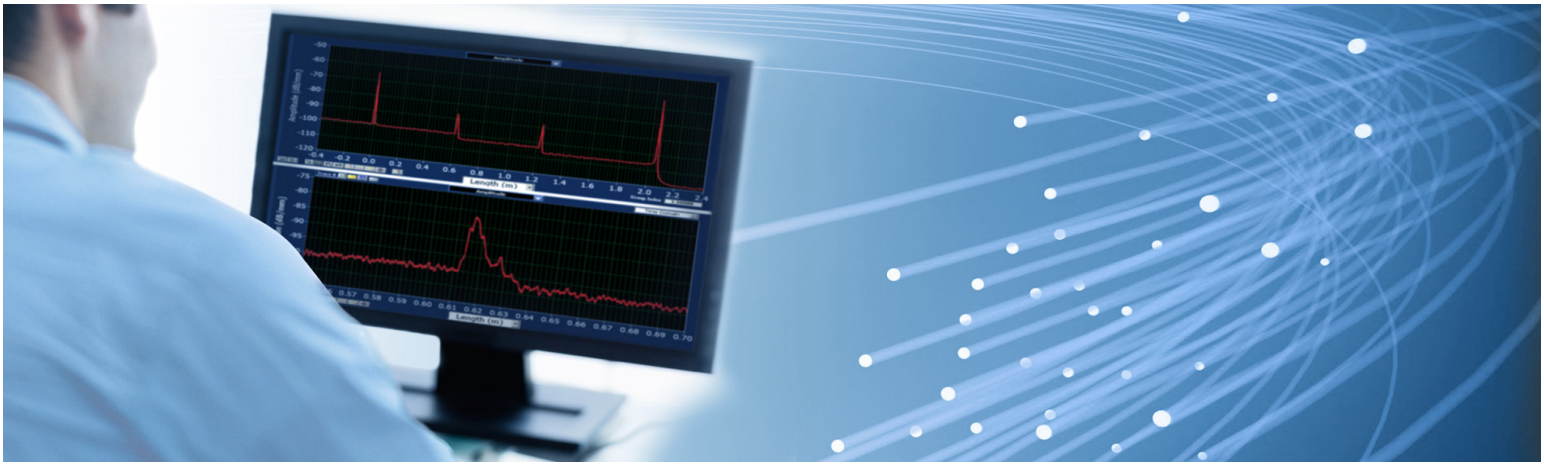


KEY FEATURES

- "Zero Dead Zone" reflectometer
- Measure 30 m with 10 µm sampling resolution in less than 7 seconds
- 80 dB dynamic range
- Backscatter-level sensitivity (-130 dB)
- Extended range provides 2 km range with no dead zone
- High-speed scanning (1 m segments at up to 3 Hz)
- Measure IL, RL, distributed loss, distance, polarization states, phase derivative and group delay
- High resolution C and L band (OBR 4600) or O band (OBR 4613) capability

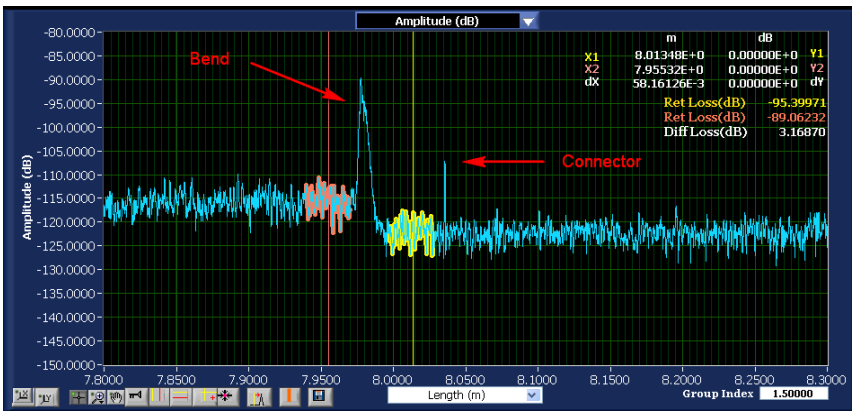
APPLICATIONS

- Easily locate, identify and troubleshoot macro-bends, splices, connectors and breaks
- Locate IL points at every point in the network or assembly – eliminate cut-backs
- Test and troubleshoot short-run networks (up to 2 km)
- Unprecedented visibility into miniaturized components

OBR 4600

Optical Backscatter Reflectometer™

The Luna OBR 4600 is part of Luna's award winning Optical Backscatter Reflectometer™ product line. Designed for component and short-run network testing and troubleshooting, the OBR 4600 enables ultra-high resolution reflectometry with backscatter-level sensitivity. With sampling resolution as low as 10 microns, zero dead zone, an extremely low noise floor, and options for extended range and distributed temperature and strain sensing, the OBR 4600 offers industry leading reflectometry technology that allows you to "see inside" your components and systems like never before.



