FFT 3010
FFT 3030
EMI Receivers

FULLY FFT DIGITAL EMI RECEIVERS FOR MEASUREMENT OF CONDUCTED ELECTROMAGNETIC INTERFERENCE FROM 9kHz TO 300MHz

Compact designed and manufactured compliant to CISPR 16 International Standard, using FFT Scan Mode for fast measurements of conducted electromagnetic interference in accordance with requirements of EMI International, European and Product standards, pre-selectors and advanced software for EMC testing.

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Based on a PC integrated architecture with WINDOWS 10 Embedded OS, FFT 3010 and FFT 3030 EMI Receivers are ready to operate with advanced software for EMC testing, fitted with pre-selectors that allow excellent dynamic range and precise conducted emission measurements covering the frequency range from 9kHz to 300MHz. Remote control with an external PC is also possible.

Measurements to commercial EMI International, European and Product standards, shall be carried out directly by comparing the EMI spectrum with the associated limit lines and switching on the appropriate detectors.

CISPR COMPLIANCE

FFT 3010 and FFT 3030 EMI Receivers fully comply with CISPR 16-1-1.
The response of Quasi-Peak Detector in terms of both absolute calibration and relative calibration lays between the tolerances of CISPR 16-1-1.
The pulse weighting conformity meets down to the minimum value of the Pulse Repetition Frequency (PRF) coming from the DUT, of 1Hz.
The FFT Scan Mode is compliant to CISPR 16-3.

Accuracy and reproducibility are key parameters for FFT 3010 and FFT 3030 EMI Receivers application.

MAIN FEATURES

- FFT Scan Mode
- Peak, Quasi-Peak, CISPR Average, RMS and CISPR RMS numerical detectors
- Automatic attenuation insertion in case of saturation condition during measurement sweep
- Precise digital overload detector to avoid saturation effects during analyzing function
- Correct pulse weighting to CISPR 16-1-1 from PRF of 1Hz
- High measurement speed
- Fast detection of critical frequencies (dwell time down to 1msec with Peak numerical detector)
- High sensitivity
- Large-signal immunity
- Low measurement uncertainty
- Correction values for attenuator/amplifier, cables loss, coupling networks and antenna factors
- Integrated signal generator
- 10MHz External reference frequency

Software enables the operator to set all parameters and set-up FFT 3010 and FFT3030 EMI Receivers as requested by CISPR 16-1-1 or to tailor them according to his specific needs.
Some examples are:

- Frequency range
- Numerical Detectors upgradable by software (Peak, Quasi Peak, CISPR Average, RMS, CISPR RMS and combination of them)
- Limits set by EMI International, European and Product standards
- Dwell measurement time
- Correction factors

TUNABLE PRE-SELECTION FILTERS

The input bandwidth of the front end is limited by pre-selection filters to reduce the energy at the input stage of the internal tuner to guarantee the wide dynamic range required for quasi-peak detection.

FFT FUNCTION

Compliant to CISPR 16-3, FFT is applied to the wide-band IF signal with the advantages of Fast Scan Mode.

FILTERS

Digital CISPR EMI Filters BW do not need any periodic adjustment and maintenance:

- 200Hz and 9kHz for FFT 3010 EMI Receiver
- 200Hz, 9kHz and 120kHz for FFT 3030 EMI Receiver

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FFT 3030 EMI Receiver

This equipment is ideally suited for measurement of electromagnetic interference in accordance with the requirements of the following standards:

- CISPR 14-1 (household appliances industry) f = 9kHz ÷ 300MHz
- CISPR 15 (lighting equipment industry) f = 9kHz ÷ 300MHz
- CISPR 25 (automotive industry) f = 9kHz ÷ 108MHz

DETECTORS

Due to digital technology, five different types of numerical detectors and combinations of them can be selected by the operator: Peak, Quasi-Peak, CISPR Average, RMS and CISPR RMS.

DATA BASE

Equipment settings, measurements set-up, tests and measurements, frequency tables, external devices correction factors are automatically saved into powerful data base according to the proper work spaces defined by the operator.

