

VIAVI

Insertion Loss/Return Loss Testing Solution (mORL)

mORL with Passive Component Testing (PCT) Application for MAP-Series

The Passive Component/Connector Test solution (PCT) from VIAVI Solutions consists of a powerful family of modules, software, and peripherals for testing IL, RL, physical length, and polarity of optical connectivity products. Leveraging the modularity and connectivity of the VIAVI MAP Series platform, the PCT can be configured for R&D production, or qualification test environments and can address all key fiber types from single-mode through OM1, OM4 and OM5.

Optical connectivity solutions (optical connectors, structured cabling, splitters, and the enclosures that house them) are central to connection-intensive central office, data center, and optical-distribution networks. Outside of telecom, datacom, wireless backhaul, and FTTx, new supercomputing applications are emerging, and naval, avionic, and military applications continue to multiply. All of these markets are driven by the demand for more bandwidth. Out of necessity, new connector formats are coming to market, driven by the need to lower installation costs and speed deployments.

However, the quality and optical performance of these connection points is often overlooked. Poor insertion and return loss (IL and RL) can have far-reaching impact on network performance. Poor performance can directly affect reach and reliability and can even block the path to technology upgrades. Simultaneously, economic factors require manufacturers to lower costs, speed production, and accelerate time-to-market.



Key Benefits

- Requires only 25% of the space of other solutions
- Enables expansion into new high-growth, high-performance applications such as 40/100 G data center markets
- Modular platform can scale as needs arise and budget allows
- Port mapping verifies multifiber MPO cassette continuity and polarity in less than 15 seconds
- Fully supports high-growth MPO and MTP multifiber connectors

Applications

- Testing IL/RL/length of optical connectors and cable assemblies, structured-cabling solutions, and optical splitters
- Automated testing of multifiber assemblies such as MPO
- Solutions for both single-mode and multimode fiber-based devices
- Verifying continuity and polarity of large multifiber assemblies
- Measuring RL of line cards and receptacle-based transponders

Compliance

- MAP mORL-A1 modules installed in a MAP Series chassis comply with CE, CSA/UL/IEC61010-1, and LXI Class C requirements

Options and Configurations

The PCT system is offered in single-mode and multimode IL and RL modules available in different wavelengths and configurations.

mORL-A1 Single-Mode IL and RL



One slot single mode module contains up to four sources (1310, 1490, 1550, 1625 nm), and integrated power meter, and an optional 2x2 optical switch for automated bidirectional testing.

RL measurements are based on time-domain technology and are often referred to as “mandrel-free.” Mandrel-free technology dramatically reduces test time by eliminating the need to make slow, difficult, manual terminations during both setup and execution of RL measurements. It also measures length, further eliminating the need for extra steps to verify quality. Leveraging decades of OTDR technology, the VIAVI mORL-A1 delivers 80 dB of RL dynamic range and can measure jumpers as short as 70 cm in as quickly as 6 seconds for two wavelengths.

IL is measured using the power meter method. Precise launch power monitoring and depolarization technology provides true 0.001 dB resolution. RL measurements are completed in parallel using the same optical stimulus, requiring less time overall.

mORL-A1 Multimode IL and RL



Multimode modules are based on the same basic technology and architecture as the single-mode module described above. A standard dual-wavelength version is available (850, 1300 nm) for multimode applications with an integrated power meter and optional 2x2 optical switches for automated bidirectional testing.

The multimode module requires the selection of fiber type. After years of fighting to balance test capacity investments between 50µm (OM2, 3, 4) and 62.5 µm (OM1), VIAVI released a first-of-its-kind module that tests both fiber types. The dual-fiber option can test 50 µm or 62.5 µm from the same module. Similar to the single-mode version, an optional bidirectional test is available which can also test hybrid assemblies. Measurements of RL from 15 to 60 dB are possible and can be achieved during concurrent IL measurements in less than 2s per wavelength.

IL performance meets IEC 61280-4-1 recommendations for mode fill. For high-throughput testing, the mORL module uses the same laser sources for IL and RL. The multimode module includes a standard set of low-power LED sources from which to select for extra precision. The low-power LED sources offer lower coherence without polarization, removing instability from speckle effects on the power meter surface. Like the single-mode module, launch powers are monitored to achieve an IL stability of ± 0.02 dB.

