



T&M EQUIPMENT OPTICAL COMMUNICATIONS

OPTICAL T&M EQUIPMENT COMMUNICATIONS

The current demand on high bandwidth data services and applications is growing at high speed. Data centers can already reach 400G thanks to the latest optical modules. The optical network architectures are more and more adaptive, and the capacity and reach is directly related with the spectrum utilization of the channels. Therefore, the future network architecture needs extremely precise characterization of the optics and photonics elements involved.

Today, optical communication technologies require a precise portrait of the signals, components and subsystems. And that includes the optical spectra. Although a regular optical spectrum analyzer (OSA) can provide good spectral information for many applications, most of optical technologies require much higher resolution in order to see further, to analyze in depth and even save time when exploring new ideas and launching new devices.



CONVENTIONAL USERS & APPLICATIONS

	8	?	
	THE CUSTOMER	THE APPS	OUR SOLUTION
1	Educational & Universities	Optical sources characterization	Optical engineering departments at Universities around the world can take advantage of Aragon Photonics high precision solutions to confirm their investigations.
2	Research & development	Optical communications Quantum photonics	R&D labs invest huge amounts of money in new developments and equipment. High end products such as BOSA and HDCA help companies make the invest profitable.
3	Manufacturers	Transceivers FBGs PICs	Only the fastest and most accurate instruments are reliable for working on a 24/7 basis, thus saving time and money in production.

OUR JOURNEY IN OPTICAL COMMUNICATIONS

Aragon Photonics was created in 2004 as a result from the collaboration between Fibercom and University of Zaragoza to develop and market a recently discovered spectroscopy technology based in Brillouin scattering: the BOSA.

Since then, Aragon Photonics has been evolving this product to adapt it to the needs of the market. Thanks to all this, it has been possible to develop a portfolio of products that meet the requirement of our customers.









BOSA is the most advanced and versatile High Resolution Optical Spectrum Analyzer in the market. Thanks to our unique optical filtering and full spurious free dynamic range the BOSA achieves reliable measurements avoiding artifacts and undesired effects on your measurements.

BOSA's unique combination of high-resolution and high dynamic-range brings a new range of measurement possibilities to the optical domain. BOSA reveals the optical spectra of the signals with a detail and precision that enables direct measurement of performance parameters for lasers and modulated signals.



TECHNOLOGY

Photonics all-optical Aragon patented technology use the stimulated Brillouin scattering (SBS) as a non-linear optical effect that causes a very narrow filtering effect. By pumping the SBS with an external cavity tunable laser source (TLS), the filter is swept along the spectral region of interest, giving the high-resolution optical spectrum. SBS gain enhances the dynamic range of the measurement compared to passive filtering, and the threshold imposed by SBS eliminates all the spurious effects of the local oscillator sidemodes and lineshape that produce measurement artifacts in heterodyne OSAs, giving the highest spurious-free dynamic range measurement available in market.

BasedonourcoreSBStechnologywehavealso developed unique measurements solutions for the characterization of the polarization and phase of the optical spectrum, providing the most complete characterization of an optical signal available in any HR-OSA.



KEY FEATURES

- High resolution (10 MHz / 0.08 pm) and narrow filter profile purely optical
- Best accuracy in the market (0.5 pm)
- Great dynamic range (>80 dB) with no artifacts. Maximum reliability
- Unique spectrally-resolved polarization measurement
- Patented optical phase spectrum measurement: chirp measurement, eye diagram, constellation...
- Integrated tunable laser and component analyzer for maximum versatility

APPLICATIONS

- Pulsed lasers & frequency combs
- 100G/400G transceiver testing
- Advanced modulation formats: OFDM, Nyquist, QAM, DP-QPSK...
- Ohirp effects analysis
- Non-linear laser dynamics
- Network analysis: DWDM, Flexigrid, OSNR



SOFTWARE FEATURES

BOSA includes some software applications that allows users performing their typical demands for an easier measurement automation.

