

# **OPERATING MANUAL**

# **EMI Receivers**

# FFT 3010 9 kHz ÷ 30 MHz

# FFT 3030 9 kHz ÷ 300 MHz

**REVISION LEVEL 3.5** 

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#### AFJ FFT 3010 AND FFT 3030 EMI RECEIVERS

#### **1. • GENERAL INFORMATION**

The information contained herein, is provided in connection with the usage of hardware and software of AFJ FFT 3010 and FFT 3030 EMI receivers. Members of the AFJ FFT 3000 family are:

FFT 3010	9 kHz	to	30 MHz
FFT 3030	9 kHz	to	300 MHz
FFT 3110	9 kHz	to	1000 MHz
FFT 3100	30 MHz	to	1000 MHz

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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.

#### 2. • SCOPE AND ORGANIZATION OF THE MANUAL

This Manual contains information and procedures required to install and operate the members of the AFJ FFT 3000 family of EMI Receivers. The contents are generic for all models of Interference Measuring Receivers: specific paragraphs, or parts thereof, will describe functionalities and operating modes pertinent to the single models, whenever appropriate.

The manual is divided into six sections as follows:

Section A	<b>RF Emission Testing and FFT-Based EMI Receivers</b>
Section B	General Information
Section C	System Installation
Section D	Operating Instruction
Section E	Report and Applications Notes
Section F	Manual Operations
Section G	Troubleshooting

#### **3.** • STATEMENT OF COMPLIANCE

The AFJ FFT 3010 and FFT 3030 EMI receivers are designed and built in accordance with CISPR Publication 16-1-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".

#### 4. • 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. Warranty is provided "Ex-Works": therefore, AFJ Instruments will be responsible of the Amendment of failures arising from ascertained manufacturing defects only.



- Warranty will not be applicable in case of mishandling, unauthorized opening of the cabinets, improper use, and unauthorized repairs. In such cases, the warranty will be terminated.
- A repair under warranty will not extend the original term of validity of the warranty itself.
- All products or parts thereof, to be subject to a warranty operation, shall be shipped to the appropriate AFJ Instruments Warranty Centre, at Customer's charge.
- If a delivery back to the supplier is necessary, we recommend keeping the original transport case.
   In such case, refer to the following Return Procedure.

#### 5. • RETURN PROCEDURE

To return the FFT 3010 and FFT 3030 EMI receivers 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.

#### 6. • 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.

#### 7. • WORKING CONDITIONS

The allowed temperature range during use of the device is  $+0^{\circ}$ C to  $+45^{\circ}$ C. In cases of storage or transport this range may exceed by  $-20^{\circ}$ C to  $+70^{\circ}$ 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 EMI receiver 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.

<u>Do not cover the ventilation holes</u>. A distance of about 20 cm must be maintained between the rear panel of FFT 3010 and FFT 3030 and any wall and about 5 cm between the sides of FFT 3010 and FFT 3030 and any other equipment or walls.

<u>NOTICE</u>: FFT 3010 and FFT 3030 EMI receivers are supplied in proper special packaging due to their heavy weight. We strongly recommend you to save packaging for next transport.



# CE

# **CE MANUFACTURER DECLARATION OF CONFORMITY**

Manufacturer AFJ INSTRUMENTS SRL Via Gavirate 16 20148 Milano Italy

Product Types EMI receivers models FFT 3010 and FFT 3030

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 MANUFACTURER DECLARATION OF CONFORMITY

Manufacturer AFJ INSTRUMENTS SRL Via Gavirate 16 20148 Milano Italy

Product Types EMI receivers models FFT 3010 and FFT 3030

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



#### SECTION A: RF EMISSION TESTING AND FFT-BASED EMI RECEIVERS

#### A.1 • EMI

EMI (<u>e</u>lectro<u>m</u>agnetic <u>i</u>nterference) is the disruption of operation of an electronic device when it is in the vicinity of an electromagnetic field (EM field) in the radio frequency (RF) spectrum that is caused by another electronic device.

The internal circuits of personal computers generate EM fields in the RF range. Also, cathode ray tube (CRT) displays generate EM energy over a wide band of frequencies. These emissions can interfere with the performance of sensitive wireless receivers nearby. If you have a wireless receiver of any kind and use it at the same time as you operate your personal computer, you will probably hear RF noise in the receiver that originates in the PC system.

Moderate or high-powered wireless transmitters can produce EM fields strong enough to upset the operation of electronic equipment nearby. If you live near a broadcast station or in the downtown area of a large city, you have probably experienced EMI from radio or television transmitters. Cordless telephones, home entertainment systems, computers, and certain medical devices can fail to work properly in the presence of strong RF fields.

Problems with EMI can be minimized by ensuring that all electronic equipment is operated with a good electrical ground system. In addition, cords and cables connecting the peripherals in an electronic or computer system should, if possible, be shielded to keep unwanted RF energy from entering or leaving. Specialized components such as line filters, capacitors, and inductors can be installed in power cords and interconnecting cables to reduce the EMI susceptibility of some systems.

Radio frequency EMI emission tests are a common feature for EMC compliance of most electronic and electrical products. The purpose of these tests is not so much to check the operation of the product, as to ensure the protection of users of the radio spectrum when the product is used in their neighborhood. All commercial products, including some automotive applications, will be tested against the CISPR standards.

#### A.2 • CISPR 16-1-1 INSTRUMENTATION

IEC CISPR publication 16-1-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus", specifies the characteristics and performance of equipment for measuring EMI in the frequency range 9 kHz to 18 GHz. It includes specifications for:

- The Peak, Quasi Peak, CISPR Average, RMS / CISPR RMS measuring receivers including FFTbased EMI receivers that can <u>«sample and evaluate the signal continuously during</u> <u>measurement time»</u> without any *blind gap*, like FFT 3010 and FFT 3030.
- Absorbing clamps
- Antenna
- Tests Sites

All commercial standards refer to CISPR 16-1-1 systems.

The EMI receiver is the key element of either conducted or radiated emission measurements.



# A.2.1 • CISPR 16-1-1 EMI RECEIVER

Parameter	Frequency Range			
	9 ÷150 kHz	0.15 ÷30 MHz	30 ÷ 1000 MHz	1 ÷ 18 GHz
Quasi Peak				
Charge time	45 ms	1 ms	1 ms	Not defined
Discharge time	500 ms	160 ms	550 ms	Not defined
Overload factor	24 dB	30 dB	43.5 dB	
Peak				
au Discharge / $ au$ Charge	1.89 x 10 <sup>4</sup>	1.25 x 10 <sup>6</sup>	1.67 x 10 <sup>7</sup>	1.34 x 10 <sup>8</sup>
General				
Bandwidths (-6 dB)	200 Hz	9 kHz	120 kHz	1 MHz
Sine Wave accuracy	< ± 2 dB	< ± 2 dB	< ± 2 dB	< ± 2.5 dB

The principal measuring receiver CISPR parameters are listed in Table A.1.

Table A.1: CISPR 16-1-1 instrumentation characteristics

Traditional EMI receivers are similar to superheterodyne spectrum analysers in all aspects, with additional features like pre-selector, pre-amplifier and different types of detectors like Peak, Quasi Peak and Average. The pre-selector consists of an input attenuator and a tunable band pass filter. It prevents the input mixer of the EMI receiver from overloading and also it improves the dynamic range. The pre-amplifier is a low noise amplifier, which it is used to improve the sensitivity of the EMI receiver. The main section of the EMI receiver are the IF filters and the detectors. The main detectors used for EMC measurements are Peak, Quasi Peak and Average. Peak detector responds instantaneously to the peak value of the signal and discharges rapidly. The Quasi Peak detector is nothing but a Peak detector with weighted charge and discharge times, which correct for the subjective human response to the pulse type interference. The Average detector measurements the Average value of the signal.

This kind of measurements are very demanding and become very time consuming when large frequency ranges need to be swept or stepped or small resolution bandwidths are needed to achieve the necessary sensitivity. So, there was a strong request in reducing measuring time saving accuracy for this type of test. Besides, there was a felt need for time-domain measurements to evaluate the duration of discontinuous disturbances.

Both these tasks are now easily and effectively and conveniently performed by the time domain output of an <u>FFT-based measuring receiver</u>.

## A.2.2 • FFT-BASED EMI RECEIVER

The possibility to record the temporal behavior of the signal directly in time domain by the use of fast ADCs (analog-to-digital converters) and to apply FFT (Fast Fourier Transform) was recently exploited by International Committees. The application of the FFT can be interpreted as a parallel implementation of many filters at different frequencies. This technique has been well known for decades, but the capability of modern ADCs has reached lately a level where the application to EMC emission measurements becomes feasible.

For CISPR-compliant emission measurements, FFT-based measuring instruments must sample and evaluate the signal continuously during the measurement time, as we have seen.

This task is the most stringent request for an EMI receiver.

In order to process the signal continuously and to enable the calculation of a real-time spectrogram, the frequency range from DC to 3 GHz is subdivided into many sub bands with a bandwidth of FFTband each. Every sub band is digitally down-converted to the baseband and the sub bands are processed sequentially. The block diagram is shown in Figure A.2.



A polyphase decimation filter is used for the in phase and quadrature channel to reduce the sampling frequency and to fulfill the Nyquist criterion. The output sampling frequency is twice the FFT-band, while the bandwidth is fixed by the FFT implementation.



Fig. A.2: FFT-based EMI receiver block diagram

The following approach was proposed by Braun from the Technical University of Munich. The signal is digitized continuously by an Analogue-to-Digital Converter System. By a digital down conversion (DDC) the measured signal is limited in its bandwidth (some dozens of MHz) and the sampling rate is reduced. After that the data is processed in a continuous way with the STFFT (Short Time Fast Fourier Transform) algorithm. The evaluation of the obtained spectrogram can be performed at several frequencies, with a great reduction of the measurement time.

The system needs a digital dedicated hardware.

In the next step, the CISPR-detectors must be modelled. Peak, average and RMS are straight forward mathematical operations, while the quasi-peak, the RMS-AV, and the CISPR-AV detectors can be modelled (also as a digital filter to model the instrument time constant). The detailed architecture diagram is shown in Figure A.3.



Fig. A.3: FFT-based EMI receiver architecture diagram



#### A.2.3 • BANDWIDTHS

If an interference signal spectrum is wider than the bandwidth of the instrument which measures it, then the indicated value will depend on that bandwidth. If it is narrower, then the indicated value is independent of bandwidth. This is the basis of the distinction between "narrowband" and "broadband" interference. If you are measuring known radio signals then you can tailor the measurement bandwidth to the characteristics of the signal, but this is not possible for EMC measurements, since the characteristic of the interference is almost by definition not known in advance. Therefore, the measuring receiver specification must include a defined value not only for the bandwidth, but for the shape of the filter that determines this bandwidth. The CISPR bandwidths are given in Table A.1. These are bandwidths at which the EMI receiver response is –6dB relative to the centre frequency.

Only an EMI receiver whose bandwidth characteristics fully comply with this specification should be used for full compliance measurements. However, if you are only measuring narrowband interference, such as individual emissions from the harmonics of microprocessor clocks, the actual performance of the EMI receiver filters will have little or no effect on the outcome. This is the root of much of the confusion over bandwidth requirements.

#### A.2.4 • DETECTORS

In nature, interference emissions are not continuous at a fixed level. A carrier signal may be amplitude modulated, and both a carried and the broadband emission may be pulsed.

That is, the measured level indicated for different types of modulation will depend on the type of detector in use. As a result, EMI receivers should have man-like response built-in: they must have a Quasi Peak weighting display to show the human perception of interference as a measured value.

CISPR 16-1-1 specifies five principal detector types, Peak, Quasi Peak, CISPR Average, RMS and CISPR RMS. Radiated emissions limits are usually specified by standards using the Quasi Peak detector. Conducted emissions limits are specified for the Quasi Peak, the Average and RMS detectors. Full compliance measurements must use only the correct detectors. The difference between the detectors resides in how they respond to pulsed or modulated signals. All five types of detector give the same response to continuous unmodulated signals. The Quasi Peak and Average detectors weight the indicated value according to its pulse repetition frequency (PRF).

The RMS detector, specified at § 7 of CISPR 16-1-1, indicates a value proportional to the square root of the PRF: this corresponds to RMS reading increasing by 10 dB when PRF increases by a factor 10 (1 decade), or an increase by 3 dB per octave (factor 2) of the PRF. The Average detector, specified at § 6 of CISPR 16-1-1, indicates a value proportional to the PRF, namely an increase in reading by 20 dB if the PRF increases by a factor 10 (1 decade), or an increase by 6 dB if the PRF is doubled (octave).

The indicated level of pulsed interference is reduced by the degree in Figure A.4, as a result of the time constant and bandwidths given in Table A.1.

The Quasi Peak detector weights the indicated value in terms of its perceived "annoyance factor": low pulse repetition frequencies (PRF) are less annoying when experienced on broadcast radio and TV channels than high PRFs. The detector is specified in terms of its attack and decay time constants, and these are fairly straightforward to implement. The Average detector simply returns the Average value rather than the peak value of the interference with which it is presented. This can in principle be achieved with a simple low-pass filter whose time constant is slower than the slowest pulse repetition frequency of the input. An EMI receiver is calibrated using pulses of defined impulse area, spectral density and repetition rate.





Fig. A.4: PRF of PK, QP, RMS and Average detectors in CISPR Band A, B and C/D

Most initial measurements are performed with the Peak detector, which as its name implies responds almost instantly to the peak value of the interference signal seen at its input. Provided that the EMI receiver dwell on each frequency for long enough to capture the maximum emission (this depends on the EUT's emission cycle time) the Peak detector will always give the maximum output level. A list of frequencies at which high emission are detected, could be created, and these frequencies are measured with the requested detectors, which will give the reading which should be compared against the limit.

As an example, most emission standards follow the simple procedure in Figure A.5.



Fig. A.5: Flow chart for use of detectors



#### A.2.5 • OVERLOAD FACTOR

The linear dynamic range of the RF circuits before the detector, and of the detector itself, must be at least equal to the dynamic range of the desired pulse weighting since the pulses are not to be compressed. This dynamic range according to the CISPR 16-1-1 specification (see table 1) can approach up to 43.5 dB, which means closer to 60dB in the EMI receiver design. If the EMI receiver did not adjust its gain continually to achieve the optimum level at the detector – acting as a spectrum analyzer, for instance – then the needed dynamic range would be increased by several tens of dB.

#### A.2.6 • VSWR

Still part of the CISPR 16-1-1 spec, is the requirement on input VSWR (Voltage Standing Wave Ratio). This is specified to be 2.0:1 with no input attenuation, dropping to 1.2:1 with  $\geq$  10dB attenuation in the range 9 kHz to 1 GHz; in the range 1 GHz to 18 GHz to be 3.0:1 with no input attenuation, dropping to 2.0:1 with  $\geq$  10dB attenuation. VSWR is related directly to measurement error due to mismatch. For a broad-spectrum EMI receiver (30MHz to 3GHz is two decades) the spec of 2:1 without attenuation is quite hard to meet – many ordinary radio receivers cannot achieve this even over a narrow range. It is easy enough if you allow yourself some attenuation at the input, but then the EMI receiver sensitivity is degraded. The sensitivity requirement in CISPR 16-1-1 is expressed in the form that the noise component should not degrade the measurement accuracy by more than 1 dB, which implies that the system noise floor must be at least 6 dB below the lowest level it is desired to measure accurately. The system noise floor is the EMI receiver noise plus the losses imposed by the transducer or antenna factor and connecting cables. In practice, the limiting performance is usually found at the top end of the radiated test around 1÷3 GHz.

#### **SECTION B: GENERAL INFORMATION**

This Section contains a general description of the FFT 3010 and FFT 3030 EMI receivers, including: associated and optional accessories, equipment specifications and safety precautions.

REFER TO MANUAL. THIS MANUAL IS AN INTEGRAL PART OF FFT 3010 AND FFT 3030 EMI RECEIVERS. 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**

FFT 3010 and FFT 3030 are microprocessor-controlled FFT-based EMI receiver covering the frequency range from 9 kHz to 30MHz / 300 MHz. These instruments are ideally suited for measurement of electromagnetic interference in accordance with the requirements of CISPR 16-1-1.

The EMI receivers can also be used as selective RF voltmeters with a level range from 10 to +127 dBµV in 50  $\Omega$  coaxial systems.

FFT 3010 and FFT 3030 EMI receivers are supplied with the following STANDARD ACCESSORIES:

	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	F 3,15A FUSE	2
4	3.5mm (Male) To 2.5mm (Female) stereo audio jack adapter	1
5	AFJ EMI Software USB-key (containing: Operating Manual & Operating Software)	1
6	Certificate of Calibration	1



Fig. B.1: AFJ FFT 3010 EMI Receiver





Fig. B.2: AFJ FFT 3030 EMI Receiver

## **B.2** • USAGE OF EXTERNAL PULSE LIMITER / ATTENUATOR

High spikes produced by either LISN output or power supply transient noises, could damage the input stage of EMI receiver. FFT 3010 and FFT 3030 EMI receivers maximum allowed RF input is +127 dB $\mu$ V in CW 50  $\Omega$  coaxial systems.

WE STRONGLY RECOMMEND THE USAGE OF EXTERNAL PAT20M (20dB/1W ATTENUATOR AND PULSE LIMITER), SUPPLIED OPTIONALLY AND SEPARATELY WITH FFT 3010 AND 3030 EMI RECEIVERS.

The PAT20M has been designed to fit between the LISN and the measuring instrument to protect the instrument from mains transients interface. The LISN itself will attenuate most of the transients on the mains supply – the real problem is the connection and disconnection of the EUT, which can cause up to 400V transients to appear at the RF outputs.

WARNING: WHEN USING FFT 3010 AND FFT 3030 EMI RECEIVERS WITHOUT PAT20M ATTENUATOR (OR SIMILAR FIXED ATTENUATORS), ANY DAMAGE AT THE INPUT STAGE OF EMI RECEIVER IS NOT COVERED BY AFJ WARRANTY.



