



AEM

Testing
Innovation

OTDR Overview

April 2023

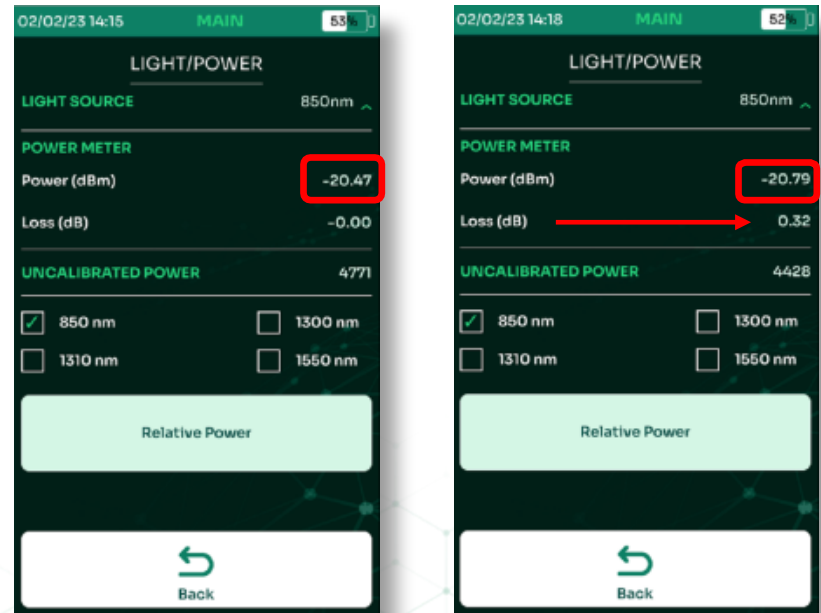


Tier 1 Fiber Certification
VS
OTDR Fiber Testing
VS
Tier 2 Fiber Certification

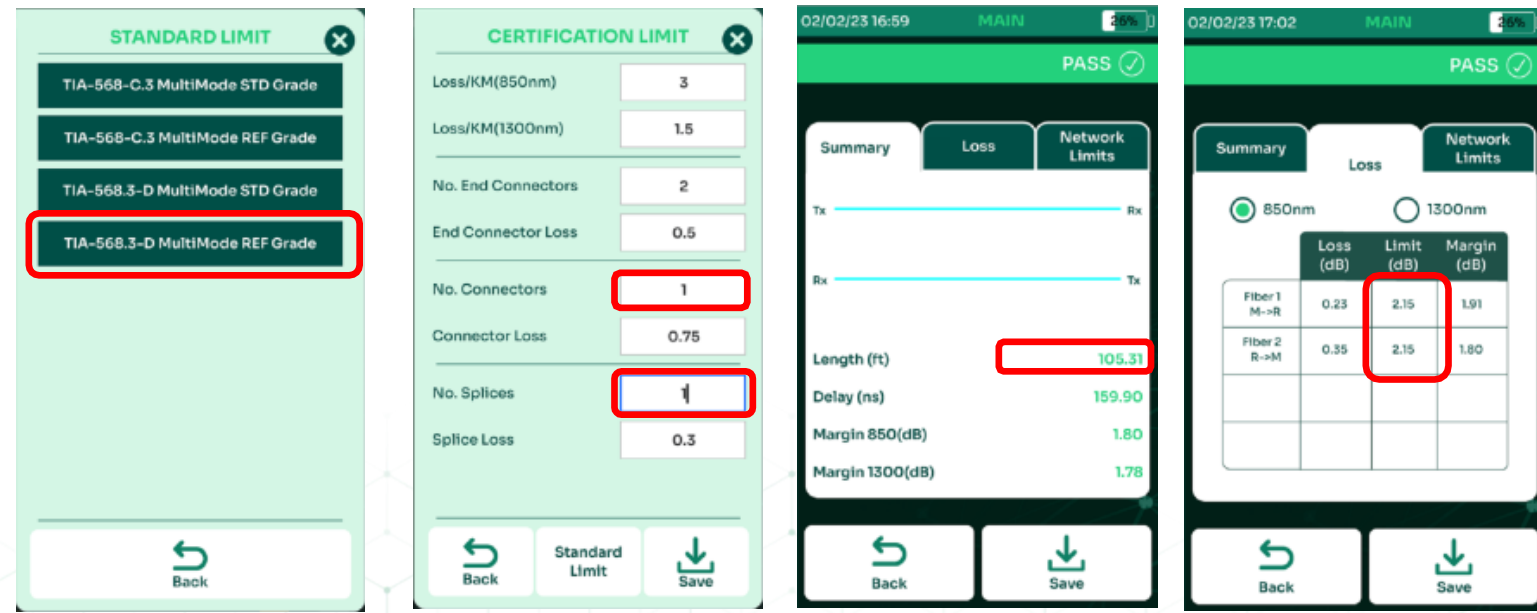
Tier 1 - Optical Loss Testing

- Tier 1 Certification - Optical Loss Testing
 - In its simplest form and optical loss testing is a comparison between the optical power measured in dBm at the output of the light