

Vega 4 pairs

Automatic testing equipment for cables from Cat 5 up to Cat 8



DESCRIPTION

This automatic testing system has been developed to offer an effective solution for testing Cat 5 to Cat 8 LAN or DATA cables. It allows low frequency measurement of pairs and quads (RCKE) as well as high frequency parameters up to 2.2 GHz (depending on the version).

Different options such as EMC (AC, AS, TI) or alien crosstalk (AXT) functionalities offer considerable flexibility in terms of testing, thus allowing full characterization of your cable, including shielding parameters.

Thanks to the "OptiTest" software (an element of the CIQ SW family) supplied with the system, operators can work easily, quickly and efficiently. OptiTest allows analysis of parameter measurements for process control, traceability or any other functions requiring statistical information.

KEY FEATURES

- **Fast and compliant**
 - The fastest measurement system on the market
 - Compliant to all major international standards for LAN and DATA cables
- **High-Tech**
 - Executive RF switches using MIL standardized relays (min 10'000'000 cycles with superior repeatability)
- **Accurate and certified**
 - Quality inspection, with very high accuracy
 - Check against certified ISO 17025 standards
- **Add-on**
 - Mode conversion parameters (TCL, ELTCTL, etc...)
 - EMC parameters (TI, AS, AC)
 - Alien crosstalk measurement



AESA Cortailod

TECHNICAL SPECIFICATIONS

Parameters	All standard low frequency and high frequency parameters available (Resistance, Capacitance, Insertion Loss, Impedance, NEXT, FEXT, ...)		
Standards	Performs electrical tests on cables responding to: <ul style="list-style-type: none"> ANSI/TIA-568.2-D for Category 5, 5e, 6, 6a and 8 IEC 61156-5/-10 for Category 5e to 8.2 YD/T 1019/2013 		
Components	<ul style="list-style-type: none"> Connecting frame with 2 x 4 pairs each (Near & Far End) for LF & HF measurements up to 750 MHz, 1.5 GHz or 2.2 GHz 1 Microsoft Windows PC with a 17" colour monitor 1 AESA measurement and result management software Power supplies, connecting interfaces and cables, measurement accessories 		
Supply Voltage	100 - 240 VAC / 50 - 60 Hz, Consumption: 600 W without printer, 1000 W with printer		
Versions (High Frequency only)	Vega 754 HF (750MHz max)	Vega 1204 HF (1.5GHz max)	Vega 2004 HF (2.2GHz max)
Article No:	00.0754.0005.0	00.1204.0003.0	00.2004.0001.0
Versions (Low & High Frequency)	Vega 754 LF HF (750MHz max)	Vega 1204 LF HF (1.5GHz max)	Vega 2004 LF HF (2.2GHz max)
Article No:	00.0754.0001.0	00.1204.0001.0	00.2004.0002.0

HIGH FREQUENCY ACCURACY

	Vega 754	Vega 1204	Vega 2004	
	100 MHz - 750 MHz	750 MHz - 1.5 GHz	1.5 GHz - 2.2 GHz	
Attenuation (corrected to 20°C)				
-80 dB to -50 dB*	± 1.5 dB	± 3 dB	± 4 dB	± 6 dB
-50 dB to -25 dB	± 0.5 dB	± 0.9 dB	± 1.5 dB	± 2 dB
-25 dB to 0 dB	± 0.2 dB	± 0.8 dB	± 1.3 dB	± 1.7 dB
Near-End & Far-End Crosstalk (NEXT & FEXT)				
-90 dB to -60 dB*	± 2 dB	± 4 dB	± 6 dB	± 8 dB
-60 dB to -30 dB	± 1.4 dB	± 1.8 dB	± 4 dB	± 6 dB
-30 dB to -10 dB	± 0.8 dB	± 1.5 dB	± 2 dB	± 3 dB
	0.772 MHz - 100 MHz	100 MHz - 750 MHz	750 MHz - 1.5 GHz	1.5 GHz - 2.2 GHz
Impedance				
90Ω - 110Ω	± 1.5Ω	± 3Ω	± 4Ω	± 5Ω
70Ω - 90Ω & 110Ω - 130Ω	± 1.5Ω	± 3.5Ω	± 4.5Ω	± 6Ω

