

# FlexScan® TS100 FTTH PON Troubleshooter

## One-Touch Troubleshooting



### Features

- Locate faults in <math><3</math> seconds with the press of a button
- Displays link length, loss, ORL, and pass/fail results
- Single-ended test reduces time and cost
- Rugged, lightweight, hand-held for field use
- Available with field-replaceable connector

### Applications

- Troubleshoot PONs or Point-to-Point networks from one end
- Diagnose faults exceeding industry or user pass/fail limits
- Verify loss of PON splitters up to 1:64 split ratio
- Verify GPON, video and XG/XGS-PON or 10GEPON power levels
- Verify insertion loss, TX output or RX input power levels
- Pinpoint location of macro-bends or breaks

AFL's FlexScan TS100 Optical Troubleshooter is an easy-to-use, all-in-one tool for detecting, identifying, locating, and resolving single-mode optical network issues. The TS100 has auto-configured settings to quickly measure received power, link length, loss, and ORL with the push of a button. The results are displayed using color-coded LinkMap® icons for easy analysis. The FlexScan TS100 automates testing, shortens test time, interprets results, and recommends corrective actions, improving efficiency of frontline technicians and reducing costs.

**Diagnose your network in seconds:** Just press Start and the TS100 immediately measures and displays received power levels when connected to a live GPON and/or 10GPON network. Within seconds, link length, loss, and ORL are displayed, along with faults exceeding industry or user-set pass/fail limits. The TS100 even recommends corrective actions based on test results making it easier for technicians to find and fix network problems.

**Requires little, if any, training:** Designed primarily for field technicians activating and maintaining broadband access networks, the TS100 requires minimal training and no OTDR experience. SmartAuto® auto-configures test settings and presents network test results in easy-to-understand, color-coded icons indicating passing or failing connections, splices, and splitters.

**All-in-one test capability:** The FlexScan TS100 includes an integrated VFL, power meter, and light source. It can be easily paired to AFL's award-winning FOCIS family of inspection scopes, ensuring technicians have everything they need to locate and quickly resolve optical network issues. The source and power meter generate and detect fiber-identifying tones and support Wave ID insertion loss testing featuring automatic wavelength identification and synchronization.

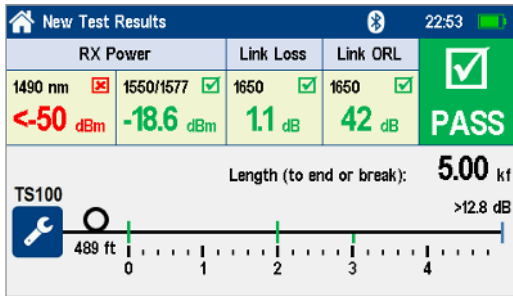
**Designed for field use:** FlexScan TS100 is small (3.5 x 6 x 1.75 in (86 x 160 x 43 mm)) and weighs less than a pound (0.4 kg). It has a large, bright indoor/outdoor touchscreen, and rechargeable battery that lasts >12 hours for all-day operation.

**Multiple storing and reporting options:** Results can be stored internally, saved to a USB, or wirelessly uploaded via the free FlexScan App for real-time reporting using the included TRM® Test Results Manager software.

**Convenient cost-saving kits:** Bundle the FlexScan TS100 with your choice of launch cable and FOCIS Flex connector inspection probe with adapter tips for significant cost-savings!

**Field-replaceable connector:** With AFL's optional field-replaceable connector, avoid expensive service repairs to replace connectors damaged due to poor cleaning practices and/or normal wear-and-tear.

