFJ\CMS SETTINGS” folder).

In case of selection of a wrong saving folder, the software will ask for choosing the same saving “C:\ Users\utente\Documents \AFJ\CMS SETTINGS” folder.

To load a stored setup the LOAD SET button must be selected (in this case the software will give the possibility to browse the hard disk for searching the correct folder and file).

### D.3.9 • OPERATING MODE

The Operating Mode box (Fig. D.29) allows to set the different modes to operate during measurements.

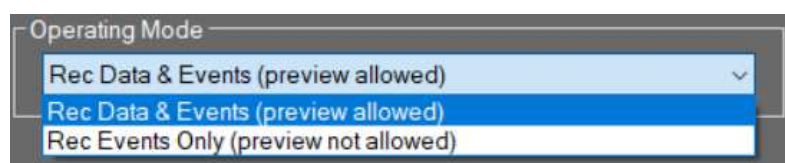


Fig. D.29: Operating Mode window

#### D.3.9.1 • REC DATA & EVENTS

This is the standard operating mode to operate that allows to record during measurement all the data and all the events. The results saved with this operating mode allow:

- to display on the ANALYZE window (see Chapter D.8 for detailed information) the waveforms of the detectors and the current absorbed by the EUT for each event on the four channels;
- the Second Pass Preview (see Chapters D.6 and D.7 for detailed information).

When using this operating mode the maximum time limit in minutes (Time Limit (min)) that can be set is 120 minutes (Fig. D.30).

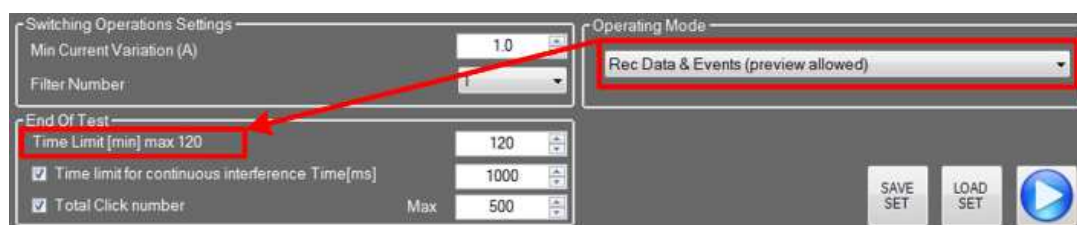


Fig. D.30: Rec Data & Events Operating Mode

### D.3.9.2 • REC EVENTS ONLY

This operating mode allows to record during measurement the events log only. The results saved with this operating mode allow to display on the ANALYZE window (see Chapter D.8 for detailed information) the recorder events only (the display of the waveforms and the Second pass Preview are not allowed).

When using this operating mode the maximum time limit in minutes (Time Limit (min)) can be extended to 1440 minutes (24 hours) (Fig. D.31).

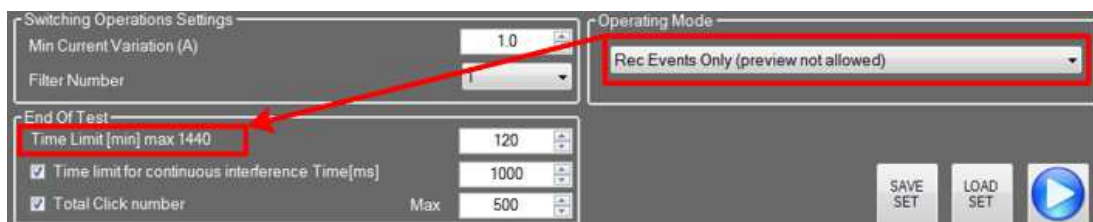


Fig. D.31: Rec Events Only Operating Mode

Push GO to access to the next page.

### D.3.10 • DENAN OPTIONS

The Denan Options box (Fig. D.32) allow to perform measurements fully compliant to DENAN LAW Part. 10 Emission Japanese standard with the evaluation of Extra Long Clicks and Denan Rules where these options are activated.

See Chapter D.11 for detailed information.



Fig. D.32: Denan Options box

### D.3.11 • RX1 FREQUENCY SETTING (VCCI OPTION)

The Rx1 Frequency Setting box (Fig. D.33) allows to perform measurements fully compliant to VCCI Emission Japanese standard using DDA55+ where this option is activated.

This standard defines four measurement frequencies: 150kHz, 550kHz (instead of 500kHz), 1.4MHz and 30MHz. For measuring including the 550kHz frequency, it is necessary to select in this checkbox such frequency.



Fig. D.33: Rx1 Frequency Setting box

## D.4 • FIRST RUN

After clicking GO on the SETTINGS page, the following screen image, representing the FIRST RUN page, appears (Fig.D.34):

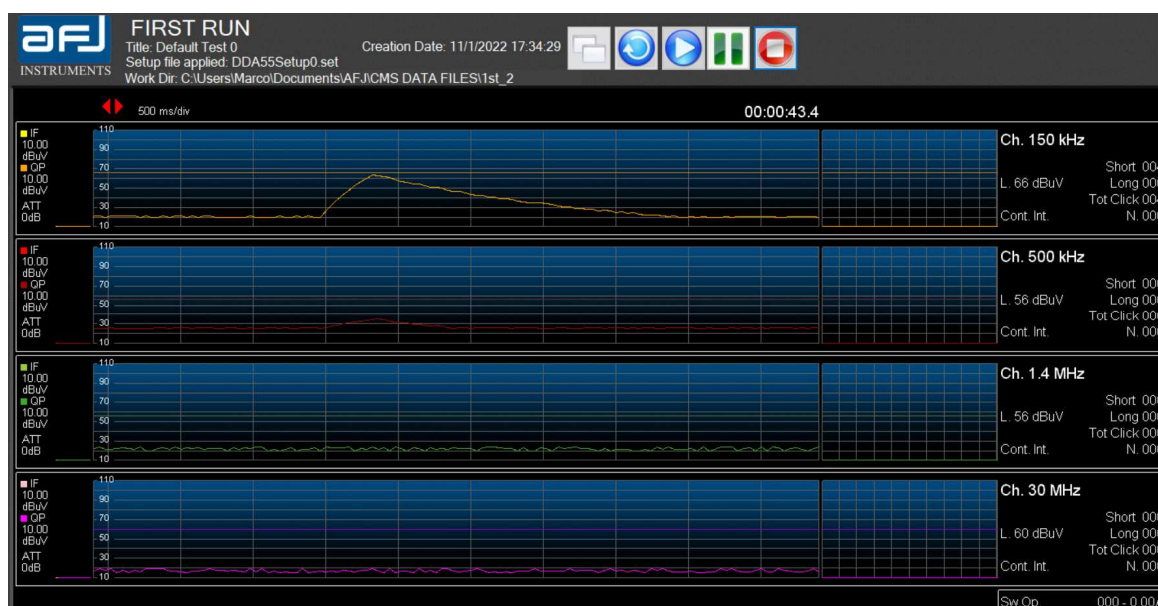


Fig. D.34: FIRST RUN Page

The FIRST RUN page (Fig. D.34) is also accessed by pressing the 1<sup>st</sup> RUN button on the left side of the MAIN COCKPIT window (Fig. D.2). The page is arranged as follows: in the reference system configuration corresponding to 4 independent channels, the major part of the screen is split into 4 identical sections, which show the status of each channel. In each high-left corner of each session, the tuned frequency of the channel receiver (150kHz, 500kHz, 1.4MHz, 30MHz) is displayed.

In each section, the following variables and parameters are available during the measurement:

- IF (dBμV): shows the Peak detector value;
- QP (dBμV): shows the Quasi Peak detector value;
- ATT (dB): shows the attenuation set;
- Level (dBμV): shows the Peak and Quasi-Peak detectors diagrams during the test. It is possible to check on the software display the Peak and Quasi Peak values in real time setting a selectable time range among 5, 2,5 and 1s (selecting among 500ms/div, 250ms/div and 100ms/div using the red triangle buttons located above the diagrams). It is also possible to divide vertically each diagram in two separated parts (with the button with double form on the upper right side of the page) to get on the right part the real time measurement on 5, 2,5 and 1s time ranges, meanwhile on the left part the real time measurement on large scale with time ranges of 120, 90, 60 and 30min (selecting among 12min/div, 9min/div, 6min/div and 3min/div using the red triangle buttons located above each diagram);
- Snapshot of the last detected discontinuous disturbance;
- Short: shows the “total number of clicks” elapsing less than 10ms;
- Long: shows the “total number of clicks” elapsing between 10ms and 200ms;
- Tot. Click: shows the “total number of clicks”, namely the sum of the short clicks and the long clicks;



- N: shows the number of “clicks per minute“. During measurement running, the value is updated in real time;
- L (dB $\mu$ V): shows the value of the programmed Limit threshold used by the device to discriminate the various kinds of disturbance;
- Cont. Interference: shows the cumulated endurance of those disturbances that cannot enter the definition of click (see CISPR 16-1-1 and CISPR 14-1) but exceed the set Limit threshold.

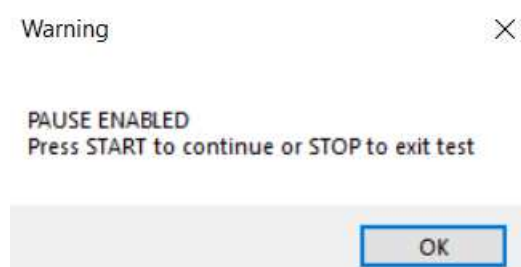
The Sw. Op. box shows the number of switching operations occurred during the test (such function is possible via proper sensor included with AFJ LS16C/10, LT32C/10 LISN and AFJ SW04/32, SW 04/100 switching boxes) and the current amplitude absorbed by the EUT in A.

The upper part of the page shows the Title of the test, the Setup file applied, the Work Dir. folder and the Creation date of the test.

The RESTART button allows to restart the time of the measurement of the running test without pushing the STOP button.

The START button allows to start the measurement.

The PAUSE button allows to interrupt manually the measurement and a Message Box alerts the operator how to continue (Fig. D.35).



**Fig. D.35: Pause Message Box**

The STOP button allows the operator to stop manually the running test.

The DDA55+ stops automatically the test against one of the End Of The Test conditions. The stop of a measurement (either manual or automatic) moves automatically from FIRST RUN page to CALCULATION page to display all the measurement results of the First Pass.



## D.5 • CALCULATION

The CALCULATION page is accessed by pressing the CALC button on the left side of the MAIN COCKPIT window (Fig. D.2) and it allows to display all the measurement results of the First Pass with N click rate calculation either from the number of clicks or from the number of switching operations.

### D.5.1 • CISPR 14-1 ED. 6.0

Selecting CISPR 14-1 Ed. 6.0 standard, the CALCULATION page shows all the measurement results of the First Pass with N click rate calculation either from the number of clicks (Fig. D.36) or from the number of switching operations (Fig. D.37).



**File Settings**

Title	Default Test	Description	
Time Test	00:02:03.00	Model	
Creation Date	11/1/2022 15:53:39	SN	
Last Modification	11/1/2022 17:38:37	Type	
Required		Report	
Executed by			
Work Dir	C:\Users\Marco\Desktop\AFJ\1st		

**First Run**

	150 kHz	500 kHz	1.4 MHz	30 MHz
t=clicks time				
Short (t≤10 ms)	11	13	8	0
Long	0	0	0	0
Tot. Clicks Meas	11	13	8	0
Long (10< t≤20 ms)	0	0	0	0
Long (20< t≤200 ms)	0	0	0	0
Tot. Clicks Corr	11	13	8	0
Continuous Int. Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
5.4.3.5 events	0	0	0	0
Sw.Op.	0	0	0	0
Limit dBuV	66	56	56	60
N	5.37	6.34	6.34	6.34

**Calculation Rules: Click Measurements (CISPR 14-1 Ed.6.0)**

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
New Limit Calculated

1.4 MHz  
New Limit Calculated

30 MHz  
No Clicks

Upper Quartile Method

New Limit [dBuV] 80.95 69.50 69.50

Allowed Clicks 2 3 2

**2nd PASS NEED** ☒ ☒ ☒ ☒

Fig. D.36: CALCULATION Page with N click rate calculation from the number of clicks for CISPR 14-1 Ed. 6.0

According to Sub Clause 5.4.2.2b of CISPR 14-1 Ed. 6.0 standard, the click rate N is determined at 150 kHz and 500 kHz. The click rate determined at 500 kHz is also used for the analysis at 1,4 MHz and 30 MHz (See Chapter A.2.3.1 for detailed information).

**NOTE:** The Long (10 < t ≤ 20ms) Clicks (“Instantaneous Switching”, as per Sub Clause 5.4.3.4 of CISPR 14-1 Ed. 6.0 standard) are appliances which fulfill the following conditions:

- The click rate is not more than 5;
- None of the caused clicks has duration longer than 20ms;
- 90% of the caused clicks have a duration less than 10ms.

According to this definition, the item called Long (10 < t ≤ 20ms) Clicks shows the “total number of clicks” elapsing greater than 10ms and less than 20ms.

A determination of whether the above conditions are met may be made at only one frequency, either 150 kHz or 500 kHz, where the higher click rate occurs (Fig. D.36).

## CALCULATION

### File Settings

Load Test

Title: Default Test

Time Test: 00:01:32.86

Creation Date: 11/1/2022 15:54:32

Last Modification: 11/1/2022 17:48:32

Required:

Executed by:

Work Dir: C:\Users\Marco\Desktop\AFJ\Test\_259

Description:

Model:

SN:

Type:

Report:

Update File Settings

### First Run

Calculation Rules: Sw.Op. - Irons f=0.66 - CEI A.4.11 (CISPR 14-1 Ed 6.0)

	150 kHz	500 kHz	1.4 MHz	30 MHz
t-clicks time				
Short (t≤10 ms)	0	0	0	0
Long	0	0	0	0
Tot. Clicks Meas	0	0	0	0
Long (10< t≤20 ms)	0	0	0	0
Long (20< t≤200 ms)	0	0	0	0
Tot. Clicks Corr	0	0	0	0
Continuous Int. Events	0	1	0	0
Time(s)	0.00	1.27	0.00	0.00
5.4.3.5 events	0	0	0	0
Sw.Op.	40	40	40	40
Limit dBuV	66	56	56	60
N	17.06	17.06	17.06	17.06

☐ Apply 5.4.3.3 Correction

[Apply 5.4.3.5](#)

☒ Manual

☐ Instantaneous switching for all channels 5.4.3.4

Test Loaded: Click 1st Pass

150 kHz

New Limit Calculated

500 kHz

New Limit Calculated

1.4 MHz

New Limit Calculated

30 MHz

New Limit Calculated

Upper Quartile Method

New Limit [dBuV]	70.90	60.90	60.90	64.90
Allowed Clicks	10	10	10	10

2nd PASS NEED

☒ ☒ ☒ ☒

**Fig. D.37: CALCULATION Page with N click rate calculation from the number of switching operations for CISPR 14-1 Ed. 6.0**

The File Settings box (Fig. D.38) shows all the data of the measurement setup (title of the test, description of the EUT, etc...) and it allows to save any modification either with the “Update File Settings” button or with a warning message during page changing.

It is possible to load a previous test selecting it through the “Load Test” button and choosing the main directory of the test “Test\_n” (with inside the “\1st”, “\2nd”... subfolders). This operation will not affect and modify the working directory sets on the SETTINGS page.

### File Settings

Load Test

Title: Default Test

Time Test: 00:01:32.86

Creation Date: 11/1/2022 15:54:32

Last Modification: 11/1/2022 17:48:32

Required:

Executed by:

Work Dir: C:\Users\Marco\Desktop\AFJ\Test\_259

Description:

Model:

SN:

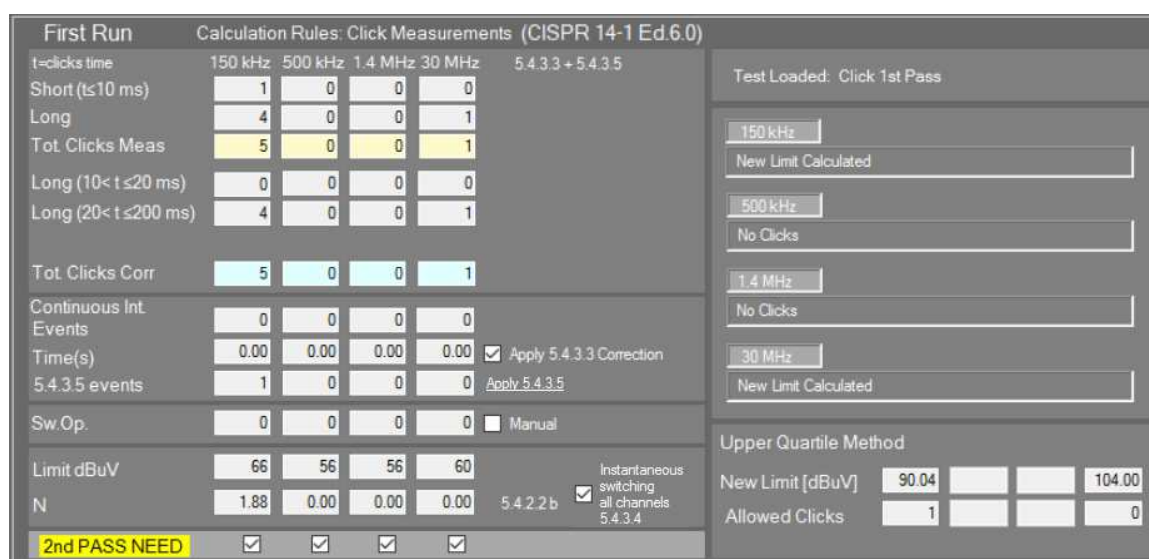
Type:

Report:

Update File Settings

**Fig. D.38: File Settings Page**

On the First Run box (Fig. D.39) the measurement results are calculated and displayed according to the calculation of the N click rate set on the SETTINGS page from the number of clicks (Calculation Rules: Click Measurements).  
It is indicated the type of Test Loaded (i.e. Click 1<sup>st</sup> Pass).



First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.6.0)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3 + 5.4.3.5	
Short ( $t \leq 10$ ms)	1	0	0	0		
Long	4	0	0	1		
Tot. Clicks Meas	5	0	0	1		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	4	0	0	1		
Tot. Clicks Corr	5	0	0	1		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction	
5.4.3.5 events	1	0	0	0	Apply 5.4.3.5	
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	1.88	0.00	0.00	0.00	5.4.2.2 b <input checked="" type="checkbox"/> Instantaneous switching all channels 5.4.3.4	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
No Clicks

1.4 MHz  
No Clicks

30 MHz  
New Limit Calculated

Upper Quartile Method

New Limit [dBuV] 90.04 104.00

Allowed Clicks 1 0

Fig. D.39: First Run box

- For each channel is shown the total clicks number measured by the equipment Tot. Clicks Meas (Short ( $t \leq 10$ ms); Long ( $10 < t \leq 200$ ms), specifying between Long ( $10 < t \leq 20$ ms) and Long ( $20 < t \leq 200$ ms)); the total clicks number corrected by the software Tot. Clicks Corr including the exceptions of the definition of click defined in the Sub Clause 5.4.3.3 and 5.4.3.5 of CISPR 14-1 Ed. 6.0 standard; Continuous Interference (number of Events, total Time(s), exceptions of the definition of click defined in the Sub Clause 5.4.3.5 of CISPR 14-1 Ed. 6.0 standard);
- Sw.Op.: number of switching operation for each channel. The number of switching operations can be determined also by other means (as e.g. evaluation of the timer diagram, use of recording devices, oscilloscopes controlling and detecting the number of switching operations without the use of a click analyzer) and should therefore be handled in the relevant product standard as an alternative method for the assessment of discontinuous disturbances in exceptional cases;
- Manual checkbox: allows the correction of number of switching operations;
- Limit in dBuV;
- N: click rate.

The determination of the Long ( $10 < t \leq 20$ ms) Clicks (“Instantaneous Switching”, as per Sub Clause 5.4.3.4 of CISPR 14-1 Ed. 6.0 standard) may be made at only one frequency, either 150 kHz or 500 kHz, where the higher click rate occurs (Fig. D.36).