Bidirectional Multimode and Single-Mode Modules

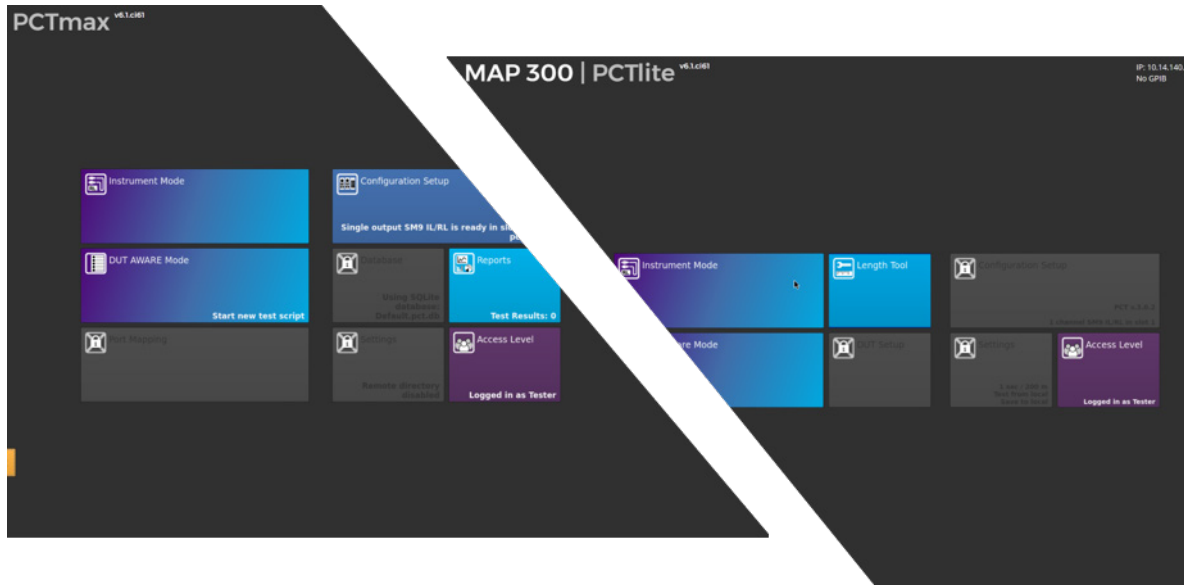
Simplify workflows with the bidirectional test. The mBID code option adds an internal 2x2 switch to the mORL modules. When coupled with the time-domain RL measurement it dramatically reduces test times because it measures optical RL on both connectors with one connection using the multiple programmable window function. This eliminates the need to measure the jumper in the other direction, effectively cutting test times in half.

PCT Application Framework

The PCT application environment for the mORL-A1 module family is considered a MAP series super-application because it drives the core measurement module as well as several adjacent modules and peripherals (for example, optical switches, barcode reader, and USB printers) for a total application solution. Maintenance utilities can assist users in the field while login rights ensure that only authorized personnel can change the key set-up parameters. It is also offered in multiple languages including English, Spanish, French, Japanese and Chinese.

The PCT Super application is offered in two versions that run natively on the MAP chassis and are offered as choice to the user.

