



ER55 EMI TEST RECEIVER

Family of automatic test receivers for measurement of electromagnetic interference from 9kHz to 1GHz

Data Sheet



Compact designed and manufactured in compliance with CISPR 16-1, For Measurements vs. commonly used EMI Standards, Continuously active pre-selectors, Advanced software for EMC automation.

The **ER55** is a family of microprocessor-controlled, super heterodyne-type automatic test receivers covering the frequency range from 9kHz to 1GHz. These receivers are ideally suited for measurement of electromagnetic interference in accordance with the requirements of **FCC, CISPR, EN**. Receivers can also be used as a selective RF voltmeter with a level range of 10dB μ V to 127dB μ V in 50 Ω coaxial systems.



EMI MEASUREMENTS TO STANDARD

Optimized easy-to-use EMI measurement concept.

Fitted with the internal pre-selector/ preamplifier all AFJ ER55 models feature an excellent dynamic range and are, therefore, able to perform precise EMC tests.

Measurements to commercial EMI standards such as **CISPR, EN 550xx**, shall be carried out directly by comparing the EMI spectrum with the associated limit lines and switching on the appropriate detectors.

MAIN FEATURES

- Peak, Quasi-Peak and AV
- Correct pulse weighting to CISPR 16-1 from PRF of 1Hz
- High measurement speed and fast detection of critical frequencies (peak time down to 2msec)
- EMI measurement bandwidths 200Hz, 9kHz, 120kHz
- High sensitivity
- Large-signal immunity
- Low measurement uncertainty
- High measurement speed
- Correction values for cables loss, coupling networks, GTEM correction and antenna k factors
- Overload indicator
- Built in AM/FM demodulation

CISPR COMPLIANCE

The ER55 Receivers fully complies with CISPR 16-1-1 and CISPR 16-2.

The response of ER55 Quasi-Peak Detector in terms of both **absolute calibration** and **relative calibration** lays between the tolerances of CISPR 16-1. 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 ER55 receiver application.

ER55 EMI Receivers are PC-based and totally controlled by easy-running WINDOWS™ software.

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

Some examples are:

- Frequency range and frequency step
- Detectors (Peak, Quasi Peak, Average and combination of them)
- Limits set by European and other Standards
- Antenna correction factors (k-factor)
- GTEM correction factors
- CISPR 15 insertion loss



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

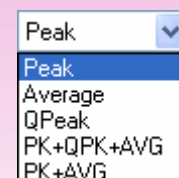
The input bandwidth of the front end is limited by pre-selection filters to reduce the total voltage level at the input mixer to an extent compatible with the wide dynamic range required for quasi-peak detection in the CISPR frequency range.

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

DETECTORS

Three different types of HW detectors and two 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.



Technical Specifications

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	20dB ± 0.3dB
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.

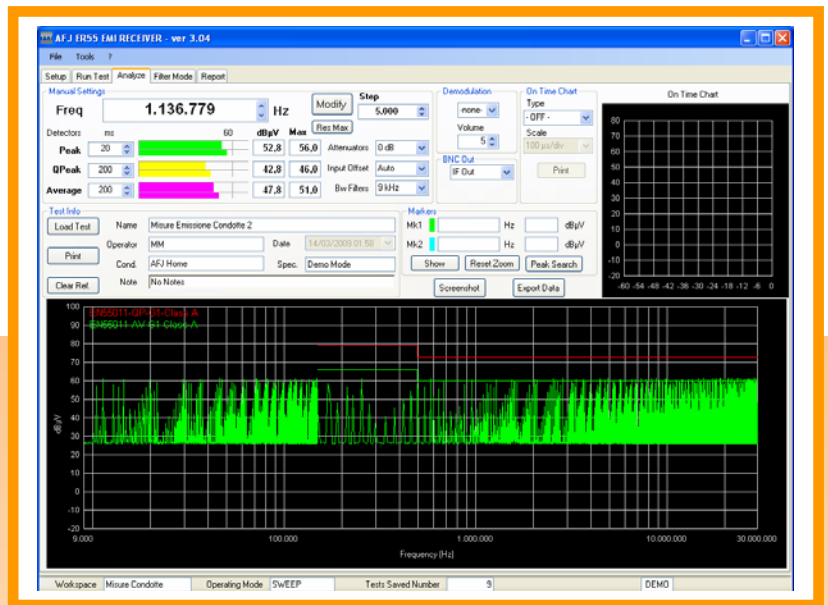


Time[hh:mm:ss] Remain 00:01:11 Elapsed 00:04:23

ER55 receiver shows measurement time on main cockpit while running the test.