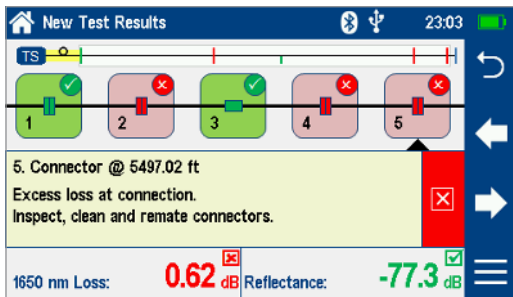
## FlexScan® TS100 FTTH PON Troubleshooter



### Verify RX Power, Link Length, Loss, and ORL in Seconds

Link length, loss, and ORL are critical parameters to check when verifying optical networks. Within seconds of pressing Start, FlexScan TS100 measures and reports distance, loss, and ORL to the end of a Point-to-Point network or to the first splitter in an FTTH PON. Additionally, for an in-service PON, TS100 automatically detects and measures downstream power levels.

Measurements of received power, link length, loss, and ORL may be compared to pass/fail limits to immediately identify any issues. Technicians can simply touch the failed measurement value to get information on why the measurement failed and what to do about it.



### Identifies & Locates Faults - Recommends Corrective Action

TS100 automatically detects network events such as connections, splices, splitters, and macro-bends. It displays these events with LinkMap® color-coded icons that are easy-to-read and enable users to quickly identify faults requiring action. Touching each event icon displays its pass/fail status, location, loss, and reflectance as well as recommended corrective actions. More detail may be obtained by touching the measurement values for failing events.

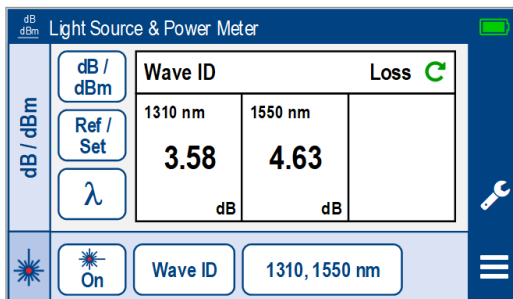
For PON systems equipped with a 1650 nm downstream monitoring system, the TS100-75 provides a 1625 nm upstream PON troubleshooting tool, which includes a 1650 nm blocking filter.



### Connectivity

Results can be stored internally, saved to a USB, or wirelessly uploaded via the free FlexScan App to a smart device for real-time reporting using the included TRM® Test Results Manager PC-based software. This real-time monitoring can help avoid mistakes in the field that will require future truck rolls.

FlexScan TS100 also pairs easily with AFL's award-winning FOCIS® family of connector inspection probes for fast, easy one-button-push inspection of single-fiber and/or multi-fiber connector end-faces. Inspection data can be saved with TS100 results internally or transferred for archiving.



### PON Power Meter for GPON, Video, 10GPON

FlexScan TS100 PON Troubleshooters include a broadband power meter plus a downstream PON power meter enabling users to immediately and independently verify 1490 nm GPON plus 1550 nm video or 1577 nm 10GPON (XG/XGS-PON or 10GEAPON).

TS100s also include an optical light source (OLS) and optical power meter (OPM) supporting fiber-identifying tone generation and detection, as well as Wave ID insertion loss measurements. With Wave ID, the OPM auto-synchronizes to a single or multi-wavelength Wave ID optical signal transmitted by another FlexScan or AFL light source. The OPM reports detected wavelengths and measures loss at each wavelength, saving significant test time and eliminating setup errors.

# FlexScan® TS100 FTTH PON Troubleshooter

## Specifications<sup>a</sup>

FlexScan TS100-60/70/75 models support PON and Point-to-Point network troubleshooting at 1625 or 1650 nm and include optical light source (OLS), optical power meter (OPM), visual fault locator (VFL), internal results storage plus Bluetooth and USB interfaces.