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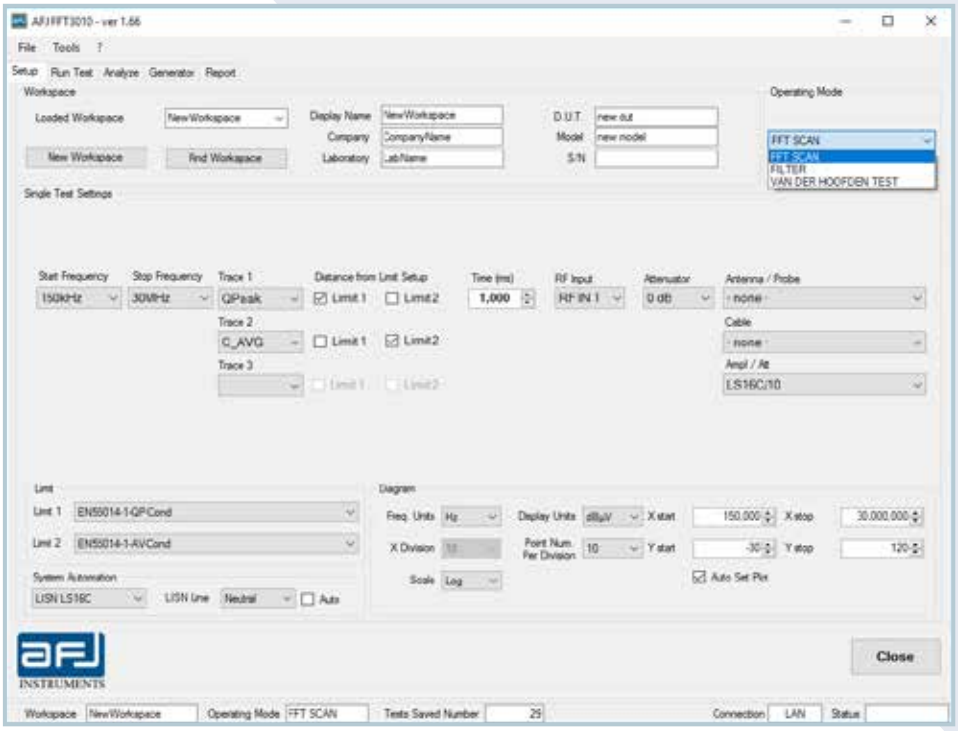
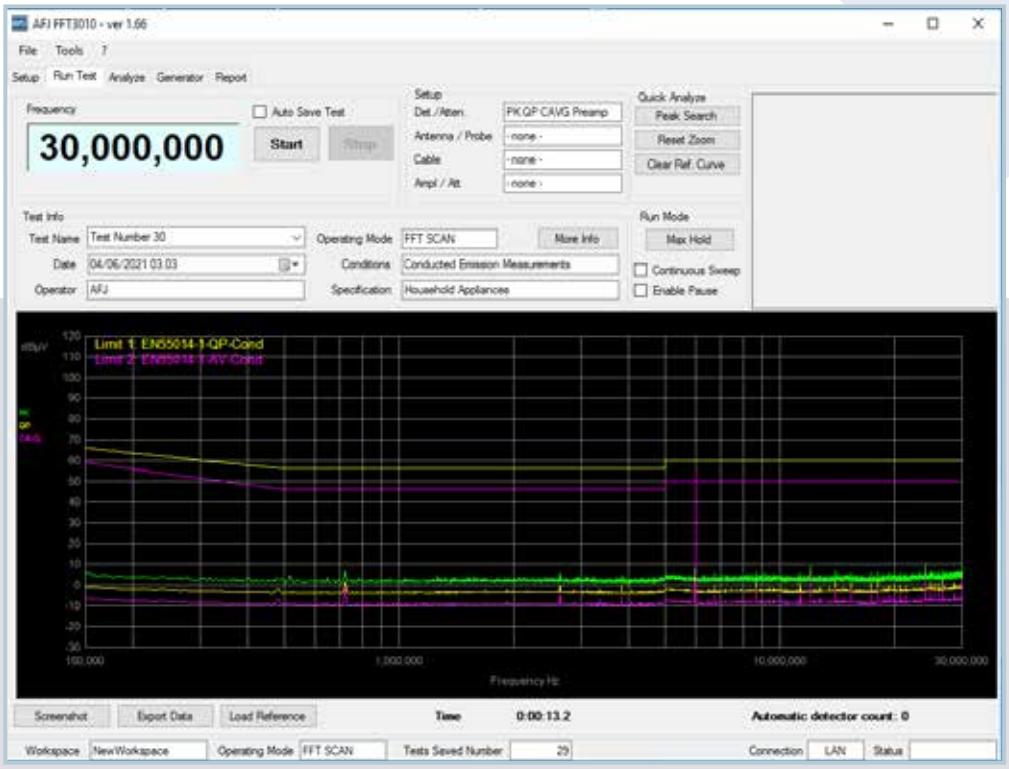