Selecting the checkbox on the CALCULATION page “Instantaneous Switching all channels 5.4.3.4” the determination may be made at all frequencies (Fig. D.40).

First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.6.0)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3	
Short ( $t \leq 10$ ms)	11	13	8	0		
Long	0	0	0	0		
Tot. Clicks Meas	11	13	8	0		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	0	0	0	0		
Tot. Clicks Corr	11	13	8	0		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction	
5.4.3.5 events	0	0	0	0	<input type="checkbox"/> Apply 5.4.3.5	
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	5.37	6.34	6.34	6.34	<input checked="" type="checkbox"/> Instantaneous switching for all channels 5.4.3.4	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
New Limit Calculated

1.4 MHz  
New Limit Calculated

30 MHz  
No Clicks

Upper Quartile Method

New Limit [dBuV] 80.95 69.50 69.50

Allowed Clicks 2 3 2

Fig. D.40: Instantaneous Switching evaluation on all channels

If the reference standard for the measurements selected in the START page (Fig. D.8) is the previous CISPR 14-1 Ed. 5.2, the determination of the Long ( $10 < t \leq 20$ ms) Clicks (“Instantaneous Switching”, as per Sub Clause 7.4.2.2 of CISPR 14-1 Ed. 5.2 standard) shall only be determined at 500kHz (Fig. D.41).

First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.5.2)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	4.2.3.2	
Short ( $t \leq 10$ ms)	11	13	8	0		
Long	0	0	0	0		
Tot. Clicks Meas	11	13	8	0		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	0	0	0	0		
Tot. Clicks Corr	11	13	8	0		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 4.2.3.2 Correction	
4.2.3.4 events	0	0	0	0	<input type="checkbox"/> Apply 4.2.3.4	
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	5.37	6.34	6.34	6.34	<input type="checkbox"/> Instantaneous switching for all channels 7.4.2.2	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
New Limit Calculated

1.4 MHz  
New Limit Calculated

30 MHz  
No Clicks

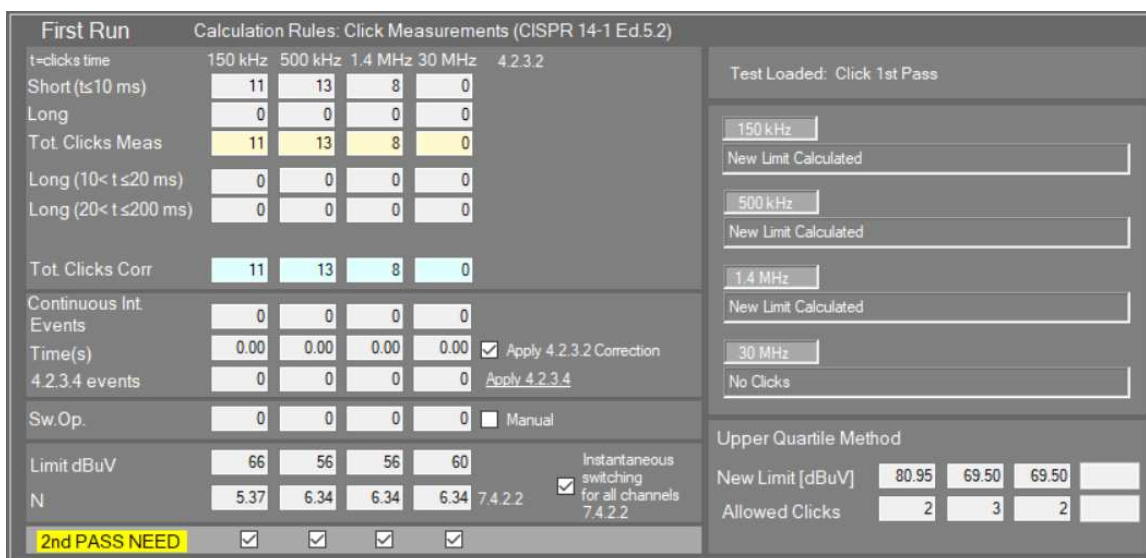
Upper Quartile Method

New Limit [dBuV] 80.95 69.50 69.50

Allowed Clicks 2 3 2

Fig. D.41: Instantaneous Switching evaluation as per Sub Clause 7.4.2.2 of CISPR 14-1 Ed. 5.2

Selecting the checkbox on the CALCULATION page “Instantaneous Switching all channels 7.4.2.2” the determination may be made at all frequencies (Fig. D.42).



First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.5.2)				
	150 kHz	500 kHz	1.4 MHz	30 MHz	4.2.3.2	
t=clicks time	11	13	8	0		
Short (t≤10 ms)	11	13	8	0		
Long	0	0	0	0		
Tot. Clicks Meas	11	13	8	0		
Long (10<t≤20 ms)	0	0	0	0		
Long (20<t≤200 ms)	0	0	0	0		
Tot. Clicks Corr	11	13	8	0		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 4.2.3.2 Correction	
4.2.3.4 events	0	0	0	0	<input checked="" type="checkbox"/> Apply 4.2.3.4	
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	5.37	6.34	6.34	6.34	7.4.2.2 <input checked="" type="checkbox"/> Instantaneous switching for all channels 7.4.2.2	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
New Limit Calculated

1.4 MHz  
New Limit Calculated

30 MHz  
No Clicks

Upper Quartile Method

New Limit [dBuV] 80.95 69.50 69.50

Allowed Clicks 2 3 2

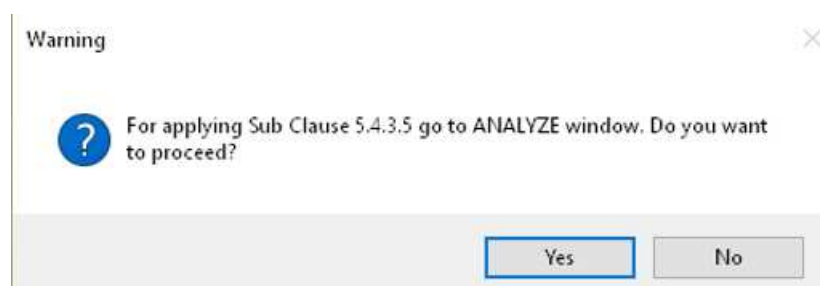
Fig. D.42: Instantaneous Switching evaluation on all channels

The software gives the possibility to apply and display the exceptions of the definition of click defined on the Sub Clauses 5.4.3.3 and 5.4.3.5 of CISPR 14-1 Ed. 6.0 standard (Sub Clauses 4.2.3.2 and 4.2.3.4 of CISPR 14-1 Ed. 5.2 standard).

To apply the exception of the Sub Clause 5.4.3.3 (Sub Clause 4.2.3.2) (*the combination of clicks in a time frame less than 600ms is considered as one click*) a checkbox on the CALCULATION page must be used.

Meanwhile, to apply the exception of the Sub Clause 5.4.3.5 (Sub Clause 4.2.3.4) (*for appliances which have a click rate less than 5, any two disturbances each having a maximum duration of 200ms, shall be evaluated as two clicks even when the separation between the disturbance is less than 200ms*), it is necessary to select the checkbox “Apply 5.4.3.5” (“Apply 4.2.3.4”) to operate on the ANALYZE page.

The following warning message will appear (Fig. D.43):



Warning

For applying Sub Clause 5.4.3.5 go to ANALYZE window. Do you want to proceed?

Fig. D.43: Request for applying Sub Clause 5.4.3.5

The applied exceptions are indicated at the right of the four frequencies list in the First Run box (Fig. D.39). In the example shown in Fig. D.36 the 5.4.3.3 + 5.4.3.5 indication confirms the application of the exceptions of the definition of click defined on the Sub Clauses 5.4.3.3 and 5.4.3.5 of CISPR 14-1 Ed. 6.0 standard.

For each channel the software shows either PASS or Fail result, indicating on the left side of the First Run box its status.

If the Upper Quartile Method is applicable the software shows like test result for each channel 2<sup>nd</sup> PASS NEED, the status of a channel will be i.e. 150kHz => New Limit Calculated and the calculation results (New Limit [dBuV] and Allowed Clicks) will be displayed (Fig. D.44).

First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.6.0)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3	
Short ( $t \leq 10$ ms)	11	13	8	0		
Long	0	0	0	0		
Tot. Clicks Meas	11	13	8	0		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	0	0	0	0		
Tot. Clicks Corr	11	13	8	0		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction	
5.4.3.5 events	0	0	0	0	Apply 5.4.3.5	
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	5.37	6.34	6.34	6.34	5.4.2.2 b <input checked="" type="checkbox"/> Instantaneous switching for all channels 5.4.3.4	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz

New Limit Calculated

500 kHz

New Limit Calculated

1.4 MHz

New Limit Calculated

30 MHz

No Clicks

Upper Quartile Method

New Limit [dBuV]	80.95	69.50	69.50	
Allowed Clicks	2	3	2	

Fig. D.44: Upper Quartile Method calculation results

On the test report (see Chapter D.9 for detailed information) the clicks registered during the First Pass are displayed as follows:

- Short ( $t \leq 10$ ms)
- Long ( $10 < t \leq 200$ ms)
- Long ( $10 < t \leq 20$ ms)

Modifying the *Default.xml* configuration file (located in “C:\Users\utente\Documents \AFJ\CMS **SETTINGS**” folder), the measurement automatically stops according to the duration of a detected continuous interference without the possibility to determine the duration time of the test. For instructions how to introduce this function please contact AFJ Instruments.



It is possible to open a form to display the First Pass results for each channel like the executed path on a simplification the flow chart defined by CISPR 14-1 Ed. 6.0 standard. In this way the operator is able to see how the software applies all the calculation rules and the exceptions on the First Pass and gives so the consequent results. To open this form the button on the upper right side of the CALCULATION page must be pushed.

Each channel has its own form and the executed path on the flow chart is indicated in red color. (Fig. D.45).

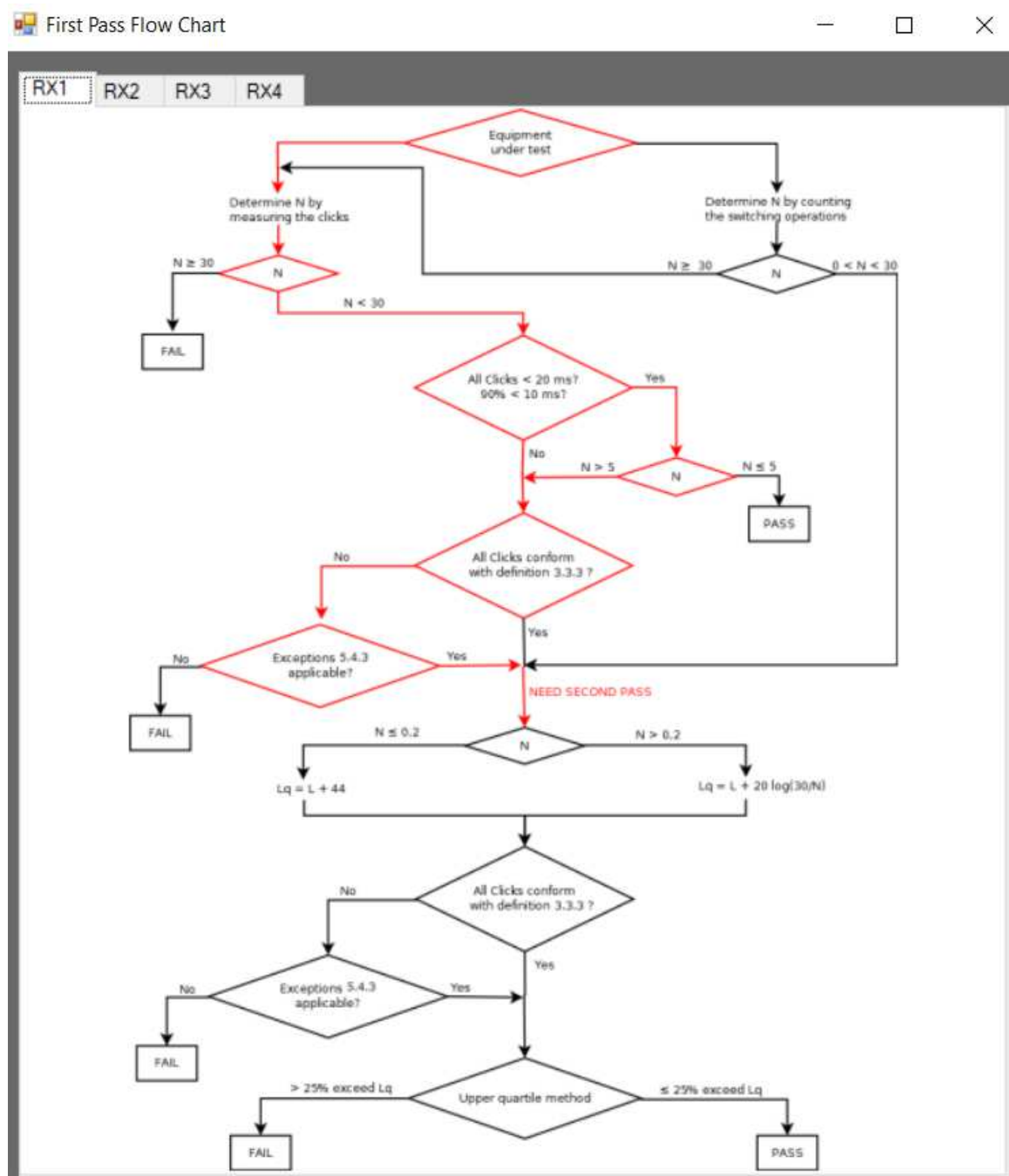
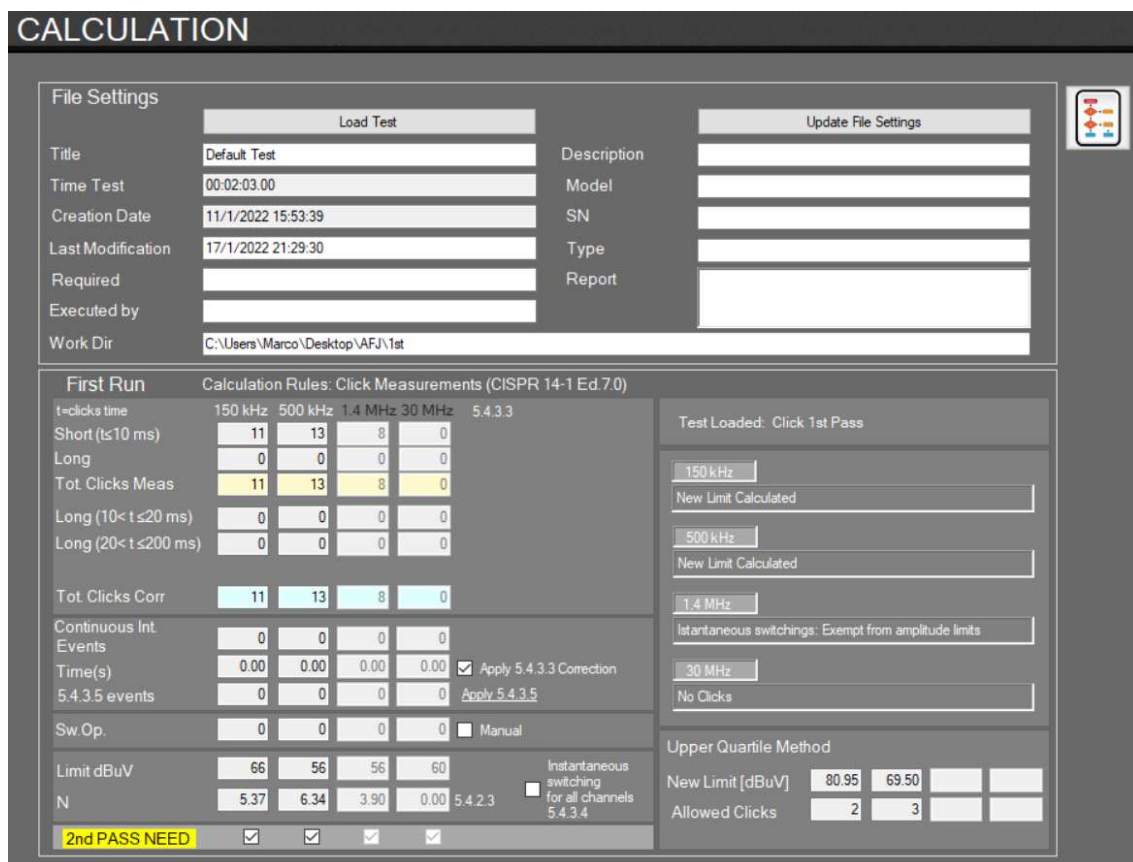


Fig. D.45: First Pass Flow Chart

### D.5.2 • CISPR 14-1 Ed. 7.0

Selecting CISPR 14-1 Ed. 7.0 standard, the CALCULATION page shows all the measurement results of the First Pass with N click rate calculation either from the number of clicks (Fig. D.46) or from the number of switching operations (Fig. D.47).



**CALCULATION**

**File Settings**

Load Test

Update File Settings

Title: Default Test

Time Test: 00:02:03.00

Creation Date: 11/1/2022 15:53:39

Last Modification: 17/1/2022 21:29:30

Required:

Executed by:

Work Dir: C:\Users\Marco\Desktop\AFJ\1st

**First Run**

Calculation Rules: Click Measurements (CISPR 14-1 Ed.7.0)

t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3
Short (t≤10 ms)	11	13	8	0	
Long	0	0	0	0	
Tot. Clicks Meas	11	13	8	0	
Long (10< t≤20 ms)	0	0	0	0	
Long (20< t≤200 ms)	0	0	0	0	
Tot. Clicks Corr	11	13	8	0	
Continuous Int. Events	0	0	0	0	
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction
5.4.3.5 events	0	0	0	0	<input checked="" type="checkbox"/> Apply 5.4.3.5
Sw.Op.	0	0	0	0	<input type="checkbox"/> Manual
Limit dBuV	66	56	56	60	
N	5.37	6.34	3.90	0.00	5.4.2.3 <input type="checkbox"/> Instantaneous switching for all channels 5.4.3.4

**Test Loaded: Click 1st Pass**

150 kHz

New Limit Calculated

500 kHz

New Limit Calculated

1.4 MHz

Instantaneous switchings: Exempt from amplitude limits

30 MHz

No Clicks

**Upper Quartile Method**

New Limit [dBuV] 80.95 69.50

Allowed Clicks 2 3

**2nd PASS NEED** ☒ ☒ ☒ ☒

**Fig. D.46: CALCULATION Page with N click rate calculation from the number of clicks for CISPR 14-1 Ed. 7.0**

According to Sub Clause 5.4.2.3 of CISPR 14-1 Ed. 7.0 standard, the click rate N shall be calculated separately for each of the four frequencies specified in Sub Clause 5.4.2.1 (150 kHz, 500 kHz, 1,4 MHz, 30 MHz) using the observation time(s) determined according to Sub Clause 5.4.2.2 (See Chapter A.2.3.2 for detailed information).

**NOTE:** The Long (10 < t ≤ 20ms) Clicks (“Instantaneous Switching”, as per Sub Clause 5.4.3.4 of CISPR 14-1 Ed. 7.0 standard) are appliances which fulfill the following conditions:

- The click rate is not more than 5;
- None of the caused clicks has duration longer than 20ms;
- 90% of the caused clicks have a duration less than 10ms.

According to this definition, the item called Long (10 < t ≤ 20ms) Clicks shows the “total number of clicks” elapsing greater than 10ms and less than 20ms.

A determination of whether the above conditions are met may be made at only one frequency, either 150 kHz or 500 kHz, where the higher click rate occurs (Fig. D.46).