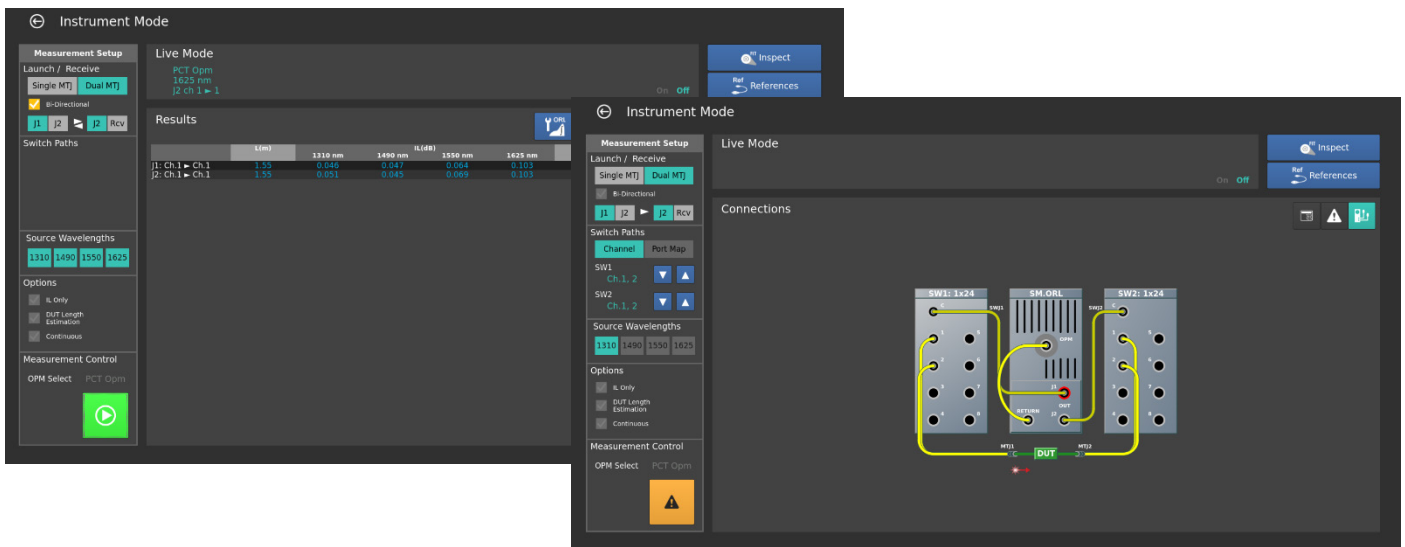
- **PCT Max** (original PCT) has a high focus on test and report management tools, with a supervisor mode layer for creating DUTs, test scripts, and report formatting, and an operator mode layer for high scale production testing with automatic databasing
- **PCT Lite** was launched as a more operator friendly interface for lab users or those who didn't need heavy scripting and automation for production. It is still backed by the stability and horsepower that PCT Max users are familiar with.



The PCT software has three main operation modes: instrument mode, script mode (DUT aware mode), and port mapping. For more information on port mapping consult the port mapping application note. A full complement of SCPI compliant remote commands is available as well.

1) Instrument Mode

Instrument mode lets users quickly and easily access all the key setup parameters in a simple easy-to-use intuitive GUI, which is ideal for R&D and qualification labs. This feature gives users maximum control in a rapidly changing environment. Users have constant access to interactive windows showing current connections and measurement setups. Quick-save features let users save test results to text files and window settings to simplify recall.



2) Script Mode (DUT Aware Mode)

Script mode fully automates tests with user-programmed test sequences and provides an SQL-light database to store results in a password-protected environment. Serial numbers may be generated locally or entered using a USB barcode reader. User-defined scripts ensure that production procedures are followed strictly while a full HTML editor can be used to embed instructions and photos for operators to follow. Users can print reports and labels or export data from the database for analysis. A database query engine lets users extract results based on criteria such as device type, connector type, or customer.

Data can be saved locally to the internal flash disk and then exported over USB or the network FTP server. Alternatively, users can store individual test files directly to a mapped network drive. When using the remote network drive, the PCT application can locally cache files, in case the connection to the remote drive is lost and will re-sync automatically once the connection is restored.