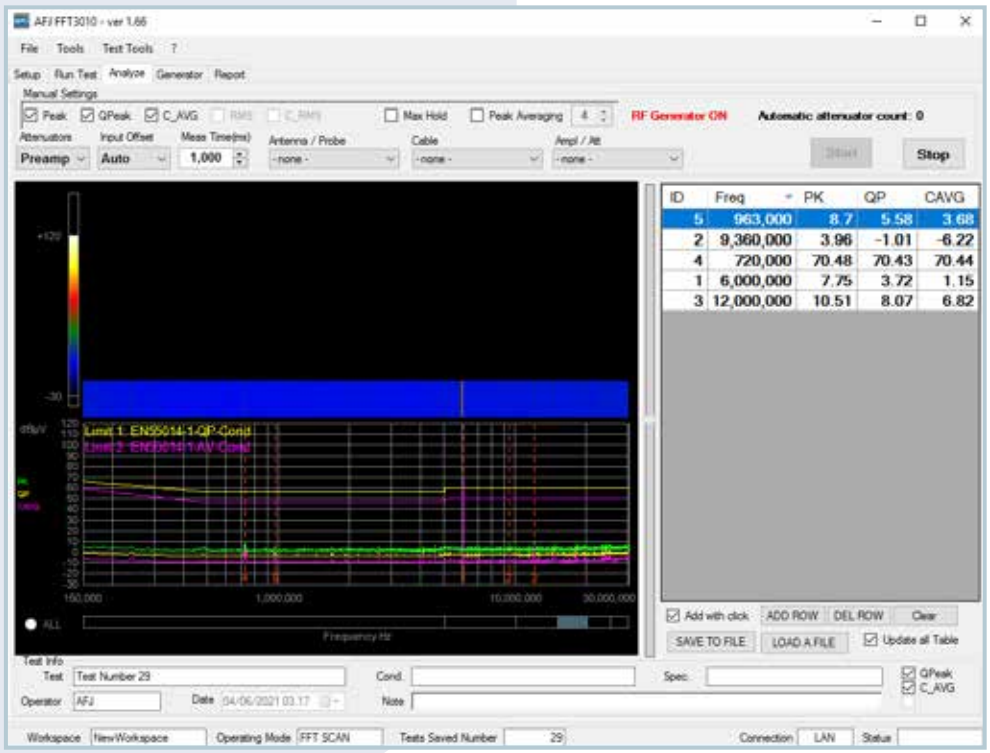
SETUP

Software settings of all measurement parameters

RUN TEST

Measurement in FFT SCAN mode



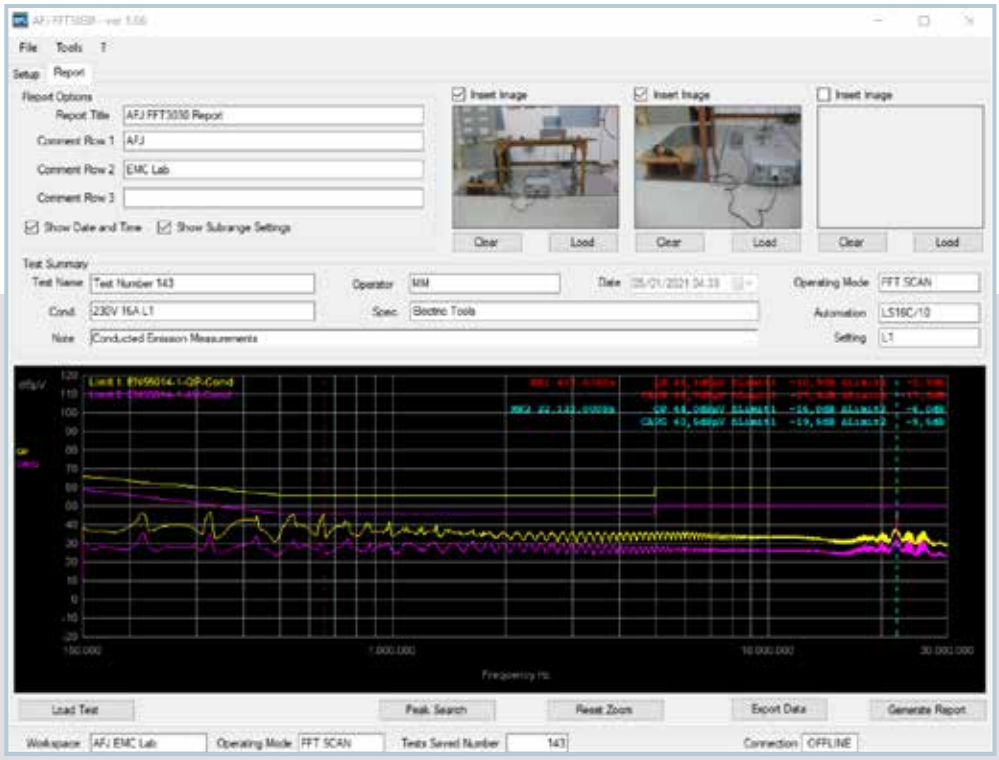


ANALYZE

Analysis of the measurement result with the possibility to perform a real time acquisition

REPORT

Creation of test report with all functions that are required for in-house tests to perform EMC diagnostic measurement and to document the test result