source and the power measured at the far end of a fiber connected to that same light source. The difference is known as loss or attenuation, expressed in dB.
 - Combining the light source/power meter, measuring against standards and providing a pass/fail is known as an Optical Loss Test Set.

Light Source/Power Meter example



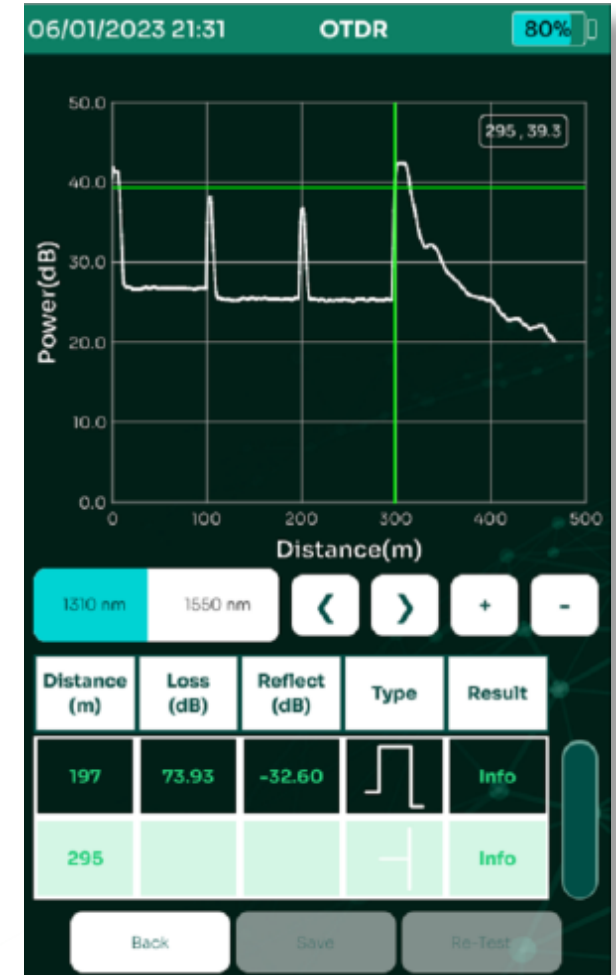
Optical Loss Test Set example showing limits, loss and margin