3) Remote Commands

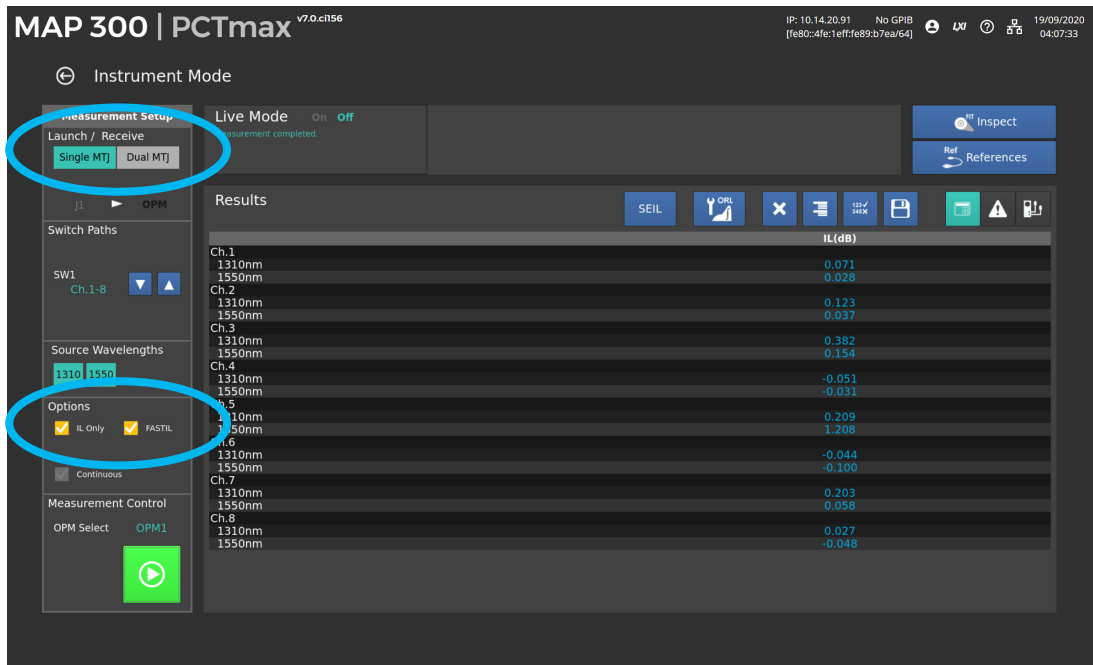
Integrating the PCT application with external automation environments, such as LabView and Visual Basic, leverages the full power of the MAP system. Its full set of standard commands for programmable instruments (SCPI)-based commands are accessible through the local area network (LAN) or over the legacy general-purpose interface bus (GPIB) interface. The simple, robust, remote interface is a core requirement of the application. The MAP Series Linux-based operating system eliminates the maintenance requirements of legacy Windows-based platforms and IT department efforts on viruses and network access. A simple Excel-based example is available and may be all that is required for programmers to get started.

For debugging purposes, users can remotely login to the unit remotely via web interface, which is extremely useful when interacting with remote manufacturing locations.

Key Features (FastIL and SEIL)

Fast Insertion Loss Mode (FASTIL)

FASTIL is an IL only mode that offers faster testing speeds with the same accuracy and stability performance as standard IL testing. This is a MAP-200 and 300 feature supported via UI and SCPI. It is ideal for applications where only IL testing is required or for pre-screening measurements to ensure good results prior to detailed measurements.



Single Ended Insertion Loss (SEIL)

SEIL is a MAP-300 supported debug tool. It allows the operator to look into an assembly to visualize regions with unexpected higher IL. It is a post measurement tool intended for fiber lengths greater than 10 meters. SEIL is ideal for complex DUTs with furcation zones that permits the user to visualize where the loss is and cannot be used as a pass/fail method. This tool is supported through a license and can be used via UI or SCPI.

