

# CTP10

## COMPONENT TEST PLATFORM



Efficiently test passive optical components in 24/7 operations. Perform insertion loss (IL), return loss (RL) or polarization dependent loss (PDL) measurements across the full telecom wavelength range with unprecedented dynamic range, speed and resolution.

### KEY FEATURES

Fast, accurate and repeatable swept wavelength measurements of IL, RL or PDL

Unprecedented operational wavelength range with continuous high performance from 1240 nm to 1680 nm

State-of-the-art electronics achieve full dynamic range IL characterization in a single sweep, ideal for components with high-contrast spectrum

10-slot platform with hot-swappable modules to test components from a few to 100+ outputs with daisy-chaining

Powerful and intuitive graphical user interface (GUI) for easy test configuration and measurement analysis

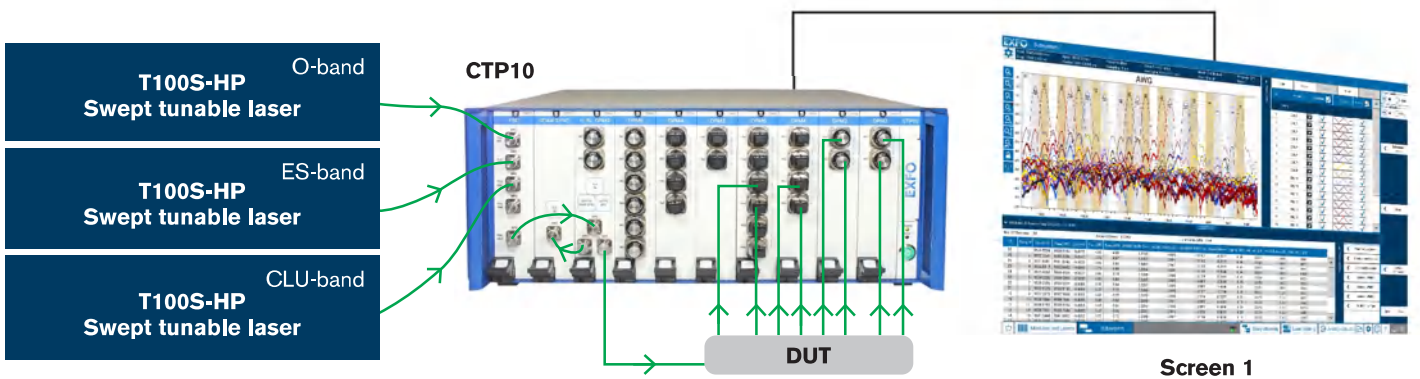
Laser-sharing function enables sharing one or more lasers between up to 8 test stations

## CTP10 PLATFORM

The CTP10 is a modular passive optical component testing platform that combines speed, accuracy and flexibility. It offers reliable, high-quality IL, RL or PDL measurement regardless of wavelength range or spectral characteristics of the device under test.