OTDR Testing

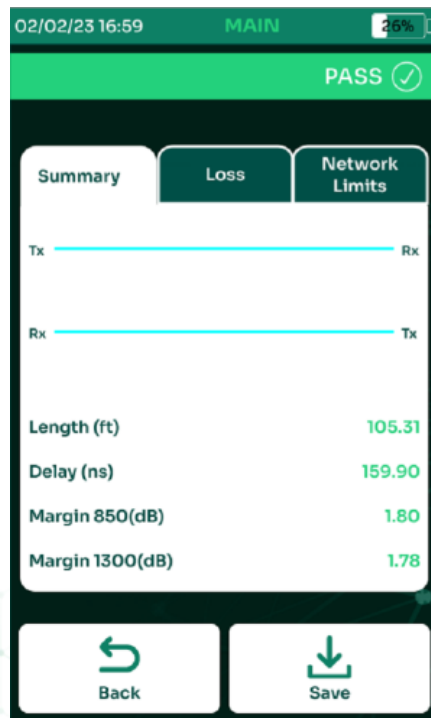


- OTDR (Optical Time Domain Reflectometry) Testing
 - “Sonar with light” is one way to think about it. The OTDR sends a pulse through the fiber, then waits for the reflection pulse to return.
 - Based on the strength and time it takes a reflected pulse to return, the OTDR calculates the position along the fiber where the event creating the reflection is.
 - OTDR Testing is commonly used for troubleshooting when OLTS shows a failure and the cause is not evident.
 - OTDR testing is NOT certification, and is not acceptable as a standalone test of the suitability of installed fiber to support intended applications.
 - Measurements include
 - Link length
 - Total link loss
 - Link ORL (Optical Return Loss)
 - Position of the elements on the link (fiber, mated connectors, splices, end of fiber/break_
 - Insertion loss of the elements is shown in the trace and the overall loss and event loss is shown
 - Insertion loss for each of the elements
 - Pass/Fail diagnostic

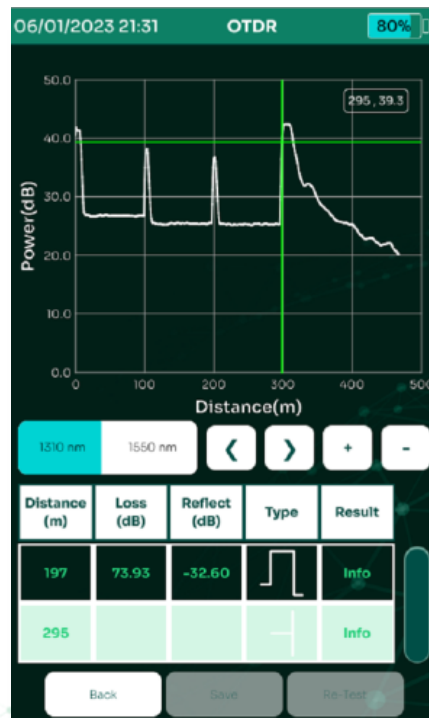


Tier 2 Testing

- TIA-568: Optical Fiber Cabling and Components Standard
 - Tier 2 testing supplements Tier 1 testing with the addition of an OTDR characterization of the elements along the fiber cabling.
- Simply put, Tier 2 is just testing the same fiber with an OLTS and an OTDR and documenting the results of both.



Tier 1 Optical Loss Test



OTDR Test

= Tier 2

The background features a complex network of white nodes and connecting lines, resembling a data or communication network. A large, thin green circle is centered on the page, framing the network. A bright, multi-pointed starburst light is positioned at the center of the network, slightly to the right of the vertical center. The overall color palette is light green and white.

AEM OTDR

AEM OTDR

- Modular design allows adapters to be used with TestPro or NSA.
- Existing TP users can add OTDR troubleshooting and Tier 2 testing.
- Existing NSA users can add OTDR troubleshooting.
- Prospective users who require an OTDR option in order to purchase/specify a certification tester now have that option with AEM.
- Available in
 - Individual adapters in MM or SM so users can add to their TP or NSA.
 - Standalone OTDR kit configurations include 1 TestPro handset, giving flexibility to expand to copper/fiber certification and smart building testing as needed by adding another handset and adapters (license required for copper certification). **All handsets have Built in 1000BASE-T Ethernet port for SNR, Network Discovery & connectivity for test results upload. Add an Edimax USB-WiFi adapter for WiFi Discovery/Testing results upload.**
 - Dual-wavelength MM kit
 - Dual-wavelength SM kit
 - Quad wavelength kit with 1 MM and 1 SM OTDR test adapter.
 - TestPro Tier1/Tier2 combination kit with Quad wavelength OLTS/OTDR capabilities
 - MM Loss Test adapters, SM Loss Test adapters, MM OTDR adapter and SM OTDR adapter
 - TestPro Smart Building Max Kit combining the TestPro-K61E with Quad OTDR capabilities.
 - Combines TestPro-K61E Smart Building Test Kit with MM and SM OTDR test adapters