Fig. B.3: PAT20M 1 W 20 dB attenuator & pulse limiter



## **B.3** • **PRODUCT STRUCTURE**

The AFJ FFT 3000 family of equipment are FFT-based EMI receivers which makes use of the super heterodyne approach, converting the RF input signal into an intermediate frequency (IF), before detection. The main instrument subsystems are:

- The pre-selector filters, tuned on the RF input frequency, to avoid spurious signals;
- The attenuators and Preamplifier, to regulate the input signal;
- The local oscillator, with a frequency lower or higher, with respect to the input signal;
- The mixers, where the input signal and the local signal are intermixed, to generate the IF;
- The ADC converter, to convert analog input signal to digital signal for DSPU;
- The DSPU (Digital Signal Processing Unit), to elaborate the digital input signal giving the output signal with the basic functions that are processed by SW, providing the experimental values and, if requested the audio signal (this subsystem includes digital filters and detectors).

The modular approach followed, enables the user to customize the system configuration according to his specific needs:

- Model FFT 3010, is suitable for measurements across the CISPR 16-1-1 frequency bands A/B, from 9 kHz to 30 MHz;
- Model FFT 3030, is suitable for measurements across the CISPR 16-1-1 frequency bands A/B/C from 9 kHz to 300 MHz;
- Model FFT 3110, is suitable for measurements across the CISPR 16-1-1 frequency bands A/B/C/D from 9 kHz to 1000 MHz;
- Model FFT 3100, is suitable for measurements across the CISPR 16-1-1 frequency bands C/D from 30 MHz to 1000 MHz.

#### **B.4 • OPTIONAL ACCESSORIES**

In order to fulfill all set-up requirements, as specified in the relevant sections of CISPR 16-1-X and the applicable Product Standards, the following OPTIONAL ACCESSORIES are made available:

Item	Description	Order Code
1	20dB/1W Attenuator and pulse limiter	PAT20M
2	High voltage probe, 30 dB attenuation	TK 9420
3	LISN, 9 kHz to 30 MHz single-phase, 2x16 A	LS16C/10
4	LISN, 9 kHz to 30 MHz three-phase, 4x32 A	LT32C/10
5	Absorbing clamp, 30 MHz to 1000 MHz (CISPR 14)	MDS 21B
6	Large Loop antenna system (LLAS) from 9kHz to 30MHz for	VVL 1530
	magnetic field measurements (CISPR 15)	
7	CDNE from 30 MHz to 300 MHz for radiated emission	M2 or M3
	measurements (CISPR 15)	(for example)
8	Dummy lamps for insertion loss measurement	Linear Type
		(for example)
9	Balance-to-unbalance transformer for insertion loss	BUT
	measurement	
10	Van Der Hoofden test head from 20kHz to 10MHz for human	VDH 30
	exposure measurements to electromagnetic fields	
11	Broadband antenna, from 30MHz to at least 1000MHz	Any brand
12	Near field probes (Large area)	Any brand



#### **B.5** • RELATED DOCUMENTS

The EMI receivers belonging to the AFJ FFT 3000 family described herein, perform electromagnetic compatibility measurements in the domain of radiated noise, in accordance with (but not limited to) the following Harmonized European EMC Standards:

	Organization, rules and procedures of the CISPR: Gives the historical background, terms of
CISPR 10	reference, composition, organization, and types of documents of the International Special
	Committee on Radio Interference (CISPR).
	Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic
CISPR 11	disturbance characteristics -Limits and methods of measurement: The limits and methods of
0.01 11 11	measurement laid down in this International Standard apply to industrial, scientific and medical
	(ISM) equipment as defined in clause 2, and to spark erosion equipment.
	Vehicles, motorboats and spark-ignited engine-driven devices - Radio disturbance
	characteristics -Limits and methods of measurement: The limits in this standard are designed to
CISPR 12	provide protection for broadcast receivers in the frequency range of 30 MHz to 1000 MHz when
	used in a residential environment. Compliance with this standard may not provide adequate
	protection for new types of radio transmissions or receivers used in the residential environment
	nearer than 10 m to the vehicle, boat or device
	Sound and television broadcast receivers and associated equipment - Radio disturbance
	characteristics - Limits and methods of measurement: Applies to the generation of
CISPR 13	electromagnetic energy from sound and television receivers for the reception of broadcast and
	Similar transmissions and from associated equipment.
	The frequency range covered extends from 9 km2 to 400 GH2.
	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
	frequency disturbances from appliances where main functions are performed by motors and
	switching or regulating devices unless the r f operative intentionally generated or intended for
CI3FIX 14-1	illumination It includes such aquinment as household electrical appliances electric tools
	regulating controls using semiconductor devices motor-driven electro-medical apprantics,
	electric toys automatic dispensing machines as well as cinema or slide projectors
	The frequency range covered extends from 9 kHz to 400 GHz
	Limits and methods of measurement of radio disturbance characteristics of electrical lighting
	and similar equipment. This Standard applies to the emission (radiated and conducted) of radio
	and similar equipment. This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or
	<b>and similar equipment</b> . This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the
	and similar equipment. This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation; the lighting part of multi-function
CISPR 15	and similar equipment. This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation; the lighting part of multi-function equipment where one of the primary functions of this is illumination; independent auxiliaries
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CISPR 15 CISPR 16-1-1	<ul> <li>and similar equipment. This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation; the lighting part of multi-function equipment where one of the primary functions of this is illumination; independent auxiliaries exclusively for use with lighting equipment; UV and IR radiation appliances; neon advertising signs; street/flood lighting intended for outdoor use; transport lighting (installed in buses and trains)</li> <li>The frequency range covered extends from 9 kHz to 400 GHz.</li> <li>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</li> </ul>
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CISPR 15 CISPR 16-1-1 CISPR 16-1-2	<ul> <li>and similar equipment. This Standard applies to the emission (radiated and conducted) of radio frequency disturbances from: all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation; the lighting part of multi-function equipment where one of the primary functions of this is illumination; independent auxiliaries exclusively for use with lighting equipment; UV and IR radiation appliances; neon advertising signs; street/flood lighting intended for outdoor use; transport lighting (installed in buses and trains)</li> <li>The frequency range covered extends from 9 kHz to 400 GHz.</li> <li>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 measurements. The requirements include the measurement of broadband and narrowband types of radio disturbance.</li> <li>Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus and</li></ul>
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	Guidance on the Use of the Substitution Method for Measurements of Radiation from		
	Microwave Ovens for Frequencies Above 1 GHz		
CISPR 19	Describes a method of measurement for small microwave ovens (largest dimension less than 1		
	m) and a separate method of measurement for large microwave ovens (largest dimension		
	exceeding 1 m).		
	Information technology equipment - Radio disturbance characteristics - Limits and methods of		
	measurement.		
	This Standard applies to information technology equipment (ITE). Procedures are given for the		
	measurement of the levels of spurious signals generated by the ITE and limits are specified for		
CISPR 22	the frequency range 9 kHz to 400 GHz for both class A and class B equipment. No measurements		
	need be performed at frequencies where no limits are specified. The intention of this publication		
	is to establish uniform requirements for the radio disturbance level of the equipment contained		
	in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize		
	operating conditions and interpretation of results.		
	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and		
	methods of measurement for the protection of on-board receivers.		
	This Standard contains limits and procedures for the measurement of radio disturbances in the		
CISPR 25	frequency range of 150 kHz to 2500 MHz. The standard applies to any electronic/electrical		
	component intended for use in vehicles, trailers and devices. Refer to International		
	Telecommunications Union (ITU) publications for details of frequency allocations. The limits are		
	Intended to provide protection for receivers installed in a venicle from disturbances produced by		
	components/modules in the same vehicle.		
	Industrial, scientific and medical equipment (ISIVI) - Guidelines for emission levels within the		
	bands designated by the HU.		
CISPR/ IR 28	this rectifical report provides the guidelines for emission levels within the bands designated by		
	application		
	application.		
	This Technical Report covers the rationale behind the actual database covering the characteristics		
	of radio services. The objective of the database is to register those characteristics which are		
	relevant for derivation and specification of limits for disturbance emissions from electric and/or		
CISPR/TR 31	electronic equipment, systems and installations. Committees responsible for generic and/or		
	product emission EMC standards should use this information together with CISPR 23. This second		
	edition includes the replacement of CISPR 23 as reference standard for the determination of		
	limits by CISPR 16-4-4:2007 on "model for the calculation of limits for the protection of radio		
	services".		
	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for		
	residential, commercial and light-industrial environments.		
150 01000 0 0	This part of IEC 61000 for EMC emission requirements applies to electrical and electronic		
IEC 01000-0-3	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.		
	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		
IFC 61000-6-4	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.		

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## B.6 • FFT 3010 AND FFT 3030 FRONT PANEL CONTROLS AND INDICATORS



Fig. B.4: AFJ FFT 3010 and FFT 3030 Front Panel

1 – POWER ON/OFF.

2 – RF OUT: Internal signal generator output. Test signal range +50 dB $\mu$ V to +95 dB $\mu$ V for the frequency range from 9 kHz to 30 MHz.

- 3 RF IN: N-type  $50\Omega$  input connector
  - for FFT 3010 EMI Receiver with CISPR Band A/B, f = 9 kHz  $\div$  30 MHz;
  - for FFT 3030 EMI Receiver with CISPR Band A/B/C,  $f = 9 \text{ kHz} \div 300 \text{ MHz}$ .
- 4 STATUS INDICATORS LEDS (from left to right):

COLOUR	NAME	FUNCTION
RED	RF OUT	The LED is lit when the internal signal generator is activated
RED	RF IN	The LED is lit during measurements in the CISPR Bands



#### B.7 • FFT 3010 AND FFT 3030 REAR PANEL CONNECTIONS



Fig. B.5: AFJ FFT 3010 and FFT 3030 Rear Panel

1 – POWER SOCKET for power cord (use Class I type only).

2 – PC board with VGA/DVI interfaces, 4 USB ports, 3 audio jacks, 1 PS2-port for mouse/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 – AUDIO / OUT external audio demodulation output with volume adjusting control and loudspeaker (1 W RMS).

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

8 – COOLING FAN.

<u>Note</u>: 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 FFT 3010 and FFT 3030 EMI receivers 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 PRODUCT 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 instruments are 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 devices. 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 EMI receivers, 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 EMI receivers. Power source check: on the rear panel, you will find a type plate. Please check whether the EMI receivers have 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 EMI receivers to the power line: please use the supplied power cord for connecting FFT 3010 and FFT 3030 EMI receivers 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 your AFJ equipment.

#### **C.2** • INSTALLATION PROCEDURE

#### C.2.1 • SYSTEM

FFT 3010 and FFT 3030 EMI receivers incorporate a last generation PC with WINDOWS 10 Embedded OS. Regardless of EMI Receiver model and SW version selected, a USB-stick is provided. Please contact AFJ Instruments or your local AFJ distributor for information about software updates always available free of charge.

The calibration data are stored directly on NVM (non-volatile memory) of the FFT 3010 and FFT 3030 EMI receivers, so they do not need to be managed by the user.

For the processing of test data coming from any of the AFJ FFT 3000 family instruments the minimal system requirements for external remote control 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

FFT 3010 and FFT 3030 EMI receivers need to be connected to external keyboard, mouse and monitor output (VGA/DVI) for standalone usage (preferred mode), as well a direct connection via LAN-Ethernet to hosting external remote control PC, through either a UTP Category 5 cross cable (included in the delivery) or a standard Ethernet LAN 10/100 MB cable as shown at Fig. C.1.



Fig. C.1: Connection procedure for FFT 3010 EMI receiver

## C.2.2.1 • STAND ALONE USAGE

Once connected to external keyboard, mouse and monitor output (VGA/DVI) for stand alone usage, a working version of the operating software is already installed on the PC integrated in the FFT 3010 and FFT 3030 EMI receivers. 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: FFT 3010 EMI receiver system start-up

If it does not start automatically, it has to be either run manually by double clicking the AFJ\_FFT 3010 (AFJ\_FFT 3030) red icon (Fig. C.3) or recover the automatic start condition (see next paragraph C.2.2.3).



Fig. C.3: FFT 3010 EMI receiver server software icon

When the server software has completed the hardware configuration (Fig. C.2), also the client software starts automatically by itself. If it does not start automatically, you have just to start it manually either by double clicking the AFJ\_FFT 3010 (AFJ\_FFT 3030) blue *icon* on the Windows desktop or as an alternative, selecting *Start => Programs => AFJ\_FFT 3010 (AFJ\_FFT 3030)* under the Windows graphic user interface (Fig. C.4). It is possible to recover the automatic start condition with the creation of a basic task to run the client software at the start-up of the operative system (see next paragraph C.2.2.4).



All Programs
Search programs and files

Fig. C.4: Starting of the FFT 3010 EMI receiver client software

The following software window appears (Fig. C.5):

AFJ FFT3010		
IP ADDRESS	127.0.0.1	TEST
	RUN	Show SW log

Fig. C.5: FFT 3010 EMI receiver IP address setting

The IP address of FFT 3010 and FTT 3030 EMI receivers is set by default to 127.0.0.1 and it does not need to be modified by the end user. TEST button allows to check the status of the communication between the equipment and the PC integrated inside with the indication of system information (Fig. C.6).



Fig. C.6: FFT 3010 EMI receiver system information

Push RUN button to access the operating software for the first time (refer to next section D). If *Show SW log* checkbox is flagged, the *Loading...* window appears showing the sequence of system information data loading when the equipment starts to communicate with the PC integrated inside (Fig. C.7).

Loading								
Connect to databaseOK								
Init HW ParamOK								
Load HW ParamOK								
Check databaseOK								
OK								
Init GUIOK								
Load GUI settings								

Fig. C.7: Sequence of system information data loading



## C.2.2.2 • REMOTE CONTROL USAGE

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

#### PERFORM THE FOLLOWING STEPS

STEP 1 - After connecting the EMI receiver to an appropriately grounded mains, ensure that all the electrically powered devices connected to the equipment in the measurement set-up are connected to a common ground. Connect the EMI receiver power cord to a grounded outlet, too.

Connect via LAN-Ethernet the device 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 – Insert USB-stick in an USB port, from Windows Explorer, locate the "FFT 3010 Receiver (FFT 3030 Receiver)/Operating SW/AFJ\_FFT 3010ClientSetup\_XYZ\_20XY (AFJ\_FFT 3030ClientSetup\_XYZ\_20XY)" folder on your AFJ USB-stick and double click on "Setup" file (Fig. C.8).



Fig. C.8 – Setup file for client software

STEP 3 – AFJ EMI receiver software installation.

The Installation Wizard starts automatically.

On next window, to proceed forward click "<u>Next</u> >" (click "Cancel" to exit installation), see Fig. C.9.

On next window, see Fig. C.10, 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.

광 AFJ FFT3010	B AFJ FFT3010
Welcome to the AFJ FFT3010 Setup Wizard	Select Installation Folder
The installer will guide you through the steps required to install AFJ FFT3010 on your computer.	The installer will install AFJ FFT3010 to the following folder. To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse". Eolder: C:\Program Files (x86)\AFJ\AFJ FFT3010\ Browse Disk Cost
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.	Install AFJ FFT3010 for yourself, or for anyone who uses this computer: <ul> <li>Everyone</li> <li>Just me</li> </ul>
Cancel Casck Next >	Cancel < Back Next >

Fig. C.9: AFJ EMI Receiver Setup Wizard window

Fig. C.10: Select Installation Folder window

Here you can also calculate the necessary disk space by clicking "Disk Cost" (about 9.1 Mb for AFJ EMI receiver software).

You can install AFJ EMI Receiver 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 EMI Receiver Software on your computer.

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



Please click "<u>N</u>ext >" to complete the installation (Fig. C.11).

At the end, the message "AFJ EMI Receiver has been successful installed" appears, the Installation Complete window appears (Fig. C.12).

j⊎ AFJ FFT3010	波 AFJ FFT3010
Confirm Installation	Installation Complete
The installer is ready to install AFJ FFT3010 on your computer.	AFJ FFT3010 has been successfully installed.
Click "Next" to start the installation.	Click "Close" to exit.
	Please use Windows Indate to check for any critical undates to the NET Framework
	, never and ministric space to more any united optices to the interministry.
Cancel KBack Next >	Cancel Close

Fig. C.11: Confirm Installation window

Fig. C.12: Installation Complete window

Now click Close to exit the installation procedure.

<u>Note</u>: nevertheless the equipment is remotely controlled by an external PC, the AFJ Local Database is always located on PC integrated in the FFT 3010 and FFT 3030 EMI receivers with WINDOWS 10 Embedded OS at the following path (Fig. C.13):

C:\Program Files\Microsoft SQL Server\MSSQL10\_50.SQLEXPRESS\MSSQL\DATA\

Organize 👻 Include in library 👻 Sha	are with 🔻 New fol	der			
	*	Name	Date modified	Туре	Size
🕞 Libraries		📴 Db_R3300.ldf	03/02/2014 15:09	SQL Server Databa	3.840 K
Documents		📴 Db_R3300.mdf	03/02/2014 15:09	SQL Server Databa	N 175.488 K
J Music		Db_R3300HwSettings.ldf	03/02/2014 15:14	SQL Server Databa	92.864 K
Pictures		📴 Db_R3300HwSettings.mdf	03/02/2014 15:14	SQL Server Databa	8.192 K
📑 Videos		📴 master.mdf	03/02/2014 15:14	SQL Server Databa	4.096 K
		🕑 mastlog.ldf	03/02/2014 15:14	SQL Server Databa	768 K
Computer		🖵 model.mdf	03/02/2014 15:14	SQL Server Databa	1.280 K
🏭 Win Embedded Std (C:)		📮 modellog.ldf	03/02/2014 15:14	SQL Server Databa	512 V

Fig. C.13: AFJ Local Database location

Here you find for example for FFT 3010 EMI receiver the following two files: <u>Db\_FFT 3010.ldf</u> and <u>Db\_FFT 3010.mdf</u>.

Right click on each one at turn, setting their Properties => Security. Below you can find an example of the Security property you need to run the AFJ EMI Receiver Database for current user.



STEP 4 – AFJ EMI receiver software running.

Once the server software has completed the hardware configuration of EMI receiver (see paragraph C.2.2.1), in order to run the client software on the external remote control PC you have just to start it either by double clicking the AFJ\_FFT 3010 (AFJ\_FFT 3030) blue icon on the Windows desktop or as an alternative, selecting *Start* => *Programs* => *AFJ\_FFT 3010 (AFJ\_FFT 3030)* under the Windows graphic user interface (Fig. C.14).

**Note**: the client software has not to be run in the operating system of the equipment for standalone usage.



Fig. C.14: FFT 3030 EMI receiver client software icon

STEP 5 – When the client software is running, it automatically looks for the equipment connected to the external remote control PC (Fig. C.15).