MODEL	TS100-60	TS100-70/75
<b>FAULT LOCATOR</b>		
Emitter Type	Laser	
Safety Class <sup>b</sup>	Class I	
Fiber Type	Compatible with all G.65x single-mode fiber	
Wavelengths (nm)	TS100-60/70: 1650 nm; TS100-75: 1625 nm	
Center $\lambda$ Tolerance <sup>c</sup>	$\pm 20$ nm	
Link Loss <sup>d</sup>	$\leq 18$ dB	$\leq 23$ dB
Test through Splitter	N/A	Up to 1:64
Test Time	Length, Loss, ORL, faults to end or Splitter: $\leq 3$ sec Loss through Splitter: $\leq 40$ sec (TS100-70/75 only)	
Index of Refraction	1.3000 to 1.7000	
Distance Resolution	0.1 m	
Distance Uncertainty <sup>e</sup>	$\pm 1.5$ m	
Distance Units	m, km, ft, kft, mi (user-selected)	
Loss Resolution	0.01 dB	
Linearity	$\pm 0.05$ dB/dB	
Reflectance Resolution	0.1 dB	
Reflectance Accuracy	$\pm 2$ dB (-20 to -50 dB)	
Results File Format	Telcordia SR-4731 Issue 2 compatible .SOR	
Results Storage	4 GB internal memory (>5000 traces typical); External USB memory stick	
Data Transfer to PC	USB cable or Bluetooth® (option)	
Test Modes	Flexpress® Fault Locate, OLS/OPM, Inspection	
Live Fiber Protection	No TS100 damage with input power $\leq +15$ dBm for wavelength(s) in range 1260 to 1675 nm	
Live Fiber Detection	Reports live fiber with input signal $\geq -35$ dBm for wavelength(s) in range 1260 to 1675 nm	
PON Filter Isolation	$>50$ dB for 1260 nm $\leq$ wavelength $\leq 1600$ nm TS100-75: $>30$ dB blocking @ 1650 $\pm 10$ nm	
Live PON TS100 Test	1625 or 1650 nm filtered detector	
<b>SPLITTER DETECTION AND LOSS MEASUREMENT (TS100-70 only)</b>		
Splitter Type	Up to 1:64 split ratio	
Fiber length before splitter	5 km	
Maximum fiber loss before splitter	2.5 dB	
Minimum fiber length after splitter	1:2 splitter	25 m
	1:4 splitter	35 m
	1:8 splitter	50 m
	1:16 splitter	200 m
	1:32 splitter	300 m
	1:64 splitter	500 m

**Notes:**

- a. All specifications valid at 25 °C unless otherwise specified.
- b. FDA 21 CFR 1040.10 & 1040.11, IEC 60825-1: 2014.
- c. Using 10 ns pulse width.
- d. Maximum link loss for which loss and distance to end or splitter can be reliably detected and measured.
- e. For a 5 km link with insertion loss  $\leq 4$  dB and reflectance  $\geq -45$  dB. Excludes uncertainty due to index of refraction.
- f. Max temperature while charging is +45 °C.
- g. Applies when operating from battery with charge level  $>20\%$ , or from AC when fully charged.

MODEL	TS100-60/70/75
<b>VISUAL FAULT LOCATOR</b>	
Emitter Type	Visible red laser, 650 $\pm 25$ nm
Output Power	1.5 mW (+2 dBm $\pm 0.5$ dB) into single-mode fiber
Safety Class <sup>b</sup>	Class 3A / Class 3R
Modes	CW and 1 Hz flashing
<b>OPTICAL LASER SOURCE (OLS)</b>	
Emitter Type	Laser
Safety Class <sup>b</sup>	Class I
Fiber Type	Compatible with all G.65x single-mode fiber
Wavelengths (nm)	TS100-60/70: 1650 nm; TS100-75: 1625 nm
Center $\lambda$ Tolerance (CW)	$\pm 20$ nm
Spectral Width (FWHM)	$\leq 5$ nm
Internal Modulation	270, 330, 1000, 2000 Hz, CW, Wave ID
Wave ID	Compatible with AFL OLS/OPM
Output Power Stability <sup>g</sup>	$\leq \pm 0.5$ dB
Output Power	+3 dBm $\pm 1.5$ dB
<b>OPTICAL POWER METER (OPM)</b>	
Calibrated Wavelengths	1270, 1310, 1490, 1550, 1577 nm
Detector Type	Filtered InGaAs (x2)
Measurement Range	+10 to -50 dBm
Linearity	1310/1490 nm: $\pm 0.1$ dB (+5 to -40 dBm); 1550/1577 nm: $\pm 0.1$ dB (+10 to -40 dBm); All: $\pm 0.25$ dB (-40 to -50 dBm)
Tone Detect Range	+3 to -35 dBm; auto-detects 270, 330, 1k, 2k Hz
Wavel ID Detect Range	+3 to -35 dBm; auto-detects 1310/1550 Wave ID
Accuracy	$\pm 0.5$ dB at -10 dBm
Resolution	0.01 dB
Measurement Units	dB, dBm or Watts (nW, $\mu$ W, mW)
<b>GENERAL</b>	
Size (in boot)	86 x 160 x 43 mm
Weight	0.4 kg
Operational Temperature <sup>f</sup>	-10 °C to +50 °C, 0 to 95% RH (non-condensing)
Storage Temperature	-40 °C to +60 °C, 0 to 95% RH (non-condensing)
Power	Rechargeable Li-Pol or AC adapter
Battery Life	$>12$ hours, Telcordia test conditions
Display	4.3 in color touchscreen LCD, 480x272, backlit
USB Ports	1 host, 1 micro-USB function
Bluetooth (optional)	Compatible with Windows PC, Android, iOS