*: Measured with lower bandwidth to reduce VNA noise

LOW FREQUENCY ACCURACY (OPTION)

Resistance R (corrected to 20°C)	
R	± 0,1% + 10 mΩ
DR	
DR	Computed
Capacitance C	
C	± 0,25% ± 10pF at 800 Hz ± 0,25% ± 10pF at 125 Hz ± 0,25% ± 50pF at 12,5Hz
K	
K	
E	± 1% ± 6pF at 800 Hz ± 1% ± 3pF at 125 Hz ± 1% ± 30pF at 12,5 Hz

REQUIRED COMPONENTS

The system must be completed with:

- Vector Network Analyzer (VNA). Can be provided by AESA or by customer.

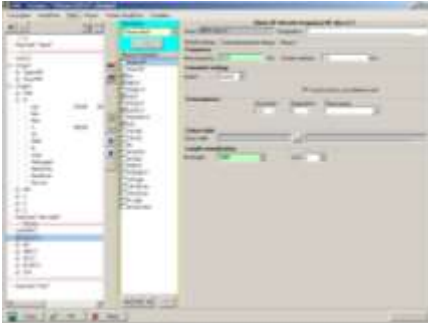
AVAILABLE OPTIONS

The equipment can be completed with:

- Coaxial cable measurement (50Ω or 50+75Ω)
- Switch for a 50Ω external connection
- Mode conversion parameters (TCL, ELTCTL,...)
- EMC parameters (Transfer Impedance, Screening/Coupling Attenuation)
- Alien crosstalk
- Low and High Frequency standards
- Movable trolley
- Warranty extension
- Maintenance contract
- Spare parts

AESA proposes other specific equipment for low and high frequency measurement.

KEY BENEFITS



USER-FRIENDLY

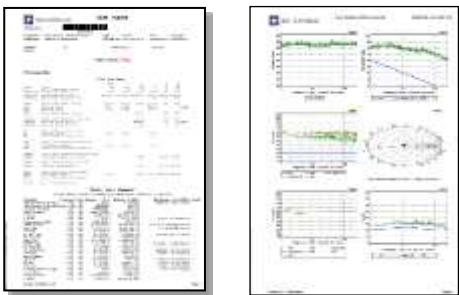
- Fast measurements
- No special HF or LF knowledge required
- Multilingual OptiTest software
- Direct results without post calculation
- Test order library

ISO 17025 ACCREDITED



ACCURATE AND REPEATABLE

- The equipment is checked against traceable calibration standards according to ISO/IEC 17025
- Perfect reproducibility
- The risk of human error is reduced to its strict minimum
- Calibration managed/saved by computer



SMART

- All data (results & conditions) are saved in the PC
- Reports and evaluations can be printed
- Data can be exported (PDF, TXT or XLS files)

Overview

SYSTEM

Accept wire diameters up to 1.2mm.
 Full two ports calibration (Thru-Open-Short-Load) for high accuracy measurement.
 No movable parts for maximum measurement speed and reliability.
 Robust mechanical design studied to facilitate maintenance and servicing operations.

LOW FREQUENCY PARAMETERS (OPTION)

The low frequency parameters feature is designed to measure pairs or quads.
 The resistance is measured at 4 points (Kelvin bridge).
 The capacitance can be measured at different frequencies in order to accommodate different cable lengths
 (Please refer to our application note 'Length Restrictions in Cable Testing').
 The feature provides self-calibration.