- Easy automation, that allows you to control your BOSA remotely through GPIB or Ethernet using SCPI commands
- Peak analysis function, allows you to identify all the maximum or minimum values that are present in the spectral trace within a user defined threshold. This lets you characterize a comb or ring resonators in a second and export the data in a csv file.



OSNR measurement application, configure the width of the signal and noise by using the traditional approach where the power density of the noise is integrated over a 0.1 nm or a user defined bandwidth, which allows multiple channel spacing possibilities, to automatically get the OSNR value.



Trace locking, uses an automatic or user-defined portion of the spectrum for reference to lock traces and obtain the most accurate averaging results. Dual-channel polarization measurement, that allows seeing the separate orthogonal polarization components of the signal simultaneously, and so, visualize its polarization dependence.



Variable resolution, despite BOSA resolution is fixed to 10 MHz, this allows you to get results more easily comparable with your old OSA by applying a software filtering based on the user defined resolution bandwidth.



Autocalibration. The BOSA has internal absolute and relative wavelength calibrators that can be checked by user.





BOSA

MODELS

BOSA 400



The most advanced & versatile high resolution Optical Spectrum Analyzer:

- Fully standalone
- 10 MHz resolution
- 📀 Fast scan (20 nm/s)
- Highest precision (0.5 pm)

BOSA 100



Our solution with the maximum performance and minimum cost:

- Use your own compatible TLS and save money
- 10 MHz resolution
- All options available for upgrade

BOSA lite



The best balanced highresolution Optical Spectrum Analyzer:

- Oost effective
- 20 MHz resolution
- 👂 2.5 nm/s scan
- Several options available for update

ADDITIONAL UPGRADES

OPTION 10. TUNABLE LASER OUTPUT

This option provides access to the internal tunable laser source included in BOSA so that it can be used for additional applications.

- High accuracy & scanning repeatability.
- Output power >0 dBm.
- Trigger synchronization.
- Use our TLS for your own purposes!



OPTION 20. COMPONENT ANALYZER

This option turns your BOSA into a passive component analyzer by including a high-dynamic range measurement port synchronized with the TLS sweep.

Connect a passive optical device to measure the spectral profile of insertion loss (IL) and return loss (RL) of your passive optical devices with detail and precision thanks to the 10 MHz resolution.

- Insertion & Return Losses
- Polarization Dependent Losses (option)
- 100 nm/s scanning speed
- FBGs, PICs, Chips, Resonators

An evolution of the component analyzer is the new option 21, with the highest performance, same as in the new High Definition Component Analyzer (HDCA) product released in Sept'21. See last two pages of this catalog for further information.

TECHNICAL SPECIFICATIONS

	BOSA 400/100	BOSA Lite	
Measure bands	C, C+L, O, O+C+L	C, C+L	
Performance			
Optical Resolution	10 MHz @1550 nm 10 MHz @1310 nm	20 MHz @1550 nm	
Wavelength range	1525-1565 nm (C) 1525-1615 nm (C+L) 1265-1345 nm (O) 1265-1345 nm, 1525-1615 nm (O+C+L)	1525-1565 nm (C) 1525-1605 nm (C+L)	
Wavelength accuracy	±0.5 pm (C, C+L) ±1.0 pm (O)	±2.0 pm	
Spurious-free dynamic range	>80 dB		
Close-in dynamic range	>40 dB @ ±0.2 pm >60 dB @ ±0.4 pm	>40 dB @ ±0.8 pm >60 dB @ ±2.0 pm	
Calibrated input power range	ge +13 to -70 dBm		
Maximum safe total power input	+20 dBn	n	
Sensivity	-70 dBm / 10 MHz		
Power accuracy	±0.5 dB		
Polarization measurement	Two Orthogonal Polarizations. Full State of Polarization (Option 30)		
Sweep time	20 nm/s	2.5 nm/s	
Wavelength calibrator	Yes	Optional	

OTHER SPECIFICATIONS

Physical & electrical			
Operating Temperature	+15 °C to +35 °C		
Power requirements	110/220V; 50/60Hz Max. 200W		
Dimmension & Mass	430x230x470 (mm). Max. 18Kg.	425x185x405 (mm). Max. 10Kg	
Optical Connections	FC/APC Others on request		
Available interfaces	Ethernet, USB, GPIB		





ADDITIONAL UPGRADES

OPTION 30. SPECTRAL POLARIMETRY

With this option, you can turn your BOSA into the most advanced tool for polarization analysis: the spectrally-resolved state of polarization (SOP) can be measured. This option is not a stand-alone module but an extension to the spectrum analysis module and the component analyzer module.