Enhance Your Network Service Assistant by adding OTDR capability

- NSA – the only Qualification+ tester on the market already provides you with more testing functionality than any other qualifier/validator on the market.
 - Certi-Lite test uses the same mandatory test limits from ANSI/TIA-1152-A in a single-ended test, the ONLY qualifier/validator with this capability.
 - PoE testing
 - MultiGig SNR with PoE Load
 - Wired/Wireless Network Discovery testing
 - Fiber Optic loopback loss testing
 - Full test reporting capability
- Adding OTDR capability provides yet another significant Network Service Assistant tool in the hands of the network/data center technician to facilitate more advanced troubleshooting.
 - Find break in fiber
 - Pinpoint which end of the fiber has a bad connector
 - Find lossy connection points
 - Pinpoint lossy splices



AEM OTDR Specifications



- Available wavelengths
 - MM 850nm/1300nm
 - SM 1310nm/1550nm
- Event dead zone
 - 0.5m to 0.7 depending on wavelength
- Attenuation dead zone
 - 2.5m to 4.5m depending on wavelength
- Dynamic Range
 - 25dB @ 850nm / 27dB @1300nm
 - 29dB @1310nm / 27dB @1550nm
- Distance Measurement Range
 - 9km for 850nm, 35km for 1300nm
 - 80km for 1310nm, 130km for 1550nm
- Pulse Width
 - 3, 5, 10, 15,..., 24995, 25000 nsec



Test Results Management/Reporting



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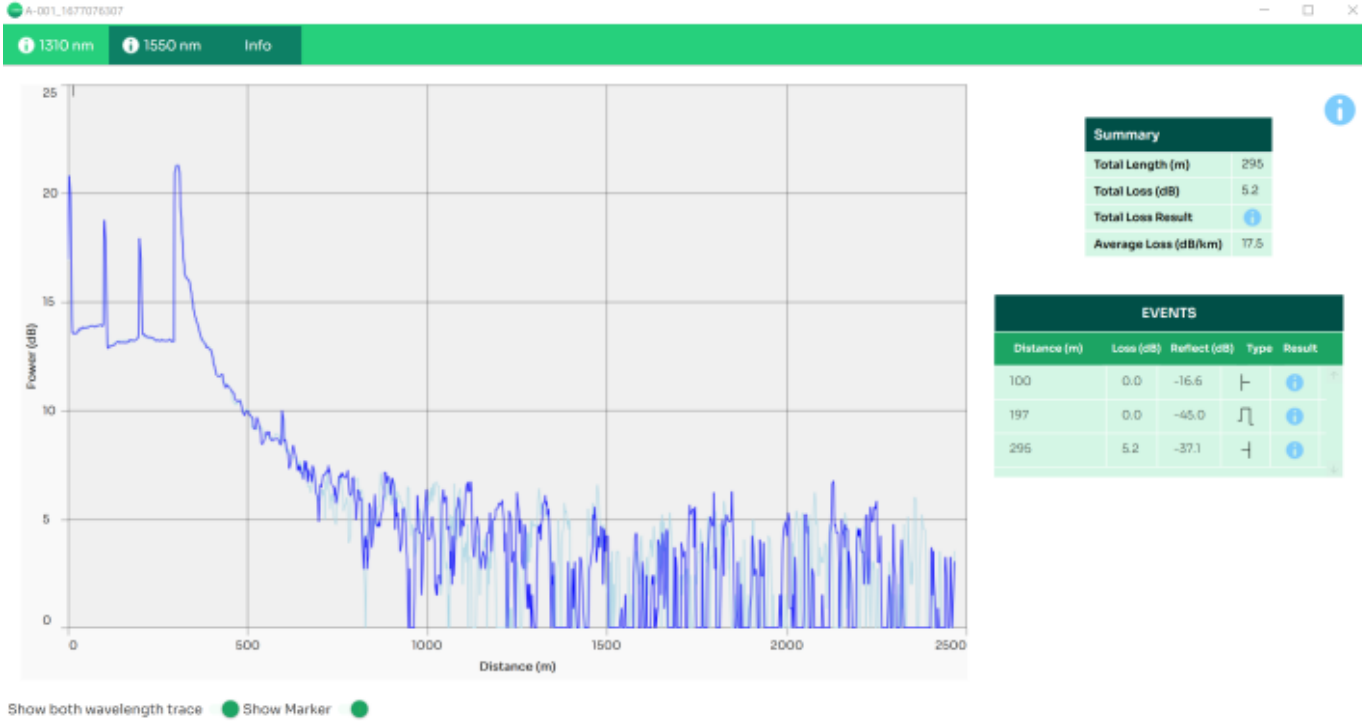