Measured parameters

	<u>Pairs</u>	<u>Quads</u>
Conductor Resistance	Ra, Rb	Ra, Rb, Rc, Rd
Loop Resistance	R	R1, R2
Resistance unbalanced	DR	DR1, DR2, DR3
Capacitance	C	C1, C2, C3
Capacitance unbalanced	K	K1-K12
Capacitance unbalanced to ground	Ei, Ea, E	Ei1-Ei3, Ea1-Ea3, E1-E3

Calculated parameters (100 to 10kHz)

Attenuation
 Characteristic Impedance
 Crosstalk
 Phase
 Velocity of propagation (VOP)

Statistical parameters

Maximum and minimum measured values	Upper quality factor
Absolute minimum measured value	Lower quality factor
Average value	RC product
Quadratic average	Standard deviation RC
Standard deviation	Variance
and more ...	

HIGH FREQUENCY PARAMETERS

The high frequency parameters are measured as pairs only (1 quad = 2 pairs).
 The measurement can be done according to a configurable curve or predefined fixed points.
 2 connecting frames allow to connect both ends of the cable for an automatic measurement of all parameters.
 A complete calibration is saved in the system allowing to change specifications without having to perform a new calibration.

Measured parameters

Transmission:	Attenuation or Insertion Loss Near end crosstalk Far end crosstalk
Reflection:	Impedance

Calculated parameters

Fitted Impedance and RL
Return Loss (RL) (Open/Short and Terminated 100Ω) (fully complex method)
NEXT Power Sum
FEXT Power Sum
Individual ACR, ACR Worst Case, Power Sum ACR
ELFEXT Pair to Pair
Phase Delay
Velocity of Propagation (VOP)
and more ...

Statistical parameters

Maximum and minimum measured values Worst case
Pair of worst case Frequency of worst case
and more ...

OPTITEST (Software)

The measuring system is equipped with OptiTest (a module of our CIQ quality data management software) which allows to prepare a measurement, to control the ATE to automatically acquire all the values of the defined parameters, to evaluate the results, to provide the measurement reports in the desired format and finally to save or export the measured values.

The software has been developed in the Microsoft® Windows™ environment and complies with the Windows features.

Creation and administration of test specification

The early creation of "Test Plan" file allows to define:

- the successive measuring sequences (Line test, LF, HF, EMC, ...)
- the appropriated limits and conditions (including complex limit curves)
- the scales (logarithmic or linear)
- the HF measuring method (sweep or frequency table; start/stop frequencies; number of points,...)
- the configuration of reports

The test plan is created only once per cable type and can be saved and re-used accordingly.

Possibility to create an unlimited number of cable specifications and test sequences.

These "test specifications" will be stored with an individual customised name and are easily retrievable.

Most of the limits and formulas recommended by the international standards are already integrated.

Their variables are programmable to enable the preparation of special specifications.

Measurement

The operator only needs to connect the cable on the frame, set the right test plan, fulfil the specific data (order number, operator name,...) and start the full automatic measurement.

- Fully automatic calibration management including automated calibration procedure
- Preliminary line test to verify the cable connection (short cut, crossover,...)
- Switching sequences indicated by LEDs
- In case of problem, the operator can repeat the measurement or continue in accepting the wrong value

Reporting

Report generation is set in the test plan and is automatically generated.

The results may be displayed, printed, stored as PDF files, exported (e.g. Excel) or sent by email.

Different highly comprehensive reports can be generated containing a limit case compilation with graphics and for each measuring block a separate summary with related graphics.