# FlexScan® TS100 FTTH PON Troubleshooter

## FlexScan TS100 Kit Configurations

All kits include selected FlexScan TS100 with AC charger, battery, carry strap, SC/2.5 mm connector adapters, TRM®, USB cable, and soft carry case. PLUS kits add a 150 m fiber ring, One-Click cleaner, and upgrade to TRM Advanced software. PRO kits add a FOCIS® Flex auto-focusing connector inspection probe with IEC pass/fail analysis and two adapter tips. TS100s are manufactured with APC connectors.

## Ordering Information

TS100-[MOD]-[KIT]-[Pn]-[Wn]-[LNG]-[AC]-[FR]-[TIP] where:

[MOD]	TS100 Configuration
60	1650 nm filtered Live PON Troubleshooter; Test to Splitter
70	1650 nm filtered Live PON Troubleshooter; Test through Splitter
75	1625 nm filtered Live PON Troubleshooter with 1650 nm blocking filter; Test through Splitter

[KIT]	TS100 Kit Configuration/Kit Contents
BAS	Includes: TS100, soft case, TRM Basic, USB cable <sup>a</sup>
PLUS	Includes: BAS kit plus 150 m fiber ring, One-Click cleaner, TRM Advanced
PRO	Includes: PLUS kit plus FOCIS Flex with 2 adapter tips

[Pn]	Power Meter Option
P2	Broadband Power Meter plus dual-wavelength PON Power Meter for GPON / Video / XG/XGS/10GE PON

[Wn]	Bluetooth Wireless Option
W0	Disabled
W1	Installed and enabled

[LNG]	Language
ENG	English
CHS	Chinese Simplified
CHT	Chinese Traditional
CZE	Czech
DEU	German
DNK	Danish
FIN	Finnish
FRA	French

[LNG]	Language
ITA	Italian
JPN	Japanese
KOR	Korean
NOR	Norwegian
POL	Polish
POR	Portuguese
SPA	Spanish
TUR	Turkish

[AC]	Destination Country	AC Plugs
US	USA	2-pin, US
EU	European Union	2-pin, EU
UK	United Kingdom	3-pin, UK
CN	China, Australia	2-pin, SAA

### Notes:

- a. Results can be transferred from FlexScan to TRM® using USB cable, or uploaded via Bluetooth using FlexScan App downloaded from 'Google play' or 'App Store'.
- b. For additional FOCIS Flex adapter tips, see FOCIS Flex data sheet or Buyer's Guide.