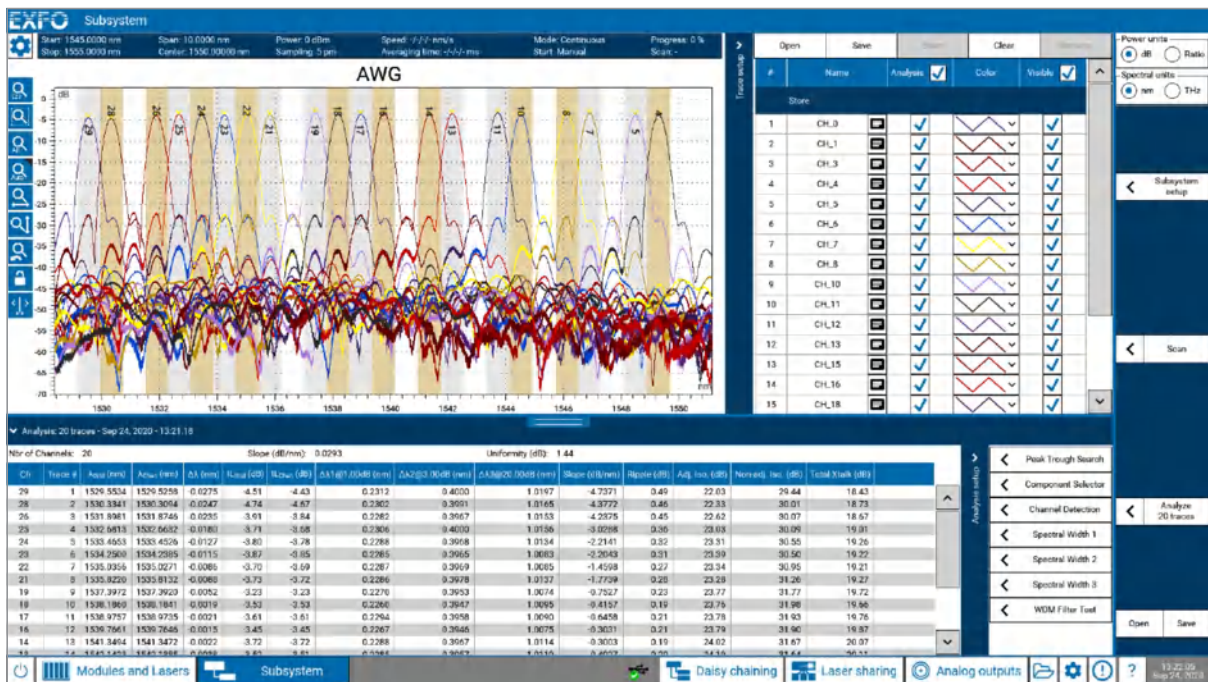
Thanks to its innovative approach, the CTP10 also greatly reduces setup time and simplifies spectral characterization by taking care of many complex operations. Indeed, the platform directly controls one or several T100S-HP continuously tunable lasers to achieve high-resolution spectral characterization within seconds. Wavelength sweep, data collection and processing for IL, RL or PDL, trace display and analysis are all performed from a single instrument, making the CTP10 a compelling, easy-to-use test solution for passive component characterization. Single-sweep insertion loss measurements with up to 80 dB dynamic range can be performed with unprecedented speed and resolution. Thanks to its modular configuration, it is the ideal instrument to characterize large port count components used in DWDM networks and photonic integrated circuits (PIC).

The platform runs a dedicated operating system with powerful data processing electronics to virtually eliminate any downtime due to data transfer. It also features a large internal hard drive for direct data storage and full remote control via SCPI-compatible commands.



## POWERFUL, INTUITIVE GUI

The feature-rich software offers a powerful and intuitive GUI to easily configure, reference the system and perform measurements. Built-in analysis functions are available to analyze components such as WDM filters or WSS.



## NEXT-GEN MODULES

The CTP10 platform hosts up to 10 hot-swappable modules, providing a variety of optical tools to perform high-quality IL, RL or PDL measurements.

CTP10 OPTICAL MODULES	
KEY MODULES	 <p><b>Insertion and polarization dependent loss</b></p> <p>Featuring real-time power monitoring and an integrated polarization generator, the <b>IL PDL OPM2</b> performs IL and PDL measurements over 1240 nm - 1680 nm and has two optical detectors.</p> <p>The <b>IL PDL</b> module enables high resolution IL and PDL measurement over the SCL band.</p> <p>2-slot module</p>
	 <p><b>Insertion and return loss</b></p> <p>Featuring real-time power monitoring, return loss measurement and two optical detectors, the <b>IL RL OPM2</b> enables high resolution IL and RL measurement over the full operating wavelength range.</p> <p>1-slot module</p>
WAVELENGTH CONTROL	 <p><b>Wavelength detection</b></p> <p>Based on high-speed optical triggered wavelength detection, the <b>SCAN SYNC</b> module offers uncompromising wavelength accuracy and sampling resolution even for high-speed testing.</p> <p>1-slot module</p>
	 <p><b>Full-band combiner</b></p> <p>The <b>FBC</b> module offers automated testing across the full telecom range by combining up to 4 tunable lasers into a single output. The <b>FBC-M</b> is a full-band combiner with polarization-maintaining fiber and is required for multi-laser IL-PDL measurement with the IL PDL OPM2 module.</p> <p>1-slot module</p>
DETECTORS	 <p><b>Optical detectors</b></p> <p>With a choice of 2, 4 or 6 high-speed InGaAs detectors per unit, the <b>OPMx</b> series module feature state-of-the-art electronics to enable full dynamic range measurement in a single laser sweep.</p> <p>1-slot module</p>