- Simultaneous measurement of Optical spectrum and Poincare sphere
- Polarization alignment of different sources
- Evolution of Polarization with wavelength
- PDL measurement for components

Use markers to measure polarization differences between different light sources or different spectral components.

OPTION 40. PHASE MEASUREMENT

This option turns the BOSA into an optical complex spectrum analyzer (OCSA), capable of measuring both the amplitude and the phase of the optical signal under test, fully characterizing the signal. With the complex spectrum information and through inverse Fourier transform, all the time-domain information can be retrieved: eye diagram, constellation, time-resolved chirp, etc.

The phase of any optical signal with a repetitive spectrum with spectral lines separated between 70 MHz and 2 GHz can be measured. You can easily generate these test signals with most commercially available PPGs or AWGs configuring the pattern repetition frequency as the baud rate divided by the number of symbols in the pattern.



The continuous evolution of the state of polarization can also be measured. Select a portion of the measured span to plot the evolution of the SOP with high resolution.





- Get a future-proof analyzer, capable of measuring any bit rate and modulation format thanks to its spectral measurement
- Measure the eye diagram for any magnitude of the signal (power, phase, I, Q)
- Get the constellation diagram of any signal, not only in the sampling point but also in the complete I-Q transitions
- Obtain straightforward measurements of the time resolved chirp (TRC)
- Analyze the complex transfer function of passive devices, by measuring a comb signal at the input and output of the DUT
- Amplitude optical spectrum always plotted for setup adjustment

TECHNICAL SPECIFICATIONS

	BOSA 400 / 100 / Lite		
Measured bands	C Band	C+L band	O band
Option 10 - Tunable laser output			
Wavelenths range	1516-1565 nm ^a	1521-1630 nm ^b	1265-1345 nm
Absolute accuracy	±1.5 pm	±2.0	pm
Tunning speed		1-100 nm/s ^c	
Output power	>1 mW		
Side-mode suppresion	>43 dB >45 dB		
RIN	<-145 dB/Hz <-140 dB/Hz		dB/Hz
Linewidth	<1 MHz ^d		
Trigger output	BNC		
Option 20 - Component analyzer			
Wavelenths range	1516-1565 nm ^a	1521-1630 nm ^b	1265-1345 nm
Absolute accuracy	±1.0 pm	±2.0	pm
Power accuraccy	±0.2 dB		
Polarization measurement	Two orthogonal states. PDL with option 30		
Output power		>0 dBm	
Sensitivity	70 dBm (IL) -45 dBm (RL)		
Calibrated input range	-10 to -70 dBm		
Spurious-free dynamic range	>80 dB ^e		
Measurement time	1 s for 100 nm ^f		
Option 30 - Spectral polarimetry			
Polarization repeatability		±5°	
Temperature dependence	±0.2°/°C		
Polarization sensitivity	-40 dBm		
Polarization crosstalk	<20 dB		
Measurement time	6 scans at 20 nm/s ^g		
Option 40 - Phase measurement			
Wavelength range	1516-1565 nm ^a	1521-1630 nm ^b	1265-1345 nm
Bandwidth	80 MHz to full span		
Pattern frequency range	70 MHz to 2 GHz		
Phase accuracy	±1°		
Sensitivity	-70 dBm		
Electrical reference input power	+5 to -15 dBm		
Measurement time	1 s for 20 nm ^f		

a. 1525-1565 nm for BOSA Lite b. 1525-1605 nm for BOSA Lite c. 2.5 nm/s for BOSA Lite d. < 5 MHz for BOSA Lite e. >70 dB for BOSA Lite f. 1 s for 2.5 nm for BOSA Lite

g. 6 scans at 2.5 nm/s for BOSA Lite





The new High Definition Component Analyzer (HDCA) from Aragon Photonics lands to characterize passive optical devices with the highest resolution and wavelength accuracy, the fastest measurement time and largest dynamic range. The spectra profile of insertion losses (IL), return losses (RL) and polarization dependent losses (PDL) of passive optical devices can be measured with femtometric resolution and fully automated.