1113030 1012.20	
Connection to AFJ F	FT3030 Server
Please Wa	it
Go to remote	Panel

Fig. C.15: FFT 3030 client software running

If the connection between client software and the equipment is not possible automatically, the next step is to insert manually the right IP address of the EMI receiver to get the communication between the equipment and the external remote control PC.

Pushing Go to remote Panel button, Fig. C.16 appears.

ard AFJ FFT3030				×
IP ADDRESS	127.0.0.1	]	TEST	ſ
	RUN	]	Show	SW log
	OFFLINE	]		

Fig. C.16: FFT 3030 EMI receiver IP address setting

To drive the EMI receiver by external remote control PC it is recommended to set static IP address in the Internet protocol (TCP/IP) Properties (from *Control panel => Local Area Connection Properties*) on both PC as follows:

 PC integrated in the EMI receiver IP: 192.168.1.2 Mask: 255.255.255.0 Note: please disable the Firewall on this PC (Fig. C.17)



	Windows Firewall		
~	> -> 🛧 💣 > Control Pan	el > System and Security > Windows Firewall	
	Control Panel Home	Help protect your PC with Windows Fire	ewall
	Allow an app or feature through Windows Firewall	Windows Firewall can help prevent hackers or malici Internet or a network.	ious software from gaining access to your PC through the
ę	Change notification settings	Update your Firewall settings	
Ŷ	Turn Windows Firewall on or off	Windows Firewall is not using the recommend settings to protect your computer.	ded 😌 Use recommended settings
•	Restore defaults	What are the recommended settings?	
•	Advanced settings		
	Troubleshoot my network	Private networks	Not connected $\odot$
		Guest or public networks	Connected 🔿
		Networks in public places such as airports or coffee	e shops
		Windows Firewall state:	Off
		Incoming connections:	Block all connections to apps that are not on the list of allowed apps
		Active public networks:	Tinidentified network
		Notification state:	Notify me when Windows Firewall blocks a new app

Fig. C.17: Firewall setting in the PC integrated in the EMI receiver

2. External remote control PC *IP: 192.168.1.3 Mask: 255.255.255.0* 

After typing the IP address of the PC integrated in the EMI receiver (Fig. C.18) push *RUN* button to access the operating software for the first time (refer to next section D).

AFJ FFT3030				×
IP ADDRESS	192.168.1.2	]	TES	Т
	RUN		Show	SW log
	OFFLINE	]		

Fig. C.18: FFT 3030 EMI receiver IP address setting

*TEST* button allows to check the status of the communication between the equipment and the external remote control PC with the indication of system information (Fig. C.19).



Fig. C.19: FFT 3030 EMI receiver system information



Push *OFFLINE* button to access the operating software in demo mode (*Setup* and *Report* pages only) (Fig. C.20) to display the measurement results and to manage the database (refer to next section D).

orkspace						(	Operating Mode
Loaded Workspace	wk2 👻	Display Name	wk2	D.U.T.	new dut	7	
		Company	CompanyName	Model	new model	1	FFT SCAN
New Workspace	Find Workspace	Laboratory	LabName	S/N			
ngle Test Settings							
Start Frequency Stop	Frequency Trace 1	Distance from	Limit Setup Time (m	s) RF Inpu	t Attenuator	Antenna /	Probe
20MHz - 30N	1Hz v Peak	+ 🔲 Limit 1	Limit 2 10	REIN	11 - 0 dB -	- none -	
	Trace 2					Cable	
	QPeak	- Limit 1	🗌 Limit 2			- none -	
	Trace 3					Ampl / Att	
	C_AVG	- Limit 1	Limit 2			- none -	
Limit Jimit 1 - none - Jimit 2 - none -		•	Diagram Freq. Units Hz • X Division 10 •	Display Units @ Point Num. 1	JBμV ▼ X start	20,000,000	X stop 30,000,000
				Per Division			
System Automation	LISN Line Neutral	▼ □ Auto	Scale Log 👻			Auto Set Plot	

Fig. C.20: Operating software in OFFLINE mode

If *Show SW log* checkbox is flagged, the *Loading...* window appears showing the sequence of system information data loading when the equipment starts to communicate with the external remote control PC (Fig. C.21).

Loading
Connect to databaseOK
Init HW ParamOK
Load HW ParamOK
Check databaseOK
OK
Init GUIOK
Load GUI settings

Fig. C.21: Sequence of system information data loading

<u>Note</u>: When the EMI receiver 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 EMI receiver is active and running properly (Fig. C.22).



Fig. C.22: Limited or no connectivity warning indication



#### C.2.2.3 • RECOVER OF SERVER SOFTWARE AUTOMATIC START

To recover the automatic start condition of the server software, please follows the next steps:

STEP 1 – In the PC integrated in the equipment, please open

Control Panel -> System and Security -> Administrative tools ->Task Scheduler

and *Delete* the old *FFT3010Server (FFT3030Server)* task (Fig. C.23).

Help								(
al) Name	Status Tri	iggers	Next Run Time	Last Run Time	Last Run Result	Author	Created	Actions
ibrary @FFT3010Ser	er tunning At	log on of any user			The task is currently running. (0x41301)	KIOSK\utente	9/29/2014 19:5:	FFT3010
C HWWOMILO	Running At	system startup		Run	he task is currently running. (0x41301)	KIOSK\utente	7/22/2014 08:50	Create Basic Task
				Dirable				📵 Create Task
				Export				Import Task
				Properties				Display All Running Tasl
				Delete				😰 Enable All Tasks History
								Mew Folder
								× Delete Folder
•				111			+	View
General Tria	orr Actions C	anditions Setting	History (disabl	(ho				Refresh
Name	FFT3010Senver	onutions   setting	s   mistory (disabi	eu)				🛛 Help
Lastin.	Leading VEFT3010							
Author	KIOSK\utente							Run
Description:								End End
								🗣 Disable
								Export
								Properties
								🔀 Delete
Security opt	ons							🔽 Help
When run Administ	ng the task, use th ors	he following user a	ccount:					
Run only	when user is log	ged on						
🔵 Run whe	ther user is logge	d on or not						
Do r	ot store password	d. The task will only	y have access to le	ocal resources				
Run with	highest privilege	5						
Hidden	Configure f	Windows Vist	a <sup>ny</sup> Windows Sen	(er™ 2008				

Fig. C.23: Delete of FFT 3030 Server task

STEP 2 – Create a new task (*Create Task...*) either with mouse right-click or with the command in the right panel (Fig. C.24).

Task Scheduler				- I 🖉 🔜
File Action View Help				
🗢 🤿 🖄 📅 🚺 📅				
(J) Task Scheduler (Local)	Name Status Triogers Next Run Time Last Run Time Last Run Result Author Created	Acti	ions	
Task Scheduler Library     EET2010	@HwMonitor Running At system startup 1/26/201511:07:22 AM The task is currently running. (0x41301) PC/utente 6/27/2014.3:40:29 PM	FFT	3010	
Microsoft		1	Create Basic Task	
C WPD		0	Create Task	
			Import Task	
		50	Display All Running Tasks	
			Enable All Tasks History	
		1	New Folder	
		×	Delete Folder	
			View	,
		G	Refresh	
		12	Help	
		Sele	ected Item	•
			Run	
	General Triagers Actions Conditions Settings History (disabled)		End	
	Name Hodonitor	•	Disable	
	VETTAVIO		Export	
	Lution Cluster - Cluster	•	Properties	
	Description:	- <b>·</b>	Delete	
			Help	
	Security options			
	When running the task, use the following user account:			
	PCsutente			
	nun only when user is logged on			
	Individual when the set of a kigged with a link will only have access to local resources			
	In the white the state of			
	Hidden Configure for: Windows Vista <sup>10</sup> , Windows Server <sup>10</sup> 2008	*		

Fig. C.24: Creation of a new task



STEP 3 – In *Create Task* window please select *Tab General* and edit the name of the new task *"FFT3010Server (FFT3030Server)"*. On *Security options* section select *Run whether the user is logged on or not* checkbox and confirm *Run with highest privileges* checkbox. Proceed clicking on *Change User or Group* option (Fig. C.25).

General T	riggers	Actions	Condi	tions	Setting	s					
Name:	FFT	3010Serve	er								
Location:	\FF	3010									
Author:	KIC	SK\utente	e i								
Description	n:										
Security of	options										
Security of When ru KIOSK\ut	options nning t tente	he task, u	se the fo	llowin	ig user a	ccount:		ſ	Cha	nge User	or Group
Security of When rul KIOSK\ut	options nning t tente nly wh	he task, u: en user is	se the fo	llowin	ig user a	ccount:		(	Cha	nge User	or Group
Security of When run KIOSK\ut Run of Run of Run w	options nning t ente nly wh hether	he task, us en user is user is log	se the fo logged o	llowin on or not	ig user a	ccount:		(	Char	nge User	or Group
Security of When rui KIOSK\ut Run o Run o Run w	options nning t ente nly wh hether o not st	he task, u en user is user is log ore passw	se the fo logged o gged on rord. Th	on or not e task	ig user a t will only	<b>ccount:</b> / have acc	ess to loca	Compute	Char	n <b>ge User</b> es.	or Group
Security of When rui KIOSK\ut ® Run o © Run w Da V Run w	options nning t cente nly wh hether o not st vith hig	he task, us en user is user is log ore passw	se the fo logged o gged on rord. Th eges	on or not e task	ig user a t will only	ccount: / have acc	ess to loca		Char	nge User es.	or Group

Fig. C.25: Tab General configuration

Proceed clicking on Advanced option (Fig. C.26).

Select User or Group		? 🗙
Select this object type:		
User, Group, or Built-in security principal		Object Types
From this location:		
PC		Locations
Enter the object name to select (examples):		
1		Check Names
Advanced	ОК	Cancel

Fig. C.26: Advanced option selection



Proceed clicking on Find Now and select Administrators on Search results section (Fig. C.27).

elect User or G	roup		3
Select this object	t type:		
User, Group, or	Built-in security principal	Object Types	
From this locatio	n:		
PC		Locations	
Common Queri	es		
Name:	Starts with 👻	Columns	Ĵ.
Description:	Starts with v	Find Now	
Disabled	accounts	Stop	1
Non expir	ing password	4	-
		<b>6</b>	
Days since is	ist logon.	P/	
Search results:		OK Cancel	
Name (RDN)	In Folder		
Administrator	PC		
Administrators	PC		Ε
🔏 Backup Oper	PC		
Cryptographic	e PC		-
Distributed C.	PC		
Event Log Re	e PC		
Guest	PC		
Guests	PC .		
LOCAL SERV	гс /		-

Fig. C.27: PC Administrators configuration

In the following window confirm with OK (Fig. C.28).

Select User or Group	? 🗙
Select this object type:	
User, Group, or Built-in security principal	Object Types
From this location:	
PC	Locations
Enter the object name to select (examples):	
PC\Administrators	Check Names
Advanced	OK Cancel

Fig. C.28: PC Administrators confirmation



STEP 4 – In *Create Task* window please select *Tab Triggers* to create a new trigger. Select *At log on* and *Any user*. Be sure *Enabled* checkbox is selected (Fig. C.29).

gin the task At log attings	on	
Any user	KIOSK\utente	Change User
dvanced settings		
dvanced settings Delay task for: Repeat task every:	15 minutes + 1 hour +	for a duration of: 1 day
dvanced settings Delay task for: Repeat task every: Stop all runr	15 minutes • 1 hour • ing tasks at end of repetit	for a duration of: 1 day 💌
Advanced settings Delay task for: Repeat task every: Stop all runn Stop task if it runs Activate: 1/26/2	15 minutes • 1 hour • ing tasks at end of repetit longer than: 3 days 015 • 14:50:23	for a duration of: 1 day * ion duration

Fig. C.29: New Trigger configuration

STEP 5 – In *Create Task* window please select *Tab Actions* and click on *New....* to create a new action (Fig. C.30).

🕒 Create Task		×			
General Triggers Acti	ons Conditions Settings				
When you create a tas	k, you must specify the action that will occur when your task starts.				
Action	Detaile	1			
Action	Details				
		<b>^</b>			
		-			
New Ed	it Delete				
		Canad			
		Cancel			

Fig. C.30: New Action creation



In the following window (Fig. C.31) select from the list of the available actions *Start a program*. Click on *Browse...* and select the file at the path

C:\Users\utente\Local\Server\AFJ\_R3300\_Server.exe

In *Start in (optional)* specify the directory

C:\Users\utente\Local\Server\

and confirm with OK.

New Action	×
You must specify what action this task will perform.	
Action: Start a program	-)
Settings	
Program/script:	
C:\Users\utente\Local\Server\AFJ_R3300_Server.exe Brow	/se
Add arguments (optional):	
Start in (optional):	Local\S <sub>1</sub>
ОКС	ancel

Fig. C.31: New Action configuration



STEP 6 – In Create Task window please select Tab Conditions and disable all the options (Fig. C.32).

) Create Task					
General Triggers Actions Conditions Settings					
Specify the conditions that, along with the trigger, determine whether the task should run. The task will not run if any condition specified here is not true.					
Start the task only if the computer is idle for:	10 minutes	*			
Wait for idle for:	1 hour	×			
Stop if the computer ceases to be idle					
Restart if the idle state resumes					
Start the task only if the computer is on AC power Stop if the computer switches to battery power Wake the computer to run this task					
Network — It computer to run this task — Start only if the following network connection is avaid —	lable:				
Any connection		Ψ			
		OK Cancel			

Fig. C.32: New Conditions configuration

STEP 7 – In *Create Task* window please select *Tab Settings*, select *Allow task to be run on demand* and *If running does not end when request force it to stop* checkboxes. Confirm with *OK* (Fig. C.33).

🕒 Create Task	×
General Triggers Actions Conditions Settings	
Specify additional settings that affect the behavior of the task.	
Allow task to be run on demand	
Run task as soon as possible after a scheduled start is missed	I
If the task fails, restart every:	1 minute 👻
	3
Attempt to restart up to:	times
Stop the task if it runs longer than:	3 days 👻
If the running task does not end when requested, force it to some and the running task does not end when requested.	stop
If the task is not scheduled to run again, delete it after:	30 days 👻
If the task is already running, then the following rule applies:	
Do not start a new instance	
	OK Cancel
Fig. C.33: New Settings co	onfiguration



#### C.2.2.4 • RECOVER OF CLIENT SOFTWARE AUTOMATIC START

To recover the automatic start condition of the client software, it is necessary to create a basic task to run the client software at the start-up of the operative system. Please follows the next steps:

STEP 1 – In the PC integrated in the equipment, please open

Control Panel -> System and Security -> Administrative tools -> Task Scheduler

Task Scheduler application can be also found from Windows Start menu (Fig. C.34).

Programs (1)	
🕑 Task Scheduler	
P See more results	
From some man f	

Fig. C.34: Windows Start menu



STEP 2 – In *Task Scheduler* window please create a new task to start client software selecting *FFT3010 (FFT 3030)* folder in the left panel and *Create Basic Task...* in the right panel (Fig. C.35).

Name Status	Triggers	Not Bun Time	Last Buo Time	Last Run Regult	Author	Created	Actions
Stantar Runnin	a At system startup		4/7/2816 5:41:33 AM	The task is currently running, (\$141303)	PClutente.	6/27/2014 3:41-29 PM	FFT)010
StartServer Runnin	g At log on of any user		4/1/2010 5:41:33 AM	The task is currently running. (Ib41303)	PClutente	1/28/2015 2:25:22 PM	💁 Creata Basis Task 🧹
							🎂 - Greate Task
							Import Task
							Display All Running Task
							Enable All Tasks History
							Diew Faldeno
							X Delets Falder
-			1011a				Wield
General Triggers Action	a Conditions Settings	History (disable	el)				Listo
Name: HeMonth							Related Dama
Location: NFFT3038							B R D
Author: PC\utente							. End
Description:							& Disable
							Export.
							(h Propertie)
							🔀 Delete
Security options							🔝 Help
When surning the task	use the following user as	counto					
PC\utente	5 10 10 Mar 200						
<ul> <li>Run only often user</li> <li>Run ball</li> </ul>	is logged on						
Do ont store pa	agged on or not second. The tack cell only	have access to lo	cal resources				
E Bun with highest or	denes	interesting to the					

Fig. C.35: Task Scheduler window

STEP 3 – In Create Basic Task Wizard window please insert the task name and then click Next (Fig. C.36).

Create Basic Task Wizard							
🔟 Create a Basic	Task						
Create a Basic Task Trigger Action Finish	Use this wiza such as mult N <u>a</u> me: <u>D</u> escription:	ard to quickly schedule a common task. For more advanced options or settings tiple task actions or triggers, use the Create Task command in the Actions pane. StartClient					
		< Back Next > Cancel					
	Fig. C.36:	: Create Basic Task Wizard window					


STEP 4 – In *Create Basic Task Wizard* window please choose *When I log on* option in the *Trigger Task* panel and then click *Next* (Fig. C.37).

Create Basic Task Wizard		3
🔟 Task Trigger		
Create a Basic Task Trigger Action Finish	When do you want the task to start?         □ Daily         ○ Weekly         ○ Monthly         ○ One time         ○ When the computer starts         ○ When I log on         ○ When a specific event is logged	

Fig. C.37: Task Trigger window

STEP 5 – In *Create Basic Task Wizard* window please choose *Start a program* option in the *Action* panel and then click *Next* (Fig. C.38).

Create Basic Task Wizard		×
Action		
Create a Basic Task Trigger	What action do you want the task to perform?	
Action Start a Program Finish	<ul> <li>Start a program</li> <li>Send an e-mail</li> <li>Display a message</li> </ul>	
	< <u>B</u> ack <u>N</u> ext > Canc	el

Fig. C.38: Action window



STEP 6 – In *Create Basic Task Wizard* window in *Start a Program* window please click on *Browse…* button (Fig. C.39).

Create Basic Task Wizard		
5tart a Program	n	
Create a Basic Task		
Trigger	Program/script:	
Action Start a Program		Browse
Finish	Add arguments (optional):	
	Start in (optional):	
		< Back Next > Cancel

Fig. C.39: Start a Program window

STEP 7 – Please browse in C:\Program Files (x86)\AFJ\AFJ FFT3010 (AFJ FFT3030)\ folder, select  $AFJ_R3310_RECEIVER.exe$  application and then click Open (Fig. C.40).