## PASSIVE OPTICAL COMPONENT TESTING

TYPICAL COMPONENT CHARACTERIZATION SETUP	CTP10 CONFIGURATION
<b>IL and RL</b> Typical examples: <ul style="list-style-type: none"> <li>• WDM components</li> <li>• Photonic integrated circuits (PIC)</li> </ul>	
<b>IL and RL, full-band characterization</b> Typical examples: <ul style="list-style-type: none"> <li>• PON components</li> <li>• Thin film filters</li> </ul>	
<b>IL and PDL, C+L bands characterization</b> Typical examples: <ul style="list-style-type: none"> <li>• Wavelength selective switches</li> <li>• DWDM multiplexers</li> </ul>	
<b>IL and PDL, full-band characterization</b> Typical examples: <ul style="list-style-type: none"> <li>• CWDM components</li> <li>• Interferometers</li> <li>• Optical filters</li> </ul>	

Our team of experts is available to assist customers in defining the system as per specific optical test requirements.

### BEST-IN-CLASS IL, RL AND PDL OVER FULL SPECTRAL RANGE

Fast and reliable IL, RL and PDL measurements are key to any R&D or manufacturing passive component test bench. Other parameters such as isolation, free spectral range or directivity all rely on a high-quality loss measurement.

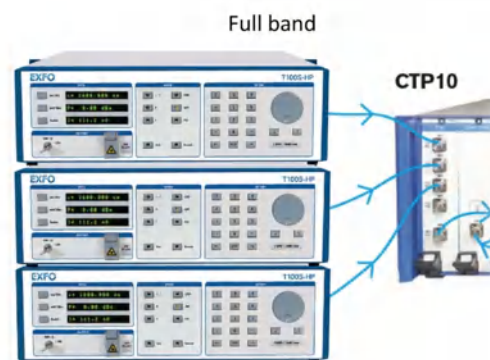
Thanks to its state-of-the-art electronics, the CTP10 outperforms all existing instruments. It offers a 70 dB dynamic range for IL in a single sweep for a tunable laser speed at 100 nm/s with 10 dBm output power while maintaining a sampling resolution of 1 pm and eliminates post-processing steps such as trace stitching and bandwidth correction.

Each of the key module IL RL OPM2, IL PDL or IL PDL OPM2 is automatically recognized by the CTP10 operating system and unlocks relevant functionalities. For example, when an IL PDL module is in use, the CTP10 will automatically generate known states-of-polarization (SOP), record all relevant spectra in each of those states and calculate both PDL and polarization-averaged IL using the Mueller method. The IL PDL OPM2 measures high precision PDL from 1260 nm to 1620 nm. Coupling it with an FBC-M module will automatically enable true full-band IL/PDL characterization.

The CTP10 can test components with a high-contrast spectrum, such as wavelength selective switches or DWDM multiplexers, without compromising on the quality of optical power measurement. The module's detectors have no slew rate issues and can readily measure a change in insertion loss of more than 10 dB/pm at 100 nm/s scanning speed.

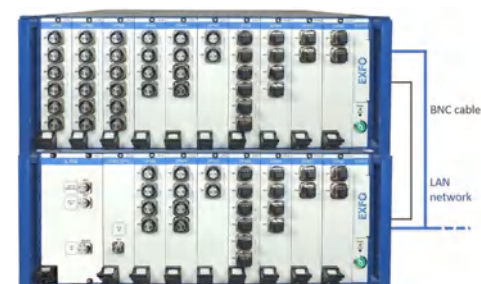
## FULL-BAND READY

The IL RL OPM2 and IL PDL OPM2 modules operate over the 1240 - 1680 nm wavelength range and can be used with multiple T100S-HP lasers using the FBC or FBC-M modules. The O, ES and CL models of T100S-HP lasers can be combined to cover the 1260-1630 nm range, and can be extended down to 1240 nm or up to 1680 nm using the O+ or CLU models. When combining several lasers, the CTP10 automatically switches between lasers for seamless, full-band testing.



## DAISY CHAINING MADE EASY

Testing high port-count components is as simple as connecting an additional CTP10 mainframe to an existing system. Available with the IL RL OPM2 module, the daisy chaining function allows seamless configuration through the GUI to perform both reference and measurement on all detectors from one CTP10.

