

# **R3030 EMI TEST RECEIVER**

Fully IF digital EMI Receiver for measurement of electromagnetic interference from 9kHz to 300MHz



Compact designed and manufactured in compliance with CISPR 16-1-1, for measurements of electromagnetic interference in accordance with requirements of EMI International, European and Product standards, pre-selectors, advanced software for EMC testing.

#### R3030 EMI Receiver is

PC based microprocessor controlled with advanced software for EMC automation. Fitted with continuously active pre-selectors that allow excellent dynamic range and precise EMC measurements covering the frequency range from 9kHz to 300MHz.

Optimized easy-to-use EMI measurement concept.

Fitted with the internal

EMC tests.

detectors.

pre-selector/ preamplifier

AFJ R3030 unit features an

excellent dynamic range and is, therefore, able to perform precise

Measurements to commercial

Product standards, shall be

the EMI spectrum with the

associated limit lines and

switching on the appropriate

EMI International. European and

carried out directly by comparing



This receiver is ideally suited for measurement of electromagnetic interference in accordance with the requirements of **CISPR 14-1** (household appliances industry) and **CISPR 15** (lighting equipment industry) standards. Further to conducted emission measurements from 9kHz to 30MHz with LISN, **CISPR 14-1** standard requires radiated power emission measurements from 30MHz to 300MHz with absorbing clamp, meanwhile **CISPR-15** standard requires radiated emission measurements from 30MHz to 300MHz with CDN method.

### MAIN FEATURES

- Peak, Quasi-Peak, CISPR Average, RMS and CISPR RMS
- Correct pulse weighting to CISPR 16-1-1 from PRF of 1Hz
- High measurement speed and fast detection of critical frequencies (dwell time down to 2msec)
  - EMI measurement bandwidths 200Hz, 9kHz, 120kHz
- High sensitivity
- Large-signal immunity
- Low measurement uncertainty
- High measurement speed
- Correction values for attenuator / amplifier cables loss, coupling networks, GTEM correction and antenna k factors
- Overload indicator
- Touch screen display for on site stand alone usage
- Tracking generator

### **CISPR COMPLIANCE**

R3030 EMI Receiver fully complies with CISPR 16-1-1. The response of R3030 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**.

Accuracy and reproducibility are key parameters for AFJ R3030 EMI Receiver application. R3030 EMI Receiver is PC-based and totally controlled by easy-running WINDOWS<sup>™</sup> software.

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

- Frequency range and frequency step
- Detectors (Peak, Quasi Peak, CISPR Average, RMS, CISPR RMS and combination of them)
- Limits set by European and other Standards
- Correction factors
- GTEM correction factors

# DATA BASE

Receiver 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 user.



#### **PRE-SELECTION FILTERS**

The input bandwidth of the front end is limited by pre-selection filters to reduce the total voltage level at the input mixer to an extent compatible with the wide dynamic range required for quasi-peak detection in the CISPR frequency range.

Up to 15 fixed and tuned pre-selector filters guarantee more than 40dB of attenuation for intermediate frequency, image frequency and intermodulation effects.

## DETECTORS

Five different types of HW detectors and combinations of them can be selected by the user.

In addition to that, each detector type can be associated with a selectable timing, corresponding to the endurance of the measurement aperture gate.



In the Manual Mode, the bar graph, with current detector value and Max Hold display, shows the results of manual circuit adjustment an when DUT cabling is arranged for maximum emission.

	SM: 20091006102 PA22000 attenuers & pulse inter PA22000 attenuers & pulse inter	RE IN I
	Technical Specific	ations
	Frequency Range	0Hz÷30MHz
	Low pass filter up to	100MHz
	Max continuous input power	1W
	Max pulse input energy	1Ws (500µs)
	Input / Output VSWR	1.05 / 1.15
	Characteristic Impedance	50Ω
	Insertion loss	$20 dB \pm 0.3 dB$
Contraction of the second seco	In / Out RF connectors	BNC (f / m)
	Dimensions	96x28x23mm
	Weight	70g
	Nominal Temperature range	–10°C÷+45°C
	Storage temperature range	-25°C÷+70°C

A **Pulse Limiter/Attenuator** is required to protect the RF input stages of sensitive equipment from unpredictable spikes generated during conducted emission testing of a DUT.

We recommend the utilization of our Pulse Limiter/Attenuator with all our EMI receivers, in particular whenever DUT are tested for the first time.

These Spikes with high spectral density/Pulse energy can seriously damage all input stages such as, attenuators, pre-amplifier, preselector or mixer of our or other receivers as well as other RF sensitive equipment such as Spectrum Analysers.

PAT20M 20dB Attenuator is designed to stand Pulse Voltages up to 1Ws.