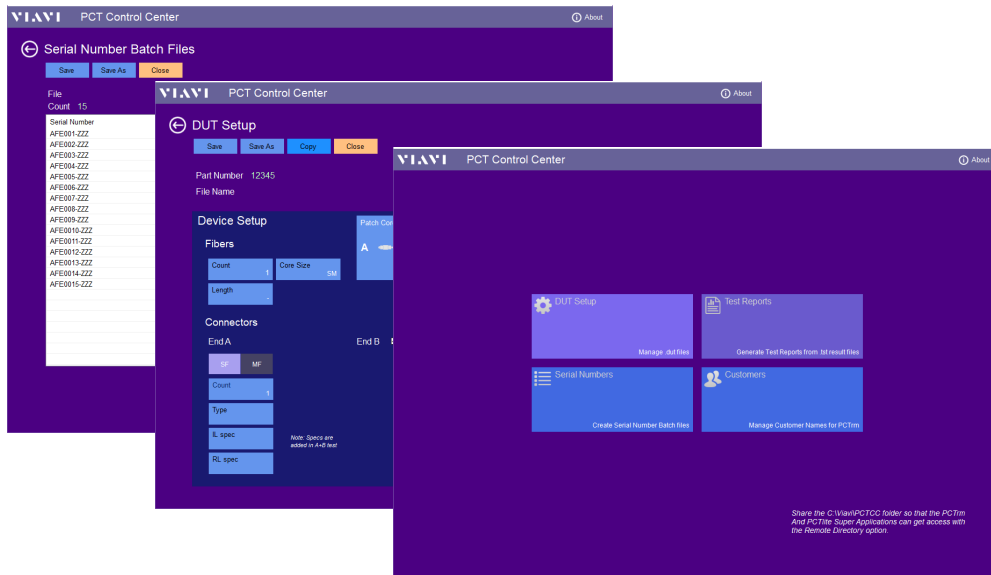


PCT Control Center

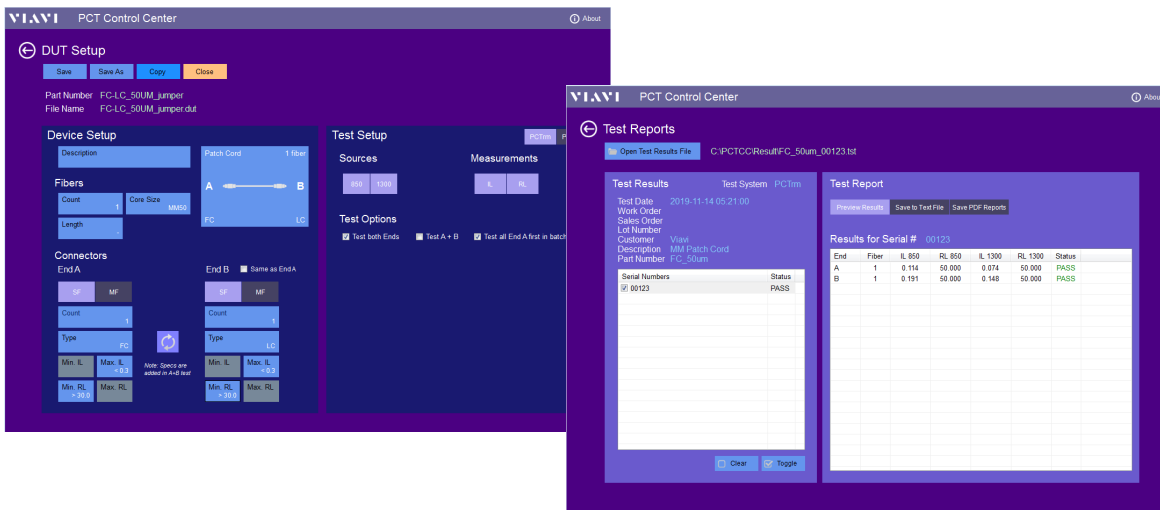
PCT Control Center is a companion PC application, designed to maximize the value of the DUT Aware measurement mode. PCT Control Center is compatible with the PCTMax and PCTLite application which leverages the mORL-A1 measurement engine.

A simple, easy to use PC interface enables creating, editing and managing DUT definition files, report templates and serial number batches. Files are saved to a shared directory and allows all PCT units to use these files. If network connectivity is not available, USB storage media can be used to transfer the information. Test results can be uploaded, viewed, filtered and printed using both standard and editable HTML templates.

PCT Control Center is also compatible with PCT-rm for users who wish to migrate to mandrel-free testing.



PCT Control Center is a simple PC application designed to simplify management of the PCTMax, PCTLite and PCT-rm based IL and RL systems.



Example of PCTcc used to test hybrid FC/LC Jumpers

Key Peripherals and Accessories

Optical Switches and Remote Power Meter Head

Pairing the mORL with the MAP Optical Switch (mOSW-C1) switch family can expand a single fiber output up to 64 channels. Switches are used to speed workflow and to connect multiple master test jumpers (MTJ) to the system simultaneously. If 64 channels are insufficient, external VIAVI switches can be used and controlled via USB to sequentially test up to 176 fibers hands-free.

The addition of a remote head power meter can also add more flexibility to the system and speed. It is ideal for difficult ergonomics with outside plant or structured cables and Hybrids (MPO to LC breakout). It also allows the addition of more OPMs to the modules (1,2 and 4 heads) and can be used on any chassis in the network. New power head is “paired” during set-up and can be toggled for use during measurement. Pairing operation links all heads. Referencing one, references ALL of them making it a very powerful addition.