Use convenient cursor tools to measure and examine scatter level and reflection events to measure RL and IL for closely spaced events.

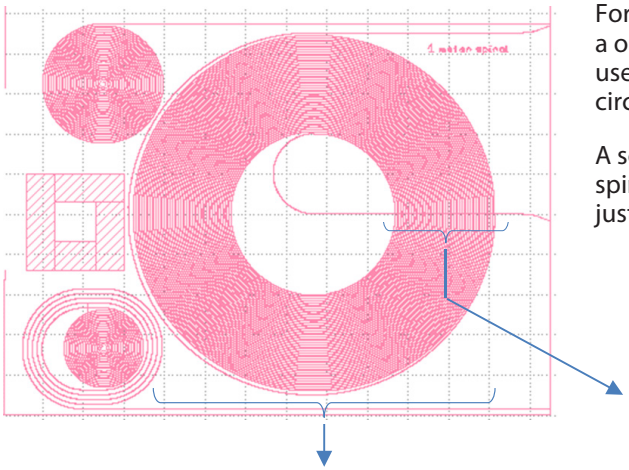
SPOT SCAN MODE

The Spot Scan mode allows scanning of any 1 or 2 meter region of the device being tested, resulting in shorter measurement times and smaller data files. Rates in the following table are for measurements made with a laser tuning speed of 100 nm/s.

Spot Scan Measurement Rates				
Mode		**30 m mode**	**70 m mode**	**Extended Range (2000 m)**
Subregion scanned		**1 or 2 m**	**1 or 2 m**	**80 m**
Wavelength Range	3.2 nm	–	–	0.15 Hz
	5 nm	3.7 Hz	2.9 Hz	–
	20 nm	1.8 Hz	1.2 Hz	–
	80 nm	0.5 Hz	–	–
Best Sampling Resolution		10 µm	20 µm	0.25 mm

EXAMPLE APPLICATION – SILICON PHOTONICS

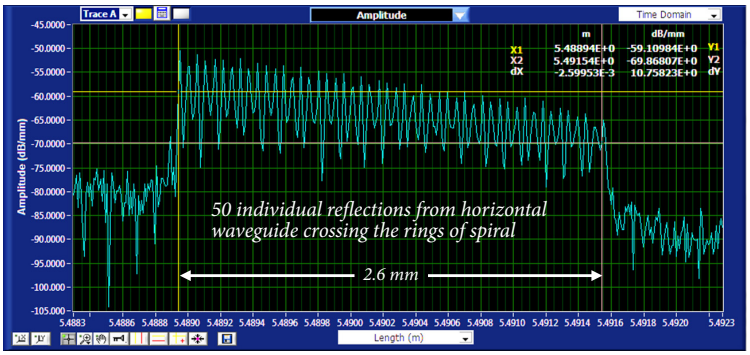
Devices built on a silicon photonic platform represent a high level of functionality miniaturized into an extremely high packaging density. The high spatial resolution and high sensitivity of the OBR 4600 offer the capability to see inside the device with a very high level of detail.

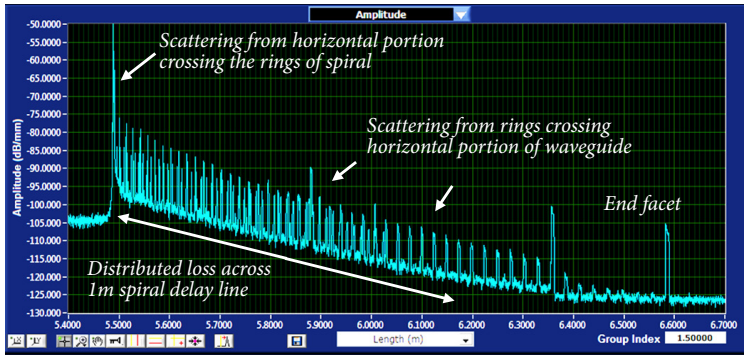


The 1 meter spiral waveguide is shown in the scan below. The graph clearly shows the distributed loss across the one meter spiral, including scattering at the crossing of the horizontal waveguide.

For example, the Optoelectronics Research Group at UCSB fabricated a one meter spiral delay line on a silicon platform. The OBR 4600 was used to measure the distributed loss inside the photonic integrated circuit (PIC), which measured only 1 cm2 in size.

A scan of the horizontal portion of the waveguide that crosses over the spiral is shown in the graph below. The waveguide crossings, spaced at just 50 microns, are clearly visible.