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.

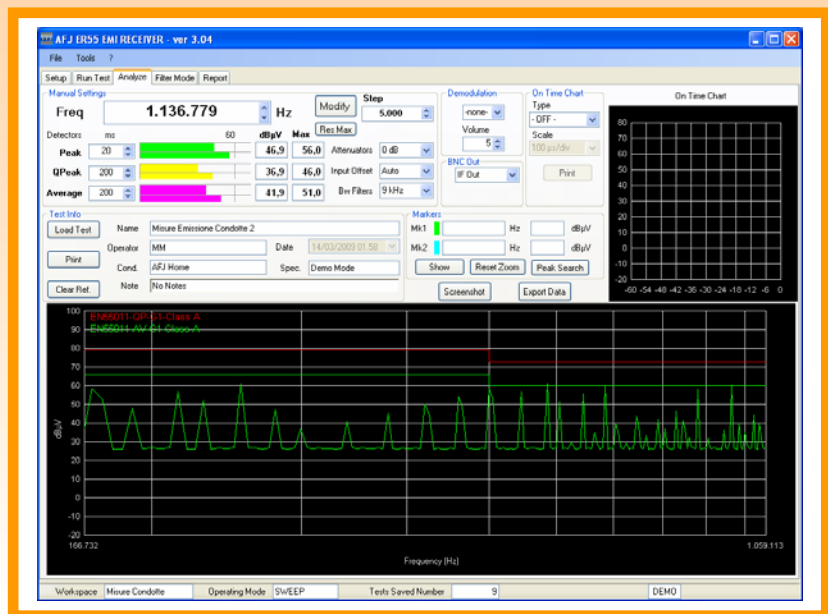


On Time Chart

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

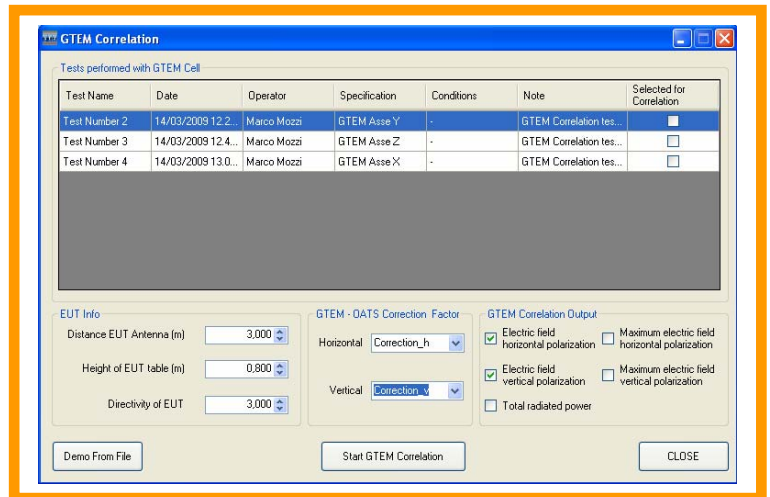
ZOOM MODE

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.



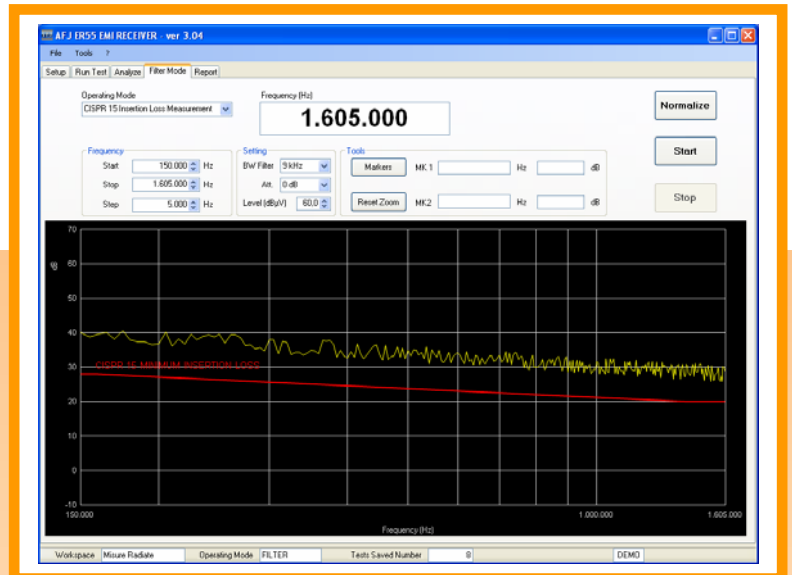
GTEM CORRELATION

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.