## CALCULATION

### File Settings

Load Test
Update File Settings

Title	Default Test	Description	
Time Test	00:01:32.86	Model	
Creation Date	11/1/2022 15:54:32	SN	
Last Modification	17/1/2022 21:34:03	Type	
Required		Report	
Executed by			
Work Dir	C:\Users\Marco\Desktop\AFJ\Test_259		

### First Run

Calculation Rules: Sw.Op. - Refrigerators and freezers f=0.5 - CEI A.1.9 (CISPR 14-1 Ed.7.0)

	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3
t-clicks time	0	0	0	0	0
Short (t≤10 ms)	0	0	0	0	0
Long	0	0	0	0	0
Tot. Clicks Meas	0	0	0	0	0
Long (10< t≤20 ms)	0	0	0	0	0
Long (20< t≤200 ms)	0	0	0	0	0
Tot. Clicks Corr	0	0	0	0	0
Continuous Int. Events	0	1	0	0	0
Time(s)	0.00	1.27	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction
5.4.3.5 events	0	0	0	0	<a href="#">Apply 5.4.3.5</a>
Sw.Op.	20	20	20	20	<input checked="" type="checkbox"/> Manual
Limit dBuV	66	56	56	60	Instantaneous switching for all channels 5.4.3.4
N	6.46	6.46	6.46	6.46	

**2nd PASS NEEDED** ☒ ☒ ☒ ☒

### Test Loaded: Click 1st Pass

150 kHz  
 New Limit Calculated

500 kHz  
 New Limit Calculated

1.4 MHz  
 New Limit Calculated

30 MHz  
 New Limit Calculated

### Upper Quartile Method

New Limit [dBuV]	79.34	69.34	69.34	73.34
Allowed Clicks	5	5	5	5

**Fig. D.47: CALCULATION Page with N click rate calculation from the number of switching operations for CISPR 14-1 Ed. 7.0**

The File Settings box (Fig. D.48) shows all the data of the measurement setup (title of the test, description of the EUT, etc...) and it allows to save any modification either with the “Update File Settings” button or with a warning message during page changing.

It is possible to load a previous test selecting it through the “Load Test” button and choosing the main directory of the test “Test\_n” (with inside the “\1st”, “\2nd”... subfolders). This operation will not affect and modify the working directory sets on the SETTINGS page.

### File Settings

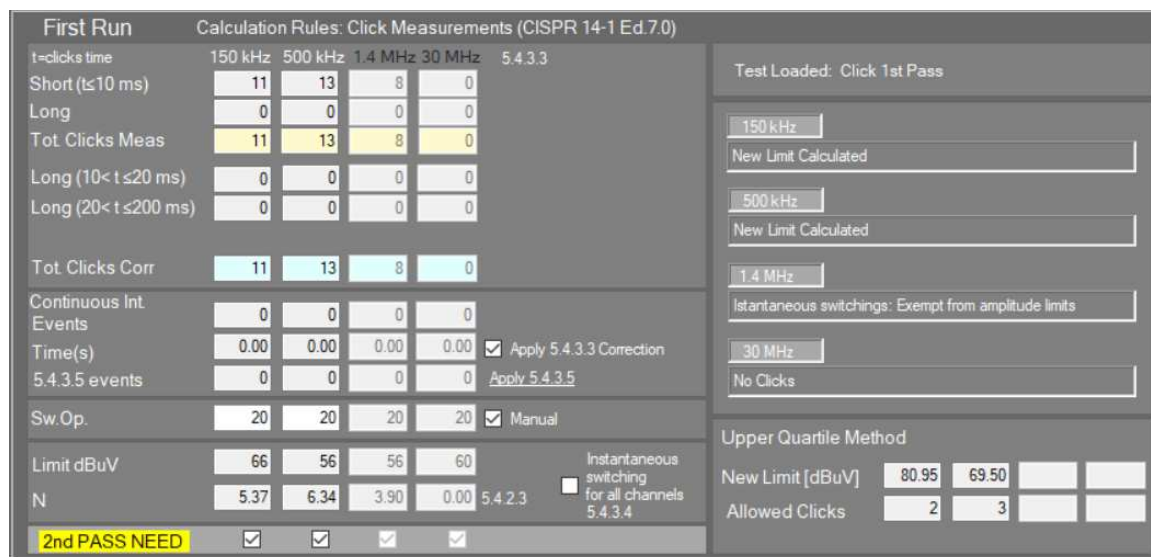
Load Test
Update File Settings

Title	Default Test	Description	
Time Test	00:02:17.00	Model	
Creation Date	6/11/2013 09:20:56	SN	
Last Modification	6/1/2014 23:21:10	Type	
Required		Report	
Executed by			
Work Dir	C:\Users\AFJ\Desktop\CL55C\TEST\Prova_6\backupProva_6		

**Fig. D.48: File Settings Page**

On the First Run box (Fig. D.49) the measurement results are calculated and displayed according to the calculation of the N click rate set on the SETTINGS page from the number of clicks (Calculation Rules: Click Measurements).

It is indicated the type of Test Loaded (i.e. Click 1<sup>st</sup> Pass).



First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed.7.0)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3	
Short ( $t \leq 10$ ms)	11	13	8	0		
Long	0	0	0	0		
Tot. Clicks Meas	11	13	8	0		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	0	0	0	0		
Tot. Clicks Corr	11	13	8	0		
Continuous Int. Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction	
5.4.3.5 events	0	0	0	0	Apply 5.4.3.5	
Sw.Op.	20	20	20	20	<input checked="" type="checkbox"/> Manual	
Limit dBuV	66	56	56	60		
N	5.37	6.34	3.90	0.00	5.4.2.3	<input type="checkbox"/> Instantaneous switching for all channels 5.4.3.4
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz  
New Limit Calculated

500 kHz  
New Limit Calculated

1.4 MHz  
Instantaneous switchings: Exempt from amplitude limits

30 MHz  
No Clicks

Upper Quartile Method

New Limit [dBuV] 80.95 69.50

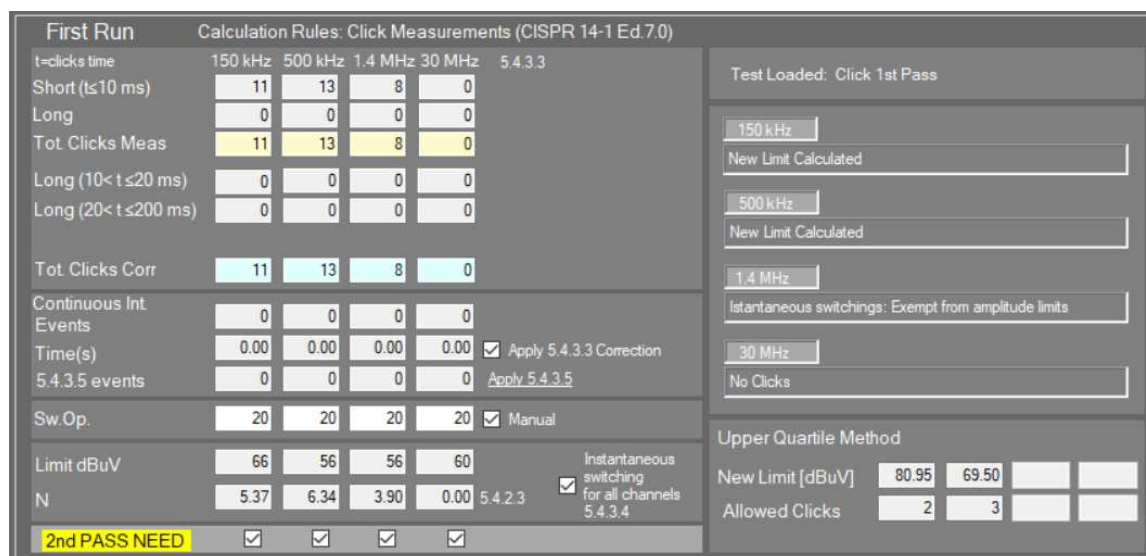
Allowed Clicks 2 3

Fig. D.49: First Run box

- For each channel is shown the total clicks number measured by the equipment Tot. Clicks Meas (Short ( $t \leq 10$ ms); Long ( $10 < t \leq 200$ ms), specifying between Long ( $10 < t \leq 20$ ms) and Long ( $20 < t \leq 200$ ms)); the total clicks number corrected by the software Tot. Clicks Corr including the exceptions of the definition of click defined in the Sub Clause 5.4.3.3 and 5.4.3.5 of CISPR 14-1 Ed. 7.0 standard; Continuous Interference (number of Events, total Time(s), exceptions of the definition of click defined in the Sub Clause 5.4.3.5 of CISPR 14-1 Ed. 7.0 standard);
- Sw.Op.: number of switching operation for each channel. The number of switching operations can be determined also by other means (as e.g. evaluation of the timer diagram, use of recording devices, oscilloscopes controlling and detecting the number of switching operations without the use of a click analyzer) and should therefore be handled in the relevant product standard as an alternative method for the assessment of discontinuous disturbances in exceptional cases;
- Manual checkbox: allows the correction of number of switching operations;
- Limit in dBuV;
- N: click rate.

The determination of the Long ( $10 < t \leq 20$ ms) Clicks (“Instantaneous Switching”, as per Sub Clause 5.4.3.4 of CISPR 14-1 Ed. 7.0 standard) may be made at only one frequency, either 150 kHz or 500 kHz, where the higher click rate occurs (Fig. D.46).

Selecting the checkbox on the CALCULATION page “*Instantaneous Switching all channels 5.4.3.4*” the determination may be made at all frequencies (Fig. D.50).



First Run	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3
t=clicks time	11	13	8	0	
Short (t ≤ 10 ms)	11	13	8	0	
Long	0	0	0	0	
Tot. Clicks Meas	11	13	8	0	
Long (10 < t ≤ 20 ms)	0	0	0	0	
Long (20 < t ≤ 200 ms)	0	0	0	0	
Tot. Clicks Corr	11	13	8	0	
Continuous Int. Events	0	0	0	0	
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction
5.4.3.5 events	0	0	0	0	<input checked="" type="checkbox"/> Apply 5.4.3.5
Sw.Op.	20	20	20	20	<input checked="" type="checkbox"/> Manual
Limit dBuV	66	56	56	60	
N	5.37	6.34	3.90	0.00	5.4.2.3 <input checked="" type="checkbox"/> Instantaneous switching for all channels 5.4.3.4
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>					

Fig. D.50: Instantaneous Switching evaluation on all channels

The software gives the possibility to apply and display the exceptions of the definition of click defined on the Sub Clauses 5.4.3.3 and 5.4.3.5 of CISPR 14-1 Ed. 7.0 standard.

To apply the exception of the Sub Clause 5.4.3.3 (*the combination of clicks in a time frame less than 600ms is considered as one click*) a checkbox on the CALCULATION page must be used.

Meanwhile, to apply the exception of the Sub Clause 5.4.3.5 (*for appliances which have a click rate less than 5, any two disturbances each having a maximum duration of 200ms, shall be evaluated as two clicks even when the separation between the disturbance is less than 200ms*), it is necessary to select the checkbox “Apply 5.4.3.5” to operate on the ANALYZE page.

The following warning message will appear (Fig. D.51):

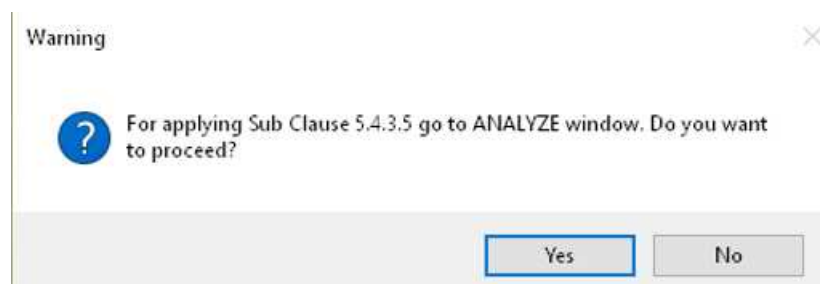


Fig. D.51: Request for applying Sub Clause 5.4.3.5

The applied exceptions are indicated at the right of the four frequencies list in the First Run box (Fig. D.49). In the example shown in Fig. D.46 the 5.4.3.3 indication confirms the application of the exception of the definition of click defined on the Sub Clauses 5.4.3.3 of CISPR 14-1 Ed. 7.0 standard.

For each channel the software shows either PASS or Fail result, indicating on the left side of the First Run box its status.

If the Upper Quartile Method is applicable the software shows like test result for each channel 2<sup>nd</sup> PASS NEED, the status of a channel will be i.e. 150kHz => New Limit Calculated and the calculation results (New Limit [dBuV] and Allowed Clicks) will be displayed (Fig. D.52).

First Run		Calculation Rules: Click Measurements (CISPR 14-1 Ed 7.0)				
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz	5.4.3.3	
Short ( $t \leq 10$ ms)	11	13	8	0		
Long	0	0	0	0		
Tot Clicks Meas	11	13	8	0		
Long ( $10 < t \leq 20$ ms)	0	0	0	0		
Long ( $20 < t \leq 200$ ms)	0	0	0	0		
Tot Clicks Corr	11	13	8	0		
Continuous Int Events	0	0	0	0		
Time(s)	0.00	0.00	0.00	0.00	<input checked="" type="checkbox"/> Apply 5.4.3.3 Correction	
5.4.3.5 events	0	0	0	0	<a href="#">Apply 5.4.3.5</a>	
Sw.Op.	20	20	20	20	<input checked="" type="checkbox"/> Manual	
Limit dBuV	66	56	56	60	Instantaneous switching for all channels 5.4.3.4 <input checked="" type="checkbox"/>	
N	5.37	6.34	3.90	0.00	5.4.2.3	
<b>2nd PASS NEED</b> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>						

Test Loaded: Click 1st Pass

150 kHz

New Limit Calculated

500 kHz

New Limit Calculated

1.4 MHz

Instantaneous switchings: Exempt from amplitude limits

30 MHz

No Clicks

Upper Quartile Method

New Limit [dBuV]

80.95

69.50

Allowed Clicks

2

3

Fig. D.52: Upper Quartile Method calculation results

On the test report (see Chapter D.9 for detailed information) the clicks registered during the First Pass are displayed as follows:

- Short ( $t \leq 10$ ms)
- Long ( $10 < t \leq 200$ ms)
- Long ( $10 < t \leq 20$ ms)

Modifying the *Default.xml* configuration file (located in “C:\Users\utente\Documents \AFJ\CMS **SETTINGS**” folder), the measurement automatically stops according to the duration of a detected continuous interference without the possibility to determine the duration time of the test. For instructions how to introduce this function please contact AFJ Instruments.

It is possible to open a form to display the First Pass results for each channel like the executed path on a simplification the flow charts defined by CISPR 14-1 Ed. 7.0 standard. In this way the operator is able to see how the software applies all the calculation rules and the exceptions on the First Pass and gives so the consequent results. To open this form the button on the upper right side of the CALCULATION page must be pushed.

Each channel has its own form and the executed path on the flow chart is indicated in red color. (Fig. D.53).

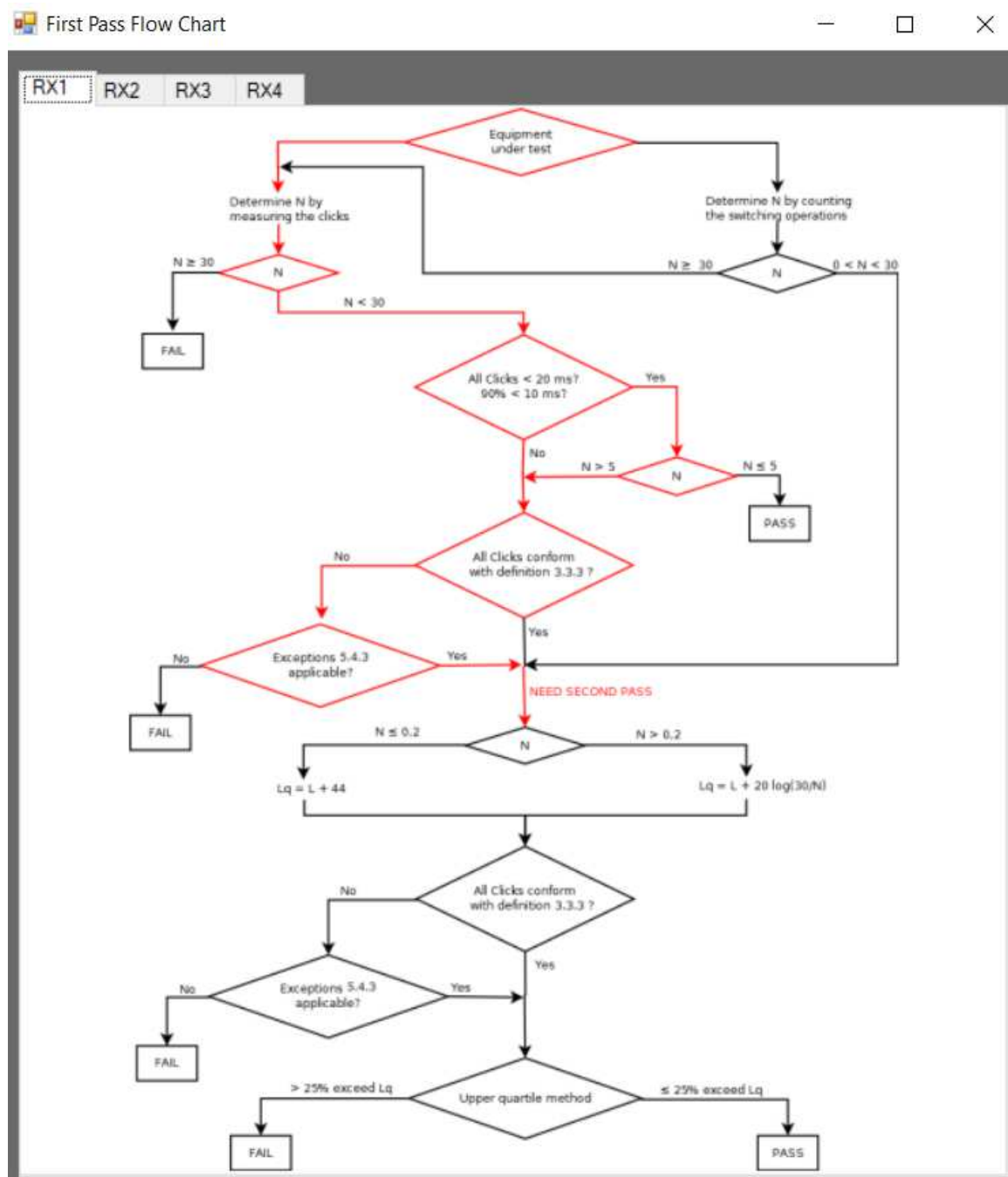


Fig. D.53: First Pass Flow Chart

## D.6 • SECOND RUN

If at the end of the First Pass there are the required condition to perform the Second Pass (either Real or Preview), the 2<sup>nd</sup> RUN button on the left side of the MAIN COCKPIT window (Fig. D.2) will be enabled and it will allow to access to the SECOND RUN page (Fig. D.54).



Fig. D.54: SECOND RUN Page

The page has the same structure and shows the same information of the FIRST RUN page with some differences.

Considering the new limit for each channel calculated by the software applying the Upper Quartile Method after the First Pass, before starting the measurement the software will inform with a warning message that new internal attenuation level for each channel shall be changed and test limit as per the observation time of the First Pass: the software itself will set the right values and it will ask for the final confirmation to the operator (Fig. D.55).

The software will automatically set the value of internal attenuation level considering the set limit for each channel: this will allow to work on the linear zone of each channel and then to get correct measurements, avoiding possible saturations of the input stage of the equipment and so wrong results.

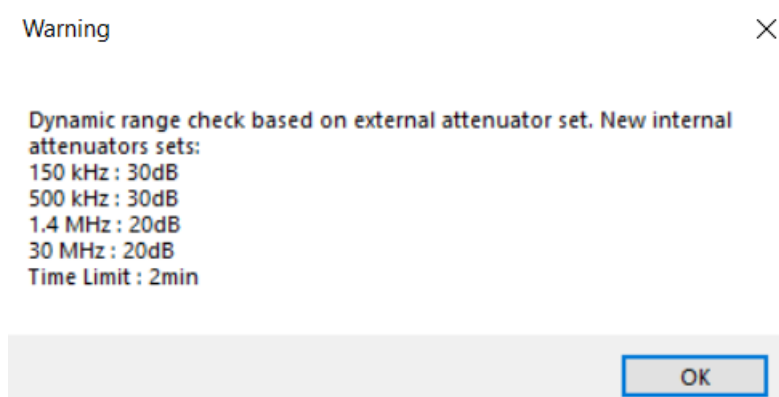


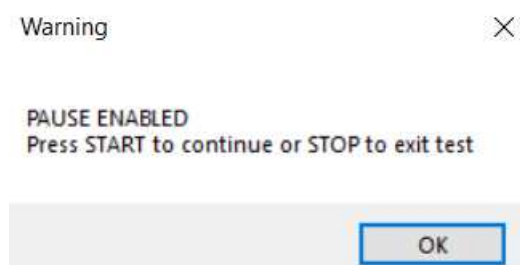
Fig. D.55: Attenuators settings confirmation window

The software allows the possibility to avoid the second step and so saving time with the Second Pass Preview option. After the first pass, the software calculates in according to CISPR 14-1 requests the values of short, long and fast long clicks (and so total clicks), continuous interference (event and time) making a preview according to the results of the first pass and comparing them with the new relaxed limits and the number of allowed clicks. In case of PASS, the operator could save up to 50% of testing time. Pushing PREV button the Second Pass Preview will be performed by the software.