PERFORMANCE

PARAMETER		SPECIFICATION			UNITS
Wavelength Range (nominal)					
OBR 4600		1525 - 1610			nm
OBR 4613		1270 - 1340			nm
Maximum Device Length					
Standard mode		30 or 70			m
Extended range mode[1]		2000			m
Sampling Resolution					
30 m mode		10			µm
70 m mode		20			µm
Extended range mode (2000 m)		1			mm
Dead Zone					
		Equals 2-pt sampling resolution			
Wavelength					
Resolution (max)		0.02			pm
Accuracy[2]		±1.5			pm
Integrated Return Loss Characteristics					
Dynamic range	30 and 70 m modes	80			dB
	Extended range mode	60			dB
Total range		0 to -125			dB
Sensitivity		-130			dB
Resolution[3]		±0.05			dB
Accuracy[3]		±0.10			dB
Integrated Insertion Loss Characteristics					
Dynamic range[4]		18			dB
Resolution[3]		±0.05			dB
Accuracy[3]		±0.10			dB
Group Delay					
Accuracy		1.0			ps
Distributed Sensing[5,6]					
Spatial resolution[7]		±1.0			cm
Temperature resolution[8]		±0.1			C
Strain resolution[8]		±1.0			µε
Scan time	Scan range	Standard	Fast[9]	Spot Scan[9]	
Scan time for 30 m mode	5 nm	2.7	1.3	0.4	s
	65 nm/88 nm[10]	14.2	6.3	2.5	s
Scan time for 70 m mode	5 nm	3.2	1.8	0.5	s
	32 nm/43 nm[10]	9.7	5.8	2.1	s
Scan time for extended range (2 km)	0.8 nm	16	–	–	s
	3.2 nm	–	–	6.5	s
Physical					
Class 1 Laser		<10			mW
Operating power		100			W
Weight (controller not included)		25 (11.4)			lb (kg)
Case size (W x D x H)		14.4 x 13.6 x 6.5 (366 x 345 x 165)			in (mm)

NOTES

Specifications are for single-mode performance. For multimode operation, specifications are nominal.

1. Extended range mode is an upgrade option.
2. Accuracy maintained by an internal NIST-traceable HCN gas cell.
3. With integration width of 0.5 m.
4. IL dynamic range is the one-way loss that can be suffered before the scatter level of standard SMF (~ -100 dB/mm) is lower than the noise floor (~ -118 dB/mm).
5. Distributed sensing mode is an upgrade option. Distributed sensing uses Rayleigh spectral shift method and is relative to reference scan.
6. Maximum standard sensing length is 70 m. Limited sensing is available in extended range mode. Contact Luna for more information.
7. Sampling resolutions listed are ideal to get the temperature and strain resolutions listed; they are not minimums or maximums.
8. Temperature and strain resolutions are calculated from spectral shift of Rayleigh scatter using 1 GHz = 0.8, C= 6.58 µstrain. [Othonos and K. Kalli, Fiber Bragg Gratings (Artech House, Boston, 1999)].
9. Times are with laser tuning speed set at 100 nm/s.
10. Maximum wavelength scan for O band is 65 nm or 32 nm; maximum wavelength scan for C and L band is 88 nm or 43 nm.

DISTRIBUTED SENSING

Distributed Sensing, available as an option, allows you to use the OBR 4600 to detect and monitor continuous strain and temperature through analysis of the Rayleigh scatter inherent to standard off-the-shelf optical fibers, with a user-specified spatial resolution down to 0.32 mm. Alternatively, the Luna ODiSI platform is optimized for sensing and provides easy-to-use, repeatable and robust sensor measurement solutions. However, the OBR 4600 with the Distributed Sensing option can be particularly useful in specialized or research applications where additional flexibility and customization is required.

ORDERING INFORMATION

Catalog Number	Description	Includes
OBR 4600	Optical Backscatter Reflectometer, 1525 nm - 1610 nm	OBR 4600 mainframe for C and L band and standard length mode (30 m and 70 m), instrument controller (workstation-class laptop) and accessory kit.
OBR 4613	Optical Backscatter Reflectometer, 1270 nm - 1340 nm	OBR 4600 mainframe for O band and standard length mode (30 m and 70 m), instrument controller (workstation-class laptop) and accessory kit.
OPT06009	Extended Range	Option to scan devices up to 2 km in length with 1 mm sample spacing.
OPT06004	Desktop Analysis Software	Software providing all of the analysis and data visualization of the OBR 4600, using only saved OBR measurement data files.
OPT06005	Lightpath Analysis Software	Software with pass/fail visualization, "Golden Trace" capture and compare, automatic event mapping, and other features useful for production and quality assurance environments.
OPT06008	Custom Software Development Kit	SDK toolkit with DLLs allowing custom GUI development.
OPT06006	Distributed Temperature and Strain Sensing	Option to monitor distributed temperature and strain in optical fiber using Rayleigh backscatter.

Luna Sales and Support Contact Information

United States, Canada, South America

1.866.LUNA OVA (866.586.2682)
solutions@lunainc.com

Europe, Middle East, Africa

Ian Shannan - Director, EMEA Sales
+44 (0)131 666 9044

Asia Pacific

GTL Technology and Service
+86 135 0127 7739