Vega AXT 28 pairs

to measure the high frequency parameters including Alien crosstalk of bundled cables Cat 5 to Cat 8

DESCRIPTION

When several cables run in bundle, they interfere with each other. This is the so-called Alien crosstalk (AXT). Basically, measuring the Alien crosstalk consists in successively measuring the impact of the 4 pairs of each disturbing cable against those of the victim cable (usually 6 +1 cables of 4 pairs).

This testing equipment has been developed to quickly and accurately test bundled Cat 5 to Cat 8 LAN and/or DATA cables. It allows for the automatic measurement of high frequency parameters up to 2.2 GHz (depending on the version) including the Alien crosstalk. AESA "OptiTest" software makes work and data management (analysis, traceability, statistical information,..) straight forward.

Different options such as low frequency (RCKE) parameters or EMC disturbances (AC, AS, TI) offer considerable flexibility in terms of testing, thus allowing for the full characterization of your cable.

KEY FEATURES

- **Fast and compliant**
  - Possibility of connecting up to 7 cables of 4 pairs at the same time
  - The fastest measurement system on the market (<10 min for 7 bundles of 4 pairs)
  - 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)

TECHNICAL SPECIFICATIONS

Parameters	All standard low frequency and high frequency parameters available (Resistance, Capacitance, Insertion Loss, Impedance, NEXT, FEXT, Alien NEXT, Alien FEXT…)
Standards	Performs electrical tests on cables responding to: • 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	• Connecting frame with 2 x 28 pairs each (Near & Far End) for LF & HF measurements up to 750 MHz 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
Dimensions (Width x Depth x Height)	1180 x 670 x 1050 (trolley only) / 1700 (including screen) mm, weight ~200kg
Versions (High Frequency only)	Vega AXT+ HF (28 pairs up to 2GHz)	Vega AXT HF (Pair 1-4 up to 2GHz & 5-28 up to 1GHz)
Article No:	00.2528.0004.0	00.2528.0001.0
Versions (Low & High Frequency)	Vega AXT+ LF HF (28 pairs up to 2GHz)	Vega AXT LF HF (Pair 1-4 to 2GHz & 5-28 up to 1GHz)
Article No:	00.2528.0003.0	00.2528.0002.0

HIGH FREQUENCY ACCURACY

	Vega AXT Pair 5-28		Vega AXT+
	0.772 MHz - 100 MHz	100 MHz - 750 MHz	750 MHz - 1.5 GHz	1.5 GHz - 2.2 GHz
***Attenuation** (corrected to 20℃)*				
-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℃)*	
R	± 0,1% + 10 mΩ
DR	
DR	Computed
Capacitance C	
C K	± 0,25% ± 10pF at 800 Hz ± 0,25% ± 10pF at 125 Hz ± 0,25% ± 50pF at 12,5Hz
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). Provided either 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)
• 9000 Low Frequency standards
• 9800 High Frequency standards
• Warranty extension
• Maintenance contract
• Spare parts

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

KEY BENEFITS
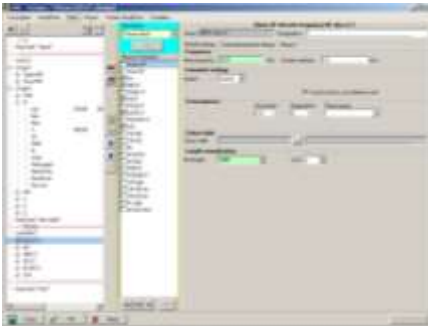
USER-FRIENDLY

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

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
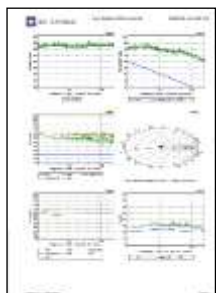
SMART

- 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	Pairs	Quads
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
	Alien Near end crosstalk
	Alien Far end crosstalk
Reflection:	Impedance

Calculated parameters

Fitted Impedance and RL
Return Loss (RL) (Open/Short and Terminated 100Ω) (fully complex method)
NEXT and ANEXT Power Sum
FEXT and AFEXT Power Sum
Individual ACR, ACR Worst Case, Power Sum ACR
AACR, AACR Power Sum
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 managemen 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.