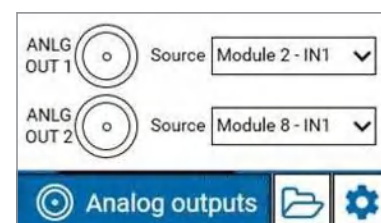


## LASER SHARING

The laser-sharing function allows the sharing of one or more lasers between up to 8 CTP10 platforms connected to the same LAN network. The sharing configuration can be easily set up using the graphical user interface of the various CTP10s and just requires an external coupler to split the light among the different test stations, thus reducing CAPEX in manufacturing environments.

## ANALOG OUTPUT

The CTP10 provides two analog outputs that can be configured via software to provide the analog signal detected by any OPM of the system. Leveraging the OPM's detection speed and dynamic range offered for alignment purposes, the CTP10 provides a single-instrument solution for optical beam searching and spectral testing.



## WAVELENGTH REFERENCING GAS CELLS

Packaged external gas cells with NIST traceable absorption lines are available in the O and C bands. This accessory can be used to regularly verify system performance and reference the SCAN SYNC module against the traceable reference material, ensuring excellent absolute wavelength accuracy at all times.

The WLRM-NS270x accessories use a Hydrogen Cyanide (HCN) gas cell in the C band and a Hydrogen Fluoride (HF) gas cell in the O band.



SPECIFICATIONS<sup>a</sup>

OPTICAL MEASUREMENT				
		With IL PDL	With IL PDL OPM2	With IL RL OPM2
Wavelength	Specified wavelength range	1510 nm–1620 nm	1260 nm–1620 nm	1250 nm–1630 nm
	Operating wavelength range <sup>b</sup>	1440 nm–1640 nm	1240 nm–1680 nm	
	Absolute wavelength uncertainty (typical)	±5 pm		
	Wavelength repeatability (typical) <sup>c</sup>	±1 pm		
	Wavelength display resolution	1 pm to 2000 pm		
Optical detectors	Sensor type	InGaAs		
	Compatible fiber type	SMF28		
	Compatible optical adaptors	FC or SC connectors		
	Maximum safe power	11 dBm		
	Averaging time	Manual: 1 μs to 1 s, automatic		
	Optical power acquisition resolution	< 0.0001 dB		
	Return loss (typical)	> 56 dB		
Optical interfaces	Optical connectors	FC type		
	Maximum safe power	TLS IN: 15 dBm SCAN SYNC: 14 dBm		
Insertion loss <sup>d</sup>	Dynamic range (typical at 10 nm/s)	> 80 dB		
	Dynamic range (typical at 100 nm/s)	> 70 dB		
	Insertion loss uncertainty (typical at 10 nm/s) <sup>e</sup>	±0.005 dB		
	Noise 2 σ (at 10 nm/s) (typical)	0 dB to 20 dB: ±0.005 dB		
		20 dB to 40 dB: ±0.005 dB 40 dB to 50 dB: ±0.010 dB 50 dB to 60 dB: ±0.035 dB		
Noise 2 σ (at 100 nm/s) (typical)	0 dB to 20 dB: ±0.005 dB			
	20 dB to 40 dB: ±0.010 dB 40 dB to 50 dB: ±0.050 dB 50 dB to 60 dB: ±0.400 dB			
Polarization dependent loss	PDL measurement method	4-States Mueller		N/A
	PDL uncertainty (typical at 100 nm/s) <sup>f</sup>	±0.06 dB + 2% PDL	±0.06 dB + 1% PDL <sup>g</sup>	N/A
Return loss	Dynamic range (typical at 10 nm/s)	N/A		> 55 dB
	Return loss uncertainty (typical) <sup>h</sup>	N/A		±0.5 dB
Swept measurement	Measurable power variation (typical) <sup>i</sup>	>10 000 dB/nm at 100 nm/s		
	Optimum tunable laser sweep speed range	10 nm/s–100 nm/s		

a. After a 1-hour warm-up time (for the CTP10 mainframe and modules), at a constant temperature of 23 °C ±1 °C, SMF28 patchcord, FC/APC connector, T100S-HP laser used with SCAN SYNC module, unless otherwise specified.