APPLICATIONS

- Quantum photonics (chips)
- Ring resonators
- Fiber Bragg gratings (FBG)
- Photonic integrated circuits (PICs)
- Wavelength selective switches (WSS)
- Ultra-DWDM network components

TECHNOLOGY

Based on the technology developed for the passive optical component analysis for the BOSA 400 option 20, the HDCA is capable of measuring devices under test (DUTs) with extraordinary wavelength accuracy, repeatability and unmatched resolution.



KEY FEATURES

- Real time measurement: 0.4 sec.
- Resolution down to 2.4 fm
- Dynamic range: >85 dB in a single sweep
- Wavelength repeatability: ±0.15 pm
- Wavelength accuracy: ±0.5 pm
- Wavelength range:
 - O band (1265-1345 nm)
 - C+L band (1510-1620 nm)
- TE/TM spectra characterization
- Configurable total data points (up to 10 million points)
- Referenced measurements using NIST traceable absorption lines
- External TLS compatible (100 series)
- HDCA performance can be included in BOSA 400 as option 21

MODELS

HDCA 400

- Fully standalone
- The fastest HDCA
- HDCA 100
- Compatible with external lasers. Contact us for further information



TECHNICAL SPECIFICATIONS

		HDCA 400	HDCA 100	
Measure bands		C+L, O	C+L, O	
Performance				
Wavelength range		1510-1620 nm (C+L) 1265-1345 nm (O)	Depends on TLS model	
Wavelength accuracy		±0.5 pm (Typ.)	Depends on TLS model	
Wavelength repeatability		±0.15 pm (Min.) ±0.35 pm (Typ.)	Depends on TLS model Highest performance (option)	
Resolution		0.3 MHz (0.0024 pm) (Min.) 1 MHz (Typ.)	Depends on TLS model	
Number of channels		1 to 4		
Calibrated Input Power Range		+10 to -90 dBm		
Dynamic range	IL	>85 dB @ 100 nm/s		
Dynamic range	RL	> 55 dB		
	IL	±0.1 dB (Typ.)		
rower accuracy	RL	±0.5 dB (Typ.)		
Power resolution		0.001 dB		
Polarization Measurement		Two orthogonal polarizations PDL measurement as option		
PDL accuracy		±0.04 dB		
PDL repeatability		±0.02 dB		
Output power		0 dBm (Min.) 0 to 30 dB attenuation (option)	Depends on TLS model 0 to 30 dB attenuation (option)	
Sweep speed		1 to 400 nm/s 100 nm/s (Typ.)	Depends on TLS model 100 nm/s (Typ.)	
Data points		10 Million (Max.) Configurable		
Measurement time		0.4 sec @ 400nm/s C+L band	<1 sec (Typ.)	
Referenced measurement		Yes		
Wavelength Calibrator		Yes		

OTHER SPECIFICATIONS

Physical & electrical			
Dimensions (mm)	445 x 470 x 140 (3 UA)		
Weigth	9 kg	7 kg	
Operating Temperature	+15 °C to +35 °C		
Power requierments	110/220V; 50/60Hz Máx. 200W.		
Optical Connections	FC/APC Others on request		
Available interfaces	Ethernet, USB, GPIB		



INDUSTRIES & PRODUCTS







BOSA HDCA High Definition Component Analyzer



CONDOR Portable solar reflectometer INCUS



Aragon Photonics Lasb S.L.U. C/ Prado 5, local 50009 Zaragoza, Spain +34 976 35 99 72

www.aragonphotonics.com

info@aragonphotonics.com