#### SWEEP MODE

Fast overview measurements with logarithmic or linear frequency scale with tuning in user defined frequency step with selectable measuring time.



#### SMART SWEEP

First measurement with one detector (usually Peak) and after peak searching the final measurement is repeated in these peaks with up to five detectors. Each peak can be check up to 10 points before / after, setting a Limit and a Measuring Time for each selected detector.







#### **TRACKING GENERATOR**

CW Generator has to be activated by checking flag RF ON and then choosing the Tracking Mode (in this case a sweep is activated) or Single Frequency Mode.



# ANALYZE MODE

The purpose of the ANALYZE mode is to load old tests and measurements and perform monitoring of the events occurring on selected frequency through MANUAL settings, checking full sweep with MARKERS, PEAK SEARCH and ZOOM functions.



The **TIME DOMAIN** option allows to analyze the interference level on selected frequency in the time domain.

#### ZOOM MODE

Performs a zooming operation on the diagram part that is selected pushing shift button of the keyboard and left key of the mouse at the same time. The new diagram can be checked with all ANALYZE MODE functions.



**CISPR 15 INSERTION LOSS** Software option allows end user to perform insertion loss measurements according to CISPR 15, selecting FILTER operating mode into the SET UP window.





# **GTEM CORRELATION**

Software option allows end user to perform radiated emission measurements in GTEM cells and calculate final result through correlation algorithmic using measurement results and GTEM correction factors.



# Test Routine

WORKSPACE To define and set all data base work space parameters where all data and results will be automatically saved.	TRACES Five different types of HW detect be selected by the user to defin three traces at the same time. sweep can be activated a parameters defined (points before Limit and a Measuring Time for selected detector.	tors can be up to . Smart and its e / after, or each ANTENNA/PROBE, To set Antenna/Prob Cabling calibration fil additional device file: Attenuators).	OPERATING MODE To enables the selection of the measure conditions under which the R3030 Receiver will operate to perform the analysis SWEEP, PEAK + QPEAK, FILTER and SMART SWEEP CABLE, Ampl/Att e correction factors, les and s (Amplifier and
File Tools Setup Burn T	CEIVER - ver 4.08 ? st   Analuze   Generator   Benort		
Workspace Loaded New W	Workspace Workspace1 ▼ Display Name Company forkspace Find Workspace Laboratory	Workspace1     D.U.T.     dut1       CompanyName     Model     model1       LabName     S/N     000	Operating Mode
Sorige Less Traces - Scan	Trace 1     Trace 2     Trace 3       Peak     Image: Constraint 1     Image: Constraint 1       Limit 1     Limit 1     Limit 1       Limit 2     Limit 2     Limit 2	Fin Meas 1     Fin Meas 1       Smart Sweep     Peak       Point before/after     Imit 1       Limit 2     Imit 2       Meas Time (ms)     200 - Imit 2	n Meas 2 Fin Meas 3 Fin Meas 4 Fin Meas 5 Fin Meas 3 Fin Meas 4 Fin Meas 5 Fin Meas 5 F
Frequency	Fstep         Bandwidt           9,000         150,000         100         200 Hz           150,000         30,000,000         5,000         9 kHz	h Time Attenuator Mode Attenuator Level Device ▼ 2 Manual ♥ 0 dB ♥ R3010 ▼ 2 Manual ♥ 0 dB ♥ R3010	Antenna/Probe         Cable         Ampl./Att                • none •               • none •               • none •                 • none •               • none •               • none •               • none •
Attenuator		Add Subrange Remove Subra	ange
Level 0 dB 0 dB 0 dB 0 dB 0 dB 10 dB 10 dB 10 dB	Repetition Num Limit 1 - none - Limit 2	Y     Preq Unit     Hz     ▼     Display Unit     dBµ√       X     Division     10     ▼     Point     per Division     10       X     Scale     Log     ▼       40	
20 dB 30 dB 40 dB 50 dB Preamp Workspace	Workspace1 Operating Mode  SWEEP	Tests Saved Number 0	Close Connection LAN Status
MANUAL ATTENUATION MODE To set the right internal attenuation of the receiver to have the better dynamic range during measurement, with possibility to insert +20dB internal Preamplifier. All changes in this section, automatically affect the correction by a consistent extent.	LIMIT To recall of all p LIMIT files that built using the E LIMIT function.	ossible can be <b>DIAGRAM</b> To set all neo parameters for settings.	cessary or diagram
SYST To con assoc set-up Anten Bar.	EM AUTOMATION htrol foreign equipment iated with the measurement site , such as LISN, Controller for na Mast, Turntable and Slide		