Organize 🔻 New fold	er		HE • 🗍 🔞
Favorites	Name	Date	Туре
🧮 Desktop	AFJ_R3310_RECEIVER	3/24/2016 5:58 PM	Application
📕 Downloads	AFJ_R3310_RECEIVER.exe	3/24/2016 5:58 PM	XML Configura
📃 Recent Places	AFJ_R3310_RECEIVER.InstallState	6/27/2014 4:24 PM	INSTALLSTATE
	ColorSlider.dll	3/24/2016 5:58 PM	Application ext
😹 Libraries 🛛 🗉	🚳 CustomControl.OrientedTextContro	3/24/2016 5:58 PM	Application ext
Documents	🚳 DataPlotter.dll	3/24/2016 5:58 PM	Application ext
👌 Music	S DelcomDLL.dll	3/24/2016 5:58 PM	Application ext
E Pictures	and icona	3/24/2016 5:58 PM	Icon
🚼 Videos	🔛 InstallBanner	3/24/2016 5:58 PM	JPEG image
	🚳 mcl_pm.dll	7/2/2014 2:23 PM	Application ext
🖳 Computer	🚳 Microsoft.ReportViewer.Common.dll	3/24/2016 5:58 PM	Application ext
🚢 Local Disk (C:)	🗟 Microsoft.ReportViewer.DataVisualiz	3/24/2016 5:58 PM	Application ext
🙀 elad_rf_lab_3 (\\1 +	*		+
Filer	ame: AFJ R3310 RECEIVER	✓ All files (*.*)	•

Fig. C.40: Browse window



STEP 8 – In *Create Basic Task Wizard* window after the selection of the required application please click *Next* (Fig. C.41).

Create Basic Task Wizard		<u>×</u>
Create a Basic Task Trigger	<u>P</u> rogram/script:	
Action	"C:\Program Files (x86)\AFJ\AFJ FFT3010\AFJ_R3310_RECEIVER.exe"	B <u>r</u> owse
Finish	Add arguments (optional):	
	< <u>B</u> ack Next	> Cancel

Fig. C.41: Selection of the required application

STEP 9 – In *Create Basic Task Wizard* window please select *Finish* panel, verify the *Name*, *Trigger* and *Action* fields, select *Open the Properties dialog for this task when I click Finish* option and then click *Finish* (Fig. C.42).

Create Basic Task Wizard		
5 Summary		
Create a Basic Task		
Trigger	Name:	StartClient
Action	Description:	
Start a Program	Description	
Finish	İ.	
	Triana	At startuni At sustem startun
	i rigger:	Acstantup, Acsystem stantup
	Action:	Start a program; "C:\Program Files (x86)\AFJ\AFJ FFT3010\AFJ_R3310_RECEIVI
	🔽 Onen the	Pronerties dialog for this task when I click Finish
	When you cl	ick Finish the new task will be created and added to your Windows schedule
	when you ci	ick rinnin, the new task will be created and added to your windows schedule.
		Pack Finish Concol
		< Dack Turiou Caucei
	F	ig. C.42: Finish window



STEP 10 – The new *StartClient* basic task is right now created and the *StartClient Properties* dialog box is open. Please select *General* tab and verify that *Run only when user is logged on* option is selected and then Select *Run with highest privileges* (Fig. C.43).

Name:	StartClient			
Location:	\FFT3010			
Author:	PC\utente			
<u>D</u> escription:				
Security opt When runn	ions ing the task, use the fi	ollowing user account:		
Security opt When runn PC\utente	ions ing the task, use the fi	ollowing user account:		Change <u>U</u> ser or Group
Security opt When runn PC\utente <u>R</u> un only	ions ing the task, use the fi when user is logged	ollowing user account:		Change <u>U</u> ser or Group
Security opt When runn PC\utente <u>Bun only</u> Run <u>w</u> he	ions ing the task, use the f when user is logged ther user is logged or	ollowing user account: on n or not		Change <u>U</u> ser or Group
Security opt When runn PC\utente <u>Run only</u> Run <u>whe</u> Do n	ions ing the task, use the fi v when user is logged ther user is logged or ot store <u>p</u> assword. TI	ollowing user account: on n or not he task will only have acces:	s to local compu	Change User or Group
Security opt When runn PC\utente @ <u>Run only</u> @ Run <u>whe</u> <u>Do n</u> W Run w <u>i</u> th	ions ing the task, use the fi when user is logged other user is logged or ot store password. Th	ollowing user account: on n or not he task will only have acces:	s to local compu	Change <u>U</u> ser or Group

Fig. C.43: General tab

STEP 11 – Please select *Triggers* tab and click on *Edit* button to modify trigger settings (Fig. C.44).

ieral [ myyers]	Actions   Conditions   Settings   History (disabled)	
nen you create	a task, you can specify the conditions that will trigge	r the task.
Frigger	Details	Status
At log on	At log on of PC\utente	Enabled
Nava	Edit Delete	
<u>I4</u> C00		



STEP 12 – In *Edit Trigger* dialog box please verify that *Begin the task* field is set to *At log on*. In *Settings* section please select *Any user* option and click *OK* to confirm the new settings and to come back to *StartClient Properties* dialog box (Fig. C.45).

gin the task: At log	on	
a Amurun 🦀		
		(
Specific user:	PC\utente	Change User
Advanced settings		
📄 Delay tas <u>k</u> for:	15 minutes 👻	
📄 Regeat task every:	1 hour +	for a duration of: 1 day 👻
Stop all runn	ing tasks at end of repetitio	n duration
📄 Stop task if it runs	longer than: 3 days	*
Activate: 4/ 7/2	016 🔲 - 10:34:26 AM	Synchronige across time zones
	017 🗐 - 10:34:26 AM	Synchroniz <u>e</u> across time zones
Expire: 4/ 7/2		

STEP 13 – Please select Actions tab and verify the status according to Fig. C.46.

Triagory	Actions	Conditions	Cattings	Listory	disable A.				
inggen		Conditions	secongs	- History (	uisablea)				
you create	a task, yo	u must speci	fy the acti	on that wil	loccurwł	ien your	r task star	ts.	
n	Det	tails							
a program	'C:	\Program File	es (x86)\AF	UVAEJ EET.	3010\AFJ_I	R3310_RI	ECEIVER.	exe"	
									-
								•	
w	<u>E</u> dit	<u>D</u> elet	:e						
	Triggers you create a program	Triggers     Actions       you create a task, yo       in     Def       a program     'C:       :w     Edit	Triggers     Actions     Conditions       you create a task, you must speci       in     Details       a program     'C:\Program File       :w     Edit	Triggers     Actions     Conditions     Settings       you create a task, you must specify the action       on     Details       a program     'C:\Program Files (x86)\Af       ""       "W     Edit	Triggers       Actions       Conditions       Settings       History (         you create a task, you must specify the action that will         in       Details         a program       'C:\Program Files (x86)\AFJ\AFJ FFT:         ""         w       Edit	Triggers       Actions       Conditions       Settings       History (disabled)         you create a task, you must specify the action that will occur when         in       Details         a program       'C:\Program Files (x86)\AFJ\AFJ FFT301J\AFJ_f         ""         w       Edit	Triggers       Actions       Conditions       Settings       History (disabled)         you create a task, you must specify the action that will occur when your         in       Details         a program       'C:\Program Files (x86)\AFJ\AFJ FFT301J\AFJ_R3310_R         ""         w       Edit         Delete	Triggers       Actions       Conditions       Settings       History (disabled)         you create a task, you must specify the action that will occur when your task star         in       Details         a program       'C:\Program Files (x86)\AFJ\AFJ FFT3010\AFJ_R3310_RECEIVER.d         ""         w       Edit	Triggers       Actions       Conditions       Settings       History (disabled)         you create a task, you must specify the action that will occur when your task starts.       Image: Conditional starts will occur when your task starts.         in       Details       Details         a program       'C:\Program Files (x86)\AFJ\AFJ FFT3010\AFJ_R3310_RECEIVER.exe"         w       Edit       Delete



STEP 14 – Please select *Conditions* tab, in *Idle* section verify that *Start the task only if the computer is idle for* option is not checked and that *Stop if the computer ceases to be idle* is checked but the check box is not enabled. In *Power* settings deselect *Start the task only if computer is on AC power* and verify that Stop *if the computer switches to battery power* is checked but the check box is not enabled (Fig. C.47).

🕒 StartClient Properties (Local Computer)		X
General Triggers Actions Conditions Settings Histo	ry (disabled)	
Specify the conditions that, along with the trigger, determ run if any condition specified here is not true. Idle	nine whether the task shou	ld run. The task will not
Start the task only if the computer is idle for:	10 minutes	T
Wait for idle for:	1 hour	*
Stop if the computer ceases to be idle		
Restart if the idle state resumes		
Power		
Start the task only if the computer is on AC power		
Stop if the computer switches to <u>b</u> attery power		
Wake the computer to run this task		
Network		
Start only if the following network connection is availa	ble:	
Any connection		v
		OK Cancel

Fig. C.47: Conditions tab

STEP 15 – Please select Settings tab and verify the options according to Fig. C.48.

B StartClient Properties (Local Computer)	×
General Triggers Actions Conditions Settings History (d	isabled)
Specify a dditional settings that affect the behavior of the task.	
Allow task to be run on demand	
Run task as soon as possible after a <u>s</u> cheduled start is misse	ed
If the <u>t</u> ask fails, restart every:	1 minute 👻
Attempt to restart up to:	3 times
Stop the task if it runs longer than:	3 days 👻
If the running task does not end when requested, force it to	o stop
If the task is not scheduled to run again, <u>delete it after:</u>	30 days 👻
If the task is already running, then the following rule applies:	
Do not start a new instance 🔹	
	OK Cancel
Fig. C.48: Settin	gs tab



STEP 16 – Please select *History* tab, verify the options according to Fig. C.49, then click *OK* to confirm the changes in *StartClient Properties* and to come back to *Task Scheduler* application.

Image: Interventions     Conditions     Settings     History (disabled)       Image: Interventional Conductions     Number of events: 0	
.evel Date a Event Task Category Operational Code Correlation Id	
	×
General Details	×

Fig. C.49: History tab

STEP 17 – Right now the *StartClient* task shall be set in *Running* status. In the central panel of *Task Scheduler* application, the new *StartClient* task is added but *Status* is set to *Ready* according to Fig. C.50. Please execute *Run* in the right panel to modify the status.

of Charles United	Fliera	Satu:	Triggers	NextRas Time	Last Bars Time	Last Rev Revel	Author .	Created	Actions	
FETTONN	@Haddasiter	Busting	Až system statuja		4/19/3018 1-12:35 AM	The lack is currently running, (Ibs1282)	PC'urbarbe	6/21/2014/540-38 PM	FFT3018	
Micronott	O Sheef from	1.1	An Kip on all and over		1 i		PC544	A112131101643181	Crosty Beric Task-	
WPD	Continue	Barring	At log on at any use		4/2/2014 4 43:32.MM	The tack is convertigenessing. (Ibill 202)	PEATHER	1/26/3115 221.02 PM	Seste Teil -	
									hyport Task .	
									😳 Diplay Al Burring Tube	
									謂 Inable AFTeits Philory	
									🚍 NewFolder	
									🗶 Delete Folder	
									West	
	and this	14	In multiple	Inc.					B. Retrick	
	beneral must	ES [Alboss	Gond Boni   Settings	H SOY INDER	50/			10.00 K 140.0	10 Hills	
	When you can common di	sta u ta id, ye	sa nan spicify the north	tire to will be	get the task. To chang	le per e printe de la printe de l La printe de la printe	ragio aritrigi	fa Properties	Selecteriftum	
	7					Person		- I	Bin	-
	R be up	6	then no of any user			Zota -			· Eral	_
	~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~	-	and a considerate						· Disable	
									Export	
									Properties	
									× Delete	
									D Help	

Fig. C.50: Status settings



Alto Darey	Satur Triggers Busedent At extern statuet	Next Ray Time Last Ray Time 4/7/2016 142 35 AM	LectRanResult The fact is convertive membras (Ib4CIBD)	Author Created FClateria 6/21/2014/348-03 PM	Actions FFT30U
ok Obeforer	Autrosp dat log on at log une	0.7572018 1.03.3 2.064	The fact is convertigeneering (Bull 187)	ACCOUNT ACCOUNTS AND ACCOUNTS AND ACCOUNTS AND ACCOUNTS A	Create Danie Task. Create Task. Create Task. Import Task. Import Task. Task./A Fast./Matary Create All Task./Matary Create Al
Seneral Trainer When you creat command	)   Actions   Conditions   Setting a whick, you can specify the com	s   History (illialdet)  Riara that will trigger the test. To cher	ige these taggers, open the test progety p	ngers using the Properties	Antonio Antonio Antonio Antonio Antonio
Trigger Re big en	Detail: Al log on al styriotr		2anu Invèlied		<ul> <li>Aun</li> <li>End</li> <li>Dicade</li> <li>Eport.</li> <li>Proportion</li> <li>Oblete</li> <li>Diffee</li> <li>Help</li> </ul>

STEP 18 – Right now the *StartClient* task has the proper status of *Running* (Fig. C.51).

Fig. C.51: Status of Running for StartClient task



## SECTION D: OPERATING INSTRUCTIONS

## D.1 • START OF THE APPLICATION

When the operating software is running, it shows the *Setup* box of the EMI Receiver (Fig. D.1). This screen, with its five options *Setup*, *Run Test*, *Analyze*, *Generator* and *Report*, constitutes the so-called *cockpit*.

rkspace								Op	erating Mode	
Loaded Workspace	Workspace 👻	Display Name	Workspace		D.U.T.	new du	t			
		Company	CompanyName		Model	new ma	odel	FF	T SCAN	
New Workspace	Find Workspace	Laboratory	LabName		S/N					
	-									
Start Frequency Stop	Frequency Trace 1	Distance from	Limit Setup	Meas Time (ms)	BF Inpu	t	Attenuators	Antenna /Pro	be	
	MHZ   Peak			10 🔄	REIN	<u> </u>	Preamp -	- none -		
	OPeak	→ 🔽 Limit 1	V Limit 2					- none -		
	Trace 3							Amplifier/Atte	nuator	
	C_AVG	🔹 🕅 Limit 1	🔽 Limit 2					- none -		
imit			Diagram				_			
imit 1 DiscLim1		•	Freq. Units Hz	Displ	ay Units [c	lBµV	▼ X start	150,000 🚖	X stop	100,000,000
imit 2 Limit Ramp		•]	X Division 10	- Poi	nt Num.	0	✓ Y start	-30 🜲	Y stop	100
ystem Automation	LISN Line Neutral	→ 🗆 Auto	Scale Log	•			<b>V</b> A	uto Set Plot		
183										[

Fig. D.1: The Setup box of the FFT 3030 EMI Receiver cockpit



# D.2 • THE SETUP BOX

, on opdoo									Op	erating Mode	
Loaded Workspa	ice Workspace		Display Name	Workspace		D.U.T.	new dut		_		
<u>.</u>			Company	CompanyName		Model	new mod	el	FFI	r scan	
New Workspace		space	Laboratory	LabName		S/N					
Start Frequency	Stop Frequency	Trace 1	Distance from	Limit Setup M	eas Time (ms)	RF Inpu		Attenuators	Antenna /Pro	be	
150kHz 🔹	100MHz 👻	Peak 👻	🔽 Limit 1	🔳 Limit 2	10 🌩	RFIN	1 🔹	Preamp -	- none -		
		Trace 2	·						Cable		
		QPeak 👻	🔽 Limit 1	🔽 Limit 2					- none -		
		Trace 3	i Internetie						Amplifier/Atte	nuator	
		[C_AVG ▼	📃 Limit 1	V Limit 2					- none -		
Limit Limit 1 DiscLim1 Limit 2 Limit Ram	p		•	Diagram Freq. Units Hz X Division 10	Display     Point     Per Di	Units o	ΒμV <del>•</del> Ο <del>•</del>	X start	150,000 🜩 -30 🜩	X stop	100,000,000
Limit Limit 1 DiscLim1 Limit 2 Limit Ram System Automation	p.		•	Diagram Freq. Units Hz X Division 10 Scale I ng	<ul> <li>▼ Display</li> <li>Point</li> <li>Per Di</li> </ul>	Units [c Num. [] vision []	ΒμV <del>•</del> Ο <del>•</del>	X start	150,000 🜩 -30 🜩 uto Set Plot	X stop	100,000,000
Limit Limit 1 DiscLim1 Limit 2 Limit Ram System Automation -none-	p USN Line	Neutral *	Auto	Diagram Freq. Units Hz X Division 10 Scale Log	Display     Point     Per Di	Units Num. vision 1	ΒµV → Ο →	X start	150,000 숮 -30 🜲 uto Set Plot	X stop	100,000,000

The Fig. D.2 shows the Setup box of the FFT 3030 EMI Receiver.

Fig. D.2: FFT 3030 EMI Receiver setup window

The upper portion of *Setup* window is labeled *Workspace* and is filled with default data you can easily change to fit your own needs.

**<u>Note</u>**: You cannot change directly the data written in the workspace section, as they derive from the underlying database. You can instead create a new workspace or select one of the stored workspace data already created, by clicking **New Workspace** or **Find Workspace** respectively.

You can create a new workspace by pressing the *New Workspace* button or from menu *File => New Workspace*. In both cases, the window *Workspace Information* appears and you can fill it with the following data:

*Display Name, Laboratory, D.U.T.* (Device Under Test), *Model, S/N* (*Serial Number*) and *Company* (see Fig. D.3) in the **New Workspace** box.

E New Worksp	ace 🛛
Workspace In	formation
Display Name	New Workspace
Laboratory	LabName
D.U.T.	new dut
Model	new model
S/N	
Company	CompanyName
	Save Cancel

Fig. D.3: Setup New Workspace Information



By pressing *Save* the new workspace data will appear in your current workspace (see Fig. D.4).

Setup	Run Test	Analyze	Generator	Report
Work	space			
	Loaded Wo	rkspace	New Wor	kspace 🔻
	New Works	space	Test 1 My Name	kspace

Fig. D.4: Choose your Workspace

You can also manage to list, filter, load, modify and delete your saved Workspaces, by pressing the *Find Workspace* button or from menu *File => Find Workspace*. In both cases, the *Workspace Management* window appears (see Fig. D.5). This window is subdivided in the three sections: *Filter* (for research tasks), *Workspace list* and *Workspace Information*. The current workspace is already highlighted (selected) and its data are listed in the *Workspace Information*.