The RESTART button allows to restart the time of the measurement of the running test without pushing the STOP button.

The START button allows to start the measurement.

The PAUSE button allows to interrupt manually the measurement and a Message Box alerts the operator how to continue (Fig. D.56).



**Fig. D.56: Pause Message Box**

The STOP button allows the operator to stop manually the running test.

The DDA55+ automatically stops the test against the Upper Quartile Method conditions. The stop of a measurement (either manual or automatic) moves automatically from SECOND RUN page to RESULTS page to display all the measurement results of the Second Pass (either Real or Preview).

Pushing STOP button on the SECOND RUN page automatically saves the measurement results on “\2nd” directory copying on “\2nd\_oldn” directory the Second Pass that already exists. In case of Second Pass Preview, the measurement results will be saved on “\preview” directory. In this way the software automatically creates many directory according to the Second Pass performed.



## D.7 • RESULTS

The RESULTS page (Fig. D.57) is accessed by pressing the RESULTS button on the left side of the MAIN COCKPIT window (Fig. D.2) and it allows to display all the measurement results of the Second Pass (either Real or Preview).



Upper Quartile Method		150 kHz	500 kHz	1.4 MHz	30 MHz
New Limit [dBuV]		80.95	69.50		
Allowed Clicks		2	3		
Short (≤10 ms)		1	4	0	0
Long		0	0	0	0
Tot Clicks Meas		1	4	0	0
5.4.3.3					
Continuous Int.					
Events		0	0	0	0
Time(s)		0.00	0.00	0.00	0.00
5.4.3.5 events		0	0	0	0
Apply 5.4.3.5					

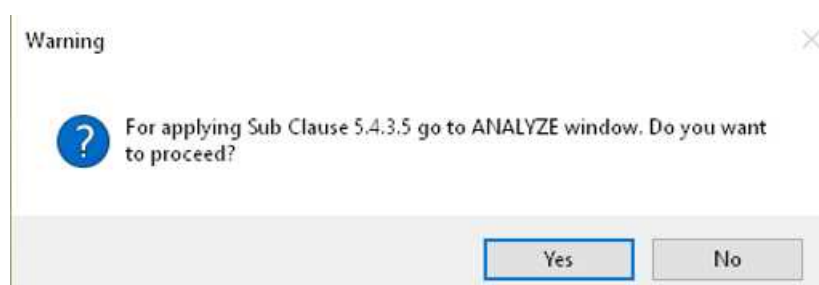
**FAIL** ☒ ☐ (1) ☒ (1) ☒

Fig. D.57: RESULTS page

- Upper Quartile Method calculation results (New Limit [dBuV] and Allowed Clicks);
- For each channel is shown the total clicks number measured by the equipment Tot Clicks Meas with indication also of Short and Long clicks numbers;
- Continuous Interference (number of Events and total Time(s)), including the exception of the definition of click defined on the Sub Clause 5.4.3.5 of CISPR 14-1 Ed. 6.0 and CISPR 14-1 Ed. 7.0 standards (Sub Clause 4.2.3.4 of CISPR 14-1 Ed. 5.2 standard).

To apply the exception of the Sub Clause 5.4.3.5 (Sub Clause 4.2.3.4) (*for appliances which have a click rate less than 5, any two disturbances each having a maximum duration of 200ms, shall be evaluated as two clicks even when the separation between the disturbance is less than 200ms*), it is necessary to select the checkbox “Apply 5.4.3.5” (“Apply 4.2.3.4”) to operate on the ANALYZE page.

The following warning message will appear (Fig. D.58):



Warning

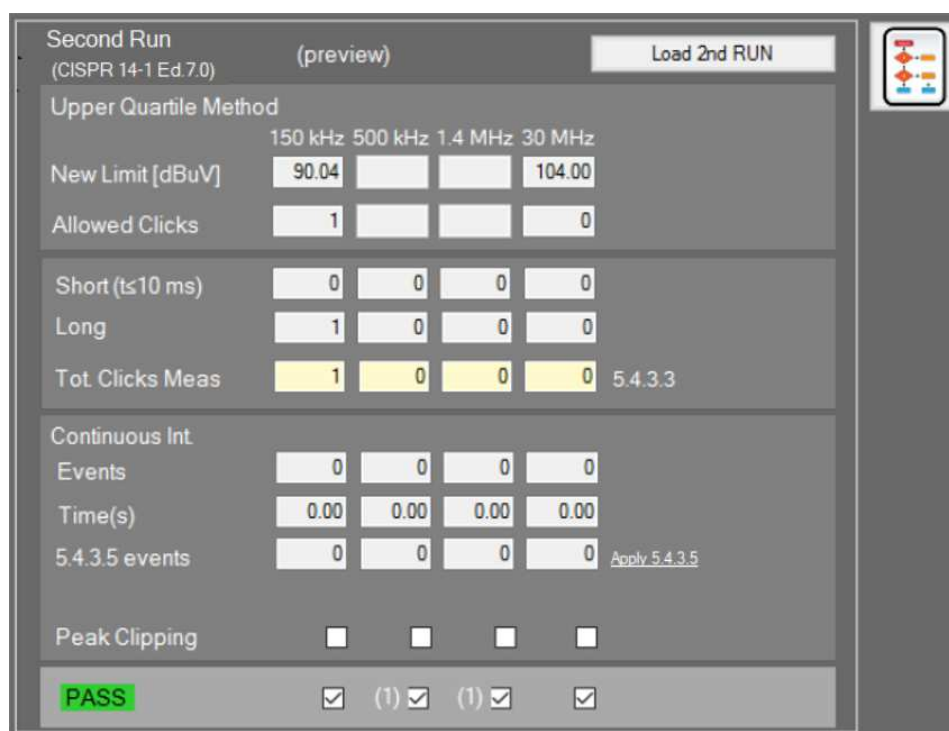
For applying Sub Clause 5.4.3.5 go to ANALYZE window. Do you want to proceed?

Yes No

Fig. D.58: Request for applying Sub Clause 5.4.3.5

It is possible to select which Second Pass to load. By default the last performed measurement is loaded (the one included on the “\2nd” folder), anyhow also another Second Pass can be loaded pushing the “Load 2<sup>nd</sup> RUN” button and selecting the necessary “\2nd\_oldn” folder (“\preview” folder to load a Second Pass Preview (Fig. D.59)).

For each channel the software shows either PASS or FAIL result.



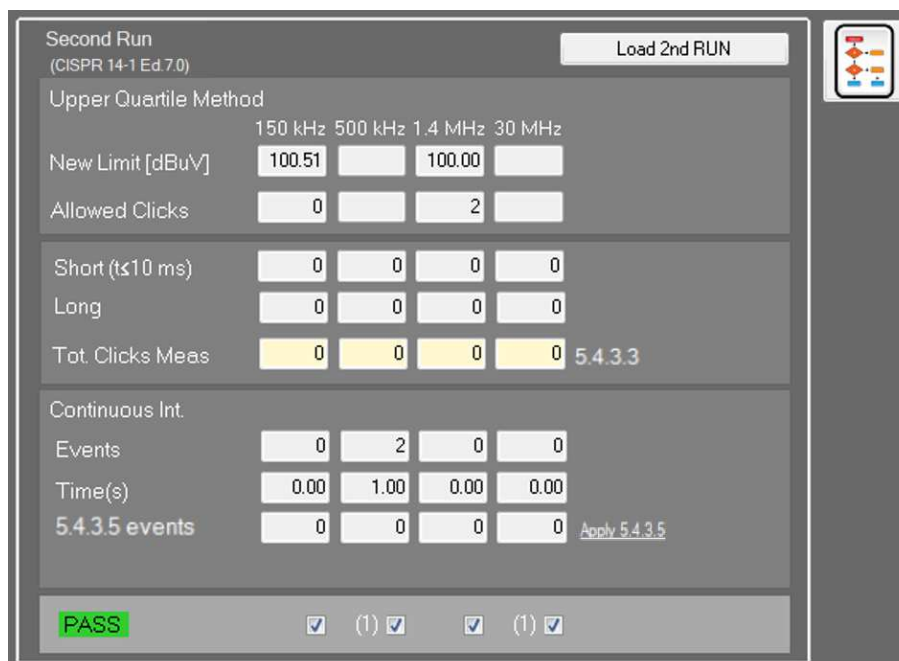
Second Run (CISPR 14-1 Ed 7.0) (preview)		Load 2nd RUN			
Upper Quartile Method					
	150 kHz	500 kHz	1.4 MHz	30 MHz	
New Limit [dBuV]	90.04			104.00	
Allowed Clicks	1			0	
Short ( $\leq 10$ ms)	0	0	0	0	
Long	1	0	0	0	
Tot. Clicks Meas	1	0	0	0	5.4.3.3
Continuous Int.					
Events	0	0	0	0	
Time(s)	0.00	0.00	0.00	0.00	
5.4.3.5 events	0	0	0	0	Apply 5.4.3.5
Peak Clipping					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PASS	<input checked="" type="checkbox"/>	(1) <input checked="" type="checkbox"/>	(1) <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Fig. D.59: Second Pass Preview window

**NOTE:** as per Fig. D.59, the software shows four **PEAK CLIPPING** indicators, one for each channel. The clipping is a general phenomenon of all receivers (of all active components in general) that consists in a loss of linearity due by a signal that exceeds a particular level. The DDA55+ detects for each channel a **PEAK CLIPPING** signal to inform the operator that the measured value during the First Pass used to calculate the Second Pass Preview and added to the value of internal attenuation could exceed or not the saturation level of each channel set to 115dB. In case of **PEAK CLIPPING** indication, the Second Pass Preview is not reliable and Second Pass is necessary.

The **PEAK CLIPPING** indicators inform the user that in such measurement condition is necessary to insert (if it is possible, of course) an external attenuator to reduce the input signal because the unit is working in no-linear mode.

In case it is necessary to perform a Second Pass after a First Pass with already PASS result, the RESULTS page reports the clicks and the continuous interferences registered during the Second Pass but the final result shall indicate PASS result according to the result of the First Pass. To indicate this the (1) symbol is reported close to the final result for each channel (Fig. D.60).



Second Run (CISPR 14-1 Ed 7.0)		Load 2nd RUN			
Upper Quartile Method					
	150 kHz	500 kHz	1.4 MHz	30 MHz	
New Limit [dBuV]	100.51		100.00		
Allowed Clicks	0		2		
Short ( $t \leq 10$ ms)	0	0	0	0	
Long	0	0	0	0	
Tot. Clicks Meas	0	0	0	0	5.4.3.3
Continuous Int.					
Events	0	2	0	0	
Time(s)	0.00	1.00	0.00	0.00	
5.4.3.5 events	0	0	0	0	Apply 5.4.3.5
<b>PASS</b> <input checked="" type="checkbox"/> (1) <input checked="" type="checkbox"/> (1) <input checked="" type="checkbox"/>					

**Fig. D.60: Second Pass window**

Possible discrepancies between First Pass and Second Pass shall be checked by the operator to define if the First Pass result is either valid or not.

In the example shown at Fig. D.60 the Second Pass is required for 150kHz and 1.4MHz channels only (according to Upper Quartile Method result), anyhow during the Second Pass N.2 continuous interferences with time frame of 1s are registered on 500kHz channel, not registered during the First Pass. The final result is anyhow PASS according to the result of the First Pass.

If N.2 continuous interferences with time frame of 1s are registered during the First Pass the final result is FAIL without needing the Second Pass, because continuous interferences have been registered and the application of the exception of the Sub Clause 5.4.3.3 (*the combination of clicks in a time frame less than 600ms is considered as one click*) is not possible.

On the test report (see Chapter D.9 for detailed information) the clicks registered during the Second Run are displayed as follows:

- Short ( $t \leq 10$ ms)
- Long

It is possible to open a form to display the Second Pass results for each channel like the executed path on a simplification the flow charts defined by CISPR 14-1 Ed. 6.0 and CISPR 14-1 Ed. 7.0 standards. In this way the operator is able to see how the software applies all the calculation rules and the exceptions on the Second Pass and gives so the consequent results. To open this form the button on the upper right side of the RESULTS page must be pushed. Each channel has its own form and the executed path on the flow chart is indicated in red color. (Fig. D.61).

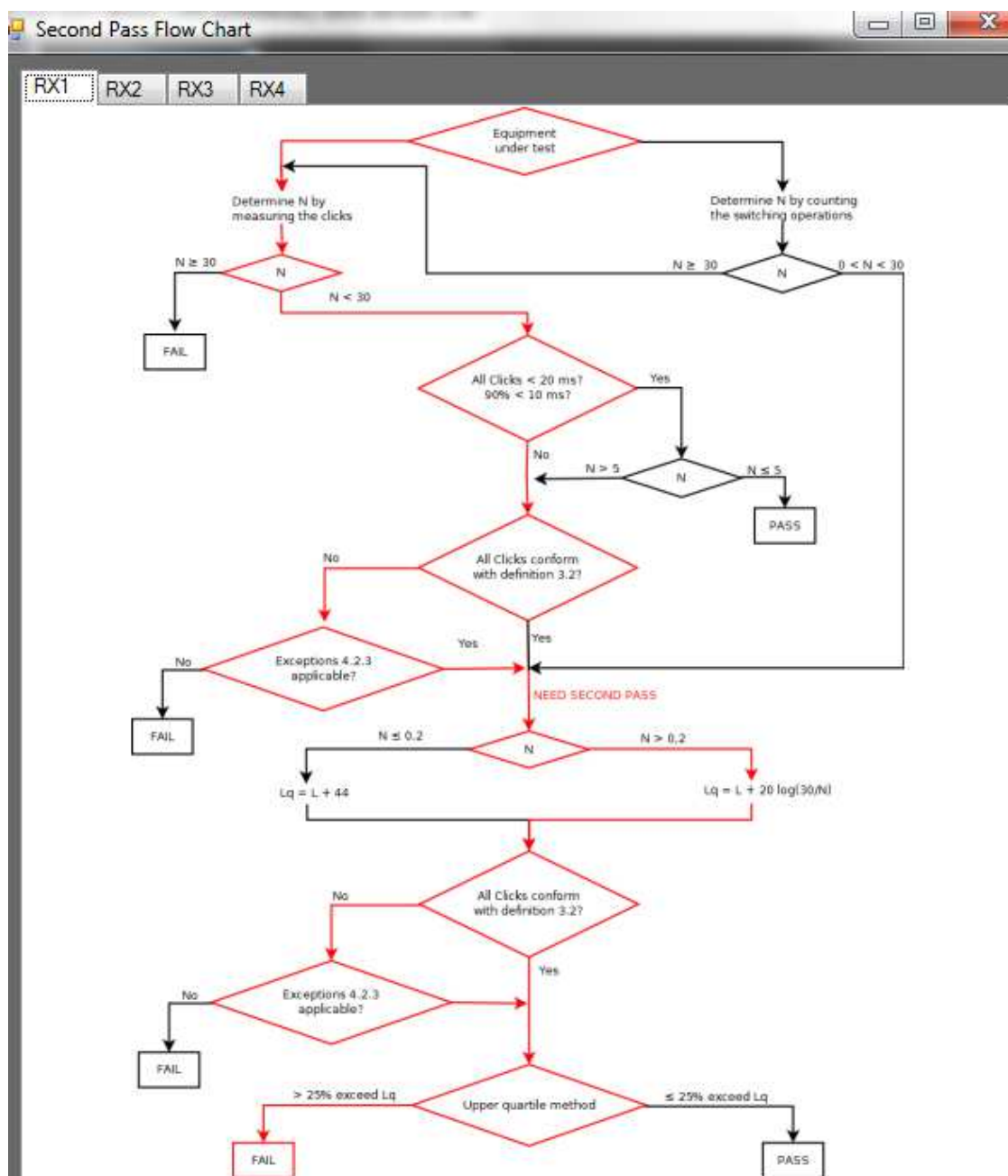


Fig. D.61: Second Pass Flow Chart

## D.8 • ANALYZE

The ANALYZE page (Fig. D.62) is accessed by pressing the ANALYZE button on the left side of the MAIN COCKPIT window (Fig. D.2) and it allows to graphically analyze all the data stored during a measurement. The displayed data can refer either to the First Pass or to the Second Pass according to the running page used before selecting the ANALYZE page: if it was the CALCULATION page, the data of the First Pass will be shown; if it was the RESULT page, the data of the Second Pass will be displayed.

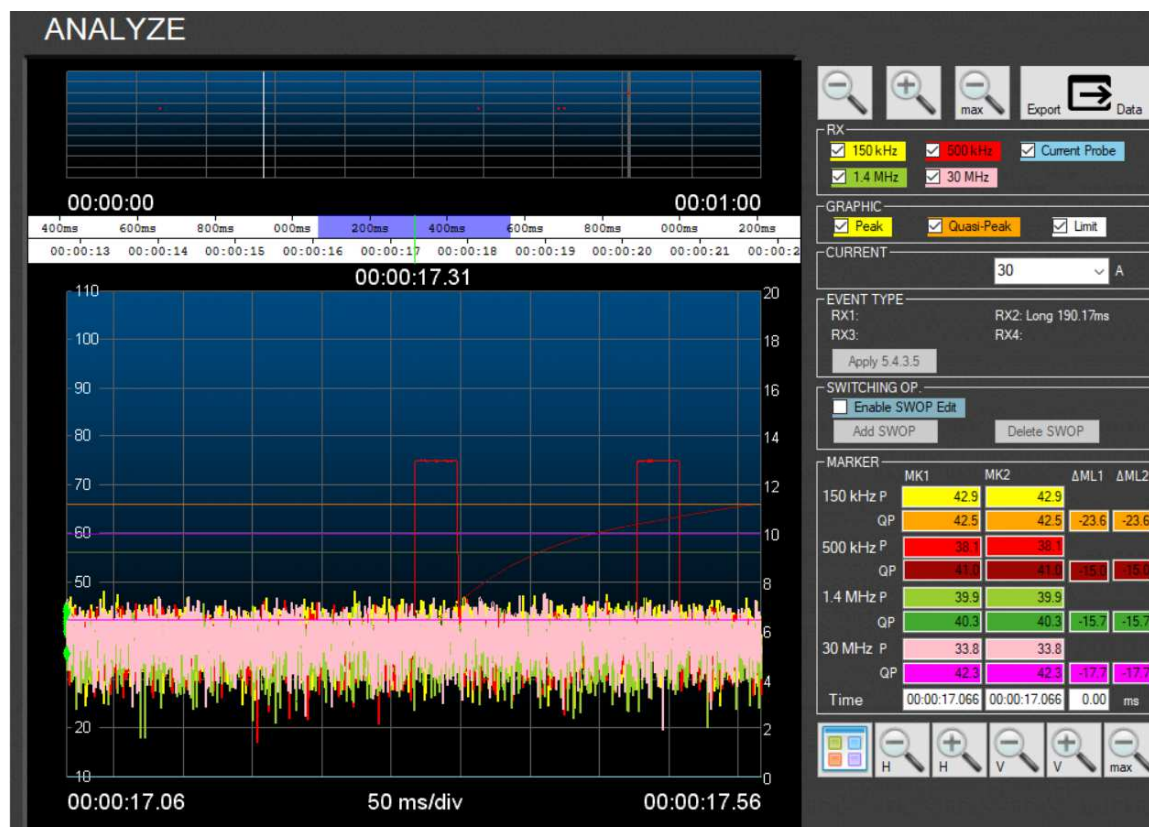


Fig. D.62: ANALYZE Page

The page shows two different diagrams:

- the upper diagram (Fig. D.63) displays all the clicks indicated by points, to have the global vision of the stored clicks during the measurement;
- the lower diagram (Fig. D.64) allows the detailed visualization of the waveforms of the selected click (with mouse right click on a point of the upper diagram).