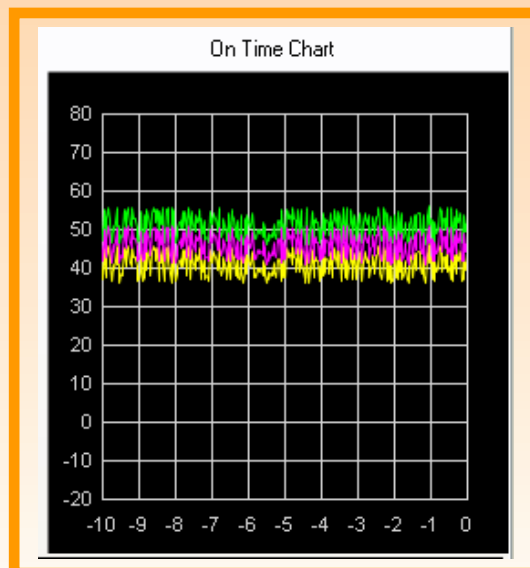
CISPR 15 INSERTION LOSS

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



TIME DOMAIN MODE

This function allows to analyze the interference level on selected frequency in the time domain.



WORKSPACE

To define and set all data base work space parameters where all data and results will be automatically saved.

DETECTOR

Three different types of HW detectors of two 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.

FREQUENCY TABLE

To set the parameters that will affect the SWEEP MODE.

OPERATING MODE

To enables the selection of the measure conditions under which the ER55 Receiver will operate to perform the analysis
SWEEP, PEAK + QPEAK, FILTER.

ANTENNA/PROBE, CABLE, Ampl./Att

To set Antenna/Probe correction factors, Cabling calibration files and additional device files (Amplifier and Attenuators).

The screenshot shows the AFJ ER55 EMI RECEIVER software interface. At the top, there are menu options: File, Tools, and ?. Below this is a 'Setup' bar with buttons for Run Test, Analyze, Filter Mode, and Report. The main interface is divided into several sections:

- Workspace:** Includes a dropdown for 'Load' (set to 'Misure Condotte'), 'Find Workspace', 'New Workspace', and 'Edit Workspace' buttons. It also has fields for 'Display Name' (Misure Condotte), 'D.U.T.', 'Company' (AFJ Office), 'Model', 'Laboratory' (Lab EMC), and 'S/N'.
- Single Test Settings:** A section for configuring individual test points.
- Frequency Table:** A table with columns: Fstart, Fstop, Fstep, Bandwidth, Detector, Time (ms), Attenuator Mode, Attenuator Level, Device, Antenna/Probe, Cable, and Ampl./Att. Two rows are visible:

Fstart	Fstop	Fstep	Bandwidth	Detector	Time (ms)	Attenuator Mode	Attenuator Level	Device	Antenna/Probe	Cable	Ampl./Att
9.000	150.000	100	200 Hz	Peak	2	Manual	0 dB	ER 55 CR	- none -	- none -	- none -
150.000	30.000.000	5.000	9 kHz	Peak	2	Manual	0 dB	ER 55 CR	- none -	- none -	- none -
- Mode:** A dropdown menu set to 'Start - Stop' with 'Add Subrange' and 'Remove Subrange' buttons.
- Max Hold:** Includes 'Repetition Num.' (set to 1) and 'Max Hold' buttons.
- Limit:** Two limit settings: 'Limit 1' (EN55011-QP-G1-Class A) and 'Limit 2' (EN55011-AV-G1-Class A).
- System Automation:** Includes a dropdown for 'System Automation' (set to '-none-') and 'LISN LINE' (Neutral).
- Diagram:** Includes 'Freq Unit' (Hz), 'Display Unit' (dBμV), 'X start' (9.000), 'X stop' (30.000.000), 'X Division' (10), 'Point per Division' (10), 'Y start' (-20), 'Y stop' (100), and 'Scale' (Log). There are also checkboxes for 'Auto Set Plot' and 'Enable Subrange Line'.