[FR1]	150 m SMF Fiber Ring
Absent	N/A in Basic kits
USC/USC	FR-SMF-150-USC-USC
USC/UFC	FR-SMF-150-USC-UFC
USC/ULC	FR-SMF-150-USC-ULC
USC/UST	FR-SMF-150-USC-UST
USC/ASC	FR-SMF-150-USC-ASC
USC/AFC	FR-SMF-150-USC-AFC
USC/ALC	FR-SMF-150-USC-ALC
USC/UE2	FR-SMF-150-USC-UE2
ASC/UFC	FR-SMF-150-ASC-UFC
ASC/ULC	FR-SMF-150-ASC-ULC
ASC/UST	FR-SMF-150-ASC-UST
ASC/ASC	FR-SMF-150-ASC-ASC
ASC/AFC	FR-SMF-150-ASC-AFC
ASC/ALC	FR-SMF-150-ASC-ALC
ASC/AE2	FR-SMF-150-ASC-AE2

[TIP] <sup>b</sup>	FOCIS Flex Tips & Cleaning (PRO only)
Blank	Option not available in Basic and PLUS kits
SC	SC-UPC bulkhead tip, 2.5 mm UPC ferrule tip, 2.5 mm One-Click
FC	FC-UPC bulkhead tip, 2.5 mm UPC ferrule tip, 2.5 mm One-Click
LC	LC-UPC bulkhead tip, 1.25 mm UPC ferrule tip, 1.25 mm One-Click
ASC	SC-APC bulkhead tip, 2.5 mm APC ferrule tip, 2.5 mm One-Click
AFC	FC-APC bulkhead tip, 2.5 mm APC ferrule tip, 2.5 mm One-Click
ALC	LC-APC bulkhead tip, 1.25 mm APC ferrule tip, 1.25 mm One-Click

## FlexScan® TS100 FTTH PON Troubleshooter

### Ordering Information

#### Accessories

DESCRIPTION	AFL NO.
FlexScan wrist strap	1400-05-0230PZ
FlexScan neck strap, 36"	1400-05-0231PZ
AC charger 100-240 VAC to 5 VDC	4050-00-0931PR
Soft carry case for TS100 kits with FOCIS Flex and Fiber Ring	1400-01-0111PZ
Soft carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring	1400-01-0128PZ
Hard carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring	1400-01-0134PZ
Vehicle charger, 12VDC to 5VDC @2A	4050-00-0033MR
Cable, USB-micro B, 5 pin, 6'	6000-00-0031MR
5V USB charging cable (1.5 m), type A to barrel (0.9 X 3.2 X 9 mm)	6000-00-0034PR
One-Clicks, fluid, wipes, etc. See <a href="http://www.AFLglobal.com">www.AFLglobal.com</a>	Cleaning Supplies

#### Field-Replaceable OTDR Connector (Optical Port Ferrule Saver)

Protect your OTDR ports from damage due to mating with dirty or damaged launch cables or patch cords or normal wear-and-tear. Equip your FlexScan TS100 with a field-replaceable connector, which installs in seconds and accepts AFL's tool-free interchangeable SC, LC, FC and ST connector adapters.

Replace damaged connectors in the field: When normal wear-and-tear or poor cleaning practices damage the port saver's end-face, replace it in seconds without having to return the OTDR to a service center for an expensive and time-consuming repair.

DESCRIPTION	AFL NO.
Field-replaceable connector; APC female to APC male	2900-58-0001MR
Field-replaceable connector; APC female to UPC male	2900-58-0002MR
Field-replaceable connector; UPC female to APC male	2900-58-0003MR
Field-replaceable connector; UPC female to UPC male	2900-58-0004MR

#### Connector Adapters


CONNECTOR ADAPTER	AFL NO.		
	OTDR/OLS PORT	OPM PORT	VFL PORT
FC	2900-50-0002MR	2900-52-0001MR	N/A
SC	2900-50-0003MR	2900-52-0002MR	N/A
ST	2900-50-0004MR	2900-52-0003MR	N/A
LC	2900-50-0006MR	2900-52-0004MR	N/A
SC/APC	2900-50-0011MR	N/A	N/A
2.5 mm Universal	N/A	2900-52-0005MR	2900-50-0007MR
1.25 mm Universal	N/A	2900-52-0006MR	2900-50-0010MR