TECHNICAL SPECIFICATIONS	FFT 3010		FFT 3030		
FREQUENCY					
Frequency Range	9kHz÷30MHz		9kHz 300MHz		
Frequency Setting	1Hz (9kHz÷30MHz)		1Hz (9kHz÷300MHz)		
Internal Reference Frequency					
Aging per Year	2 x 10^{-6}		2 x 10^{-6}		
Temperature Drift	15 x 10-5 (+10 °C to +40 °C)		15 x 10-5 (+10 °C to +40 °C)		
External Reference Frequency	10MHz		10MHz		
Measurament Time (manual mode)	1ms to 5s		1ms to 5s		
Resolution	1ms		1ms		
Measurement Time (sweep mode)	1ms to 5s		1ms to 5s		
Resolution	1ms		1ms		
RESOLUTION BANDWIDTHS					
Digital CISPR EMI Filters BW	200Hz (-6dB Bandwidth) 9kHz (-6dB Bandwidth)		200Hz (-6dB Bandwidth) 9kHz (-6dB Bandwidth) 120kHz (-6dB Bandwidth)		
PRESELECTION					
Pre-Selector Filters	9 kHz to 150kHz 150 kHz to 5MHz 5MHz to 10MHz	10MHz to 15MHz 15MHz to 20MHz 20MHz to 30MHz	9 kHz to 150kHz 150 kHz to 5MHz 5MHz to 10MHz 10MHz to 15MHz	15MHz to 20MHz 20MHz to 30MHz 30MHz to 60MHz 60MHz to 140MHz 140MHz to 300MHz	
LEVEL					
Maximum Input Level					
DC Voltage	50V (AC-coupled)		50V (AC-coupled)		
CW RF Power	+17dBm (Input Attenuation 0dB) +27dBm (Input Attenuation ≥ 10dB)		+17dBm (Input Attenuation 0dB) +27dBm (Input Attenuation ≥ 10dB)		
Immunity to Interference					
Image Frequency	> 60dB		> 50dB		
RF Shielding	3V/m (50Ω termination)		3V/m (50Ω termination)		
Noise Floor	BW 200Hz	BW 9kHz	BW 200Hz	BW 9kHz	BW 120kHz
50 Ω termination, Input Attenuation 0dB, Preamplifier OFF					
Peak	< 10dBµV	< 20dBµV	< 10dBµV	< 20dBµV	< 18dBµV
Quasi Peak	< 0dBµV	< 15dBµV	< 0dBµV	< 15dBµV	< 12dBµV
CISPR Average	< 0dBµV	< 10dBµV	< 0dBµV	< 10dBµV	< 7dBµV
RMS	< 0dBµV	< 10dBµV	< 0dBµV	< 10dBµV	< 8dBµV
CISPR RMS	< 0dBµV	< 10dBµV	< 0dBµV	< 10dBµV	< 8dBµV
50 Ω termination, Input Attenuation 0dB, Preamplifier ON					
Peak	< 0dBµV	< 10dBµV	< 0dBµV	< 10dBµV	< 8dBµV
Quasi Peak	< -10dBµV	< 5dBµV	< -10dBµV	< 5dBµV	< 2dBµV