At the bottom, there are status indicators for 'Workspace' (Misure Condotte), 'Operating Mode' (SWEEP), 'Tests Saved Number' (9), and 'DEMO'. A 'Close' button is located at the bottom right.

Attenuator Level

- 0 dB
- 0 dB
- 0 dB
- 10 dB
- 20 dB
- 30 dB
- 40 dB
- 50 dB
- Preamp

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

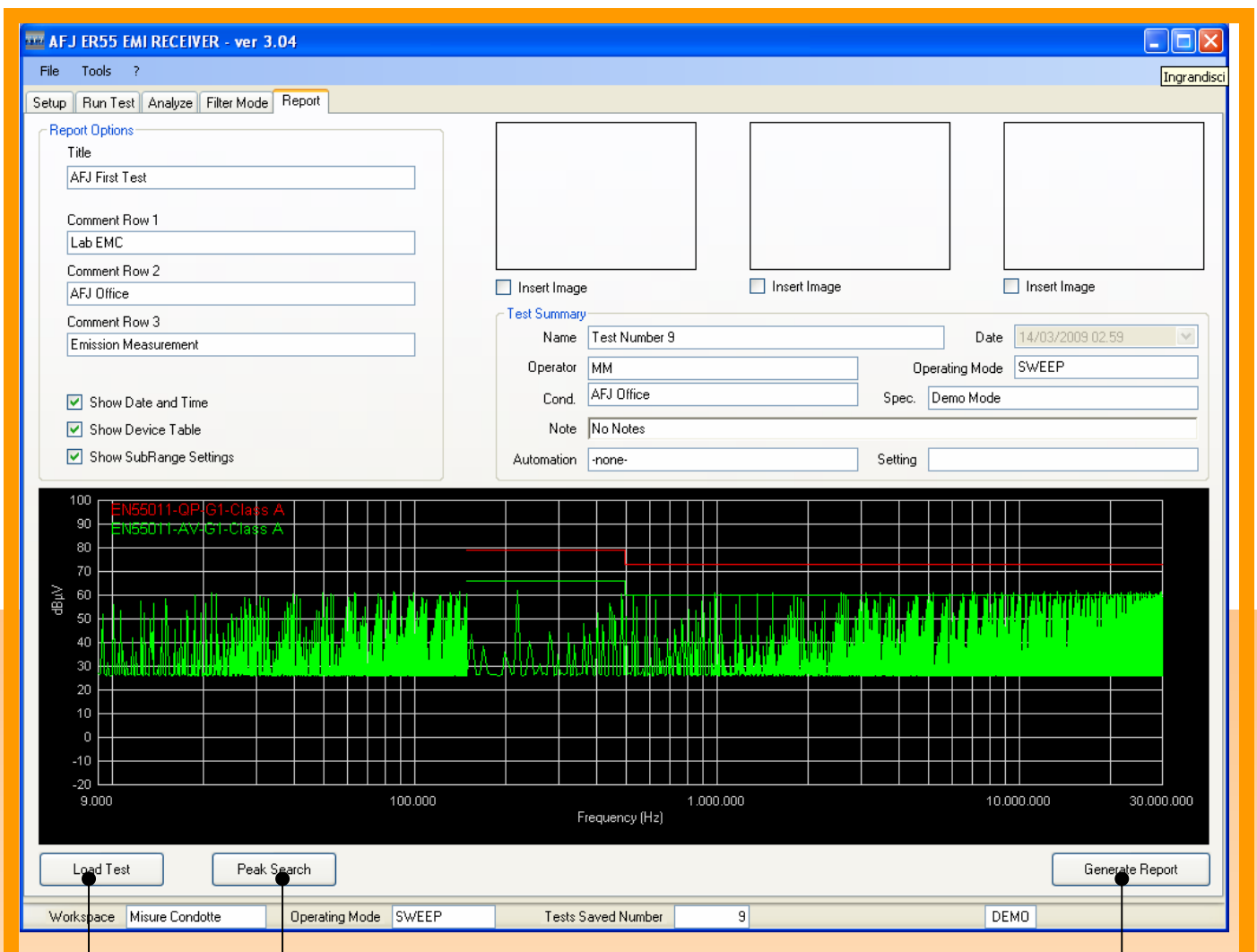
To recall of all possible LIMIT files that can be built using the EDIT LIMIT function.