AFJ EMI RECEIVER – ver 4.10						
File Tools ?						
ietup   Run Test   Analyze   Generator	Filter Mode Report					
Report Options						
Title						
Report Demo						
Comment Row 1 Comment 1						
Comment Bow 2 Comment 2						
Comment Bow 3 Comment 3						
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Show Date and Time	Show Device Table	Test Summary				
I∕ Show SubRange Settings		Name	MHz to 30 MHz with 1	MHz peak spacing	Da	te  12/10/2010/03.42
		Operator	4. Mozzi		Operating Mod	le SWEEP
		Cond.	Field Reference Source		Spec. CISPR 22	
		Note				
		Automation	none-		Setting	
dBµV 75 EN55022-QP-Class	A				1	
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R3030 EMI Receiver offers all functions that are required for in-house tests to perform EMC diagnostic measurement as quickly, easily and as accurately as necessary and to document the test results.

- Manual measurement through Manual Mode function
- On site stand alone usage through touch screen display
- Semi automatic measurement with predefined scan and sweep tables allowing interactive interruption
- Individual of critical frequencies using markers and zoom functions
- Fully automatic interference measurements in conjunction of external devices, as LISN, turn table, antenna mast, slide bar controllers

The EMC compliance test then will be just a formality.

		R3030			
Frequency Range		9kHz÷300MHz			
Frequency Setting		1Hz (9kHz÷300MHz)			
Internal Reference Frequency					
Aging per Year		2 x 10 <sup>-6</sup>	\		
Temperature Drift	1:	5 x 10 <sup>-3</sup> (+10 °C to +40 °C			
External Reference Frequency		10 MHZ			
Resolution					
Frequency Display Remote (sweep mode)	G	araphic Display on PC SV	N		
Resolution	Free	quency Step (zoom funct	tion)		
Measurement Time (manual mode)		2ms to 90min			
Resolution		1ms (< 60sec)			
		1sec (> 60sec)			
Measurement Time (sweep mode)		2ms to 60s			
Resolution		TITIS 200Hz (-6dB Bandwidth)			
Digital FMI Filters BW	2UUHZ (-6aB Bandwidth)				
	1	120kHz (-6dB Bandwidth	)		
Hardwara Filtara BW		15kHz	1		
		1MHz			
		9 kHz to 150kHz			
		150 kHz to 2MHz			
Fixed & Tunable Preselection Filters		15MHz to 30MHz			
		30 MHz to 60 MHz			
		60 MHz to 140 MHz			
		140 MHz to 300 MHz			
Maximum Input Level					
DC Voltage		50V (AC-coupled)			
CW RF Power Pulse Spectral Density		+20dBm			
	+9/0BµV/MHZ				
Image Frequency	> 60dB				
Intermediate Frequency		> 70dB			
RF Shielding	3V/m (50Ω termination)				
Noise Floor	IF 200 Hz	IF 9kHz	IF 120kHz (R3030)		
Peak Ouegi Beak	< -10dBµV				
	< -150BuV				
RMS	< -20dBuV	< 0dBuV	< 5dBuV		
CISPR RMS	< -20dBuV	< 0dBuV	< 5dBuV		
FRONT PANEL with Knob					
Display	3,5 Inch TFT with Touch Panel				
Features	Virtual Keyboard				
Level Display (digital)	Numeric (resolution U,U1dB)				
Detectors	Dalylapii Peak Oliasi-Peak CISPR Averane RMS CISPR PMS				
Number of Contemporary Detectors	3				
Display Units	dBµV, dBm, dBµV/m, dBµA/m, dBA/m, dBµA, dBpW				
RF Input Impedance	50Ω				
RF Input Connector(s)	N female (RF 9kHz to 30MHz)				
	N female (RF 30MHz to 300MHz)				
RF Input VSWR	2,0 to 1,0 (attenuation 0dB)				
BE Input Attenuator	1,2 to 1,0 (attenuation 2 100B) OdB to 50dB in 10dB steps				
IF Output Impedance	50Ω				
IF Output Connector	N female				
	10,7MHz (< 30MHz)				
	18MHz (> 300MHz)				
I racking Generator	+50÷+95dBµV (9kHz÷150MHz)				
плетасе	Ethernet 10/100 MB (TCP Port: 1893)				
	Above 1GB RAM (min)				
PC Requirement	Ethernet 10/100 MB Network Board				
	WIN XP, WIN VISTA, WIN 7 OS				
Power Supply	230Vac ± 10% 50-60Hz				
Power Consumption	50VA				
Storage Temperature	ປິ 10 45 ປິ - 20° to 70 ເ				
Size (W x H x D)	450x135x436mm				
Weight	15kg				



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