b. When using SCAN SYNC, first and last 2.5 nm of the laser(s) wavelength scanning range are not usable.

c. Over one minute, within optimum tunable laser sweep speed range, laser optical power 10 dBm.

d. Tunable laser power 10 dBm, after zeroing of optical detector, averaging time set to Automatic and without FBC module in optical path.

e. For IL < 20 dB, after power referencing, not including connector uncertainty, degree of polarization < 5%.

f. For PDL < 2 dB and IL < 20 dB; 10 dBm TLS, auto avg. time, FC/PC connector to OPM. Higher PDL values can be displayed depending on measurement conditions.

g. ±0.04 dB + 1% PDL over spectral range 1490 nm – 1620 nm

h. For RL < 40 dB, degree of polarization < 5%.

i. For IL < 45 dB, tunable laser power +10 dBm and averaging time set to 1 μs.

## SPECIFICATIONS—HARDWARE

Interfaces (rear panel of mainframe)	Display ports	2x (HDMI + display port) Compatible with split screen display and touchscreen with multitouch control
	Remote	Ethernet, USB (Option: GPIB)
	Electrical inputs (hardware ready)	10x BNC
	Electrical outputs (hardware ready)	7x BNC
	Other inputs	2x USB 2.0 and 2x USB 3.0
Interfaces (front panel of mainframe)	Number of module slots	10
	Other inputs	3x USB-A 2.0
Data storage	Hard drive	HDD, 2 TB
General	Temperature	Storage Operating
		–20 °C to 65 °C (–4 °F to 149 °F) 5 °C to 40 °C (41 °F to 104 °F)
	Weight (mainframe)	8.5 kg (18.7 lb)
	Weight (module)	1 kg to 2.8 kg (2.2 lb to 6.2 lb)
	Dimensions (mainframe - H x W x D)	178 mm x 482 mm x 435 mm (7 in x 19 in x 17 in) 4U full rack with rackmount fixtures
	Power supply	100 V to 240 V AC (50/60 Hz)



ORDERING INFORMATION <sup>a</sup>**CTP10 mainframe****CTP10-XX****GPIB option**00 = Without GPIB  
GPIB = With GPIB

Example: CTP10-GPIB

**IL RL OPM2 module****IL-RL-OPM2-58-XX****Connector adaptor**FOA-322-EMC = FC ultra-low-reflection: FC (PC/SPC/UPC/APC)  
FOA-354-EMC = SC ultra-low-reflection: SC (PC/SPC/UPC/APC)

Example: IL-RL-OPM2-58-FOA-322-EMC

**IL PDL module (2-slot module) <sup>b</sup>****IL-PDL-CL-58**

Example: IL-PDL-CL-58

**IL PDL OPM2 module (2-slot module) <sup>c</sup>****IL-PDL-OPM2-F-58-XX****Connector adaptor**FOA-322-EMC = FC ultra-low-reflection: FC (PC/SPC/UPC/APC)  
FOA-354-EMC = SC ultra-low-reflection: SC (PC/SPC/UPC/APC)

Example: IL-PDL-OPM2-F-58-FOA-322-EMC

**SCAN SYNC module****SCAN-SYNC-58**

Example: SCAN-SYNC-58

**Full-band combiner module****FBC-XX-58****Fiber type**00 = single-mode fiber  
M = polarization-maintaining fiber <sup>b</sup>

Example: FBC-M-58

**OPMx module****OPMXX-XX****Number of detectors**2 = 2 power meters  
4 = 4 power meters  
6 = 6 power meters**Connector adaptor**FOA-322-EMC = FC ultra-low-reflection: FC (PC/SPC/UPC/APC)  
FOA-354-EMC = SC ultra-low-reflection: SC (PC/SPC/UPC/APC)

Example: OPM6-FOA-322-EMC

**Wavelength reference gas cells****WLRM-NS270XX****Spectral reference range**1 = C-band  
2 = O-band

Example: WLRM-NS2701

a. All 1-slot module except for the 2-slot module IL PDL CL and IL PDL OPM2.

b. This module operates with tunable lasers with polarization maintaining fiber output,

c. This module operates with tunable lasers with polarization maintaining fiber output. Use an FBC-M module if several PM lasers need to be combined.

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