Filter					
Workspace name			D.U.T.		
Company			Model		Clear Filter
Laboratory			S/N		
Name	Laboratory	D.U.T.	Model	S/N	Company
lew Workspace	LabName	new dut	new model		CompanyName
Test 1	Laboratory Name	Generic EUT	Model	111111111	Company Name
	Max Link contant, Name	My FUT	My model	My S/N	My Company
My Name	Wy Laboratory Name	119 201	ing model	19 011	ing company
Workspace Information	ne Test 1	19 201	D.U.T.	Generic EUT	ny company
Vy Name Workspace Information Workspace nar Compa	ne Test 1 ny Company Name		D.U.T. Model	Generic EUT Model	
Workspace Information Workspace nar Workspace nar Compa Laborate	ne Test 1 ny Company Name ny Laboratory Name		D.U.T. Model	Generic EUT Model	

Fig. D.5: Workspace Management window

Any operation on workspaces can be performed easily, being the meaning of different fields intuitive for the user.

The *Filter* is especially useful when you have many *workspaces*, which cannot fit in just a screen, and it enables you to find out your saved data in a fast way.

You can filter your data according to one or more fields as *Workspace Name, Company, Laboratory, DUT, Model, S/N*: the found data appear immediately in the list and the first found in the *Workspace Info* section.

You can select another workspace from the list by clicking on it: you can now *Load* or *Delete Selected* workspace with the below buttons. When a workspace is selected, all its data appears on the *Workspace Info*, so enabling you to modify them. After done that, press *Save Modifications* to store new data, *Close* to go back to main workspace screen.

<u>Note 1</u>: Please, be aware that *any modification* you make on *any saved workspace*, will have an impact on all the data stored in that workspace and consequently in the whole *Database* you are working with. On the other hand, it is easy to make changes on all data taken during a measurement session.

**Note 2**: The software is able to manage \*.txt files with American indication (comma to separate thousands; dot to separate decimals), please leave unchanged the international settings of the PC with default configuration.



## **D.2.1 • OPERATING MODES**

Referring again to main Setup window (Fig. D.2), focus now on its upper right portion *Operating Mode*. Here you can choose one of the three operating modes: *FFT Scan, Filter* and *Van Der Hoofden Test*. These modes can be selected from the drop-down menu *Operating Mode* (Fig. D.6).

Operating Mode	
FFT SCAN	
FFT SCAN FILTER	
VAN DER HOOFDEN TEST	Г

Fig. D.6: Operating Mode selection among FFT SCAN, FILTER and VAN DER HOOFDEN TEST options

## FFT Scan Mode

This is the default mode, being the most convenient mode for usage in most situations, allowing for fast and still reliable measurements. It is an important opportunity for experimenting with the FFT scan for any kind of interferences and be able to compare the results with the classic EMI receiver Sweep Modes. This task can be done easily with FFT 3010 and FFT 3030 EMI Receivers.

FFT Scan Mode has a fixed frequency step of 46,875Hz from 9kHz up to 150kHz, 3kHz from 150kHz to 30MHz and 24kHz from 30MHz to 300MHz and it can be operated with up three detectors at the same time and two different Limits (1 and 2).

Refer to the left portion of *Single Test Settings* section for *Trace 1, Trace 2* and *Trace 3,* each trace is checked against one of two limits (see Fig. D.7).

In this mode, as well as the Sweep Mode, up to three different detectors can be selected at the same time.

Start Frequency	Stop Frequency	Trace 1			
150kHz 🔹	30MHz 🔹	Peak	*	🔲 Limt 1	🛄 Limit 2
		Trace 2			
		QPeak		💟 Limit 1	🛄 Limit 2
		Trace 3			
		C AVG		Lint 1	V Limit 2

Fig. D.7: Setup of the Single Test Settings section for FFT Scan Mode with three traces at once

The limits must be selected in the *Limit* section (in the left-lower part of Setup box, see Fig. D.8).

Limit		
Limit 1	EN55022-QP-Class B	-
Limit 2	EN55022-AV-Class B	1

Fig. D.8: Selection of limits in the Limit section

#### Filter Mode

This optional feature is especially suited to perform CISPR 15 Insertion Loss Measurements.



## Van Der Hoofden Test

FFT 3010 and FFT 3030 EMI receivers are automatically set according to the requirements of IEC 62493 Ed. 2.0:2015-03 standard (*Assessment of lighting equipment related to human exposure to electromagnetic fields*) (Fig. D.9) for measurements with Van Der Hoofden Test Head model AFJ VDH 30.

Frequency range	B <sub>6</sub> according to CISPR 16-1-1	Measurement time	f <sub>step</sub>	Detector
20 kHz – 150 kHz	200 Hz	100 ms	220 Hz	Peak
150 kHz – 10 MHz	9 kHz	20 ms	10 kHz	Peak

Fig. D.9: IEC 62493 Ed. 2.0:2015-03 standard requirements for measurement equipment

On the Setup box the Single Test Settings will be automatically grayed out (Fig. D.10).

/orkspace							Ope	rating Mode	,
Loaded Workspace Workspace		Name Workspace		D.U.T.	new dut				
	Corr	pany CompanyName		Model	new mod	del	FFT	SCAN	
New Workspace Find Works	space Labo	ratory LabName		S/N					
ngle Test Settings									
Start Frequency Stop Frequency 1	Trace 1		Meas Time (m	s) RF Inpu	t	Attenuators	Antenna /Pro	De	
9kHz • 10MHz •	Peak - Limi	1 Limit 2	10 🍦	RFIN	1 -	Preamp 🔻	- none -		
	+ Limi	1 Limit 2					Cable		
	Trace 1						Amplifier/Atter	nuator	
		1 🗌 Limit2					- none -		
Limit Limit 1 DiscLim1		Diagram Freq. Units Hz	- Dis	play Units [	¦BµV ◄	• X start	150,000 숮	X stop [	100,000,000
Limit 2 Limit Ramp		X Division 10	- P	oint Num. er Division	0	Y start	-30	Y stop	100
System Automation -none-	Neutral 💌 🖂 Auto	Scale Log	<b>,</b>			<b>V</b> A	uto Set Plot		
ac									Class

Fig. D.10: Setup box settings for Van Der Hoofden Test operating mode

## **D.2.2** • SYSTEM AUTOMATION

You can also add the System Automation (Fig. D.11).



Fig. D.11: Setup System Automation section for an AFJ LISN choice



For FFT 3010 and FFT 3030 EMI Receivers you can add either AFJ LISN LS16C/10 or AFJ LISN LT32C/10. Then you can choose the *LISN LINE to measure*. Possible choices are:

- Line 1 or neutral for LISN LS16C/10 (single phase LISN);

- Line 1, Line 2, Line 3 or Neutral for LISN LT32C/10 (three phase LISN).

The phase is switched after you press the Start button in the Run Test box (the led on LISN front panel will switch on).

If *Auto* option is selected, the measurement will be performed in sequence automatically on all the phases of the selected AFJ LISN.

You can also choose the *SyA Script* function for the System Automation. In this case the LISN LINE gray out (Fig. D.12).



Fig. D.12: Setup System Automation section for LISN choices

This function requires a text script files to be programmed; this file allows you to make an automatic sequence of measurements. In this file you change test name, operator name, test conditions and specifications, test notes and you can send commands to RS232 serial port via the host PC.

As soon START is pushed into 'Run Test', the SyA Script Log window appears and it is required to load the \*.txt file that contains all the commands.

Commands syntax is the following:

<u>OPEN232 COM1,9600,N,8,1</u>	Open COM1 port with baud rate=9600, parity=None, data bits=8, stop
	bit=1.
<u>Wait 2000</u>	Wait for 2000 ms
WR TN Test Name1	Write 'Test Name1' into Test Name field (TN = test name)
WR OP Operator Name1	Write 'Operator Name1' into Operator field (OP = operator)
WR CO Test Conditions1	Write 'Test Conditions1' into Conditions field (CO =condition)
WR SP Test Specifications1	Write 'Test Specifications1' into Specifications field (SP= specification)
WR NO Test note1	Write 'Test note1' into Test Note field (More Info button)
WRITE232 COM1 *idn?	Send the string '*idn?' plus the blank space ' ' to COM1 port
<u>SWEEP</u>	Run the test with Frequency Table settings
Ш	Comments on single text line

Serial port settings syntax commands:

OPEN232 baud\_rate, parity, data\_bits, stop\_bits

Baud rate port settings: 2400, 4800, 9600, ..., 115200Parity:None  $\rightarrow$  N / Even  $\rightarrow$  E / Mark  $\rightarrow$  M / Odd  $\rightarrow$  O / Space  $\rightarrow$  SData bits:Set either 8 or 7.Stop bits:To set nothing insert N, otherwise 1,1.5 or 2.

LISN and Max hold settings syntax commands:

LISN 0	select line N
LISN 1	select line L1
LISN 2	select line L2 (for LT32C only)
LISN 3	select line L3 (for LT32C only)
HOLD SET 2	enable MAX Hold and set the repetition number to 2 (defined by user)
HOLD RST	disable Max hold



## D.2.3 • AN EXAMPLE OF SYA SCRIPT FILE

The below script allows you to make 2 sweeps for both LISN lines, at the end saving Max hold of 4 scans. The final result is saved as "Test Lisn 1 - L1".

```
WR OP Operator1
WR NO SyA Script: Script1.txt
WR SP Max Hold 2 Rep.
WR CO LISN LINE 0
                 // Set LISN on N-line
LISN 0
WR TN Test Lisn 1 - L0
          // Max Hold Reset, delete previous traces
// Reset
HOLD RST
HOLD SET 2
                // Enable Max Hold with two repetitions
SWEEP
                // Sweep with two Max hold repetitions
                // Set LISN on L1-line
LISN 1
WR CO LISN LINE 1
WR TN Test Lisn 1 - L1
                 // Sweep with two Max hold repetitions
SWEEP
```

The below script allows you to make two sweeps for each LISN line saving the max hold of two repetitions on line LO in a file ("Test Lisn 2 - L0") and the Max hold of two repetitions of line L1 in another file "Test Lisn 2 - L1".

The main difference is the HOLD RST command of the third row from the end.

```
WR OP Operator Name
WR NO SyA Script: Script2.txt
WR SP Max Hold 2 Rep.
WR CO LISN LINE 0
LISN 0
WR TN Test Lisn 2 - L0
HOLD RST
HOLD SET 2
SWEEP
LISN 1
WR CO LISN LINE 2
WR TN Test Lisn 2 - L1
HOLD RST
HOLD SET 2
SWEEP
```

Another example runs two different tests with their names, operators, conditions, specifications. Between two tests the software runs a command to serial port, for example for settings an external hardware.

```
OPEN232 COM1,9600,n,8,1
WAIT 2000
WR TN Test Name1
WR OP Operator Name1
WR CO Conditions1
WR SP Specifications1
WR NO Test note1
WRITE232 com1 *idn?
WAIT 2000
SWEEP
WR TN Test Name2
WR OP Operator Name2
WR CO Conditions2
WR SP Specifications2
WR NO Test note2
WRITE232 COM1 *idn?
WATT 2000
SWEEP
```

Of course mode tests can be added to the file.



# D.2.4 • LIMIT EDITOR (TOOLS MENU)

The client software comes already with many measurements limits according to emission standards CISPR/EN 55011, 14, 15, 19, 22 (both Average and Quasi Peak, Group 1/2, Class A/B where applicable). In case of need, you can create your own limit.

This task is easily done with the *Limit Editor* that you find on the menu *Tools => Limit => Limit Editor* (see Fig. D.13).

File 1	Tools ?		
Setup	Limit	•	Limit Editor
Work	Input Device Calibration Van Der Hoofden Test	· •	Limit Import Limit Export
	Customize	• F	Company
100	Options	- • H	Laboratory
	ManageAdmin Passwor	d	
Singl	Database	•	

Fig. D.13: Limit Editor selection

In this box you can change the parameters of the current test Limit and its display configuration, with the possibility to *Add New Limit*, select another Limit (*Selected Limit*) and *Delete Limit*. It is possible to add a discontinuous limit according to the requirements for example of CISPR 25 standard with the definition of some frequency points with No Limit definition. A frequency point added with active *NoLim* flag allows to get a discontinuous gap from that frequency point up to the next one added with no active *NoLim* flag. The overall functionality (Fig. D.14) is similar to the *Input Device Calibration Editor* (See § D.2.6), so it does not need further explanation.

At the end of editing, you can press the Save button to store your data and then the Close button to exit.



Fig. D.14: Limit Editor parameters for an example of discontinuous limit



You can also Import / Export limits in XML format (version 1.0, *Standalone*) for using them in different XML-parsing programs (Fig. D.15).

File	Tools	?	_	
Setup	Li	mit	•	Limit Editor
Work	In	put Device Calibration	•	Limit Import
	Va	an Der Hoofden Test		Limit Export
	C	ustomize	• F	Company
1	0	ptions	- • H	Laboratory
	N	1anageAdmin Password		
Singl	D	atabase		

Fig. D.15: Limit Import / Export options

With these two options (Import / Export) for Limit lines, different limits can be exchanged between two different databases (local or remote ones, no matter), allowing maximum flexibility for any EMI Receiver installation (Fig. D.16).

ddress						
C:\Users\utente\D	lesktop\R3030img\IEC	_60533.xml	XML File	Server		
Filter						
Limit Name			Description	n		
Limit Name	Description		Label	Point	Meas. Unit	Var Lin with Log Freg
EC60533-Table	2 IEC60533-Table 2fo	r bridge and deck zone	IEC60533-Table 2	<documentelem< td=""><td>dBuV</td><td>true</td></documentelem<>	dBuV	true
•						

Fig. D.16: Limit Import

The XML-schema for a limit is:

<?xml version="1.0" standalone="yes"?> <NewDataSet> <Table> ... </Table>

For the newly created limit IEC 60533 we have the following syntax:

```
<Nome> Name of the Standard (IEC60533-Table_2) </Nome>

<Descrizione> Description (IEC60533-Table_2 for bridge and deck zone) </Descrizione>

<Etichetta> Label (e.g. IEC60533-Table_2) </Etichetta>

<Punti> Points <DocumentElement> </Punti> e.g.

<Point>1</Point><Frequency>0000000389C7C41</Frequency>><Level>00000000004B40</Level>

<Unit_Misura> dBµV </Unit_Misura>

<VarLinearLog> true/false (true = Lin / false = Log) </VarLinearLog>

<Detector> QP / Pk / C_RMS etc. </Detector>
```



In the Import Limit an XML file can be loaded and filtered according to *Limit Name* and its *Description*. After highlighting a Limit, press Import to import it onto your database (Fig. D.17).

aaress D:\Program Files\AFJ\Limits.>	ml	_	Xml file	Serve	r	
Filter Limit Name EN			Descriptio			
Name	Description	Label	Point	Meas. Unit	Var. Lin. Log.	Detector
EN55022-QP-Class B	EN55022-QP	EN55022-QP	<documentelem< td=""><td>dBμV</td><td>true</td><td>QP</td></documentelem<>	dBμV	true	QP
EN55022-QP-Class A	EN55022-QP	EN55022-QP	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN55022-AV-Class B	EN55022-AV	EN55022-AV	<documentelem< td=""><td>dBμV</td><td>true</td><td>AV</td></documentelem<>	dBμV	true	AV
EN55022-AV-Class A	EN55022-AV	EN55022-AV	<documentelem< td=""><td>dBμV</td><td>true</td><td>AV</td></documentelem<>	dBμV	true	AV
EN15-QP-loop-2m	EN15-QP-loo	EN15-QP-loo	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN15-QP-Cond.	EN15-QP-Co	EN15-QP-Co	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN15-AV-Cond.	EN15-AV-Co	EN15-AV-Co	<documentelem< td=""><td>dBµV</td><td>true</td><td>AV</td></documentelem<>	dBµV	true	AV
EN55011-QP-G1,2-Class B	EN55011-QP	EN55011-QP	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN55011-QP-G2-Class A	EN55011-QP	EN55011-QP	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN55011-QP-G1-Class A	EN55011-QP	EN55011-QP	<documentelem< td=""><td>dBµV</td><td>true</td><td>QP</td></documentelem<>	dBµV	true	QP
EN55011-AV-G1,2-Class B	EN55011-AV	EN55011-AV	<documentelem< td=""><td>dBµV</td><td>true</td><td>AV</td></documentelem<>	dBµV	true	AV
				l		

Fig. D.17: Limit Import of an XML-file

## D.2.5 • SINGLE TEST SETTINGS

In the *Single Test Settings* section of the Setup window you can change the *Frequency Start / Stop* of your scan, *Measurement Time*, *RF Input* connector (*RF IN*), *Attenuator Level* (*Manual* attenuator mode only, please notice that AUTO Attenuator mode is not foreseen; *Preamplifier*) and *Antenna / Probes*, *Cables* and *Amplifiers / Attenuator* of the actual emission chain (Fig. D.18).

le Test Settings											
tart Frequency	Stop Frequency	Trace 1		Distance from	n Limit Setup	Meas Tir	ne (ms)	RF Input	Attenuators	Antenna /Probe	
150kHz 👻	100MHz 🔹	Peak		💟 Limit 1	🔲 Limit 2	10		RFIN1 +	Preamp 💌	-none-	
		Trace 2								Cable	
		OPeak.		💟 Limit 1	💟 Limit 2					-none -	
		Trace 3								Amplifier/Attenuator	
		C AVC	104	The Linear Street	Dimit 2					- 0000 -	

Fig. D.18: Single Test Settings section

*Measurement Time* can be set manually by the operator from 1ms to 5000ms when selecting a single trace with Peak detector only. When another detector is selected (Quasi Peak, CISPR Average, RMS, CISPR RMS or a combination of them), *Measurement Time* will be set automatically to 1000ms independently from the selection of Peak detector and the operator will get a *Warning* message (Fig. D19).



Fig. D.19: Measurement Time set automatically to 1000ms

It is possible to select for each trace which limit (*Limit 1, Limit 2* or both) to consider during Peak Search function and so to display into the table of the results the *Distance from Limit* of each trace (Fig. D.50).