SYSTEM AUTOMATION

To control foreign equipment associated with the measurement site set-up, such as LISN, Controller for Antenna Mast, Turntable and Slide Bar.

DIAGRAM

To set all parameters necessary for the display settings.



LOAD TEST

To load old tests and measurements and set all the necessary parameters and information for the test report.

PEAK SEARCH

To search the peaks to insert into the test report.

GENERATE REPORT

To create the test report according to the information set by the user.

ER55 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
- 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.

	ER55C	ER55CR
Frequency Range	9kHz-30MHz	9kHz- 1000MHz
Frequency Settings	50Hz (9kHz-150kHz) 1kHz (150kHz-30MHz)	50Hz (9kHz-150kHz) 1kHz (150kHz-30MHz) 25kHz (30MHz-1GHz)
Setting Error	$< 3 \times 10^{-6}$	$< 3 \times 10^{-6}$
RF Input	BNC 50 Ω (9kHz-30MHz)	BNC 50 Ω (9kHz-30MHz) N 50 Ω (30MHz-1000MHz)
VSWR Input	$< 2:1$ $< 1.5:1$ with preamplifier $< 1.2:1$ with attenuator	$< 2:1$ $< 1.5:1$ with preamplifier $< 1.2:1$ with attenuator
Preselector 9KHz-30MHz Fixed filters	9kHz-150kHz 150kHz-500kHz 500kHz-2MHz 2MHz-10MHz 10MHz-30MHz	9kHz-150kHz 150kHz-500kHz 500kHz-2MHz 2MHz-10MHz 10MHz-30MHz 30MHz-62.5MHz 62.5MHz-125MHz 125MHz-250MHz 250MHz-500MHz 500MHz-750MHz 750MHz-1000MHz
Max. Input	127dB μ V	127dB μ V
Intermediate Frequency	153.22MHz 10.7MHz 455KHz	1554MHz, 480MHz, 153.22MHz, 10.7MHz, 455KHz
IF Bandwidth	200Hz, 9KHz, 120KHz	200Hz, 9KHz, 120KHz
Noise Floor	(IF 200Hz) (IF 9kHz)	(IF 200Hz) (IF 9kHz) (IF 120KHz)
Peak	< -10 dB μ V < 0 dB μ V	< -10 dB μ V < 0 dB μ V < 10 dB μ V
Quasi Peak	< -13 dB μ V < -3 dB μ V	< -13 dB μ V < -3 dB μ V < 7 dB μ V
Average	< -20 dB μ V < -10 dB μ V	< -20 dB μ V < -10 dB μ V < 3 dB μ V
Measuring error	± 1.5 dB max.	± 1.5 dB max. (9kHz - 30MHz) ± 2 dB max. (30MHz - 1GHz)
Demodulation	AM/FM	AM/FM
Display Measure Level	-20 to 120dB μ V	-20 to 120dB μ V
Pulse Spectral Density	90dB μ V /MHz	90dB μ V/MHz
Image Freq. Rejection	85dB Typ.	85dB Typ.
Intercept Point d3	$ f_2 - f_1 > 100$ kHz level f1, f2: -10dBm fin<2MHz: 8dBm typ fin>2MHz: 15dBm typ	$ f_2 - f_1 > 100$ kHz level f1, f2: -10dBm Level f1, f2: -10dBm Pre off: 12dBm, typ Pre on: 0dBm, typ
Delay Time	2ms to 60s	2ms to 60s
Display Units	dB μ V, dB μ V /m, dBm, dBpW, dB μ A/m	dB μ V, dB μ V/m, dBm, dBpW, dB μ A/m
Interface	LAN 10/100 Mbit USB 2.0	LAN 10/100 Mbit USB 2.0
Power Supply	110/230 Vac $\pm 10\%$ 50/60Hz	110/230 Vac $\pm 10\%$ 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 (WxHxD)	450x135x436 mm	450x135x436 mm
Weight	14 kg	17 kg



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