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
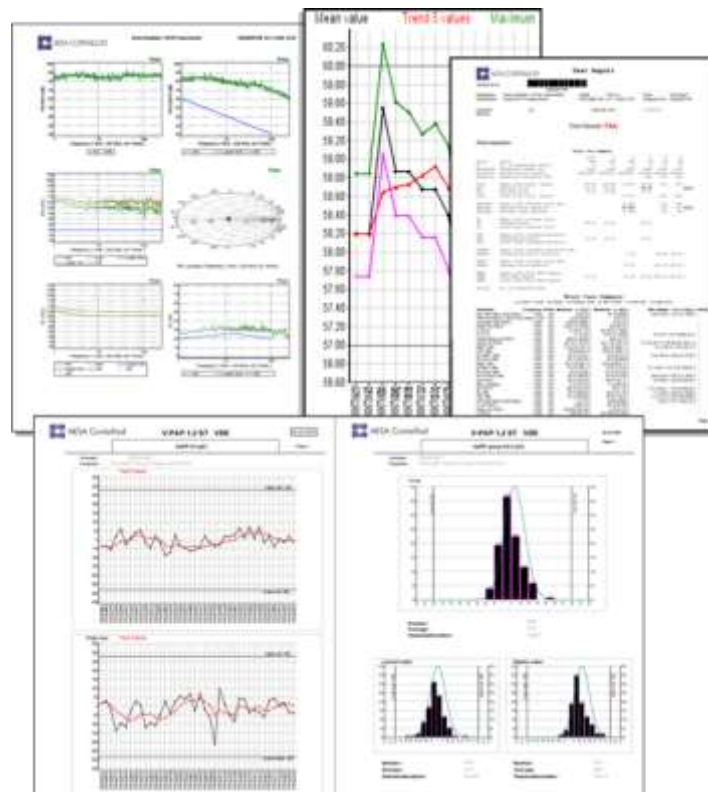
Data management

Connected to CIQ (AESA 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 – 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	100 MHz 500 MHz	500 MHz 1 GHz	1 GHz 3 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, ∅ 2.3 - 9.8 mm   Article No: 51.0001.0072.0
- Transfer Impedance Kit,   ∅ 6 - 22 mm   Article No: 51.0001.0073.0

6. Printer   Article No: 51.0500.0021.0

LaserJet printer

7. 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

8. Set of ISO 17025 certified HF standards type AESA 9800   Article No: 45.9800.0001.0

This set of "coaxial" primary standards, certified ISO 17025, allows the periodic calibration, thus proving the accuracy of the complete measurement system (Vector Network Analyzer + RF multiplexer + connecting frame).
It should not be mixed up with the "symmetrical" zero correction kit, delivered with the ATE, which is used to carry out the periodical zero correction files of the equipment, required to measure LAN cables.

The set of certified HF standards is composed of:

- 2 attenuation references type 9801   – 3dB
- 2 attenuation references type 9802   – 6dB
- 2 attenuation references type 9803   –10dB
- 2 attenuation references type 9804   –20dB
- 2 attenuation references type 9805   –30dB
- 2 x 50Ω terminations
- 2 special connectors for the terminations
- 4 HF connecting cables for the attenuation
- 1 set of miscellaneous HF material

9. *Warranty Extension*
Article No: 60.0900.0001.0

AESA is confident with its technology and the quality of its goods.This is why the system is supplied with a 2-years warranty period. In order to protect its customer's investment, AESA offers the possibility to extend the warranty period to 3 years.

10. *Maintenance contract*
Article No: 60.0100.0002.0

Even the most reliable systems require regular, planned and preventive maintenance as well as periodical calibrations. AESA proposes service packages to extend the operating life of your equipment, control of your maintenance costs and ensure optimal performances.

11. *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