In the Diagram section of the Setup window you can set the parameters for graphical data presentation of final spectrum (in the next window *Run Test*):

Frequency Unit: Hz, kHz, MHz, GHz Display Unit: dBμV, dBm, dBμV/m, dBμA/m, dBA/m, dBμA, dBpW X-axis (Frequency) Start / Stop limits (<u>Note</u>: these limits are only valid for the output spectrum) Y-axis Start / Stop (<u>Note</u>: as above) Point per division: 1, 2, 5. 10, 20 points per division X division: 2, 5, 10, 20 divisions of X-axis

**<u>Note</u>**: this option is available only with the *Linear scale* for X-axis choice as obvious.

Scale: *Linear* or *Logarithmic* scales for X-axis: with the usual Log scale the *X Division* will grey out, while for Linear scale the *X Division* can be set 2 - 5 - 10 - 20 (Fig. D.20);

Diagram	Diagram
Freq. Units MHz   Display Units dBµV   X start 30.000   X stop 3.000.000	Freq. Units MHz
X Division 10 v Point Num. 10 v Y start 0 V Stop 130 V	X Division 20  Point Num. 10
Scale Log   Auto Set Plot   Enable Subrange Line	Scale Linear -

D.20: Diagram window. Left: Log scale for X-axis. Right: Linear scale for X-axis.

Autoset Plot: with this option enabled, the graphic will show all measured points, according to X- and Yaxis limits set by the user. When this option is disabled, if the range of the X-axis (Frequency) does not match the frequency range set for the measurement a Message Box (Fig. D.21) will appear to indicate the wrong setting.



D.21: Plot Range error Message Box

*Enable Subrange Line*: with this option enabled, a red vertical (dotted) separation line at the crossings of the subranges appears in the graphic during run-time.

If you now click on the Run Test label you see the effect on your diagram.

## D.2.6 • INPUT DEVICE CALIBRATION EDITOR (TOOLS MENU)

Before running your test, typically it is necessary to setup your Antenna or Probe, measurement Cable(s), and optionally also an Attenuator/Amplifier.

This task is easily done with the Input Device Editor that you find on the menu:

Tools => Input Device Calibration => Input Device Calibration Editor (Fig. D.22)

File	Tools	?		
etup	Li	mit	•	
Work	In	put Device Calibration		Input Device Calibration Editor



The window of Fig. D.23 now appears.

First of all you have to press the *Add New Device* button (on left-top of the window): so doing, a *New Device* will appear in the *Selected Device* drop-down menu and you can edit all its properties.

In the middle section *Input Device Info* you can choose a different *Name* and *Type* of your device in use among *Antenna/Probe, Cable* or *Amplifier/ Attenuator*.

You can adapt the range for X-axis, namely frequency in Hz (by default, this is the full range 9 kHz up to 1 GHz) and the range for Y-axis, namely *Level* in dB (by default, this is  $\pm 20$  dB). For this task, you can use the up/down arrow (in this case the graphic will be updated automatically), or directly editing the values with the keyboard and then pressing *Enter* to redraw the graphic.

On the *Points* section you can enter the couple *Frequency / Level* [dB], and press Add. The data points are ordered as you enter them, but you can *Reorder* or *Remove point*.

Input Device Calibration Editor				
File				
Add New Device	Selected Device	New device		Delete
20				
5				
-10				
9.000 100.00	0 1.000.000	10.000.000	100.000.000	1.000.000.000
Input Device Info		Points		
Device Name New device Type Probe/Antenna	•	Frequency (	Hz) Value (dB)	
Chart X start Y X stop Y 1.000.000.000 + Y	start -20 <u>*</u> stop 20 <del>*</del>			
Close		Freq 9.000	Hz Value 0.00	dB Add Load From File

Fig. D.23: Edit Input Device Calibration window

You can press the *Save* button to store your data, the following message appears (Fig. 24):



Fig. D.24: Device calibration updated confirmation

In the next page, we have set the typical parameters for the device calibration of an external attenuator 20 dB Attenuator (Fig. D.25) and one for a log-periodical antenna (Fig. D.26).

In the first case, all data were entered manually, by adding them directly in the *Input Device Calibration Editor*.

In the second case, the data were imported with the function "Load From File". For this action, you need to write down a simple Text file with two tab delimited fields - use Export Text (tab delimited) from Excel, Notepad or a similar editor - with the couple values of frequency expressed in Hz and the antenna factor.



An example of a such file is here:

270000000	15.51
275000000	15.22
280000000	15.24
285000000	14.98
290000000	14.87 etc.



D.25: Input Device Calibration parameters for an external 20 dB Attenuator



D.26: Input Device Calibration parameters for a log-periodical antenna



The Load from File button allows you to import data from a file. The file must contain all the couples Frequency / Value (dB), separated by a blank space.

It is possible to protect with User / Password the access to the *Input Device Calibration Editor* . See § D.2.10 for further information.

## D.2.7 • TOOLS MENU

The other commands found in the Tools menu are as shown in Fig. D.27:



D.27: Commands of the Tools menu

*Van Der Hoofden Test* for calculating F factor from peak detector measurement sweep into the frequency range f=20kHz÷10MHz when using FFT 3010 and FFT 3030 EMI Receivers with Van Der Hoofden Test Head model AFJ VDH 30 according to IEC 62493 Ed. 2.0:2015-03 standard (*Assessment of lighting equipment related to human exposure to electromagnetic fields*) (Fig. D.28).

📧 Van Der Hoofde	en Test	X
Test Data	From local database From local database From file	
Load Test		
🗖 Generate Dutout	File	
		GO
	Generate Report	

Fig. D.28: Van Der Hoofden Test Software Tool

With *Test Data* you select where to find (either from local database or from file) the measurement result obtained with VDH 30.

With *Load Test* the measurement result is selected and loaded.

Pushing GO you get the F factor with either "PASS" (F $\leq$ 1) or "FAIL" (F>1) indication (Fig. D.29), with the possibility to generate at the same time an output \*.txt file (Generate Output File) with the following information:

frequency (Hz); test level (dBµV); current density Jcap(f) (A/m<sup>2</sup>); electric field Ecap(f) (V/m)



With *Generate Report* you automatically create the report with all the information about measurement with VDH 30.

Test Data	From file	•	
oad Test	C:\Users\AFJ\	Desktop\VDH3	10.txt
F =	0,06600	91 : PAS	s GO

Fig. D.29: Van Der Hoofden Test Result

# D.2.8 • CUSTOMIZE (TOOLS MENU)

From this menu, you can change the palette color appearance of the software windows/report and the information showed in the report.

#### **Customizing your Colors**

Tools => Customize => Colors

Here you can change colors for Software Display and Print/ Report (Fig. D.30).

The colors for the lines and the Max Hold lines with different detectors (Peak, QPeak, C\_AVG, RMS/C\_RMS) as well as for limits 1 & 2 and the Reference line can be changed at will.

The Plotters colors refers to background, axis and grids of the spectrum in the Run/Analyze mode. For instance, you can set the background to white (255, 255, 255 RGB) instead of default black.

Color Theme Editor					
	Software dis	play	•		
Plotter Colors	Software do Print and rep	pley port			
Background 0:0:0		P	Peak Line	192; 255; 19	2 💽
Avia 128 126	128	QP	Peak Line	255; 255; 0	
Gui 120-120	120	C,/	AVG Line	255; 0; 255	
Gild 120, 120	, 120 <u>(</u>	F	RMS Line	0; 255; 255	
		C_F	IMS Line	255; 215; 0	
Automatic Limit Curve Colo	r Setting	Peak I	Line Ref.	192; 265; 19	2 -
Ask for Automatic Limit Cu	ve Color Setting	QPeak I	Line Ref.	255; 255; 19	2 💌
		C_AVG	Line Ref.	255; 192; 25	5 💌
		RMS	Line Ref.	192; 255; 25	5 💌
		C_RMS	Line Ref.	255; 224; 19	2 💌
		Lir	nit 1 Line	192: 192: 0	
		Lir	nit 2 Line	255; 0; 255	
		Marke	er 1 Color	255; 0; 0	
		Marke	er 2 Color	0; 128; 0	
		Analyze Mark	ers Lines [	255; 69; 0	
Default Palette	Edit	White		0	Remove
Load S	iave	White		50	Add
			[	Save	Close



The first time you open this window, the option "Ask for Automatic Limit Curve Color Setting" is checked. If you leave it such way, then the following window will appear (Fig. D.31):

E Automatic Limit Color Settings	<b>—</b>
QP/AVG limit color and QP/AVG on Do you want to automtically set QI of the QP/AVG curve?	curve color are different. P/AVG limit color at the same color
Yes	© No
Don't ask anymore	OK Cancel

Fig. D.31: Automatic Limit Color Settings for QP/AVG limits

If you answer "Yes" then the other flag for "Automatic Limit Curve Color Setting" will be checked. If you answer "No" and "Don't ask anymore" then the flag for "Ask for Automatic Limit Curve Color Setting" will be unchecked.

## **Customizing your Reports**

Tools => Customize => Report

In this window (Fig. D.32), you can edit some Report options, namely Report Title & Comments (three lines possible). You can set also the "Show Date and Time" & "Show Subrange Settings" options.

Report Options	×
Report Title	
AFJ FFT3010 Report	
Comments	
Report Comment 1	
Report Comment 2	
Report Comment 3	
<ul><li>Show Date and Time</li><li>Show Subrange Settings</li></ul>	
ОК	Cancel

Fig. D.32: Report Options

## D.2.9 • OPTIONS (TOOLS MENU)

Tools => Options => Peak Search Setting

*Peak Search Settings* lists the parameters for *Peak Search* (appropriate for evident peaked spectra) and *Max Search* (for smoothed spectra, with no evident peaks). <u>A limit must be set to get results of both</u> <u>searches</u>. *Threshold* (dBμV), *Peak Escl* (dB), *Max Peaks Number, Threshold From Limit (dB)* and *Show All Detected Peaks* (Fig. D.33).

Peak Search Setting	s X	Peak Search Settings	×
Mode Pea	k Search 🗸	Mode Max S	earch 🗸
Threshold	-10 🜲	Threshold	Search
Peak Escl (dB)	3.0 🜩	Peak Escl (dB)	3.0 韋
Max Peaks Number	20 🜩	Max Peaks Number	20 💲
Threshold From Limit (dB)	10,0 🜲	Threshold From Limit (dB)	10,0 💠
Show All Detected Pe	eaks	Show All Detected Peal	ks
ОК	Cancel	ОК	Cancel

Fig. D.33: Peak Search Settings



**Note:** The Peak Search will be effective <u>only</u> if a Limit is selected and associated to the detector of the *Trace 1* in the Single Test Settings part of the *Setup* cockpit (Fig. D.34):

•	💟 Limit 1
•	[ Limit 1
	E] Limit 1
	•

#### Fig. D.34: Limit selection on Single Test Settings section

**Threshold (dB** $\mu$ **V)**: this parameter allows to set a minimum limit to the max/peak search routine, i.e. no peaks are considered below this level. The default value is -10dB $\mu$ V, which is below the noise limit. So, in practice, that means that <u>all peaks</u> are considered. This line settles the threshold under what the peaks must be cut out from the inquiry, it is a factor which distinguish a peak from the nears.

**Peak Escl (dB):** this parameter allows to search only the peaks having a difference of more than [Peak Escl] from the local minima just aside the peak. The default value of this parameter is 6dB.

*Max Peaks Number:* is the number of peaks to retain for each scan: this field allows setting an upper limit to the number of peaks to be considered in the table (max. 200 peaks).

**Threshold From Limit (dB):** this parameter allows to set the distance from the limit for considering the max/peak search routine, i.e. peaks with a distance from the limit bigger than this value are not considered. The default value is 10dB.

**Show All Detected Peaks (dB):** all the values of the detectors used during the measurement associated to the detected peaks by the max/peak search routine will be shown.

<u>Note</u>: "Threshold", "Peak Escl" and "Threshold From Limit" parameters distinguish various kinds of peaks and their maximum values, to help the choice of the most significant disturbances. Due to difficulty of automatic max peak selection, it is always possible to approach and complete the inquiry in manual mode.

## Tools => Options => Plot Screenshot Settings

The *Plot Screenshot Settings* window lists Width/Height pixel size for the output bitmap of the working spectrum. Default *Plot Screenshot Size* is 710 x 425 pixel but it is recommended to set it at least double (1420 x 850 pixel).

Tools => Options => Language

Selection between English (default) and Chinese.



# D.2.10 • MANAGE ADMIN PASSWORD (TOOLS MENU)

It is possible to protect with User / Password the access to the *Input Device Calibration Editor* selecting:

Tools => Manage Admin Password (Fig. D.35)



Fig. D.35: Manage Admin Password selection

User / Password are set by default to Admin / Admin and without any updating the User Name / Password Message Box will not appear when accessing the *Input Device Calibration Editor*.

For updating the Password it is necessary to input the old Password and the new Password with the consequent confirmation (Fig. D.36).

User	Admin		
Password	••••		
	6	Cancel	ОК
New Password	••••		
Confirm New Password	••••		
			OK

Fig. D.36: Password updating

After pushing OK the Message Box with Updated Admin Password confirmation will appear (Fig. D.37).



Fig. D.37: Updated Admin Password confirmation

After updating the Password when accessing the *Input Device Calibration Editor* the User / Password Message Box will appear (Fig. D.38).

User	Admin
Password	

Fig. D.38: User / Password Message Box



## D.2.11 • DATABASE (TOOLS MENU)

When the database size exceeds 50% of the available space, a warning message appears at the bottom of the Setup box (Fig. D.39):

Operating Mode	FFT SCAN	Tests Saved Number	25	Warning: Database Used Space > 50%!	OFFLINE
	Fig. D.39: Wa	arning message when d	latabase siz	e exceeds 50% of the available space	

In case the database size exceeds 80% of the available space, further the warning message at the bottom of the Setup box (Fig. D.40) another warning message in a separated window appears with the recommendation to delete some old or unnecessary test data to reduce the database size (Fig. D.41).



Fig. D.41: Warning window when database size exceeds 80% of the available space

It is possible to manage the database selecting:

Tools => Database (Fig. D.42)



Fig. D.42: Database selection



#### Tools => Database => Backup

To copy the actual database in the backup folder created automatically by the software:

## C:\Users\...\Documents\AFJ\DB\BACKUP

After completing successfully the backup of the actual data base (\*.bak file) a confirmation message will appear (Fig. D.43).



Fig. D.43: Database backup confirmation

#### Tools => Database => Restore

To restore a previous copy of the database loading a \*.bak file from the list (Fig. D.44).

rganizza 🔻 🛛 Nuova ca	rtella				
📰 Immagini 🛛 🖈 ^	Nome	Ultima modifica	Тіро	Dimensione	
OneDrive	Db_FFT3030-2019-12-11-09-19-02.bak	15/01/2020 10:27	File BAK	13.232 KB	
	Db_FFT3030-2020-01-15-10-54-02.bak	15/01/2020 10:54	File BAK	3.580 KB	
Questo PC	Db France File PAK	30/01/2020 18:04	File BAK	14.076 KB	
Desktop	Dt Dimensione - 3,49 MB	31/01/2020 12:39	File BAK	14.076 KB	
🗄 Documenti	Ultima modifica - 15/01/2020 10:54				
🕹 Download					
📰 Immagini					
b Musica					
Oggetti 3D					
Video					
Windows (C:)					

Fig. D.44: Selection of the database file to restore

After completing successfully the restore of a copy of the database (\*.bak file) a confirmation message will appear (Fig. D.45).



Fig. D.45: Database restore confirmation



## Tools => Database => Delete Tests

To delete from the actual database all the tests before of a date selected by the operator (Fig. D.46).

ile	Tool	s 1	ŝ.					.15								
tup	Run 1	fest	Analy	ze Ge	nerator	Cal	b F	Report								
R	eceiver							-		23	Ŋ					
		- Marian	31574152		1425-AUT-0	10000					ame	wk2		D.U.T.	new du	ıt
3	Delete	all tes	s befo	ire the s	elected	d date					any	CompanyName		Model	new m	odel
	4		Dec	ember	2019						tory	LabName		S/N	-	
	Sun 24 1 8 15 22 29	Mor 25 9 16 23 30	26 3 10 17 24 31	Wed 27 4 11 18 25 1 Oggi	Thu 28 5 12 19 26 2 12/3/	Fri 29 6 13 20 27 3 2019	Sat 30 7 14 21 28 4		Dele	te xel	from	Limit Setup	Time (ms)	RF Inpu	t 11 -	Att
							Trace 2 QPe Trace 2 C_A	2 ak 3 /G	•	Info	0	Delete Tests befo	re date 12/3/201	19 11:20:19	AM ?	

Fig. D.46: Delete tests before a date defined by the operator

After completing successfully the deletion of all the tests a confirmation message will appear (Fig. D.47).

Delete done	el

Fig. D.47: Deletion confirmation



# D.3 • RUN TEST BOX

In the *Run Test* box (second label of the cockpit), you can make a measurement and analyze it in a quick but still effective way.

To begin the run procedure, select the *Start* button in the *Frequency* section (by default, it shows the last performed measurement), the box depicted in Fig. D.48 will appears.

Setup Run Test A	nalyze Generator	Report					
Frequency			Auto Sa	ave Test	Setup Det./Atten.	PK QP CAVG 0 dB	Quick Analyze Peak Search
30.0	00 00		Start	Stop	Antenna / Probe	- none -	Reset Zoom
30,0	00,00	0			Cable	- none -	Clear Ref. Curve
					Ampl / Att	- none -	
Test Info							Run Mode
Test Name Test	Number 12		~	Operating Mode	FFT SCAN	More Info	Max Hold
Date 05/03	3/2021 11.26			Conditions			Continuous Sweep
Operator AFJ				Specification			Enable Pause

Fig. D.48: Frequency section of Run Test Box

The scan/sweep will now proceed according to all the parameters (frequency ranges, detectors, limits, traces, etc.) you have chosen in the previous paragraphs (Fig. D.49).

Setup Run 1	Fest Analyze Generator Re	port				
Frequency		Auto Sa	ave Test	Setup Det./Atten.	PK QP CAVG 0 dB	Quick Analyze Peak Search
5	15/ 000	Pause	Stop	Antenna / Probe	- none -	Reset Zoom
<b>J</b> ,	134,000			Cable	- none -	Clear Ref. Curve
				Ampl / Att	- none -	
Test Info						Run Mode
Test Name	Test Number 12	~	Operating Mode	FFT SCAN	More Info	Max Hold
Date	05/03/2021 11.26		Conditions			Continuous Sweep
Operator	AFJ		Specification			Enable Pause

Fig. D.49: Frequency section of Run Test Box during measuring

Selecting *Pause* button the measurement will be interrupted manually by the operator and such button will become red indicating such condition (Fig. D.50).