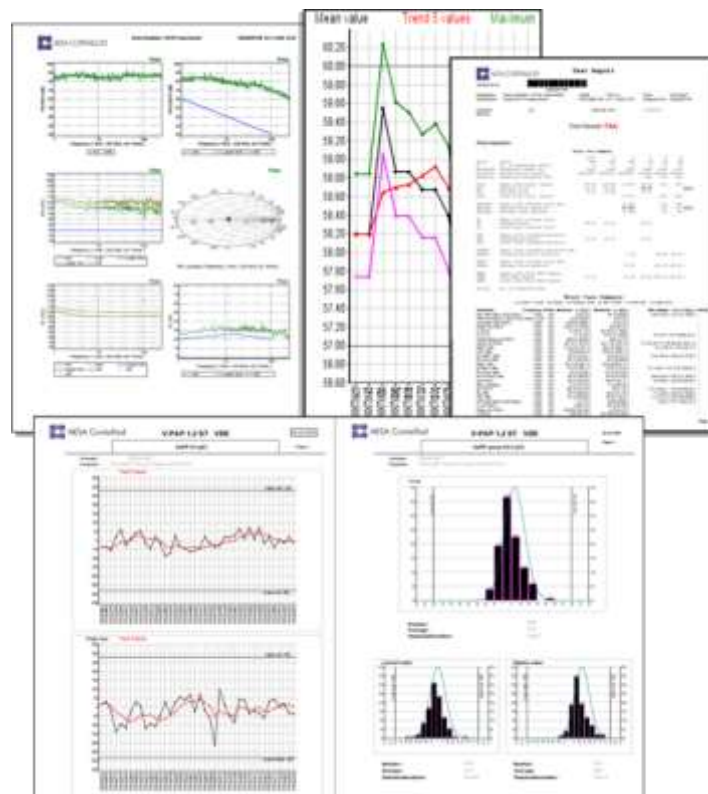
Filters and search criteria normally generate sample lists which facilitate multiple further actions such as:

- Display and process measured values
- Print reports and labels

Evaluation

All data is available for evaluation at any time. Thus, all test data of a cable can be collectively analyzed and printed. Some examples of how to perform evaluations are:

- Sample list sorted by test order
- Search with pre-defined or customized filters through the data pool
- Generate quality charts (statistics)
- Statistical distribution (Gauss type curve)
- Evolution and parameter survey as function of time
- Measurements repartition in a defined time period to determine the testing load



Data management

Connected to CIQ (AESAs quality data management system), all data gathered with OptiTest can be used for further statistical evaluations and combined with other measurements gathered during the complete manufacturing process, from incoming good inspection to the dispatch of the finished product.

Options

1. Vector Network Analyzer (VNA)

A VNA must be integrated into the equipment. This can be provided as an option by AESA. If the customer already has a VNA, he can send it to us (if compatible). In this case, AESA will only charge the integration cost.

- Keysight E5061B 2 ports (100 kHz – 1.5 GHz) [Article No: 51.0001.0045.0](#)
- Keysight E5061B 2 ports (100 kHz – 3.0 GHz) [Article No: 51.0001.0050.0](#)

Other VNAs can be proposed upon request.

2. Coaxial cables measuring option

The option includes the modification of the equipment (N-connectors, switch,...) and the related software module to allow the measurement of coaxial cables with Vega.

- **50 or 75 ohms coaxial option** [Article No: 50.0001.0031.0](#)
- **50 + 75 ohms coaxial option** [Article No: 50.0001.0029.0](#)

Coaxial accuracy (frequency range will depend on the VNA)	From	To		100 kHz	100 MHz	500 MHz	1 GHz	3 GHz
				100 MHz	500 MHz	1 GHz	3 GHz	6 GHz
S21 transmission (Attenuation, NEXT) corrected at 20°C	-80	-50	dB	± 1.5 dB	± 1.7 dB	± 1.9 dB	± 2.4 dB	± 3.0 dB
	-50	-25	dB	± 0.5 dB	± 0.6 dB	± 0.7 dB	± 0.9 dB	± 1.5 dB
	-25	-10	dB	± 0.2 dB	± 0.3 dB	± 0.4 dB	± 0.8 dB	± 1.3 dB
	-10	0	dB	± 0.2 dB	± 0.2 dB	± 0.4 dB	± 0.8 dB	± 1.3 dB
Impedance	50	50	Ω	± 0.5 Ω	± 0.7 Ω	± 1.0 Ω	± 1.5 Ω	± 4.0 Ω
	75	75	Ω	± 0.75 Ω	± 1.2 Ω	± 1.5 Ω	± 2.0 Ω	± 6.0 Ω

3. Switch for an external 50Ω connection

The option includes the necessary hardware to connect specific options to the system (e.g. TCL, EMC,...).