VIAVI also offers Teflon-based integrating sphere to minimize polarization-dependent loss and access high power. Integrated remote heads provide a larger input aperture that is ideal for high port MPO connectors or duplex connectors. They are Measure IL for high port count MPO connectors with < 0.01dB positional variations. They can also measure high powers of >20dBm with an 80dB dynamic range.

Third Party Accessories

To simplify workflow, several standard third-party accessories can be used including a standard mouse, keyboard and ASCII text-entry based barcode readers. The unit directly supports two label printers. It also supports network printing on postscript-enabled printers. VIAVI currently supports ZPL compatible Zebra printers.

Connector Inspection

Manufacturers know that contaminated master test jumpers are a major source of test failure if left uncontrolled. The fiber inspection and test application (mSUP-FIT) is a super application that runs parallel to the PCT. A toggle button ensures that the operator is never more than one-button-press away from inspection of the master-test jumper. VIAVI has a wide range of inspection tools include the P5000i fiber microscope and the FVAi/FVDi benchtop microscope.

Power Meter Connector Adaptors

VIAVI is committed to providing the latest power-meter adaptor interfaces. As connector formats change, new power-meter adaptors are required. VIAVI can provide mechanical specifications and drawings for specialized formats so that manufacturers can develop their own interface, as required. For more information, you can find the [AC adaptor selection guide](#) with all currently available adaptors.



Chassis and Modular Family

The VIAVI Multiple Application Platform (MAP) is a modular, rack mountable or benchtop, optical test and measurement platform with chassis' that can host 2, 3 or 8 application modules. The MAP Series offers industry-unique levels of integration. The compact size of the modules lets you develop a universal fiber test solution within a single three-slot chassis. Accessibility from the front, rear, or side minimizes the working space required to manage and properly condition test cables. The PCT is part of the LightTest modular family and is compatible with all current MAP-300 and MAP-200 chassis with the exception of MAP-220. The LightTest family of modules are application specific systems which leverage the MAP System to provide turn-key optical test solutions for common test applications. They can be combined with the VIAVI LightDirect modules to form the foundation of a diverse array of optical test applications.

All MAP Series modules are accompanied by a web enabled multiuser interface that is simple and intuitive. LXI compliant with a full suite of SCPI based automation drivers and PC based management tools, the VIAVI MAP is optimized for both the lab to manufacturing environments.

Serviceability and After-care

In manufacturing applications, maintaining equipment and maximizing uptime is critical to profitability; the VIAVI Product and Service offerings for mORL-A1 and the MAP Series chassis were designed with this critical need in mind. With offerings ranging from factory service to onsite calibration and extended warranty, VIAVI is working to make product service as convenient and accessible as possible.

VIAVI has recently enhanced its services for the PCT systems which now include,

- 1. Return to the Factory:** An all-inclusive service option that includes functional testing, recalibration, implementation of necessary engineering changes, software upgrade, calibration sticker/cert and calibration report.
- 2. NEW Onsite Verification:** With this option, a VIAVI technician comes directly to the customer site and will perform functional test and (if necessary) calibration including a cert and calibration sticker.
- 3. NEW Onsite Calibration:** The customer receives all the same services as the Onsite Verification with the addition of a detailed report that identifies as received/final condition of the product as well as the detailed test results for each product tested.
- 4. NEW Onsite Maintenance:** This type of repair could include replacement of damaged adapters or ejector handles, and software updates.
- 5. Extended warranty:** Extend your hardware warranty and enjoy peace of mind in addition to budget predictability. Available at time of purchase or at any time up to the expiration of the OEM warranty, this offering facilitates quick turnaround and no repair charge in the event of an unforeseen hardware failure after the OEM warranty expiration.

For more information on services, visit the dedicated [PCT services page](#), contact your local VIAVI account manager or email technical support at support@viavisolutions.com.

Specifications

For more information on this or other products and their availability, please contact your local VIAVI account manager or VIAVI directly at 1-844-GO-VIAVI (1-844-468-4284) or to reach the VIAVI office nearest you, visit viavisolutions.com/contacts.