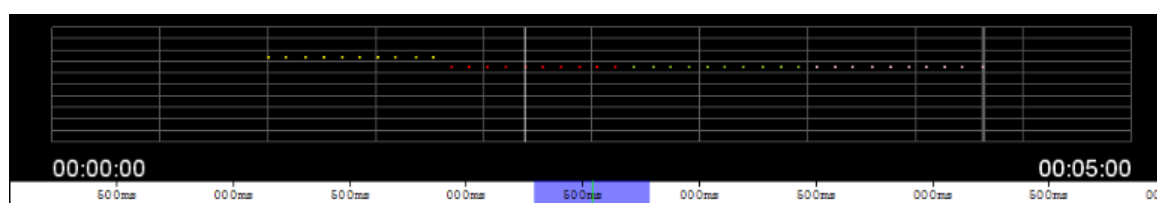
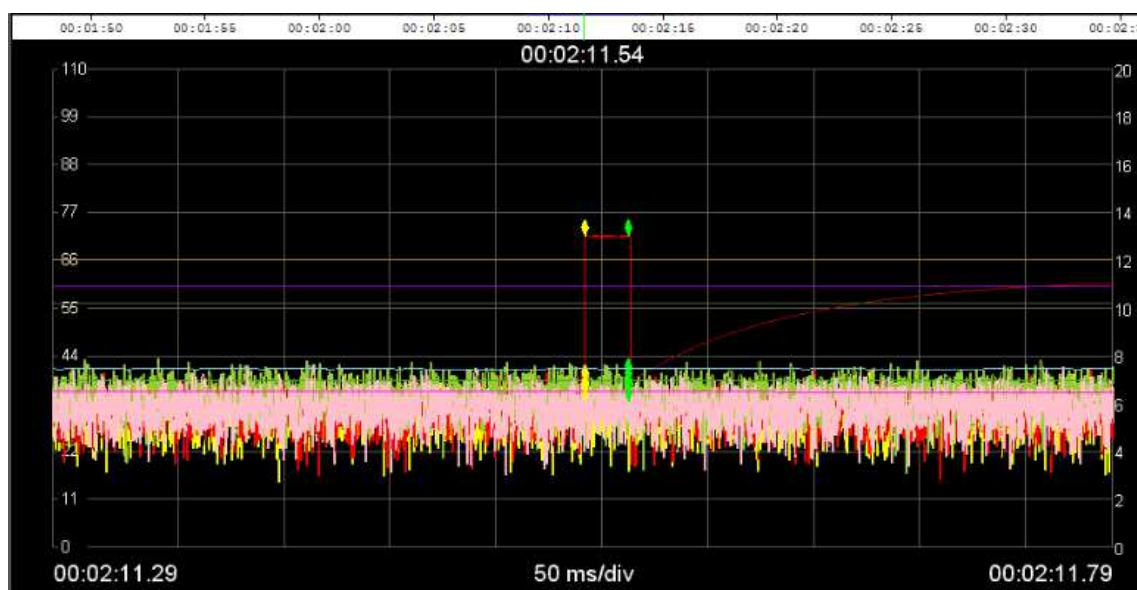


Fig. D.63: Clicks diagram

It is possible to modify the visualization of the clicks indicated by points on a time range among 2h, 1:30h, 1h, 30min, 10min, 5min and 1min (with – and + buttons in the upper right part of the page) (Fig. D.65).

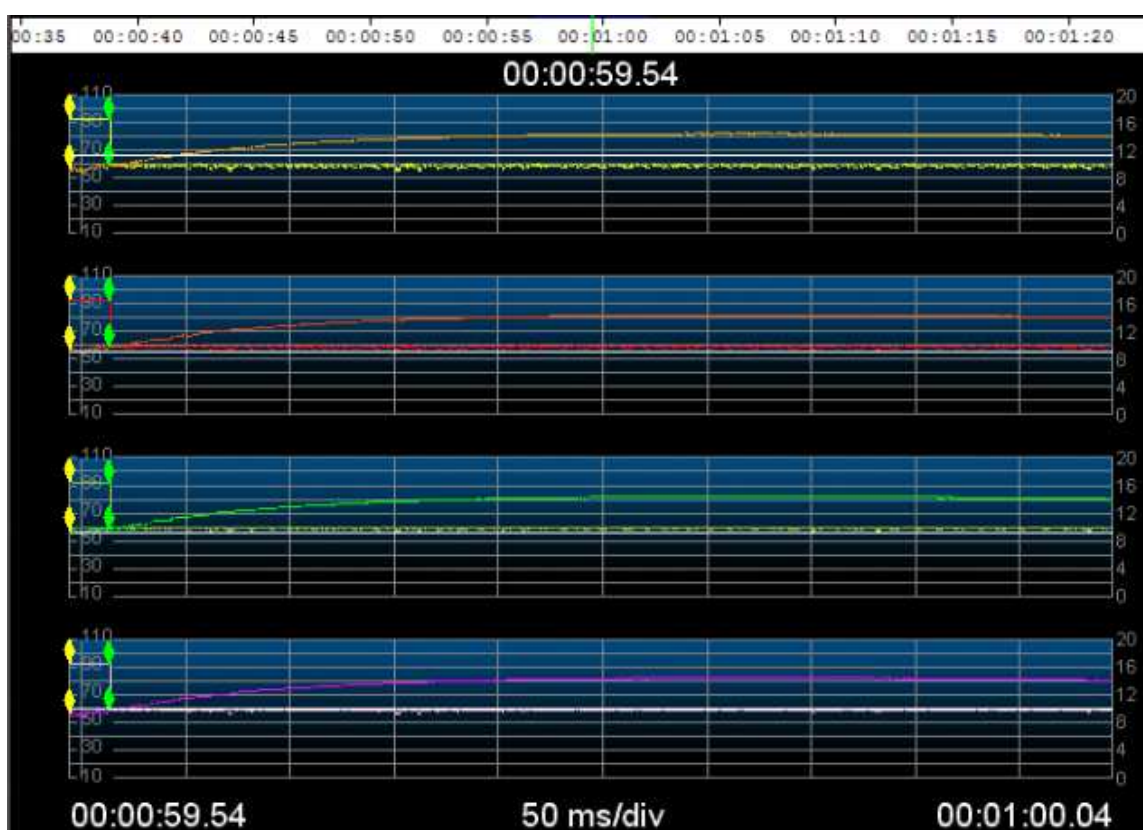


Fig. D.65: Zoom buttons window



**Fig. D.64: Waveforms diagram (single diagram)**

The visualization diagram of the selected click can be split in either one (Fig. D.64) or four separated diagrams (Fig. D.66) with the first button from the left on the lower right part of the ANALYZE page (Fig. D.62).



**Fig. D.66: Waveforms diagram (split on four separated diagrams)**



The visualization diagram of the selected click can be zoom both horizontally both vertically with + and – buttons on the lower right side of the page (Fig. D.67).



Fig. D.67: Split and Zoom buttons window

For both diagrams the displayed data can be filtered by the operator choosing:

- the channel and the current absorbed by the EUT to visualize with RX box (Fig. D.68), for example in the case the 500kHz channel (Fig. 69);



Fig. D.68: RX box

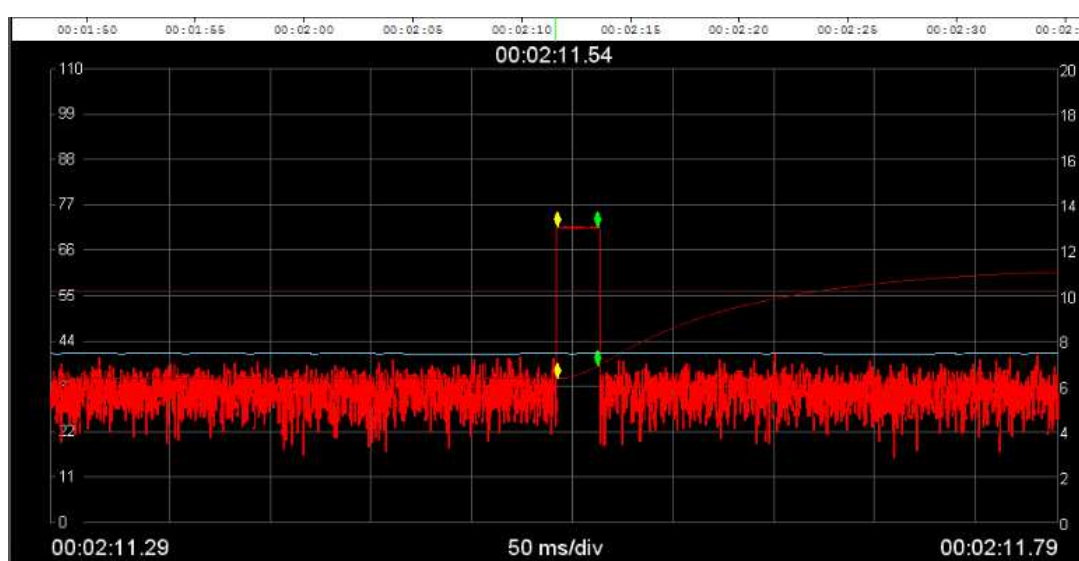


Fig. D.69: 500kHz channel results display

- the data to visualize for all the diagrams (Peak, Quasi-Peak or Limit) with GRAPHIC Box (Fig. D.70);

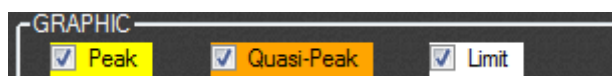


Fig. D.70: GRAPHIC box

- the visualization scale of the current absorbed by the EUT (5, 10, 15, 20 and 30A) with Current box (Fig. D.71);

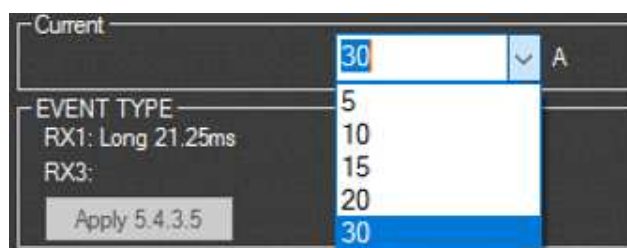
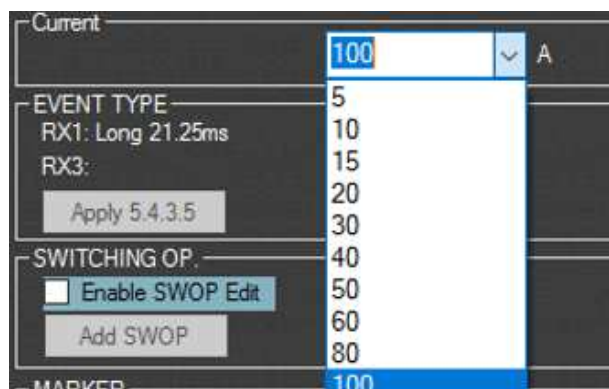


Fig. D.71: Current box

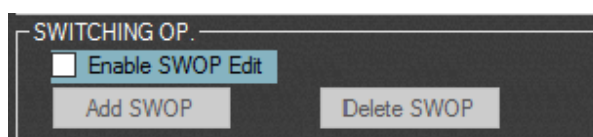


- the visualization scale of the current absorbed by the EUT in case of usage of SW04/100 switching box (5, 10, 15, 20, 30, 40, 50, 60, 80 and 100A) with Current box (Fig. D.72);



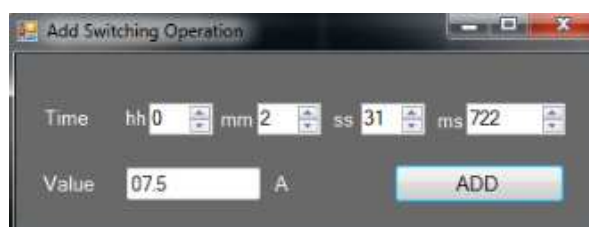
**Fig. D.72: RX box**

- to add or delete a switching operation (after enabling the edit and selecting it on the upper diagram) with SWITCHING OP. box (Fig. D.73);



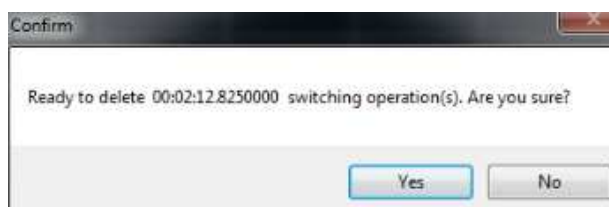
**Fig. D.73: SWITCHING OP. box**

After selecting Add SWOP, to edit and add a switching operation the following window appears (Fig. D.74):



**Fig. D.74: Add Switching Operation Window**

After selecting Delete SWOP, to delete a switching operation the following window appears (Fig. D.75), asking for confirmation by the end user:



**Fig. D.75: Add Switching Operation Window**

- to visualize the value of Peak and Quasi-Peak of a selected click moving on the lower diagram the two markers MK1 (with mouse left click) and MK2 (with mouse right click) and to calculate the distance of Quasi-Peak values of both markers (always enabled) from the limit ( $\Delta ML1$  and  $\Delta ML2$ ) into MARKER Box (Fig. D.76). Also the Time distance between the two markers can be shown;

MARKER				
	MK1	MK2	ΔML1	ΔML2
150 kHz P	93.6	92.4		
QP	57.7	58.7	-08.3	-07.3
500 kHz P	93.6	92.4		
QP	57.7	58.7	01.7	02.7
1.4 MHz P	93.6	92.4		
QP	57.7	58.7	01.7	02.7
30 MHz P	93.6	92.4		
QP	57.7	58.7	-02.3	-01.3
Time	00:00:59.544	00:00:59.562	19	ms

Fig. D.76: MARKER box

- to move the selected marker with → and ← arrows and to change the enabled marker through ↑ and ↓ buttons (if the mouse arrow is located on the lower diagram);

The event type and the duration of the selected click for each channel is displayed on EVENT Type box (Fig. D.77).

EVENT TYPE	
RX1:	RX2: Long 30.17ms
RX3:	RX4:
Apply 5.4.3.5	

Fig. D.77: EVENT TYPE box

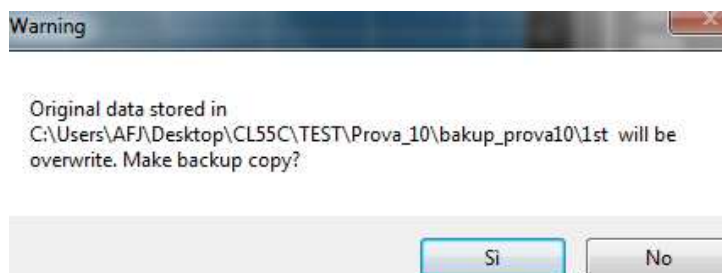
The software allows to apply, with *Apply 5.4.3.5 (Apply 4.2.3.4)* button on the EVENT TYPE box, the exception of the definition of click defined on the Sub Clause 5.4.3.5 of CISPR 14-1 Ed. 6.0 and CISPR 14-1 Ed. 7.0 standards (Sub Clause 4.2.3.4 of CISPR 14-1 Ed. 5.2 standard) on continuous disturbances if there are the conditions. This exception can be applied if the event is Cont. Interference (continuous interference) type only (Fig. D.78).

EVENT TYPE	
RX1:	RX2: Cont. Int.
RX3:	RX4:
Apply 5.4.3.5	

Fig. D.78: Exception application condition

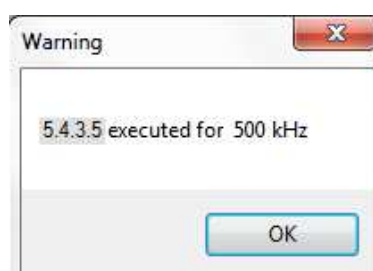
The *Apply 5.4.3.5 (Apply 4.2.3.4)* button must be pushed for each channel with Cont. Interference (continuous interference) event type (i.e. once for RX2 channel for the data shown on Fig. D.78).

When the software applies this exception it modifies permanently the xml files of the stored clicks, for this reason it asks for saving or not a backup copy of the measurement before proceeding (Fig. D.79).



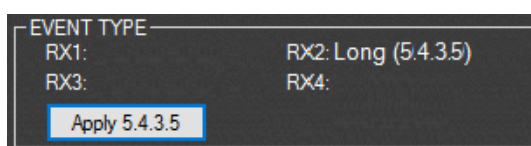
**Fig. D.79: Backup Copy Request window**

In case of positive answer, the software asks for creating a backup folder. The exception will be applied with a confirmation message (Fig. D.80).



**Fig. D.80: Exception application confirmation**

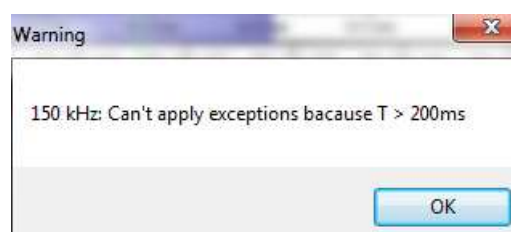
The EVENT TYPE box will be modified specifying the new event after the application of the exceptions (Fig. D.81).



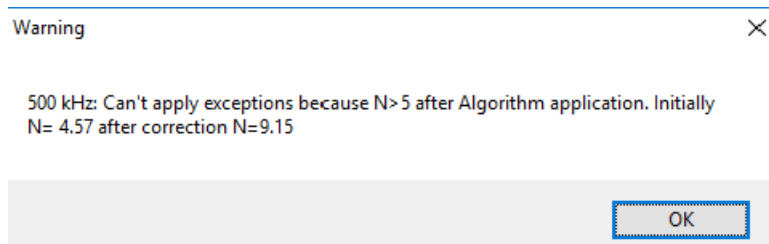
**Fig. D.81: Exception application specification**

Consequently the application of this exception will be shown on the measurement data either on the CALCULATION PAGE or on the RESULTS page.

In case there are not the conditions to apply the exception of the definition of click defined on the Sub Clause 5.4.3.5 of CISPR 14-1 Ed. 6.0 and CISPR 14-1 Ed. 7.0 standards (Sub Clause 4.2.3.4 of CISPR 14-1 Ed. 5.2 standard) on continuous disturbances on a specific frequency channel, warning messages will be shown by the software (Fig. D.82 and Fig. D.83).