CISPR Average	< -10dBµV	< 0dBµV	< -10dBµV	< 0dBµV	< 0dBµV
RMS	< -10dBµV	< 0dBµV	< -10dBµV	< 0dBµV	< 0dBµV
CISPR RMS	< -10dBµV	< 0dBµV	< -10dBµV	< 0dBµV	< 0dBµV
Measurement Accuracy with S/N > 20dB	± 0.8dB (9kHz÷30MHz)		± 0.8dB (9kHz÷30MHz) ± 1.4dB (30MHz÷300MHz)		
FFT SCAN MODE					
A/D Converter Resolution	16 bit		16 bit		
Sampling Rate	122,88MHz		Variable		
FFT Span	141kHz (Full CISPR Band A) 5 MHz (Total 6 bands to cover Full CISPR Band B)		141kHz (Full CISPR Band A) 5 MHz (Total 6 bands to cover Full CISPR Band B) 5 MHz (Total 54 bands to cover Full CISPR Band C)		
Full Compliant (1Hz) Sweep Measurement Time	< 18s (Band A + Band B) < 15s (Band B)		< 18s (Band A + Band B) < 15s (Band B) < 150s (Band C)		
Simultaneous detectors in parallel	3009 (Band A) 1669 (Band B)		3009 (Band A) 1669 (Band B) 211 (Band C)		
FFT Frequency Resolution	46,875 Hz (Band A) 3kHz (Band B)		46,875 Hz (Band A) 3kHz (Band B) 24kHz (Band C)		
INPUT & OUTPUT					
RF Input	50Ω		50Ω		
RF Input Connector	N female (RF 9kHz to 30MHz)		N female (RF 9kHz to 300MHz)		
RF Input VSWR	< 2,0 : 1,0 (Input Attenuation 0dB) < 1,2 : 1,0 (Input Attenuation ≥ 10dB)		< 2,0 : 1,0 (Input Attenuation 0dB) < 1,2 : 1,0 (Input Attenuation ≥ 10dB)		
RF Input Attenuator	0dB to 30dB in 10dB steps		0dB to 30dB in 10dB steps		
Integrated Signal Generator	+50 ÷ +90dBµV		+50 ÷ +90dBµV (9kHz÷30MHz)		
GENERAL					
Interface	Ethernet 10/100 MB Remotable LAN (LXI Level 0 Protocol)		Ethernet 10/100 MB Remotable LAN (LXI Level 0 Protocol)		
Power Supply	110/230Vac ± 10% 50/60Hz		110/230Vac ± 10% 50/60Hz		
Power Consumption	50VA		50VA		
Operating Temperature	0° to 45°C		0° to 45°C		
Storage Temperature	-20° to 70°C		-20° to 70°C		
Size (W x H x D)	450 x 135 x 400mm		450 x 135 x 400mm		
Weight	16kg		16kg		

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