Parameter	Single-Mode mORL-A1	Multimode mORL-A1		
Source				
2-Wavelength Version	1310, 1550 nm	850, 1300 nm		
4-Wavelength Version	1310, 1490, 1550, 1625 nm	-		
Fiber Types				
Single Fiber	Single-Mode 9 μm core	50 μm core (OM3)		
Dual Fiber	-	50 μm core (OM3) and 62.5 μm core (OM1). Software selectable		
Measurement time				
Initializing Time	< 4s			
Averaging Options per wavelength	2, 5, 10s			
Insertion Loss				
Modes	-	LED or laser (software selectable)		
Display Resolution	0.001 dB			
Total IL Uncertainty ^{1,5,6}	± 0.02 dB	± 0.05 dB		
Additional uncertainties due to 1xN switching (if mOSW-C1 added)	± 0.01 dB			
Additional uncertainties due to fiber position in the integrating Sphere ²	± 0.03 dB			
Return Loss				
Display Resolution	0.01 dB			
DUT length				
DUT reflections (both ends) < 40 dB	> 170 cm			
DUT reflections (both ends) > 40 dB	> 70 cm			
Return Loss Repeatability^{3,4}	- 30 to 65 dB	± 0.1 dB	-15 to 60 dB	± 0.2 dB
	- 65 to 70 dB	± 0.2 dB		
	- 70 to 75 dB	± 0.4 dB	-60 to 70 dB	± 0.5 dB
	- 75 to 80 dB	± 1.5 dB		
Return Loss Accuracy³	- 30 to 70 dB	± 1.0 dB	-15 to 20 dB	± 1.8 dB
	- 70 to 75 dB	± 1.7 dB	-20 to 60 dB	± 1.3 dB
	- 75 to 80 dB	± 3.0 dB		
Recalibration Period	1 year			
Environmental Specifications				
Warm-up time	20 min			
Operating Temperature, humidity	25 \pm 5°C non-condensing humidity			
Storage Temperature	- 30 to + 60°C			
Physical Specifications				
Size (W x H x D)	4.06 x 13.26 x 37.03 cm (1.6 x 5.22 x 14.58 in)			
Weight (Approximately)	1.2 kg (2.65 lb)			

¹ After valid zero loss, total expanded uncertainty (2 σ), and reconnecting the same connector and OPM adaptor, temperature $\pm 1^\circ\text{C}$, using internal source.

² 24-channel ribbon fiber

³ All measurement specifications provided at 5 s averaging time and 200 m range, unless otherwise stated.

⁴ 10 measurements with a stable connection of a 3 m patch cord.

⁵ For LED mode, after valid zero loss, total expanded uncertainty (2 σ), and reconnecting the same connector and OPM adaptor, temperature $\pm 1^\circ\text{C}$, using internal source.

⁶ IL uncertainty from launching condition is not included.

Ordering Information

Insertion loss and Return Loss Modules

All PCT systems will require an IL/RL meter in a MAP-Series platform. Please consult the MAP-300 and the MAP-200 data sheets for more information on the platforms.

Type	Part Number	Description
Single Mode IL/RL Meter	MORL-A13500-STD-M100-MFA	IL/RL Meter 1310 /1550nm SMF FC/APC
	MORL-A13500-BID-M100-MFA	IL/RL Meter 1310/1550nm SMF Bidirectional FC/APC
	MORL-A13456-STD-M100-MFA	IL/RL Meter 1310/1490/1550/1625nm SMF FC/APC
	MORL-A13456-BID-M100-MFA	IL/RL Meter 1310/1490/1550/1625nm SMF Bidirectional FC/APC
Multimode IL/RL Meter	MORL-A11308-STD-M101-MFA	IL/RL meter 850/1300 nm 50um OM3 MMF FC/APC
	MORL-A11308-BID-M101-MFA	IL/RL meter 850/1300nm 50um OM3 MMF Bidirectional FC/APC
	MORL-A11308-BID-M112-MFA	IL/RL meter 850/1300 nm Dual Output OM3/OM1 MMF Bidirectional FC/APC
	MORL-A11308-STD-M112-MFA	IL/RL meter 850/1300 nm Dual Output OM3/OM1 MMF FC/APC

MAP-Series Switch Configurations

All mOSW-C1 switches are configured by a single part number that defines the function and options of the module. The **XXX** code defines the fiber type, as seen in Table 1, and the **YY** code defines the connector type, as seen in Table 2. For more switch options and specification details consult the mOSW-C1 data sheet.