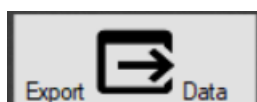


**Fig. D.82: Exception not applied**

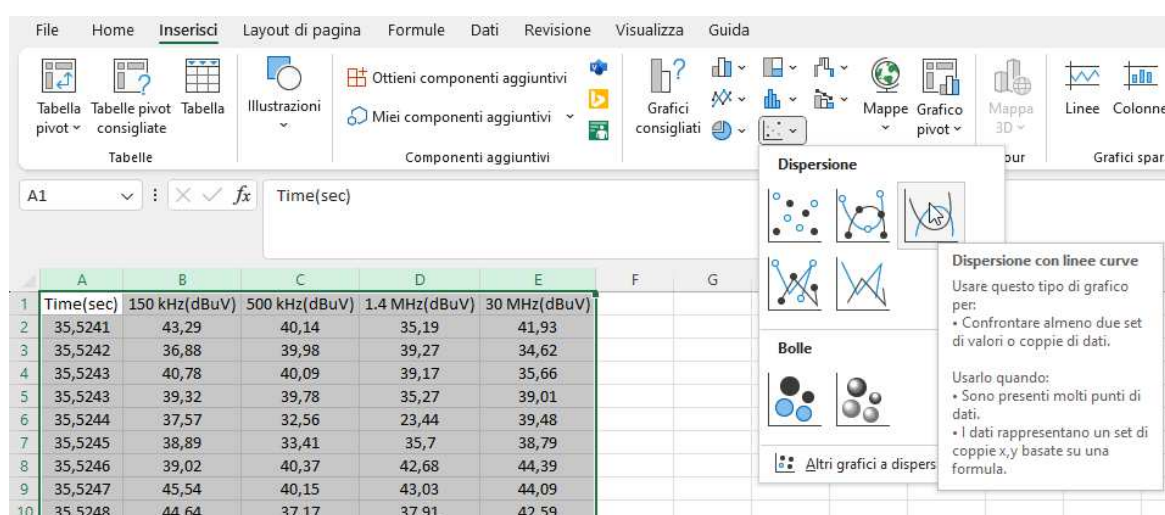


**Fig. D.83: Exception not applied**

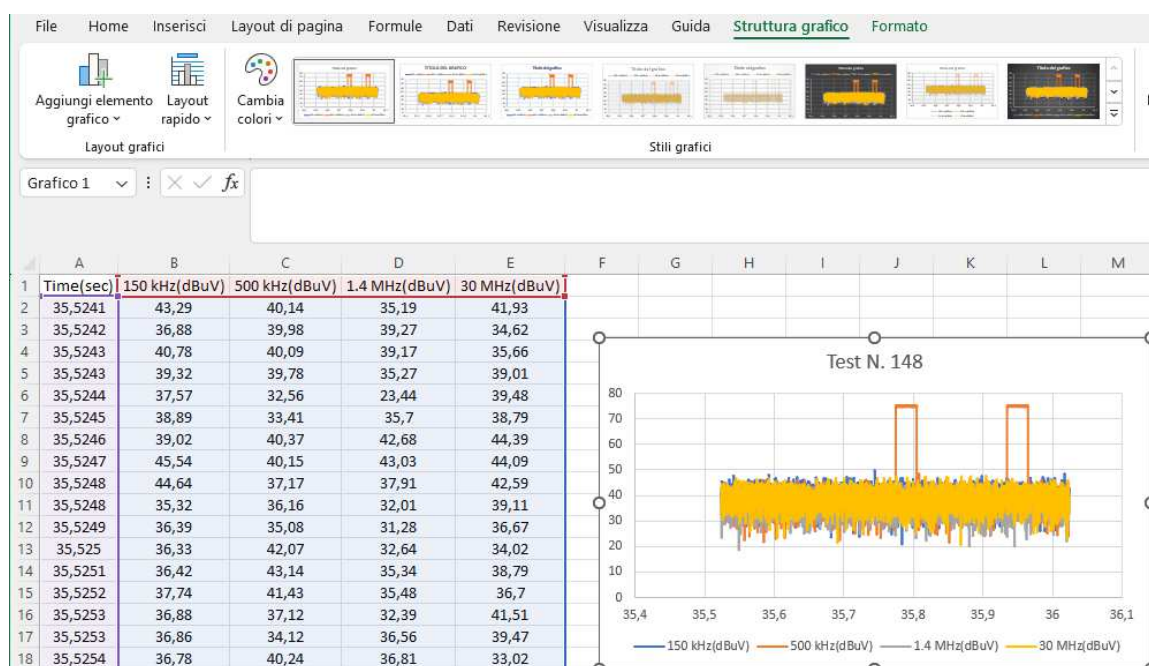
It is possible to export the measured data in \*.csv (Excel) format (Fig. D.84) for further own elaboration by the operator (Fig. D.85 and D.86).



**Fig. D.84: Export Data window**



**Fig. D.85: Elaboration of the Data – Step 1**



**Fig. D.86: Elaboration of the Data – Step 2**

## D.9 • REPORT

The REPORT page is accessed by pressing the REPORT button on the left side of the MAIN COCKPIT window (Fig. D.2). Automatically the software generates a DDA55+ Test Report with all measurement results summarize in a form suitable for reporting and presentation (Fig. D.87).

The report includes the last visualized data either of the CALCULATION page or on RESULTS page if these ones are properly loaded into their form.

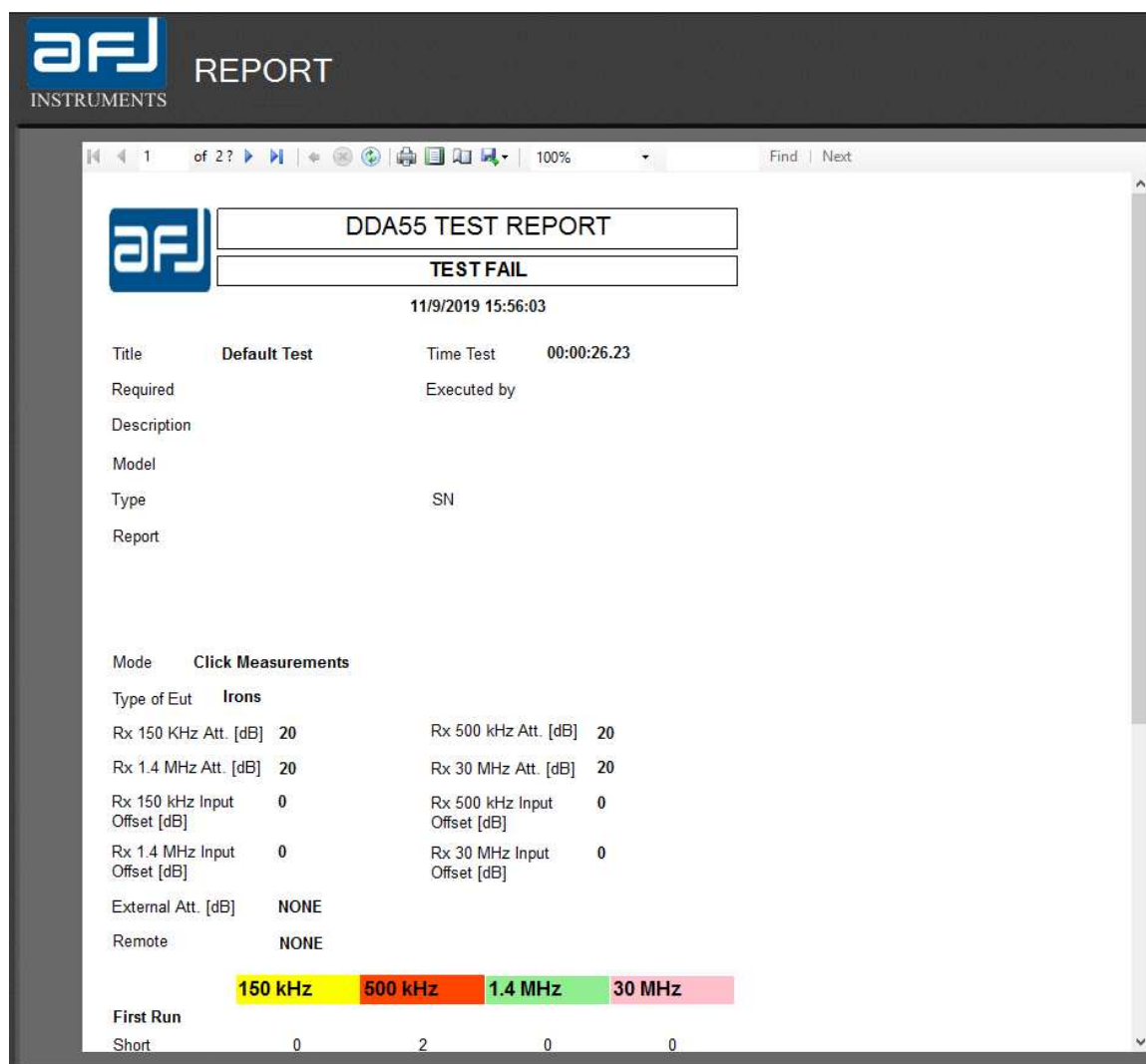


Fig. D.87: REPORT page

In the headings you can navigate the report on different pages, print it on papers and save it as an Excel, PDF and Word file (Fig. D.88).

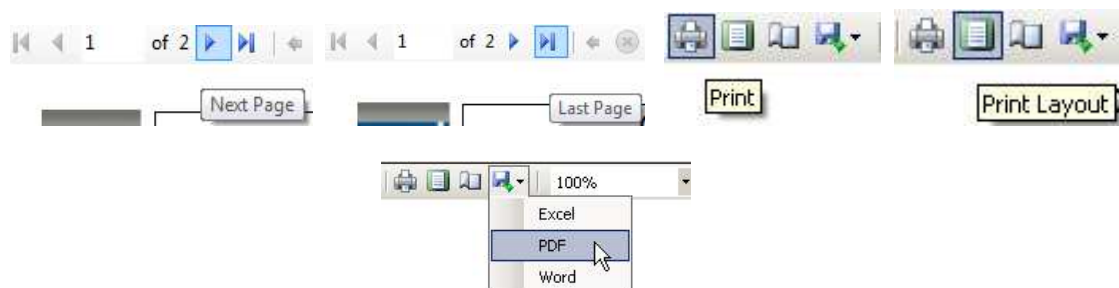



Fig. D.88: Navigation, Print, Print layout, Export as Excel / PDF / Word file

### D.9.1 • EXAMPLE OF TEST

	<b>DDA55+ TEST REPORT</b>		
	<b>PASS</b>		
<b>25/11/2015 01:21:23</b>			
Title	<b>First Test</b>	Time Test	<b>00:05:05.40</b>
Required	<b>AFJ</b>	Executed by	<b>J. Stark</b>
Description	<b>Dummy Iron</b>		
Model	<b>Steel 3</b>		
Type	<b>Dry</b>	SN	<b>1976</b>
Report	First test after design and assembly		
Mode	<b>Click Rate</b>		
Type of Eut	<b>Irons</b>		
Rx 150 KHz Att. [dB]	<b>25</b>	Rx 500 kHz Att. [dB]	<b>15</b>
Rx 1.4 MHz Att. [dB]	<b>15</b>	Rx 30 MHz Att. [dB]	<b>20</b>
Rx 150 kHz Input Offset [dB]	<b>0</b>	Rx 500 kHz Input Offset [dB]	<b>0</b>
Rx 1.4 MHz Input Offset [dB]	<b>0</b>	Rx 30 MHz Input Offset [dB]	<b>0</b>
External Att. [dB]	<b>NONE</b>		

	150 kHz	500 kHz	1.4 MHz	30 MHz
<b>First Run</b>				
Short	0	0	0	0
Long	10	10	10	10
Long (10 < t ≤ 20ms)	0	0	0	0
Total Clicks Corr	10	10	10	10
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	0	0	0	0
5.4.3.5 events	0	0	0	0
Limit dBuV	66	56	56	60
N	1.96	1.96	1.96	1.96
	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
	150 kHz	New Limit Calculated	500 kHz	New Limit Calculated
	1.4 MHz	New Limit Calculated	30 MHz	New Limit Calculated
New Limit [dBuV]	89.68	79.68	79.68	83.68
Allowed Clicks	2	2	2	2
Short	0	0	0	0
Long	1	1	0	0
Total Clicks Corr	1	1	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
5.4.3.5 events	0	0	0	0
	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>



## D.10 • OPTIONS

The OPTIONS page (Fig. D.89) is accessed by pressing the OPTIONS button on the left side of the MAIN COCKPIT window (Fig. D.2).

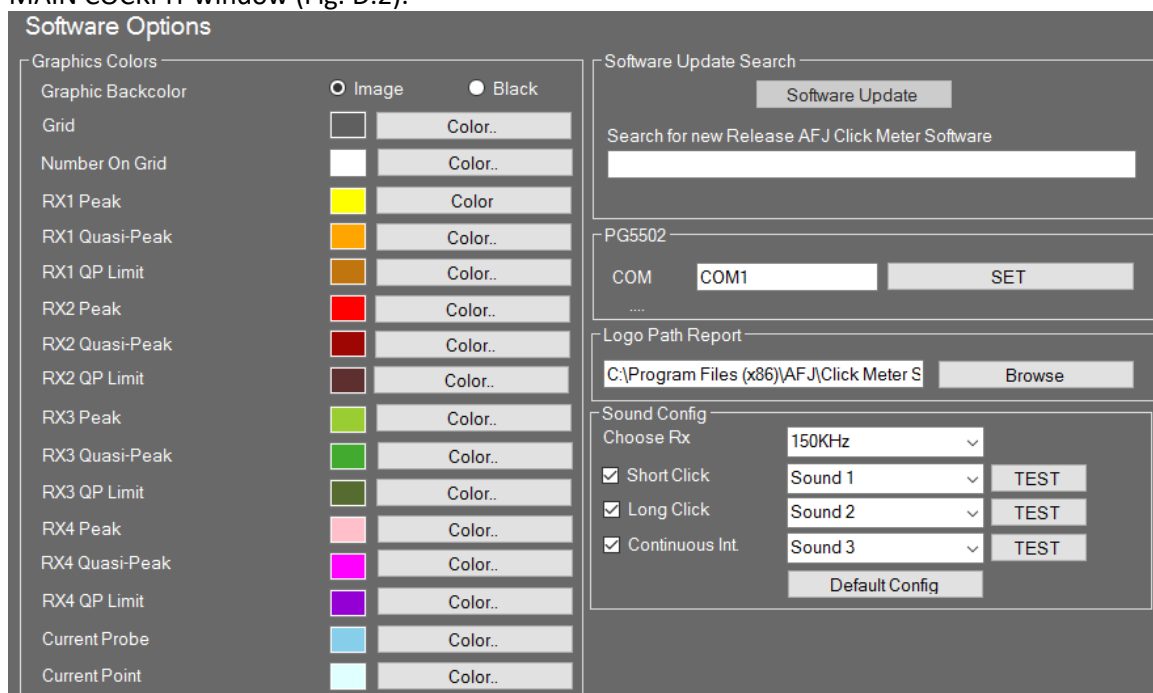


Fig. D.89: OPTIONS page

It allows to set software and hardware options:

- the type of the graphics background between default image or black and the configuration of the colors to associate to the Peak and Quasi-Peak detectors for each channel and to the Current Probe during measurements, with Graphics Colors box (Fig. D.90);

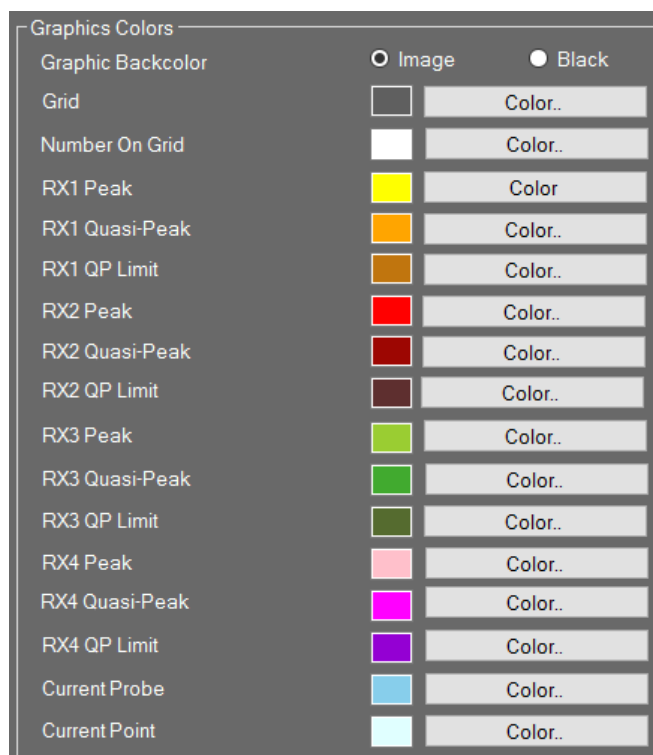
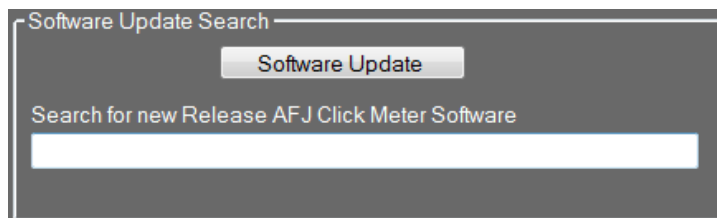


Fig. D.90: Graphics Background box

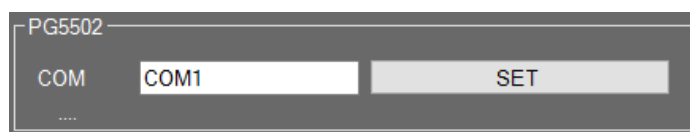
- the search of updated versions of the software on the webserver with Software Update Search (Fig. D.91);



**Fig. D.91: Software Update Search box**

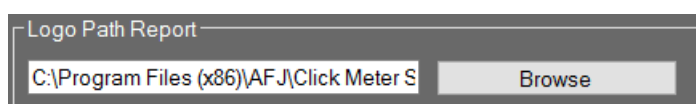
The procedure of searching for new software releases foresees the automatic connection to a webpage saved on *Default.xml* file. Actually this webpage is located to the 'register.eladit.net/upgrade.asp' address and the procedure needs DDA55+ and its PC were properly connected to the network for sending the serial number of the equipment to this webpage. After checking the presence of a new software release on the server, this webpage communicates the link where download it.

- the settings of the AFJ PG5502 with PG5502 box (Fig. D.92). After enabling the interface of this device, the COM port must be set for the communication with DDA55+;



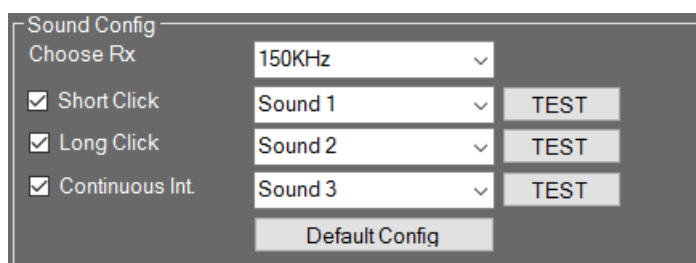
**Fig. D.92: PG5502 box**

- the upload of the company logo to use on the Test Report with Logo Path Report box (Fig. D.93).



**Fig. D.93: Logo Path Report box**

- The Sound Config box (Fig. D.94) allows to set, for each channel, the kind of sound to be associated with each kind of event.



**Fig. D.94: Sound Configuration box**

## D.11 • DENAN OPTIONS

When Denan Options are activated on DDA55+, the operator can perform measurements fully compliant to DENAN LAW Part. 10 Emission Japanese standard with the evaluation of Extra Long Clicks and Denan Rules enabling these options through the checkboxes (Fig. D.32) on the SETTINGS page (Fig. D.9 and Fig. D.10).

### D.11.1 • EXTRA LONG CLICKS

When Denan Option checkbox for the evaluation of Extra Long Clicks box is selected, the system uses the following parameters:

Specific EUT according to DENAN LAW Part. 10

- Analysis frequencies: **150kHz, 500kHz (550kHz), 1.4MHz, 30MHz**
- Minimum separation time between clicks: **200ms**
- Disturbance duration  $\leq 10\text{ms}$  : **Short Click**
- $10\text{ms} < \text{Disturbance duration} \leq 200\text{ms}$ : **Long Click**
- $200\text{ms} < \text{Disturbance duration} \leq 400\text{ms}$ : **Extra Long Click**
- Disturbance duration  $> 400\text{ms}$ : **Continuous Interference**

During First Pass the number of Extra Long Clicks shall be treated as follows:

- if the number of Extra Long Clicks is  $\leq 1/5$  of the total number of Clicks, the Extra Long Clicks shall be counted as ONE Click (Case A);
- if the number of Extra Long Clicks is  $\geq 1/5$  of the total number of Clicks,  $1/5$  of the total number of clicks counted as ONE Click, the remaining Extra Long Clicks are counted as TWO Clicks (Case B).