# FlexScan® TS100 FTTH PON Troubleshooter

## Test Management and Reporting Software


DESCRIPTION	AFL NO.
TRM® 3.0 with Basic License (TS100 Trace/OLTS Viewer, Batch Editor and Reports), USB delivery (included with all TS100 kits)	TRM3-BASIC
TRM 3.0 upgrade from Basic to Advanced License, USB delivery	TRM3-UPGRADE
TRM 3.0 upgrade from Basic to Advanced License, email delivery	TRM3-UP-EMAIL
FlexScan App (available on 'Google play' and 'App Store')	Free Download

## Recommended Products



**FOCIS Flex and FOCIS Lightning (Multi-Fiber) Connector Inspection**

- Self-contained, tether-free, hand-held inspection solution
- Auto-focus and auto-centering for fast, easy inspection
- IEC, IPC and user-defined pass/fail analysis
- FOCIS Lightning: extremely fast multi-fiber auto-analysis for datacom and telecom inspection applications



**OFI-BIPMe Optical Fiber Identifier**

- World class signal sensitivity
- Trigger lock, positive stop for optimum detection
- Integrated optical power meter option

## Qualifications

CATEGORY	REGULATION/STANDARD	QUALIFICATION
CE Marking	EU	Compliant to relevant EU Directives on health, safety, and environmental protection, and certified with CE marking
Safety/EMC/EMI	IEC	Compliant to IEC 61010-1 for safety requirements for electrical equipment
	EN	Compliant to EN 61010-1 for safety requirements for electrical equipment
	IEC	Compliant to IEC 61326-1 for EMC requirements for electrical equipment
	EN	Compliant to EN 61326-1 for EMC requirements for electrical equipment
	EN	Compliant to EN 55011 for EMC requirements for industrial, scientific and medical equipment
	Telcordia	Compliant to GR-196-CORE 4.5.1 for requirements on electromagnetic interference
	FCC	Compliant to code of federal regulations FCC 47 CFR 15 on unlicensed transmissions
	FDA	Compliant to code of federal regulations FDA 21 CFR 1040.10 and 1040.11 on laser products
RoHS	IEC	Compliant to IEC 60825-1 for safety of laser products
	EU	Compliant to EU regulations Directive 2011/65/EU (RoHS 2) and Directive 2015/863 (RoHS 3)
Test Method	TIA	Compliant to TIA-568.3-D for test and measurement requirements for premises optical fiber cabling and components
	IEC	Compliant to IEC 11801 for test and measurement requirements for optical fiber cabling for use within premises
	AS/NZS	Compliant to AS/NZS 3080 for test and measurement requirements for optical fiber cabling for use within premises
	TIA	Compliant to TIA-526-7 for test procedures for installed optical fiber cable plant
	TIA	Compliant to TIA-526-14 for test procedures for installed optical fiber cable plant
	IEC	Compliant to IEC 14763-3 for systems and methods for the inspection and testing of installed optical fiber cabling
	AS/NZS	Compliant to AS/NZS 14763.3 for systems and methods for the inspection and testing of installed optical fiber cabling
	IEC	Compliant to IEC 61280-4-1 for test procedures for installed optical fiber cable plant
	IEC	Compliant to IEC 61280-4-2 for test procedures for installed optical fiber cable plant
Generic Requirement	Telcordia	Compliant to GR-196-CORE for generic requirements for OTDR-type equipment
	Telcordia	Compliant to SR-4731 Issue 2 for OTDR data format
	IEC	Compliant to IEC 61746-1 for requirements on calibration of OTDR

Contact [Sales@AFLglobal.com](mailto:Sales@AFLglobal.com) to schedule a demonstration or learn how to buy.

Visit [www.AFLglobal.com/Test](http://www.AFLglobal.com/Test) to learn more about FlexScan TS100 Troubleshooters.

International Sales and Service Contact Information available at [www.AFLglobal.com/Test/Contacts](http://www.AFLglobal.com/Test/Contacts)