Info

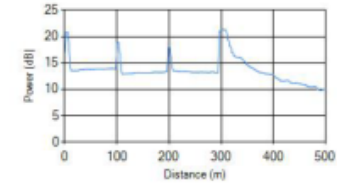


Test Time : 2/22/2023 10:31:47 PM
Project : cart
Operator : Default
Wavelength : 1310 & 1550 nm
Pulse Width (ns) : 30
Averaging : 16384
Launch Cord Length(m) : 100

Model : 7
Serial Number : Main: 5300-1117
Device Software : 4.1.A20
Calibration Date : 6/7/2022 12:00:00 AM
Main Adapter : PROBE_OTDR_SM, SiN: 12
Cable Type / NVP : Single Mode
Connector : SC
Hardware Version : 0



Trace - 1310 nm



Summary - 1310 nm

Total Length (m)	Total Loss (dB)	Total Loss Result	Average Loss (dB/km)	Overall Result
295	5.2	Info	17.5	Info

Event Table - 1310 nm

Distance (m)	Loss (dB)	Reflect (dB)	Type	Result
100	0.0	-16.6	┆	Info
197	0.0	-45.0	J	Info
295	5.2	-37.1	┆	Info

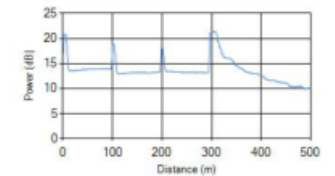


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Info

Trace - 1550 nm



Summary - 1550 nm

Total Length (m)	Total Loss (dB)	Total Loss Result	Average Loss (dB/km)	Overall Result
295	5.1	Info	17.3	Info

Event Table - 1550 nm

Distance (m)	Loss (dB)	Reflect (dB)	Type	Result
100	0.0	-16.6	┆	Info
197	0.0	-44.7	J	Info
295	5.1	-37.1	┆	Info

AEM OTDR Test Adapters, Kits and Launch Cords



Part number	description	Target application/customers
TESTPRO-K21E-SM	Single TestPro platform and Singlemode OTDR kit	Standalone OTDR alternative
TESTPRO-K21E-MM	Single TestPro platform and Multimode OTDR kit	Standalone OTDR alternative
TESTPRO-K21E-QD	TestPro platform and Singlemode and Multimode OTDR kit	Standalone OTDR alternative
AD-OTDR-SM	Single mode OTDR adapter for TestPro/NSA	Customers with TP or NSA who need OTDR
AD-OTDR-MM	Multi mode OTDR adapter for TestPro/NSA	Customers with TP or NSA who need OTDR
TestPro-K41E	TestPro fiber certification and OTDR kit (SM and MM)	Tier-1 and tier-2 fiber certification
TestPro-K71E	TestPro Smart Building Max Kit (TestPro-K61 plus MM and SM OTDR)	Super technician who installs, maintains and troubleshoots copper and fiber links
SM-SC-LC CORD-150M	SC to LC Launch Cord, Singlemode	
SM-SC-SC CORD-150M	SC to SC Launch Cord, Singlemode	
SM-LC-LC CORD-150M	LC to LC Launch Cord Singlemode	
MM-SC-LC-CORD 150M	SC to LC Launch Cord, Multimode	
MM-SC-SC CORD-150M	SC to SC Launch Cord, Multimode	
MM-LC-LC CORD 150M	LC to LC Launch Cord, Multimode	
ACC-HARD-CASE-LARGE	Large Hard Case for TestPro K41E and K71E	
ACC-HARD-CASE-SMALL	Small Hard Case for TestPro K21E	

- **Standalone OTDR kits/combo kits K21E/K41E/K71E include a hard case.**
- **Launch cords are included ONLY with the Tier 1/Tier 2 combination kit K41E and the Smart Building Max kit K71E and must be purchased separately for all other configurations.**
- **Individual adapters AD-OTDR-SM/AD-OTDR-MM are boxed and include 1 each of:**
 - **SC interface**
 - **2m SC-SC TRC (“connector protectors”)**
 - **LC & SC coupler**
 - **1.25mm & 2.5mm connector cleaners**



Demonstration



Thank You

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