Numerical examples:

#### Case A

- Total measured clicks = 100  
Extra Long clicks = 15 ( $< 1/5$ )  
No Extra Long clicks = 85 ( $100 - 15$ )  
Computed clicks from Extra Long clicks = 15 ( $15 \times 1$ )  
Computed total clicks = 100 [ $85 + (15 \times 1)$ ]
- Total measured clicks = 100  
Extra Long clicks = 20 ( $= 1/5$ )  
No Extra Long clicks = 80 ( $100 - 20$ )  
Computed clicks from Extra Long clicks = 20 ( $20 \times 1$ )  
Computed total clicks = 100 [ $80 + (20 \times 1)$ ]

#### Case B (Fig. D.88)

- Total measured clicks = 100;  
Extra Long clicks = 26 ( $> 1/5$ );  
No Extra Long clicks = 74 ( $100 - 26$ )  
 **$1/5$  of Total measured clicks = 20;**  
**Remaining Extra Long clicks = 6 ( $26 - 20$ )**  
Computed clicks from Extra Long clicks = 32 ( **$20 \times 1 + 6 \times 2$** )  
Computed total clicks = 106 [ $74 + 32$ ]

File Settings

Load Test

Update File Settings

Title

Default Test

Description

Time Test

00:07:36.12

Model

Creation Date

8/10/2015 12:21:10

SN

Last Modification

15/10/2015 09:02:11

Type

Required

Report

Executed by

Work Dir

C:\Users\utente\Documents\AFJ\CMS DATA FILES\Test\_45

First Run

Calculation Rules: Click Rate

t-clocks time

150 kHz

500 kHz

1.4 MHz

30 MHz

Short (t $\leq$ 10 ms)

50

0

65

0

Long (10< t $\leq$ 400 ms)

50

0

35

0

Tot Clicks Meas

100

0

100

0

Long (10< t $\leq$ 20 ms)

9

0

15

0

Long (20< t $\leq$ 200 ms)

15

0

0

0

Long (200< t $\leq$ 400 ms)

26

0

20

0

Tot Clicks Corr

106

0

100

0

Continuous Int.

0

0

0

0

Events

0.00

0.00

0.00

0.00

Time(s)

0

0

0

0

5.4.3.5 events

0

0

0

0

Sw.Op.

0

0

0

0

Limit dBuV

66

56

56

60

N

13.94

0.00

0.00

0.00

2nd PASS NEED

☒

☒

☒

☒

Test Loaded: DDA55 Click 1st Pass

150 kHz

New Limit Calculated

500 kHz

No Clicks

1.4 MHz

New Limit Calculated

30 MHz

No Clicks

Upper Quartile Method

New Limit [dBuV]

72.66

100.00

Allowed Clicks

26

25

Fig. D.95: First Pass with Extra Long Clicks evaluation

Also the possible Second Pass (either Real or Preview) reports information about the number of Extra Long Clicks evaluation (Fig. D.96).

Second Run

Load 2nd RUN

Upper Quartile Method

150 kHz

500 kHz

1.4 MHz

30 MHz

New Limit [dBuV]

78.64

68.64

68.64

72.64

Allowed Clicks

26

26

26

26

Short (t $\leq$ 10 ms)

0

76

76

76

Long (10< t $\leq$ 400 ms)

24

24

24

24

Tot Clicks Meas

24

100

100

100

Continuous Int.

0

0

0

0

Events

0.00

0.00

0.00

0.00

Time(s)

0

0

0

0

5.4.3.5 events

0

0

0

0

FAIL

☒

☐

☐

☐

Fig. D.96: Second Pass with Extra Long Clicks evaluation

**NOTE:** the evaluation of Extra Long Clicks can be performed also when 550kHz frequency is selected instead of 500kHz (VCCI Option).

### D.11.2 • DENAN RULES

When Denan Option for the evaluation of Denan Rules checkbox is selected, the measurement at 150kHz frequency channel is not required and during the First Pass the verification of the “All clicks  $\leq 10\text{ms}$ ?” condition is performed according to the flow chart described into DENAN LAW Part. 10 Emission Japanese standard (Fig. D.99).

The operator can set the following rules to analyze the measurement (Fig. D.97):



Fig. D.97: Denan Rules

- N click rate calculation at 500kHz frequency channel only (at 550kHz frequency channel only also when 550kHz frequency is selected instead of 500kHz (VCCI Option)).
- EUT type selection among Class A ( $N \leq 1.5$ ), Class B ( $N \leq 5$ ) and Neither A or B. The EUT type selection into the Calculations rules window does not define any further rule and any value of the f factor.
- The selection of the f factor value
  - if  $f=1$ , it is possible to select between click or switching operations evaluation (Fig. D.100);
  - if  $f<1$ , switching operations evaluation is possible only (Fig. D.101);

The selection of the f factor disappears from the Calculations rules window because the value of this parameter is manually selected by the operator into the Denan Options box (Fig. D.98).

- “> 2 clicks in 2s” phenomenon (this option is valid at the end of second pass only).  
In case of this rule the measurement is FAIL according to the specification below

*“> 2 Clicks in 2s” phenomenon described in DENAN LAW Part. 10 Emission Japanese standard*

- *This is evaluated in Second Run only, not during First Run;*
- *If the > 2 Clicks in 2s phenomenon occurs among clicks exceeding Lq limit during Second Run, the measurement is evaluated as FAIL. According to the standard, > 2 Clicks in 2s phenomenon is regarded as continuous interference and evaluated by L limit, which means automatically that the measurement is FAIL;*
- *“> 2 Clicks in 2s” phenomenon evaluation shall be selectable for the operator that can select if either activate it or not.*



Fig. D.98: Manual selection of the f factor

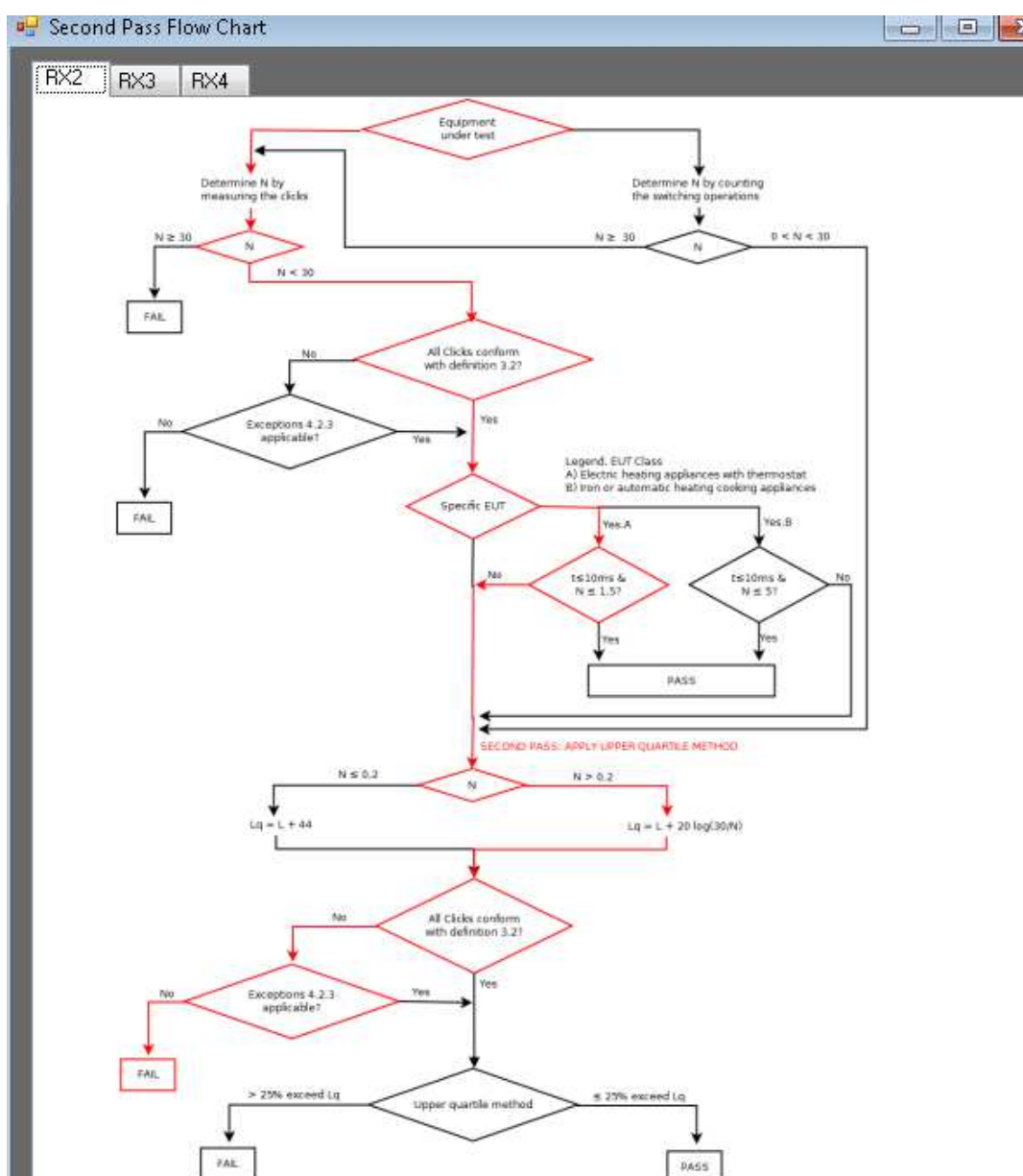


Fig. D.99: DENAN LAW Part. 10 Emission Japanese standard Flow Chart

Calculation Rules

Floor polishers

Click Rate N based on:

☐ Click Measurements
 ☒ Switching Op. (Auto f)
 ☐ Switching Op. (Manual f)

Rx 150 kHz Limit [dBuV] 66.0

Rx 1.4 MHz Limit [dBuV] 56.0

Rx 500 kHz Limit [dBuV] 56.0

Rx 30 MHz Limit [dBuV] 60.0

Hardware Settings

Rx 150 kHz Att. [dB] 20

Rx 150 kHz Input Offset [dB] 0.0

Rx 500 kHz Att. [dB] 20

Rx 500 kHz Input Offset [dB] 0.0

Rx 1.4 MHz Att. [dB] 20

Rx 1.4 MHz Input Offset [dB] 0.0

Rx 30 MHz Att. [dB] 20

Rx 30 MHz Input Offset [dB] 0.0

External Att. [dB] NONE

Remote NONE

Switching Operations Settings

Min Current Variation (A) 1.0

Filter Number 1

End Of Test

Time Limit [min] max 900 120

☒ Time limit for continuous interference Time[ms] 1000

☒ Total Click/Switching Operation number Max 2

Display Settings

Snapshot PreTrigger [ms] 50.0

Gate Time [ms] 500.0

Ref level 110.0

dB/div 10.0

General Settings

Work Dir. C:\Users\user\Documents\AFJ\CMS DATA FILES\Test\_Daikin\_18

Test Counter 18

Setup Dir. DDA55Setup0.set

HD Free Memory Space: 67.04GB

Operating Mode

Rec Data & Events (preview allowed)

Denan Options

☐ Enable Extra Long Click
 ☒ Enable Denan Rules
 ☒ N calculated only for 500 kHz
 ☐ N ≤ 1.5 (EUT A)
 ☐ N ≤ 5 (EUT B)
 ☐ Neither A or B
 

f = 1.0

☐ > 2 Clicks in 2s (only 2nd run)

Rx1 Frequency Setting

Rx1 Freq 500kHz

SAVE SET

LOAD SET




Fig. D.100: Selection between either click or switching operations evaluation with  $f=1$

Calculation Rules

Type of Eut

Click Rate N based on:

☐ Click Measurements
 ☐ Switching Op. (Auto f)
 ☒ Switching Op. (Manual f)

Rx 150 kHz Limit [dBuV] 66.0

Rx 1.4 MHz Limit [dBuV] 56.0

Rx 500 kHz Limit [dBuV] 56.0

Rx 30 MHz Limit [dBuV] 60.0

Hardware Settings

Rx 150 kHz Att. [dB] 20

Rx 150 kHz Input Offset [dB] 0.0

Rx 500 kHz Att. [dB] NONE

Rx 500 kHz Input Offset [dB] 0.0

Rx 1.4 MHz Att. [dB] 20

Rx 1.4 MHz Input Offset [dB] 0.0

Rx 30 MHz Att. [dB] 20

Rx 30 MHz Input Offset [dB] 0.0

External Att. [dB] NONE

Remote NONE

Switching Operations Settings

Min Current Variation (A) 1.0

Filter Number 1

End Of Test

Time Limit [min] max 900 120

☒ Time limit for continuous interference Time[ms] 1000

☒ Total Click/Switching Operation number Max 2

Display Settings

Snapshot PreTrigger [ms] 50.0

Gate Time [ms] 500.0

Ref level 110.0

dB/div 10.0

General Settings

Work Dir. C:\Users\utente\Documents\AFJ\CMS DATA FILES\Test\_14

Test Counter 14

Setup Dir. DDA55Setup0.set

HD Free Memory Space: 102.52GB

Operating Mode

Rec Data & Events (preview allowed)

Denan Options

☐ Enable Extra Long Click
 ☒ Enable Denan Rules
 ☒ N calculated only for 500 kHz
 ☐ N ≤ 1.5 (EUT A)
 ☐ N ≤ 5 (EUT B)
 ☐ Neither A or B
 

f = 0.5

☐ > 2 Clicks in 2s (only 2nd run)

Rx1 Frequency Setting

Rx1 Freq 500kHz

SAVE SET

LOAD SET




Fig. D.101: Switching operations evaluation with  $f<1$



The following example shows First Pass with Denan Rules evaluation selecting Click Measurements and EUT type Class A ( $N \leq 1.5$ ).

N click rate is 3.89 (so  $N > 1.5$ ), this means the Second Pass is necessary (Fig. D.102).

First Run		Calculation Rules: Click Measurements (Denan EUT class A)				Test Loaded: DDA55 Click 1st Pass	
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz			
Short ( $t \leq 10$ ms)	0	8	0	0	150 kHz		
Long	0	0	0	0	No Clicks		
Tot. Clicks Meas	0	8	0	0	500 kHz		
Long ( $10 < t \leq 20$ ms)	0	0	0	0	New Limit Calculated		
Long ( $20 < t \leq 200$ ms)	0	0	0	0	1.4 MHz		
Tot. Clicks Corr	0	8	0	0	No Clicks		
Continuous Int. Events	0	0	0	0	30 MHz		
Time(s)	0.00	0.00	0.00	0.00	No Clicks		
5.4.3.5 events	0	0	0	0	Upper Quartile Method		
Sw.Op.	0	0	0	0	New Limit [dBuV] 73.74		
Limit dBuV	66	56	56	60	Allowed Clicks 2		
N	0.00	3.89	3.89	3.89	5.4.2.3		
2nd PASS NEED		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Fig. D.102: First Pass with Denan Rules evaluation and EUT Class A

The next example shows First Pass with Denan Rules evaluation selecting Click Measurements and EUT type Class B ( $N \leq 5$ ).

N click rate is 3.89 (so  $N \leq 5$ ), this means the Second Pass is not required and the measurement is PASS (Fig. D.103).

First Run		Calculation Rules: Click Measurements (Denan EUT class B)				Test Loaded: DDA55 Click 1st Pass	
t=clicks time	150 kHz	500 kHz	1.4 MHz	30 MHz			
Short ( $t \leq 10$ ms)	0	8	0	0	150 kHz		
Long	0	0	0	0	No Clicks		
Tot. Clicks Meas	0	8	0	0	Text		
Long ( $10 < t \leq 20$ ms)	0	0	0	0	1.4 MHz		
Long ( $20 < t \leq 200$ ms)	0	0	0	0	No Clicks		
Tot. Clicks Corr	0	8	0	0	30 MHz		
Continuous Int. Events	0	0	0	0	No Clicks		
Time(s)	0.00	0.00	0.00	0.00	Upper Quartile Method		
5.4.3.5 events	0	0	0	0	New Limit [dBuV]		
Sw.Op.	0	0	0	0	Allowed Clicks		
Limit dBuV	66	56	56	60			
N	0.00	3.89	3.89	3.89	5.4.2.3		
PASS		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Fig. D.103: First Pass with Denan Rules evaluation and EUT Class B

**NOTE:** the evaluation of Denan Rules can be performed also when 550kHz frequency is selected instead of 500kHz (VCCI Option).

## D.12 • USAGE OF DDA55+ PULSE GENERATOR

DDA55+ Pulse Generator has been designed and manufactured for checking, with standard pulses according to **CISPR 16-1-1 Table 14** (Fig. D.104) and **CISPR 16-1-1 Annex F Table F.1** (Fig. D.105) or CUSTOM pulses 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. It can be used also like CW Generator.

The pulse generator is remotely controlled by DDA55+ software.

Anytime the pulse generator must be used, remove the plug from the CLICK PULSE OUT connector (Fig. B.3) and connect the CLICK PULSE OUT connector with a RF cable to the RF input of the click meter or analyser to be checked. In case of the same DDA55+, please connect the RF cable to RF IN connector. After using the pulse generator and before starting any measuring session, connect the plug to the CLICK PULSE OUT connector (Fig. B.3).


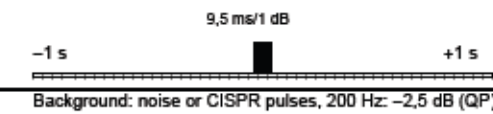
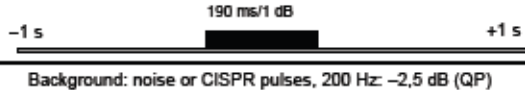





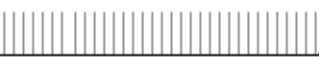
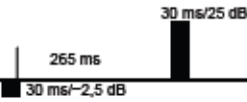
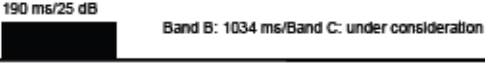
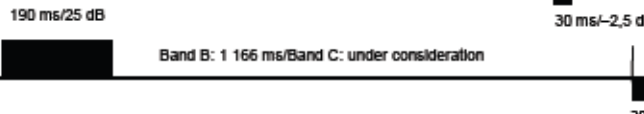





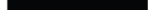




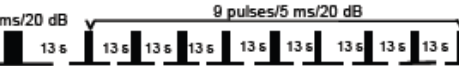
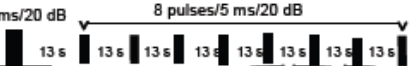
Test No.	Test signal	Evaluation by the analyzer
1		1 click
2		1 click
3		1 click
4		Other than click
5		Other than click
6		Other than click
7		1 click
8		2 clicks
9		Other than click
10		1 click
11		2 clicks
12		1 click

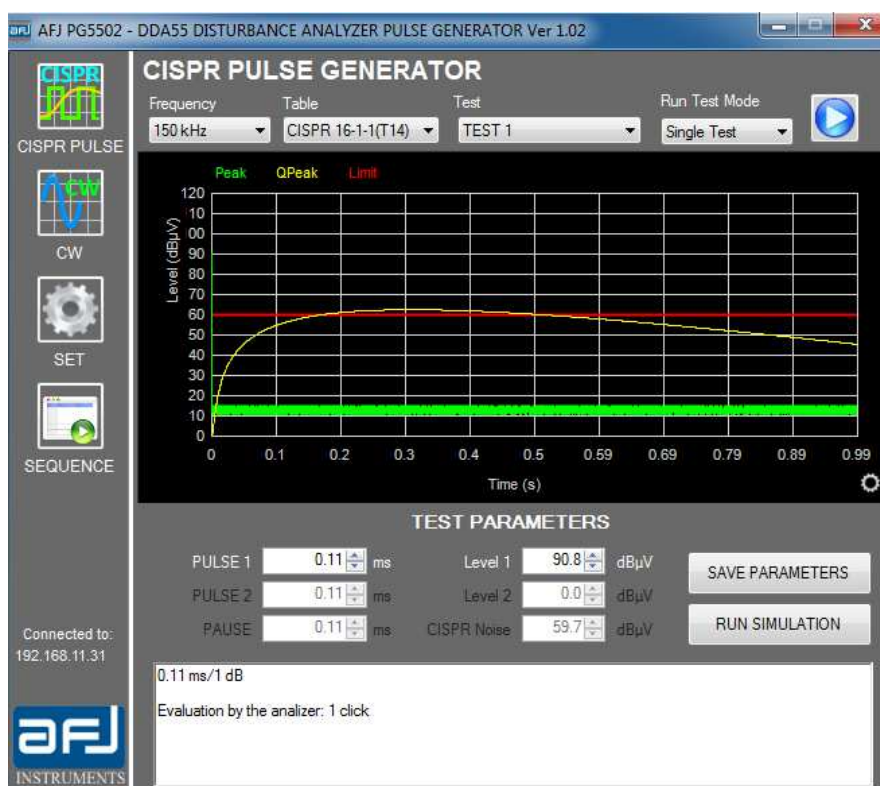
Fig. D.104: CISPR 16-1-1 Table 14

Test No	Test signal	Evaluation by the analyzer
1	 0,11 mV/1 dB	1 click $\leq 10$ ms
2	 9,5 ms/1 dB	1 click $\leq 10$ ms
3	 10,5 ms/1 dB	1 click $> 10$ ms, $\leq 20$ ms
4	 19 ms/1 dB	1 click $> 10$ ms, $\leq 20$ 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 $\leq 600$ ms (DUT programme-controlled)
8	 220 ms/5 dB    190 ms    220 ms/5 dB	Continuous $\geq 600$ ms
9	 190 ms/5 dB    190 ms    190 ms/5 dB	1 click $\leq 600$ 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 $\leq 600$ ms for programme controlled DUT
11	 15 ms/20 dB    13 s    9 pulses/5 ms/20 dB    13 s    13 s    13 s    13 s    13 s    13 s    13 s    13 s    13 s repeated up to 40 counted clicks	36 clicks $\leq 10$ ms 4 clicks $> 10$ ms, $\leq 20$ ms
12	 15 ms/20 dB    13 s    8 pulses/5 ms/20 dB    13 s    13 s    13 s    13 s    13 s    13 s    13 s repeated up to 40 counted clicks	35 clicks $< 10$ ms 5 clicks $> 10$ ms, $\leq 20$ ms

**Fig. D.105: CISPR 16-1-1 Annex F Table (F.1)**

The CISPR PULSE GENERATOR page (Fig. D.106) is accessed by pressing the PULSE GEN button on the left side of the MAIN COCKPIT window (Fig. D.2).