Setup Run T	est Analyze Generator Repo	ort				
Frequency	,002,000	Auto Sa	Stop	Setup Det./Atten. Antenna / Probe Cable	PK QP CAVG 0 dB	Quick Analyze Peak Search Reset Zoom
	, ,			Ampl / Att	- none -	Clear Ref. Curve
Test Info						Run Mode
Test Name	Test Number 12	~	Operating Mode	FFT SCAN	More Info	Max Hold
Date	05/03/2021 11.26		Conditions			Continuous Sweep
Operator	AFJ		Specification			Enable Pause

Fig. D.50: Frequency section of Run Test Box during pausing condition

Selecting again *Pause* button the measurement will continue, meanwhile with *Stop* button the measurement will be interrupted definitively by the operator.



If *Auto Save Test* is not flagged (default choice), then at the end of each measurement, the following window appears (Fig. D.51):



Fig. D.51: Test terminated saving confirmation

If Auto Save Test check is flagged, automatically saving of test results without user confirmation is enable.

At the end of the measurement you can save the test with its name and perform a quick analysis directly from this window (for a detailed analysis, please, refer to next § D.4).

In our example, the conducted emission measurement on the EUT is performed from 150 kHz to 30 MHz in the *FFT Scan* mode with Peak, Quasi Peak, CISPR Average, Bandwidth 9 kHz, with 1 s measuring time. The result of the actual measurement is shown in Fig. D. 52, as seen from the *Run Test* box.



Fig. D.52: A frequency spectrum of conducted emission measurement from 150 kHz to 30 MHz

# **D.3.1** • RUN TEST SECTIONS

The Setup section shows:

- *Detectors* in use, namely *PK* (green), *QP* (yellow), *C\_AVG* (violet) and the value of the internal *Attenuator* or the use of the internal preamplifier (Preamp);
- the presence / absence of any *Probe/Antennas* in use during the measurement;
- the presence / absence of any *Cable* in use during the measurement;
- the use of an external pulse limiter (for example AFJ PAT20M attenuator & pulse limiter) as Amplifier/Attenuator.



The *Quick Analyze* section is the most important section where the measurements can be checked (Fig. D.53).



Fig. D.53: Quick Analyze section

The *Peak Search* function will show the following table sorted by *Distance from Limit* (Fig. D.54).

ort B	y Distant	ce from Limit	~				Add with click	Del Roy	w En	able All	Disable All	Clear T	able
	Freq	Antenna / Probe Factor [dB]	Cable Factor [dB]	Ampl / Att Factor [dB]	Detector	Meter Read [dBµV]	Meas. Level [dBµV]	Limit 1 [dBµV]	Limit Dist	Limit2 [dBµV]	Limit 2 Dist	Enable	
1	186kHz	0.05		19,94	QPeak	47,93	67,92	64,21	3,70				
	261kHz	0.05		19,94	QPeak	44,99	64,98	61,40	3,58	1			
6	264kHz	0,05		19,94	QPeak	44,53	64,52	61,30	3,22				
3	336kHz	0.05		19,94	QPeak	40.64	60,63	59,30	1.33				
7	339kHz	0,05		19,94	QPeak	40,43	60,42	59,23	1,20				
1	411kHz	0.05		19,94	QPeak	34,85	54,84	57,63	-2,79				
8	414kHz	0.05		19,94	QPeak	34,68	54,67	57,57	-2,90				
5	483kHz	0,05		19,94	QPeak	30,48	50,47	56,29	-5,82				
9	486kHz	0.05		19,94	QPeak	29,97	49,96	56,24	-6,27				
6	633kHz	0.05		19,94	QPeak	29,05	49.04	56,00	-6,96				
0	636kHz	0,05		19,94	QPeak	28,75	48,74	56,00	-7,26				
7	558kHz	0,05		19,94	QPeak	28,59	48,58	56,00	-7,42				
1	561kHz	0.05		19,94	QPeak	27,67	47,66	56,00	-8,34				
8	150kHz	0.05		19,95	QPeak	36,62	56,62	66,00	-9,38				
9	22,119MHz	0,10		19,98	QPeak	<mark>28,62</mark>	48,70	60,00	-11,30				
0	780kHz	0,05		19,95	QPeak	20,67	40.67	56,00	-15,33				
2	783kHz	0.05		19,95	QPeak	20,57	40,57	56,00	-15,43				
1	855kHz	0,05		19,95	QPeak	18,86	38,86	56,00	-17,14				
24	711kHz	0,05		19,95	QPeak	18,57	38,57	56,00	-17,43				
12	453kHz	0.05		19,94	QPeak	19,38	39,37	56,82	-17,45				
25	858kHz	0,05		19,95	QPeak	18,46	38,46	56,00	-17,54				
23	450kHz	0.05		19,94	QPeak	18,96	38,95	56,88	-17.92				

Fig. D.54: Peak Search table of the actual spectrum, ordered by Distance From Limit

**<u>Note</u>**: A sort by either Frequency or Amplitude (in ascendant order, from the lowest value) is also possible from the *Sort By* drop-down menu.

It is possible to add manually more peaks to include on the measurement report. For manually modifying the results of the *Peak Search* function:

- Selecting "Add with click" and with mouse right-click on the graphic it is possible to add a row to the table;
- "Del Row" deletes the selected row;
- "Enable All" enables the visualization on the graphic of all the peaks included into the table;
- "Disable All" disables the visualization on the graphic of all the peaks included into the table;
- "Clear Table" deletes all the rows of the table.

*Report* function allows to generate a report including measurement sweep and peak search table.



If a Limit is not selected and associated to the detector of the *Trace 1* in the Single Test Settings part of the *Setup* cockpit, selecting the *Peak Search* function the following warning message will appear (Fig. D.55):



Fig. D.55: Peak Search function warning message

You have also the choices or by clicking directly on the table headers labeled as *Meter Read* [dB $\mu$ V], namely the reading at main EMI receiver RF-input, *Measured Level* [dB $\mu$ V], namely the overall chain reading (including the effect due to any cables, antennas, amplifier/attenuators), *Limits* [dB $\mu$ V] and *Limit Distance* [dB $\mu$ V] (namely the difference between the measured level and the limit at one frequency), clicking once for descendant order and twice for ascendant order:

	Meter Read [dBµV] →	Meas. Level [dBµV]	Limits [dBµV]	Limit Dist. [dB]
or	1 1			
	Meter Read [dBµV]	Meas. Level [dBμV]	Limits [dBµV]	Limit Dist. [dB]
or		- N		
	Meter Read [dBµV]	Meas, Level [dBµV]	Limits [dBµV] N	Limit Dist. [dB]
or			1 1	
or	Meter Read [dBµV]	Meas. Level [dBµV]	Limits [dBµV]	Limit Dist. [dB]
	or or or or	or Meter Read [dBµV] Meter Read [dBµV] or Meter Read [dBµV] Meter Read [dBµV] or	or	or

Fig. D.56: Ordering Peak Search table by Meter Read., Meas. Level, Limits, Limit Distance.

It is possible to make a manual *Zoom* in any spectrum window in two steps: 1) holding down the *Shift-key* ( $\uparrow$ ) and then left-clicking and moving the mouse in a rectangle while holding the mouse button (Fig. D.57 A); 2) after you release it a blue rectangle appears and the area is zoomed (Fig. D.57 B):



Fig. D.57: Manual Zoom on Emission Spectrum

If you want to come back to the initial view (without Zoom), you can press the *Reset Zoom* button in the *Quick Analyze* section (Fig. D.53).

The *Clear Ref. Curve* button in the *Quick Analyze* section (Fig. D.53) allows to clear the spectrum loaded pressing *Load Reference* button in Run Test window and select a test from the list (Fig. D.60).

You can use the Max Hold function by clicking *Max Hold* button in the *Run Mode* section of the *Run Test* box and set if you want to perform a *Continuous Sweep* as well. Pressing *Max Hold* button the function will be activated and the button will switch its name to *Reset* in red color (Fig. D.58).



Run Mode	Run Mode
Max Hold	Reset
Continuous Sweep	Continuous Sweep

Fig. D.58: Setup Max Hold section. A: Max Hold inactive; B: Max Hold active, with Continuous Sweep ON

Selecting *Continuous Sweep* function the measurement sweep will be repeated until the operator stops the test manually; selecting *"Enable Pause"* function at the end of each measurement sweep the test system will be in *"Pause"* status showing a Message Box to give the possibility to decide when to continue with the next measurement sweep (Fig. D.59).

Pause		x
	Pause, Enter to Continue	
	ОК	

Fig. D.59: Pause Message Box

At this point, all traces and limits in the *Single Test Settings* are frozen to their current states and any change to them is not possible while Max Hold is active.

Click *Reset* to make *Max Hold* inactive and go back to single scan measurements. The red script *Max Hold Active* reminds you the *Max Hold* active state.

By pressing *Screenshot* button, it enables the saving of the measurement diagrams on a \*.JPG, \*.PNG, or \*. BMP file. A *Save as type* dialog opens with Browse for directory and filename. In order not to less any detail of your image, but still save disk space, the PNG-format for your plot is suggested (Fig D.60 and D.61).



Fig. D.60: Screenshot, Export Data and Load Reference buttons

File <u>n</u> ame:	Test_Spectrum	•	<u>S</u> ave
Save as <u>t</u> ype:	JPG (*.jpg)	•	Cancel
	JPG (*.jpg)		
	PNG (".png) BMP (".bmp)		
	All files (*.*)		

Fig. D.61: Saving in JPG/PNG/BMP files

By pressing *Export Data* button, it enables the saving of the measurement data on a text file \*.txt that can be opened by Windows Notepad or similar Editor program, or can be imported in any spreadsheet application, being each field separated by semicolon (Fig. D.62).

📕 Test_Spectrum.txt - Notepad		A	В	С	D
File Edit Format View Help	1	1,000,000.000	69.01.00	56.00.00	46.00.00
1,000,000.000;69.1;56.0;46.0	2	1,005,000.000	68.05.00	56.00.00	46.00.00
1,010,000.000;68.7;56.0;46.0	3	1,010,000.000	68.07.00	56.00.00	46.00.00
1,015,000.000;86.6;56.0;46.0	4	1,015,000.000	86.06.00	56.00.00	46.00.00

Fig. D.62: Text file saved with Export Data and imported in a spreadsheet (Excel)



In the *Test Info* section of the *Run Test* box (Fig. D.63) you can write your personalized *Test Name* (default is *Test Number* with a progressive number), the *Date* of test (default is the current system date), the name of the *Operator*, the *Conditions* (usually the ambient test conditions) and *Specification* (Standards, limits, etc.).

Test Info			1
Test Nam	Test Number 10	Operating Mode	SWEEP More Info
Date	20/10/2010 11.22	Conditions	Temperature 24°C, Pressure 107 kPa, HR: 55 %
Operator	M. Mozzi	Specification	EN 55022 / CISPR 22 QP / AV limits

Fig. D.63: Test Info section of Run Test box

You can introduce a list of possible different *Test Name* loading into the following directory:

C:\Program Files (x86)\AFJ\AFJ FFT3010 (AFJ FFT3030)

a text file called *TestName.txt* according to the example shown in Fig. D.64.

	TestName - Blocco note di Windows					
File	Modifica Formato Visualizza ?					
AFJ	Test 34					
AFJ	Test 44					
AFJ	Test YY					
	Fig. D.64: Example of <i>TestName.txt</i> file					

After restarting the client software the *Test Info* section will show a list of possible different *Test Name* as per Fig. D.65.

Test Name	AFJ Test 34	~	Operating Mode	FFT SCAN	More Info
-	AFJ Test 34				
Date	AFJ Test 44		Conditions		
	AFJ Test YY		o 70 1		
Uperator	AFJ		Specification		

Fig. D.65: Test Info section of Run Test box

Now you can click to *More Info* button and the *Test Info* window opens (Fig. D.66).



Fig. D.66: Test Info window with three loaded images

Here you can load up to three image sketches (in JPEG, PNG or Bitmap-format). They will appear in each of the three separate windows and one of them can be shown (check *Show*) in your main *Run Test* window (Fig. D.67), and you can add your *Test Note* about the current performed test.





Fig. D.67: Showing your Test Info image on Run Test window

You can easily work with one or two markers, by left- and/or right-clicking in any part of the displayed spectrum window. Once activated, the first marker (red color) is driven by mouse left-click: you can put or drag-and-drop in any point of the spectrum to read its frequency and level. A mouse right-click will add the second marker (light-blue color) that behaves similarly at all, so enabling to make a second measurement. The two markers on the spectrum appear as apparent in Fig. D.68.



Fig. D.68: Markers MK1 (red) and MK2 (light blue) in a spectrum

The relative measurements of the enabled detectors values will be put in the upper right portion of the spectrum as depicted in Fig. D.69.

MK1 1.000,000MH		PK	72,0dBµV
		QP	69,8dBµV
		CAVG	69,8dBµV
MK2 1.205,000MH	× .	<b>PK</b>	65,8dBµV
	TA T	QP	63,8dBµV
		CAVG	63,8dBuV

Fig. D.69: Marker 1 an 2 readings in the displayed spectrum


When Van Der Hoofden Test operating mode is selected, at the end of the measurement the software will automatically show the F factor with either "PASS" ( $F \le 1$ ) or "FAIL" (F > 1) indication (Fig. D.70).



Fig. D.70: Van Der Hoofden Test result

After saving the measurement data, it will be possible to load it and calculate again the F factor with the possibility to generate a test report using the software tool described at the paragraph D.2.7.

If during a scan / sweep the SERVER COMMUNICATION FATAL ERROR message appears in the *Run Test* window (Fig. D.71), FTDI (Future Technology Devices International) component for internal USB communication of the equipment is not running properly and so please contact service center.

	SERVER COMMUNICAT
	Quick Analyze
PK 0 dB	Peak Search
none -	Reset Zoom
none -	Clear Ref. Curve
- none -	

Fig. D.71: SERVER COMMUNICATION FATAL ERROR message in Run Test window



#### D.4 • ANALYZE BOX

The Analyze box is useful for making an accurate analysis of your noise spectrum. It includes a singlefrequency real-time measurement with up to three different detectors at the same time. The initial appearance of the Analyze Box is apparent from Fig. D.72.



Fig. D.72: The Analyze Test Box

In the Analyze box you can Load Test, make a Peak Search, Export Data, Generate Report, make a Screenshot, Print and Reset Zoom (Fig. D.73).

File	Tools	Test Tools	?
Setup	Run Tes	Load T	est
Manu	ual Settings	Peak S	earch
1 F	eak 📃	Export	Data
Attenu	uators	Genera	ite Report
0 dB	•	Screen	shot
	80	Print	
dеV		Reset 2	loom

Fig. D.73: Test Tools menu of Analyze box



*Load Test.* This button has much utility and different options. It opens the *Test Management* window where you can load any of performed tests (Fig. D.74).

Exactly as seen for the *Find Workspace* window, here you can use *Filter* for filtering your tests by Test Name / Operator, select one run test and change its stored data with *Edit Info* (press Save Modification for storing permanently your changes), you can *Load* a Test and it will automatically use as a reference spectrum for data analysis (it will superimpose to your actual real time running test), *Delete Selected Tests* (you can select more than one Test by clicking on each Test while holding down the *Ctrl* button) and *Close*.

Test Nam	ie			Operator			
							Clear Filter
т	est Name	Date	Operator	Operating Mode	Max Hold	Specification	Conditi
Te	est Number 19	9/4/2014 9:47 AM	Franco	FFT SCAN			Carico 4
Te	est Number 20	9/4/2014 9:48 AM	Franco	FFT SCAN			Carico 4
M	42289020 21	9/4/2014 9:53 AM	Franco	FFT SCAN	(m)		M4228
Te	est Number 22	9/4/2014 9:53 AM	Franco	FFT SCAN			M4228
Te	est Number 23	9/4/2014 9:54 AM	Franco	FFT SCAN			M42289
Te	est Number 24	9/4/2014 9:55 AM	Franco	FFT SCAN	<b>m</b>		M42289
Te	est Number 25	9/4/2014 10:01	Franco	FFT SCAN			PSV59
Te	est Number 26	9/4/2014 10:01	Franco	FFT SCAN			PSV59
Te	est Number 27	9/4/2014 10:02	Franco	FFT SCAN	<b></b>		PSV59
Te	ast Number 28	9/4/2014 10:02	Franco	FET SCAN	peq		PSV59
Test Info Test Nam	e Test Numb	per 22		Date 04/09/2014	09.5: 👻	Operating Mode FF	T SCAN
Operate	or Franco		Conditions	M42289020	Speci	fication	
Test Not	le						
Automatic	on -none-			Settin	9		w Settings

Fig. D.74: Test Management table for Load Test

Pressing *Show Settings* button for the selected test, a window with all information on run test opens (Fig. D.75).

Test	Settings									- 2	×
			Trace 1 Detec	tor	Trace 2 Dete	ctor		Trace 3 Deter	tor		
			0		-1			-1			
Fstart		Fstop	Fstep	Bandwidth	Time (ms)	RF Input		Attenuator	Antenna / Probe	Cable	Ampl / Att
	9,000	150,000	46.8Hz	200Hz		RF IN 1	-	0 dB	-none -	- none -	-none -
	150,000	30,000,000	3kHz	9kHz	10	RF IN 1	-	0 dB	- none -	- none -	- none -

Fig. D.75: *Test Settings* for a Load Test

With reference to the example shown at Fig. D.71, the loaded Test is automatically use as a reference spectrum for data analysis reporting the waveforms with faded colors and the indication of the three detectors with (R), so PK(R), QP(R) and CAVG(R).

Pushing the *Start* button, the real time measurement will be performed reporting the waveforms with standard colors and the indication of the three detectors will be as usual PK, QP and CAVG. The actual real time running measurement will be compared with the reference spectrum. The waveforms of the reference spectrum of the loaded Test can be enable / disable using the checkbox on right-lower part of the Analyze box, see Fig. D.72.