- **Switch + 50 ohms N-connector for options** [Article No: 50.0001.0032.0](#)

4. Mode conversion parameters TCL & ELTCTL *

To perform Mode conversion parameters measurements, following accessories are required

- One hardware connecting frame with special balun or balunless
- One software package (specific measurement module)

These accessories allow measuring all Mode conversion parameters like TCL, TCTL, LCL, LCTL, EL LCTL and EL TCTL.

** this option requires a system with a 50 ohms switch. If the system is not equipped with it, it must be ordered separately.*

- **TCL & ELTCTL option 4 pairs 650MHz baluns** [Article No: 51.0001.0024.0](#)
- **TCL & ELTCTL option 4 pairs 1.2GHz baluns** [Article No: 51.0001.0089.0](#)
- **TCL & ELTCTL option 4 pairs 2.0GHz balunless** [Article No: 51.0001.0104.0](#)
- **TCL & ELTCTL option 25 pairs** [On request](#)

5. EMC Parameters (TI, AS, AC)*

To perform EMC measurements (Transfer Impedance, Coupling Attenuation, Screening Attenuation) with the tri-axial method, following accessories are required

- One hardware package to prepare the sample and take care for the impedance adaptation
- One software package (specific measurement module)

These accessories allow measuring the transfer impedance, the screening attenuation and coupling attenuation according to IEC 62153-4-9 when knowing the impedance of the internal coaxial cable created with the sample under test.

** this option requires a system with a 50 ohms switch. If the system is not equipped with it, it must be ordered separately.*

- Transfer Impedance Kit, Ø 2.3 - 9.8 mm

Article No: 51.0001.0072.0

- Transfer Impedance Kit, Ø 6 - 22 mm

Article No: 51.0001.0073.0



6. Alien crosstalk AXT

AESA has developed a software package along with a test procedure that allows the swapping of the different cables on a 4-pair connecting frame. It allows making all necessary measurements in a well-defined order. The software will then compute the measured crosstalk and show the results as specified in the standards.

This option is optimized for screened cables (X/FTP, F/UTP) up to 2000MHz and unscreened cables. It includes a connecting plate to terminate the non-measuring pairs.

- Solution covering up to Category 6a standards

Article No: 52.0001.0007.0

- Solution covering up to Category 8 standards (different terminations)

Article No: 52.0001.0011.0

7. Printer

LaserJet printer

Article No: 51.0500.0021.0

8. Set of ISO 17025 certified LF standards type AESA 9000

Article No: 45.9000.0001.0

This set of "Low Frequency" standards, certified ISO 17025, allows the periodic calibration, thus proving the accuracy of the complete measurement system. The kit is composed of:

- | | | | | |
|----------------------|------------|----------|----------|-------------|
| - Standard type 9001 | C1,2 | 19,20 nF | ± 0,1 % | ± 30 ppM/°C |
| - Standard type 9002 | C1,2 | 192,0 nF | ± 0,1 % | ± 30 ppM/°C |
| - Standard type 9003 | C3 | 16,0 nF | ± 0,1 % | ± 30 ppM/°C |
| | K1, K2, K3 | 16000 pF | ± 0,1 % | ± 30 ppM/°C |
| - Standard type 9004 | E1, E2, E3 | 12000 pF | ± 0,1 % | ± 30 ppM/°C |
| - Standard type 9005 | RA, RD | 192 Ω | ± 0,01 % | ± 2 ppM/°C |
| | RB, RC | 1920 Ω | ± 0,01 % | ± 2 ppM/°C |



13. Spare Parts

AESA recommends following set of spare parts for a safety operation of two years:

Vega Type	Mini Kit	Full Kit
1 CKE measuring bridge type KM		✓
1 R measuring bridge type RM		✓
1 LF relay matrix board type AZU		✓
1 CPU Board		✓
2 test heads (4 if two different connecting frames)	✓	✓
2 HF relays (3 if two different connecting frames)	✓	✓
1 control boards set	✓	✓
1 set of HF cable	✓	✓
1 set of different mechanical and electronic hardware	✓	✓
Article No	50.0900.0003.0	50.0900.0002.0