The first window to appear is the CISPR PULSE GENERATOR menu for CISPR 16-1-1 and CUSTOM tests (Fig. D.106). It is possible to access to this menu selecting CISPR PULSE on the left side of the page.



**Fig. D.106: CISPR PULSE GENERATOR menu**

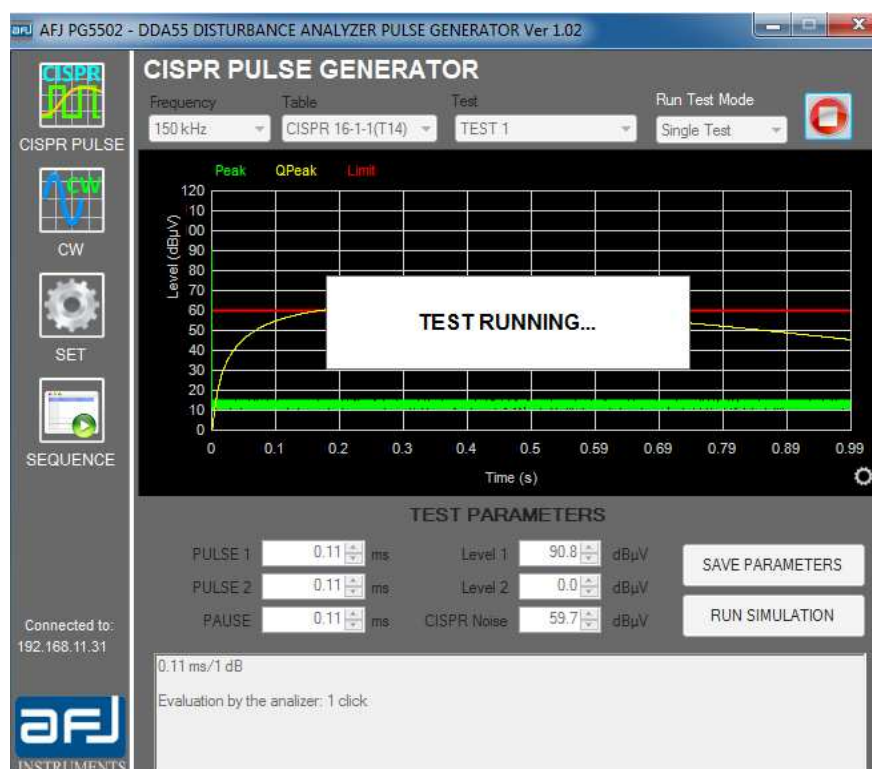
On this menu it is possible to select the frequency of the channel, the table (CISPR 16-1-1 Table 14, CISPR 16-1-1 Annex F Table F.1 or CUSTOM defined by the end user), the type of the test and the running test mode of the test to perform.

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.

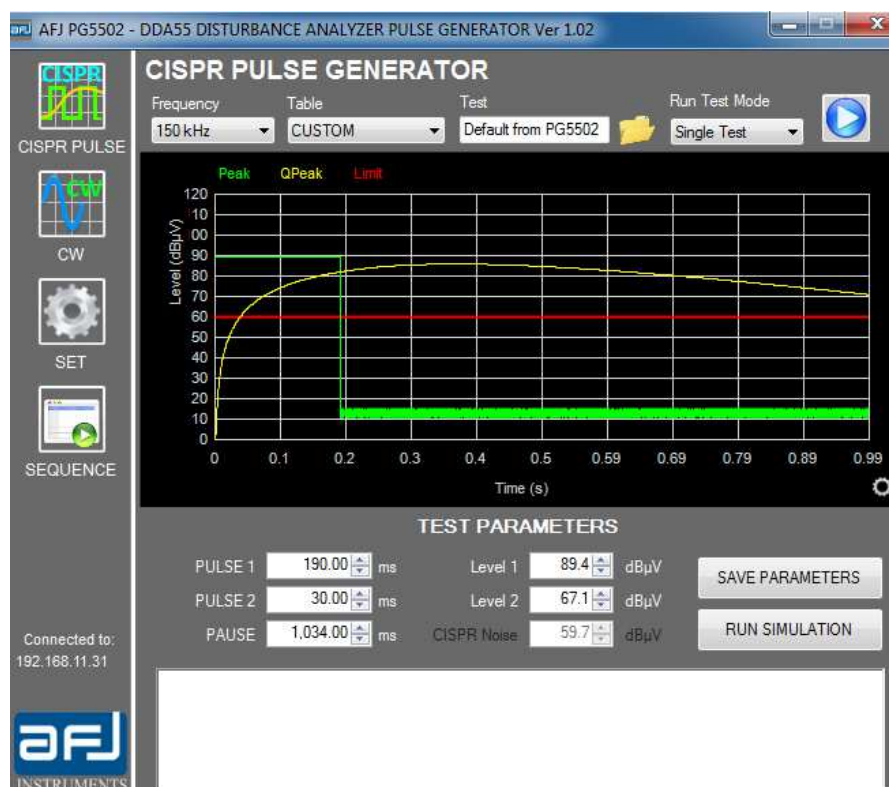
The RUN TEST MODE section allows to set the operative mode among “Single Test”, “Continuous” and “Scan Table”.

Pushing START for running the test, TEST RUNNING... message appears to inform the end user that the pulse generator is working (Fig. D.107).

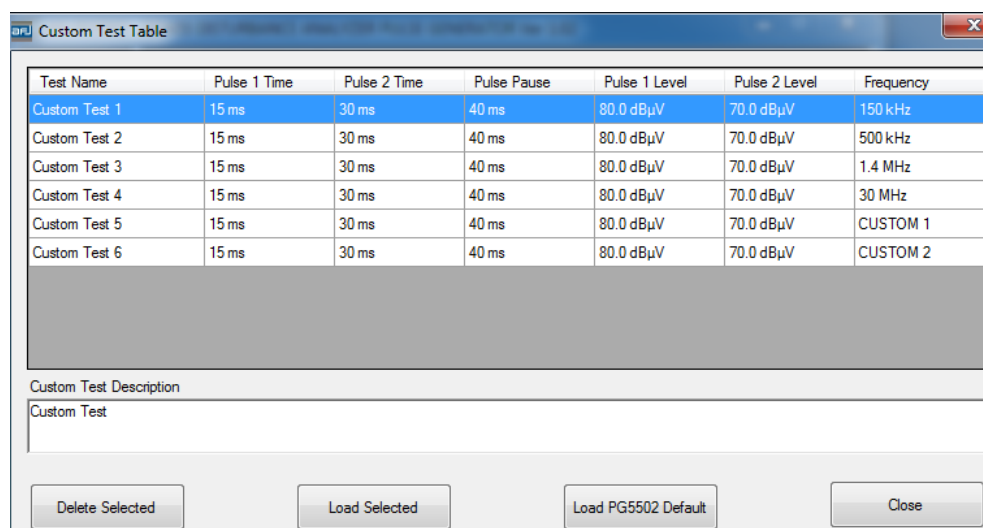


**Fig. D.107: TEST RUNNING message**

When CUSTOM table is selected (Fig. D.108), it is possible to run a test stored into the pulse generator. Pushing the folder browse button, it is possible to manage the table with the list of the custom tests (Fig. D.109).



**Fig. D.108: CUSTOM table**



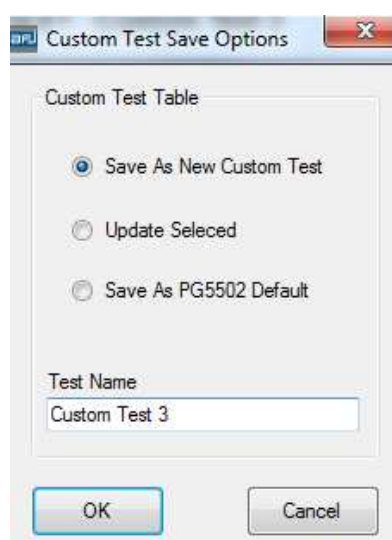
Test Name	Pulse 1 Time	Pulse 2 Time	Pulse Pause	Pulse 1 Level	Pulse 2 Level	Frequency
Custom Test 1	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	150 kHz
Custom Test 2	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	500 kHz
Custom Test 3	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	1.4 MHz
Custom Test 4	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	30 MHz
Custom Test 5	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	CUSTOM 1
Custom Test 6	15 ms	30 ms	40 ms	80.0 dBµV	70.0 dBµV	CUSTOM 2

Custom Test Description  
Custom Test

Delete Selected Load Selected Load PG5502 Default Close

**Fig. D.109: CUSTOM test table**

To insert a test into the list it is necessary to select the CUSTOM table mode and push SAVE TEST PARAMETERS. The following window appears (Fig. D.110):



Custom Test Table

☒ Save As New Custom Test  
☐ Update Selected  
☐ Save As PG5502 Default

Test Name  
Custom Test 3

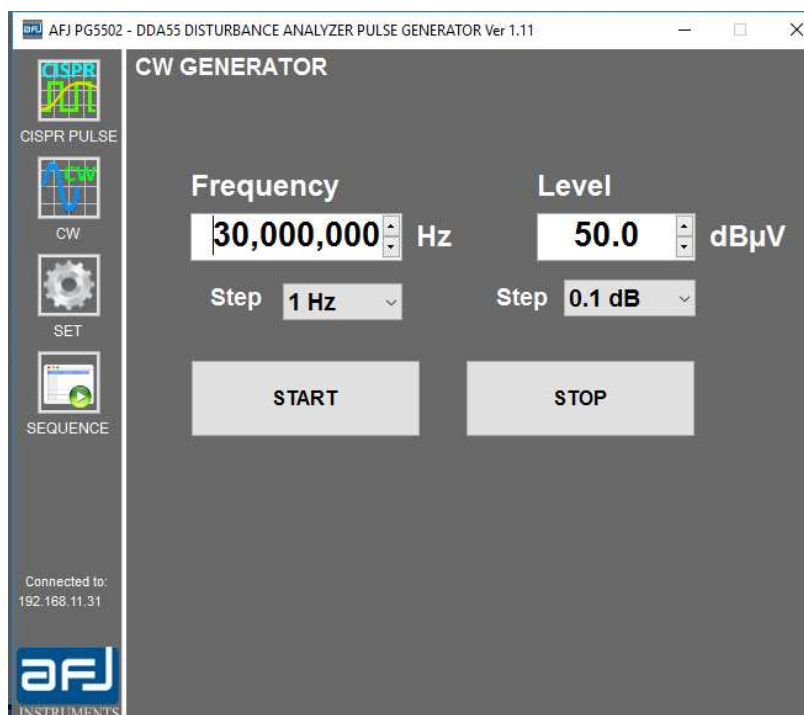
OK Cancel

**Fig. D.110: CUSTOM test save options**

There are three available options:

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

Selecting CW, the CW GENERATOR menu appears (Fig. D.111). Adjust Frequency and Level and then push START / STOP to run the generator.



**Fig.D.111: CW GENERATOR menu**

Selecting SET, the PULSE GENERATOR PARAMETERS and SYSTEM INFORMATION menu appears (Fig. D.112).



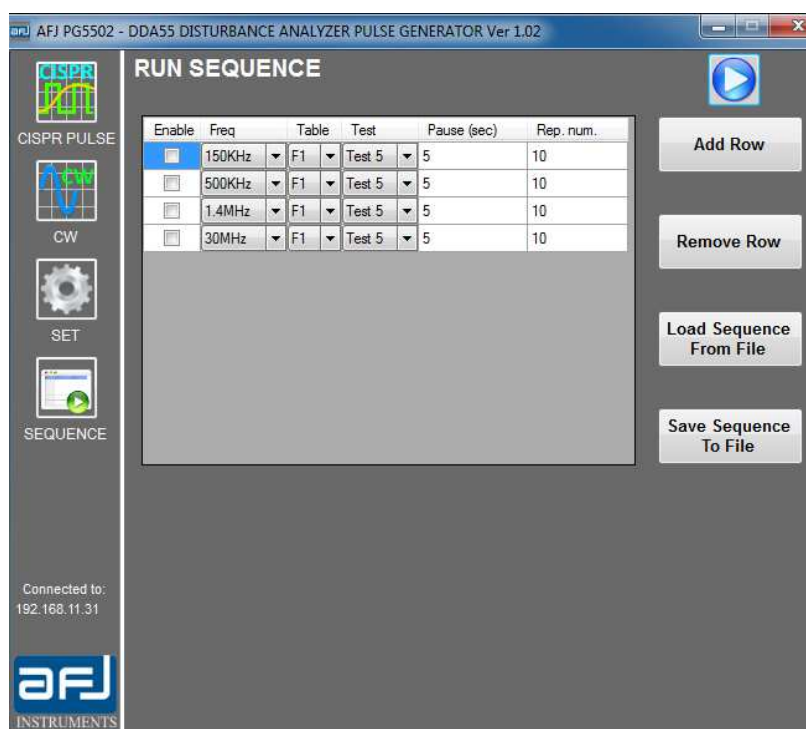
**Fig. D.112: SETUP menu**



With the PULSE GENERATOR PARAMETERS section it is possible to set the custom frequencies, the pause test 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, the firmware and the hardware of the pulse generator. Pushing RESTORE DEFAULT PULSE LEVELS it is possible to reload the default values of the pulses levels. Pushing USER INTERFACE FIRMWARE UPDATE it is possible to update the graphical interface of the equipment.

Selecting SEQUENCE, the RUN SEQUENCE menu appears (Fig. D.113).



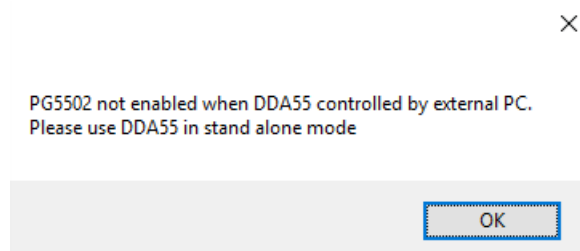
**Fig. D.113: RUN SEQUENCE menu**

With this function it is possible to create a sequence of test enabling the four channels of the equipment and to select for each channel the table (CISPR 16-1-1 Table 14, CISPR 16-1-1 Annex F Table F.1 and CUSTOM), the number of the test, the pause among the single tests and the repetition number of the single test.

During the creation of the sequence new rows on the list can be added with “Add Row” and deleted with “Remove Row”.

Each sequence can be saved selecting “Save Sequence To File” and loaded with “Load Sequence From File”.

When DDA55+ click analyser is remotely controlled by an external PC, PG5502 Pulse Generator is not enabled and it cannot be selected by the operator (Fig. D.114).



**Fig. D.114: PG5502 Pulse Generator not enabled**

The stand alone usage of the equipment is highly recommended.

### D.12.1 • TECHNICAL NOTE

Pulse 2 and pulse 3 of CISPR 16-1-1 Table 14 (Fig. D.115) shall be performed with background noise consisting of 200Hz CISPR pulses at a level 2.5dB below the Quasi-Peak threshold level.

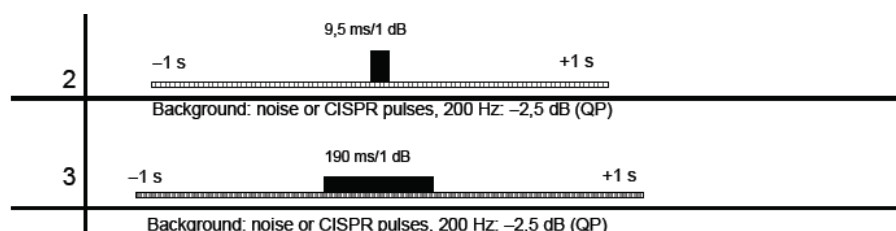


Fig. D.115: CISPR 16-1-1 Table 14 Pulse 2 and pulse 3 with background noise

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 CISPR PULSE IN connector in the front panel of DDA55+, max input level is 63dBμV. The software will show the following window (Fig. D.116):

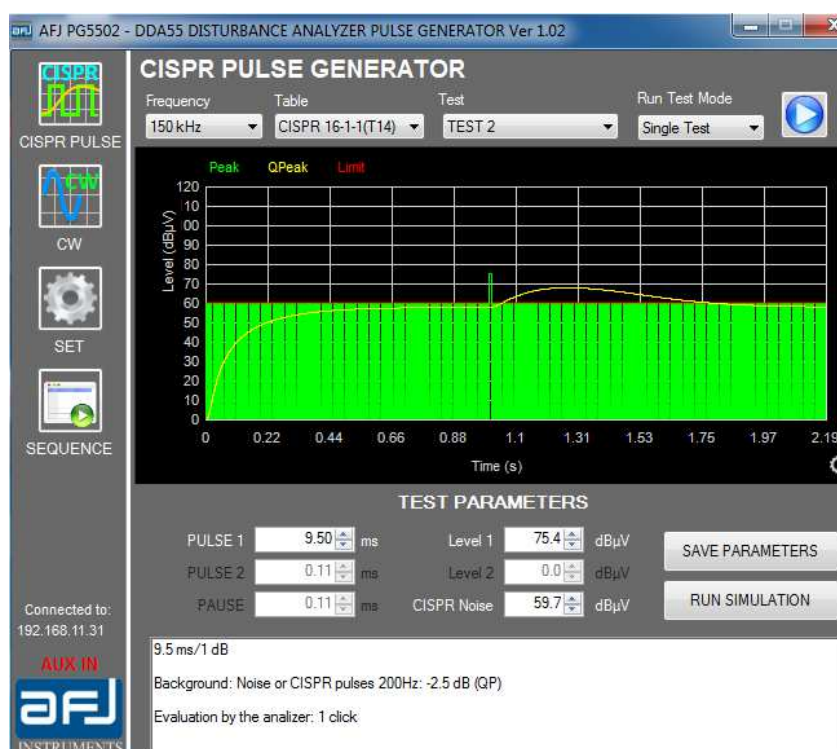


Fig. D.116: CISPR 16-1-1 Table 14 Pulse 2 and pulse 3 with background noise shown by the software

### D.12.2 • TECHNICAL SPECIFICATIONS

Duration of the pulses:	110μs÷1.3ms (Accuracy ±3%)
Rise Time of the pulses:	<1μs
Click analyser test level:	60dBμV
RF Level:	30÷112dBμV
Frequency range:	150kHz÷30MHz
Frequency precision:	<30x10 <sup>-6</sup>
Impedance:	500hm

**D.13 • CLOSE**

CLOSE button allows to close and exit the software safely (Fig. D.117).



**Fig. D.117: CLOSE button**