Part Number	Description
MOSW-C111C004B0-MXXX-MYY	Single 1 x 4 switch, bulkheads
MOSW-C111C008B0-MXXX-MYY	Single 1 x 8 switch, bulkheads
MOSW-C111C012B0-MXXX-MYY	Single 1 x 12 switch, bulkheads (Dual width module)
MOSW-C111C024B0-MXXX-MYY	Single 1 x 24 switch, bulkheads (Dual width module)

Table 1

XXX code	Fiber Type
M100	9 μm Single Mode
M101	50 μm (OM3)
M102	62.5 μm (OM1)
M105	100 μm

Table 2

YY Code	Connector Type
MFP	FC/PC
MFA	FC/APC
MSC	SC/PC
MSU	SC/APC
MLC	LC/PC
MLU	LC/APC

MAP-Series Remote Power Head Configurations

Optional mOPM remote head can be added to the PCT system. The available configurations are in the table below. For more power meter options and specification details consult the mOPM-C1 data sheet.

Type	Part Number	Description
Remote Head Base Cassette	MOPM-C1RH1	Single channel remote interface cassette
	MOPM-C1RH2	Dual channel remote interface cassette
	MOPM-C1RH4	Quad channel remote interface cassette
Remote Head Options	MOPM-C1RHPCT	2mm InGaAs PCT system remote head
Integrated Remote Head Options	MOPM-C1RHIP	Integrated PCT system remote head

Software Options

VIAVI offers software licenses that can accompany your PCT system

Type	Part Number	Description
MAP-300 Family	MSUP-300A-FIT	MAP-300 Fiber connector inspection app - requires probe
	MSUP-300A-PCTMAPPING	MAP-300 PCT polarity and port mapping application add-on
	MSUP-300A-PCTREMDB	MAP-300 PCT remote centralized database connection key
	MSUP-300A-SBSC	MAP-300 PCT driver for legacy SB/SC series switches
	MSUP-300A-SEIL	MAP-300 Single Ended Insertion Loss license
MAP-200 Family	MSUP-FIT	MAP-200 Super Application Fiber Inspection (FIT)
	MSUP-PCTMAPPING	MAP-200 Super Application PCT Mapping
	MSUP-PCTREMDB	MAP-200 CT Remote Database Connection Key
	MSUP-SBSC	MAP-200 driver for legacy SB/SC series switches

Accessories

Accessories (Optional)	Product and description	
Inspection and cleaning tools	CleanBlastPRO	The patented VIAVI Solutions® CleanBlastPRO fiber end-face cleaning system provides a fast, effective, and cost-efficient solution for removing dirt and debris from connectors in most common applications.
	FiberChek probe microscope	One-button FiberChek Probe delivers a reliable, fully autonomous, handheld inspection solution for every fiber technician.
	P5000i fiber microscope	Automated Fiber Inspection and Analysis Probe provides PASS/FAIL capability to PC, laptops, mobile devices and VIAVI test solutions. The PCT application offers an inspection pass/fail.
	FVAi / FVDi Benchtop Microscopes	Digital benchtop microscopes are the ideal inspection solution for fiber connector production by giving users a single system that is scalable to optimize throughput at any stage of the production process.
Replacement Parts	Mating sleeves	AC500;FC/PC-FC/PC Universal Connector Adapter
		AC501;FC/PC-SC/PC Universal Connector Adapter
		AC502;FC/APC-FC/APC Universal Connector Adapter
		AC503;FC/APC-SC/APC Universal Connector Adapter
Detector Adaptors	A complete range of single ferrule, duplex, and bare fiber power meter adaptor are available at VIAVI including MPO, FC, LC and Integrating spheres. Refer to the AC adaptor selection guide for more information.	

A wider range of inspection tools are available at VIAVI. More information about the products and accessories can be accessed through our website at www.viavisolutions.com. For further assistance please contact your local VIAVI account manager or VIAVI directly at 1-844-GO-VIAVI (1-844-468-4284) or to reach the VIAVI office nearest you, visit viavisolutions.com/contacts.