X

#### Peak Search. This will open the Peak Search – Analyze window (Fig. D.76)

Peak Search - Report

	Freq	Antenna / Probe Factor [dB]	Cable Factor [dB]	Ampl / Att Factor [dB]	Detector	Meter Read [dBµV]	Meas. Level [dBµV]	Limit1 [dBµV]	Limit Dist	Limit2 [dBµV]	Limit 2 Dist	Enable
	186kHz	0,05		19,94	QPeak	47,93	67,92	64,21	3,70			
2	261kHz	0.05		19,94	QPeak	44,99	64,98	61,40	3,58			
16	264kHz	0,05		19,94	QPeak	44,53	64,52	61,30	3,22			
3	336kHz	0.05		19,94	QPeak	40.64	60,63	59,30	1.33			
17	339kHz	0,05		19,94	QPeak	40,43	60,42	59,23	1,20			
4	411kHz	0.05		19,94	QPeak	34,85	54,84	57,63	-2,79			
18	414kHz	0,05		19,94	QPeak	34,68	54,67	57,57	-2,90			
5	483kHz	0.05		19,94	QPeak	30,48	50,47	56,29	-5,82			
19	486kHz	0.05		19,94	QPeak	29,97	49,96	56,24	-6,27			
6	633kHz	0.05		19,94	QPeak	29,05	49.04	56,00	-6,96			
20	636kHz	0,05		19,94	QPeak	28,75	48,74	56,00	-7,26			
7	558kHz	0.05		19,94	QPeak	28,59	48,58	56,00	-7,42			
21	561kHz	0.05		19,94	QPeak	27,67	47,66	56,00	-8,34			
8	150kHz	0.05		19,95	QPeak	36,62	56,62	66,00	-9,38			
9	22,119MHz	0,10		19,98	QPeak	28,62	48,70	60,00	-11,30			
10	780kHz	0.05		19,95	QPeak	20,67	40.67	56,00	-15,33			
22	783kHz	0.05		19,95	QPeak	20,57	40,57	56,00	-15,43			
11	855kHz	0.05		19,95	QPeak	18,86	38,86	56,00	-17,14			
24	711kHz	0.05		19,95	QPeak	18,57	38,57	56,00	-17,43			
12	453kHz	0.05		19,94	QPeak	19,38	39,37	56,82	-17.45			
25	858kHz	0,05		19,95	QPeak	18,46	38,46	56,00	-17,54			
23	450kHz	0,05		19,94	QPeak	18,96	38,95	56,88	-17,92			

Fig. D.76: Peak Search - Analyze data, sorted by Distance from Limit

Remarks:

Antenna / Probe Factor	[dB] is the antenna / probe factor expressed in dB
	is the cable factor expressed in up
Ampl / Att Factor [dB]	is the attenuator factor for cable or amplifier/attenuator at the selected frequency
	in dB
Detector	is the type detector in use: Peak, Qpeak, C_AVG, RMS, C_RMS
Meter Read [dBμV]	is the meter reading (V) expressed in dBμV
Meas. Level [dBμV]	is the measured level (expressed in dBμV
Limit1 [dBµV]	is the value of the chosen limit 1 at the selected frequency
Limit1 Dist [dB]	is the margin from limit 1 at the selected frequency: a negative value is below the
	limit (compliant), a positive value is over the limit (not compliant)
Limit2 [dBµV]	is the value of the chosen limit 2 at the selected frequency
Limit2 Dist [dB]	is the margin from limit 2 at the selected frequency: a negative value is below the
	limit (compliant), a positive value is over the limit (not compliant)

Export Data. It enables the saving of the measurement data on a text file \*.txt that can be opened by Windows Notepad or similar Editor program, or can be imported in any spreadsheet application, being each field separated by semicolon (Fig. D.77).

📕 Test_Spectrum.txt - Notepad		A	В	С	D
File Edit Format View Help	1	1,000,000.000	69.01.00	56.00.00	46.00.00
1,000,000.000;69.1;56.0;46.0	2	1,005,000.000	68.05.00	56.00.00	46.00.00
1.010.000.000:68.7:56.0:46.0	3	1,010,000.000	68.07.00	56.00.00	46.00.00
1,015,000.000;86.6;56.0;46.0	4	1,015,000.000	86.06.00	56.00.00	46.00.00

Fig. D.77: Text file saved with Export Data and imported in a spreadsheet (Excel)



*Generate Report.* It enables to easily create a report of the loaded test. After a few instants a window opens with your customized test report (See § E.2 for more details and information).

*Screenshot.* It enables the saving of the measurement diagrams on a \*.JPG, \*.PNG, or \*. BMP file. A *Save as type* dialog opens with Browse for directory and filename. In order not to less any detail of your image, but still save disk space, the PNG-format for your plot is suggested.

*Print.* This prints the display in a "XPS" document with the colors chosen in the Customize Colors => Print and Report section of the Color Theme Editor. Before printing, it opens the system *Page Setup* Print dialogue box, default page orientation is landscape, with 10 mm distance from all margins.

*Reset Zoom.* This restore the display to its original form, by resetting any previous zoom (it works only if a Zoom was active). It is possible to make a manual *Zoom* in any spectrum window in two steps: 1) holding down the *Shift-key* ( $\uparrow$ ) and then left-clicking and moving the mouse in a rectangle while holding the mouse button (Fig. D.78 A); 2) after you release it, a blue rectangle appears and the area is zoomed (Fig. D.78 B):



Fig. D.78: Manual Zoom on Emission Spectrum

If you want to come back to the initial view (without Zoom), you must choose *Test Tools* => *Reset Zoom* in the *Analyze* box.

Checking the right side of the *Analyze* box, it is possible to add manually more points on the frequencies list selecting "Add with click" and using the mouse right-click on the graphic (Fig. D.79).

Pushing the *Start* button, the real time measurement will be performed at all the frequencies of the list only with up to three different detectors at the same time. Pushing "Add Row" button, it is possible to add manually other new points on the frequencies list during the real time measurement (Fig. D.80).



Fig. D.79: Manual addition of points on the frequencies list

Add Frequency	X
160	
MHz kHz	Hz

Fig. D.80: Manual addition of points on the frequencies list

"Delete Row" button allows to remove a selected frequency from the list and the "Clear" button allows to delete all the frequencies of the list.

"Save To File" button allows to save into a file the list of all the frequencies of the table with all the last real time measurements performed. Such file can be loaded again selecting "Load A File" button. To update the real time measurements of all the frequencies of the table it is necessary to select "Update all Table" checkbox.

The lowest part of the Analyze box window is the so-called *Test Info* (Fig. D.81), including the information saved in the *Test Management* window. These comprise *Test Name* (default one is *Test Number* with a progressive number), name of the *Operator, Date* of test (default is the current system date), *Conditions* (the ambient test conditions), *Specification* (Standards, limits, etc...) and *Note*.

Test Info Test	1 MHz-comb generator		Cond.	20°C, 100kPa, 60% RH	Spec. CISPR 22 Standard	
Operator	M. Mozzi	Date 20/02/2014 11.34	Note	This was a test with a Field Ref Source in the freq.	range 1-3 GHz	
Workspa	ace New Workspace	Operating Mode	FFT SCAN	Tests Saved Number 12	Connection LAN Status	

Fig. D.81: Test Info section of Run Test box

Also into the Analyze window you can easily work with one or two markers with the same procedure described into the Run Test box (section D.3.1, Fig. D.68 and D.69).

#### D.4.1 • THE MANUAL SETTINGS SECTION

In the *Manual Settings* section you can choose up to three from five available detectors, by flagging their names. There is a sketch of the Analyze section with three detectors (Peak, QPeak, C\_AVG) at Fig. D.82.

🗵 Peak 🛛	QPeak 💹 C	_AVG 🔛 RMS	C_RMS	12	Max Hold 🛛 🔯 Peak Averag	ana 4 🖶	Automatic attenuator count: 0
Attenuatora	Input Offset	Meas Time(ms)	Antenna /Probe		Cable	Amplifier/Attenuator	
0 dB 👻	Auto 🔫	10 🚖	- none -	•	• none • •	none - 🔻	

Fig. D.82: Manual Settings of detectors, attenuators, etc.



The Attenuators (0 / 10 / 20 / 30 dB or PREAMP), the Input Offset (Auto/Disabled) and the Measuring Time (ms) can also be set by the end user.

It is possible to include correction factors coming from external devices included into the measurement setup (Antenna/Probe, Cable, Amplifier/Attenuator).

You can use the Max Hold function by flagging *Max Hold* option.

It is possible to display on the diagram the average of the last N measurements <u>with Peak detector only</u> by flagging *Peak Averaging* option and introducing the number of measurements (in the example shown on Fig. D.82, N=4).

The Automatic attenuator count indication shows how many times the internal attenuators has been set automatically by the system during measurement.

#### D.4.2 • THE REAL TIME VISUALIZATION

Further than the numerical indication of the table on the right side of the *Analyze* box, during real time measurement it is also possible to check the measured signal amplitude at the selected frequencies through waterfall visualization (Fig. D.83). To obtain the waterfall visualization it is necessary to move down the cursor indicated on the red rectangle on Fig. D.83. Moving up and down the same cursor it is possible to adjust the visualization dimensions of both diagrams (waterfall and frequency sweep).



#### Fig. D.83: Waterfall visualization

With mouse right-click on the lower part of the graphic, it is possible to select one of the FFT bands of the whole frequency range and the real time measurement will be performed into the selected single FFT band.

Pushing "ALL" button, the real time measurement will be performed into the whole frequency range.



### **D.5** • CW GENERATOR BOX

.

CW Generator is the so-called Internal Signal Generator Box. It is depicted in Fig. D.84.

💷 AFJ FFT3030 - ver 1.29Beta		
File Tools ?		
Setup Run Test Analyze Generato	tor Calib Report	
	CW Generator	
	Fragueney	
	<b>30,000,000</b> σΒμγ	
	Step	
	5,000 🖶 🥂 🖤 🕅 RF ON	
Workspace Workspace	Operating Mode FFT SCAN Tests Saved Number 304 Connection LAN Status	

Fig. D.84: CW Generator Box

The CW Generator has to be activated by checking flag RF ON after setting the frequency and the amplitude.

The operator can quickly increase / decrease the value of the frequency according to the set frequency step pushing the black arrows.

The Amplitude range is from +50 dBµV to +90 dBµV for the Frequency range from 9 kHz to 110 MHz.



#### SECTION E: REPORT AND APPLICATION NOTES

#### E.1 • REPORT BOX

The *Report* box of the cockpit is the place you can summarize your test results in a form suitable for reporting and presentation (Fig. E.1).



Fig. E.1: The Report Box

In the *Report* box you can *Load Test*, make a *Peak Search*, *Reset Zoom* (if any), *Export Data* and *Generate Report* (see next paragraph E.2).

Load Test will open the well-known Test Management table (Fig. E.2).

ilei Faat Nome				Operator			
est Name				Operator	ß		Jear Filter
Te	st Name	Date	Operator	Operating Mode	Max Hold	Specification	Conditions
Tes	t Number 1	23/10/2013 14:20	M. Mozzi	FFT SCAN	[***	CISPR 11	
Tes	t Number 2	28/10/2013 14:37	M. Mozzi	FFT SCAN	1	CISPR 11	
Tes	t Number 3	28/10/2013 16:10	M. Mozzi	FFT SCAN	(m)	CISPR 22	
Tes	t Number 4	14/02/2014 10:21	M. Mozzi	FFT SCAN	[T]	CISPR 11	
Tes	t Number 5		M. Mozzi	FFT SCAN			
est <mark>Info</mark> est Name	Test Num	her 5		Date 14/02/2014 1	0.35 -	Operating Mode FFT	SCAN
est <mark>Inf</mark> o 'est Name	Test Num	ber 5		Date 14/02/2014 1	0.35 🛩	Operating Mode FFT	SCAN
est Info est Name Operator	Test Num M. Mozzi	ber 5	Conditions	Date 14/02/2014 1	0.35 👻	Operating Mode FFT fication CISPR 22	SCAN
est Info 'est Name Operator Test Note	Test Num M. Mozzi	ber 5	Conditions	Date 14/02/2014 1	0.3: - Spect	Operating Mode FFT fication CISPR 22	SCAN
est Info 'est Name Operator Test Note	Test Num M. Mozzi	ber 5	Conditions	Date 14/02/2014 1	0.35 -	Operating Mode FFT fication CISPR 22	SCAN
est Info Test Name Operator Test Note	M. Mozzi	ber 5	Conditions	Date 14/02/2014 1	0.35 - Spect	Operating Mode FFT	SCAN
est Info Fest Name Operator Test Note	M. Mozzi	ber 5	Conditions	Date 14/02/2014 1	10.35 v	Operating Mode FFT fication CISPR 22	SCAN
est Info Gest Name Operator Test Note utomation Load As in Run Ti	Test Num     M. Mozzi     none- Reference C est Mode	ber 5	Conditions	Date 14/02/2014 1 Setting Reference Curve a Mode	0.3: • Spect	Operating Mode FFT fication CISPR 22	SCAN

Fig. E.2: Test Management in Report box



Here you can Load/delete a Test and Save Modifications to it, as usual. Pressing the *Show Settings* button, a summary of Test Settings is presented as a Table, with all information about measurement settings (Fig. E.3).

Test S	Settings	-			_ 0						
			Trace 1 Detector		Trace 2 Detector			Trace 3 Detector			
			0		-1			-1			
Fstart		Fstop	Fstep	Bandwidth	Time (ms)	RF Input		Attenuator	Antenna / Probe	Cable	Ampl / Att
	9.000	150,000	46.8Hz	200Hz	10	RF IN 1	-	0 dB	-none -	- none -	-none -
	150,000	30,000,000	3kHz	9kHz	10	RF IN 1	-	0 dB	- none -	- none -	- none -

#### Fig. E.3: Test Settings in Report box

Remember that you can customize the *Report Options* information, under the menu:

Tools => Customize => Report.

A window summarizing the following information is apparent:

*Title Comment 1* to *Comment 3* Show Date and Time Show Subrange Settings

See Fig. E.5 for details.

Add a title to your Report Add three lines of comments to your Report Add current date and time to your Report Add subrange information to your Report

Report Options	×
Report Title	
AFJ FFT3010 Report	
Comments	
Report Comment 1	
Report Comment 2	
Report Comment 3	
<ul><li>✓ Show Date and Time</li><li>✓ Show Subrange Settings</li></ul>	
ОК	Cancel

Fig. E.4: *Report* Options window

#### E.2 • GENERATE A REPORT

Once you have loaded a test and set all your supplementary information, you can easily generate a report by pressing the Generate Report button.

After a few instants a window opens with your customized test report (Fig. E.5). Here you can make many actions as

Export

Export as an Excel, PDF and Word file





Fig. E.5A: Report window (Page 1 / 2)



Fig. E.5B: Report window (Page 2 / 2)

In the headings you can navigate on different pages, print on paper, choose a print layout, see the page setup for different paper-format, and save it as a file: PDF, Excel and Word file are allowed (Fig. E.7).



Fig. E.7: Navigation, Print, Print layout, Export as Excel / PDF / Word file

Report can be opened in Word (any version), see next pages.



## AFJ FFT3010 Report

Report Test: LED Device WorkSpace: AFJ EMI Test Lab

Test Summary			
WorkSpace	AFJ EMI Test Lab	Test Name	LED Test
Laboratory	<pre>/ AFJ EMI Test Lab</pre>	Date	14/01/2021 03.38
DUT	LED Device	Operator	AFJ
Company	/ AFJ	Test Type	FFT SCAN
Mode	l 100~240V	Specification	
Seria	l	Condition	220V_L2
Note	9		
Unit	: dBµV		
Autom	none-	Setting Ne	utral

Settings SubRange Summary		
Range Number: 1		
Start Freq.: 9.000Hz	Stop 30.000.000Hz Freq.:	Step: 46.8Hz/3kHz
Trace 1: QPeak	Trace 2: C_AVG	Trace 3:
Bandwidth: 200Hz/9kHz	Measurment 1000 ms Time:	Attenuator: 0 dB
Antenna/Probe: L2-16B LISN-L2	Cable: - none -	Amplifier/Atten.: PAT20M





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ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Туре	dBuV	dBuV	dBuV	dB	dBuV	dB	P/F
1	186kHz	0,05		19,94	QPeak	47,93	67,92	64,21	3,70			F
2	261kHz	0,05		19,94	QPeak	44,99	64,98	61,40	3,58			F
3	336kHz	0,05		19,94	QPeak	40,64	60,63	59,30	1,33			F
4	411kHz	0,05		19,94	QPeak	34,85	54,84	57,63	-2,79			Р
5	483kHz	0,05		19,94	QPeak	30,48	50,47	56,29	-5,82			Р
6	633kHz	0,05		19,94	QPeak	29,05	49,04	56,00	-6,96			Р
7	558kHz	0,05		19,94	QPeak	28,59	48,58	56,00	-7,42			Р
8	150kHz	0,05		19,95	QPeak	36,62	56,62	66,00	-9,38			Р
9	22,119	0,10		19,98	QPeak	28,62	48,70	60,00	-11,30			Р
23	150kHz	0,05		19,95	C_AVG	22,21	42,21			56,00	-13,79	Р
10	186kHz	0,05		19,94	C_AVG	46,67	66,66			54,21	12,45	F
11	264kHz	0,05		19,94	C_AVG	43,53	63,52			51,30	12,22	F
25	300kHz	0,05		19,94	C_AVG	15,87	35,86			50,24	-14,38	Р
12	339kHz	0,05		19,94	C_AVG	38,88	58,87			49,23	9,64	F
26	375kHz	0,05		19,94	C_AVG	13,91	33,90			48,39	-14,49	Р
13	414kHz	0,05		19,94	C_AVG	32,56	52,55			47,57	4,98	F
19	450kHz	0,05		19,94	C_AVG	15,28	35,27			46,88	-11,61	Р
14	486kHz	0,05		19,94	C_AVG	26,94	46,93			46,24	0,69	F
21	525kHz	0,05		19,94	C_AVG	12,80	32,79			46,00	-13,21	Р
16	561kHz	0,05		19,94	C_AVG	23,90	43,89			46,00	-2,11	Р
24	600kHz	0,05		19,94	C_AVG	12,22	32,21			46,00	-13,79	Р
15	636kHz	0,05		19,94	C_AVG	24,42	44,41			46,00	-1,59	Р
20	711kHz	0,05		19,95	C_AVG	13,27	33,27			46,00	-12,73	Р
18	783kHz	0,05		19,95	C_AVG	14,86	34,86			46,00	-11,14	Р
22	858kHz	0,05		19,95	C_AVG	12,68	32,68			46,00	-13,32	Р
27	18,051	0,10		19,98	C_AVG	15,38	35,46			50,00	-14,54	Р
17	22,119	0,10		19,98	C_AVG	24,75	44,83			50,00	-5,17	Р





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