# FlexScan® TS100 PON Troubleshooter

## One-Touch Troubleshooting

### Features

- Locate faults in as fast as <3 seconds with the press of a button
- Displays power and 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 adapter

### 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
- Verify GPON, video and XG/XGS-PON or 10GEPON power levels
- Verify insertion loss, TX output or RX input power levels
- Pinpoint location and verify loss and reflectance of network events

**FlexReporter™ Software Suite**

PC Software          Mobile App

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 10G PON 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 minimal, if any, training:** Designed primarily for field technicians activating and maintaining broadband access networks, the TS100 requires little 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. OTDR and PON OPM test setups can also be saved and recalled to reduce repeated setup of common test configurations.

**All-in-one test capability:** The FlexScan TS100 family includes options for integrated VFL, broadband and/or PON power meter, and light source capabilities. They can be easily paired to AFL's FOCIS family of inspection scopes, ensuring technicians have everything they need to locate and quickly resolve optical network issues. Featuring automatic wavelength identification and synchronization, the light source and broadband power meter support AFL's Wave ID insertion loss testing. The units also generate and detect fiber-identifying tones.

**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 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 an external device via USB, or wirelessly uploaded via the free AFL's FlexApp for real-time reporting using the included FlexReports Test Results Manager software. Reports can also be viewed on FlexApp.

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

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# FlexScan® TS100 PON Troubleshooter
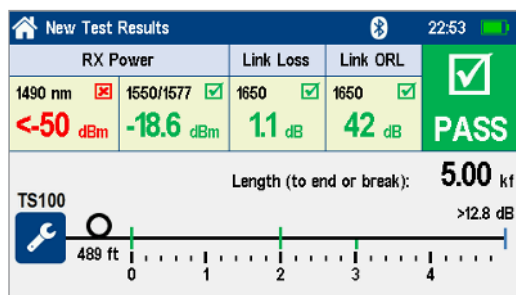
## Verify RX Power, Link Length, Loss, and ORL in Seconds

Link length, loss, and ORL are critical parameters to check when verifying optical networks. Within seconds of pressing Start, FlexScan TS100 options measure and report distance, loss, and ORL to the end of a Point-to-Point network or to the first splitter in a 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.
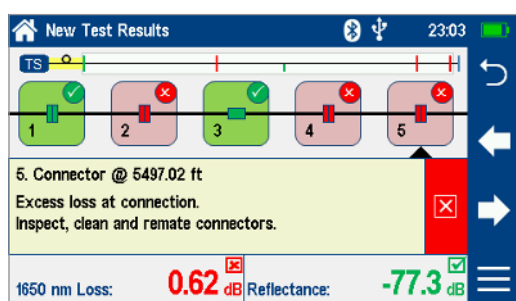
## Identifies & Locates Faults - Recommends Corrective Action

TS100 automatically detects network events such as connectors, splices, and splitters. It displays these events with LinkMap® easy-to-read, color-coded icons and enable users to quickly identify faults that require 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. An event type can be changed if needed to another event type and the event analysis is repeated based on pass/fail limits of the new event type. FlexScan TS100 also supports OTDR and PON power meter test setups to be created, saved, transferred to other FlexScans, and recalled in the field, simplifying testing and avoiding user setup errors.

**FlexReporter™ Software Suite**
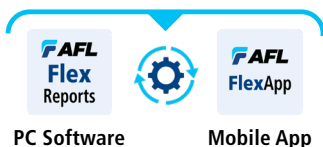
**PC Software**          **Mobile App**

## Connectivity

Results can be stored internally, saved to an external device via USB, or wirelessly uploaded via the free FlexApp to a smart device for real-time reporting using the included FlexReports Test Results Manager PC-based software. This real-time reporting 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 TS100-60/70 models include a broadband power meter and a downstream PON power meter, enabling users to immediately and independently verify 1490 nm GPON, 1550 nm video, and 1577 nm 10GPON (XG/XGS-PON or 10GEPON). FlexScan TS100-30 model includes a downstream PON power meter for verifying 1490 nm GPON and 1577 nm 10GPON (XG/XGS-PON or 10GEPON). The product family supports fiber-identifying tone generation and detection, as well as AFL's 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.
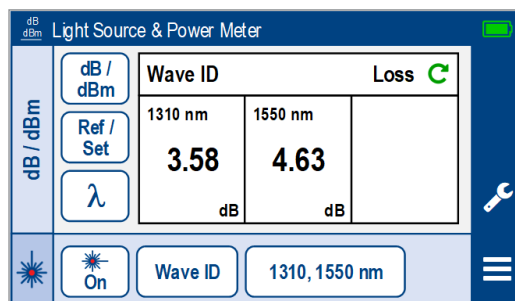
# FlexScan® TS100 PON Troubleshooter

## Specifications[a]

FlexScan TS100-30/60/70 models support PON and Point-to-Point network troubleshooting at 1625/1650 nm and, depending the model, include optical light source (OLS), optical power meter (OPM), visual fault locator (VFL), internal results storage plus Bluetooth/Wi-Fi, & USB interfaces.

| MODEL | TS100-30/60/70 |
|---|---|
| **FAULT LOCATOR** | |
| Emitter Type | Laser |
| Safety Class[b] | Class I |
| Fiber Type | Compatible with all G.65x single-mode fiber |
| Wavelengths (nm) | TS100-30: 1625 nm, TS100-60/70: 1650 nm |
| Center λ Tolerance[c] | ±20 nm |
| Link Loss[d] | TS100-30 ≤12 dB, TS100-60: ≤18 dB, TS100-70: ≤23 dB |
| Test Through Splitter | Up to 1:32 (TS100-70 only) |
| Test Time | To end or Splitter: TS100-30: ≤30 sec, TS100-60/70: ≤3 sec Through Splitter: ≤40 sec (TS100-70 only) |
| Index of Refraction | 1.3000 to 1.7000 |
| Distance Resolution | 0.1 m |
| Distance Uncertainty[e] | ±1.5 m |
| Distance Units | m, km, ft, kft, mi (user-selected) |
| Loss Resolution | 0.01 dB |
| Linearity | ±0.05 dB/dB |
| Reflectance Resolution | 0.1 dB |
| Reflectance Accuracy | ±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 | TS100-30: SmartAuto Fault Locate, OPM, Inspection TS100-60/70: SmartAuto-FleXpress® Fault Locate, OLS/OPM, Inspection |
| Live Fiber Protection | No TS100 damage with input power ≤ +15 dBm for wavelength(s) in range 1260 to 1675 nm |
| Live Fiber Detection | Reports live fiber with input signal ≥ -35 dBm for wavelength(s) in range 1260 to 1675 nm |
| PON Filter Isolation | >50 dB for 1260 nm ≤ wavelength ≤1600 nm |
| Live PON TS100 Test | TS100-30: 1625 nm filtered detector TS100-60/70: 1650 nm filtered detector |

| Splitter Support (TS100-70 only) | |
|---|---|
| Minimum Splitter Ratio | 1:2 |
| Fiber length before splitter (with minimum 150 m launch cable) | 0 to 5 km |
| Maximum fiber loss before splitter | 2.5 dB |

| VISUAL FAULT Locator - TS100-60/70 only | |
|---|---|
| Emitter Type | Visible red laser, 650 ± 25 nm |
| Output Power | 1.5 mW (+2 dBm ± 0.5 dB) into single-mode fiber |
| Safety Class[b] | Class 3A / Class 3R |
| Modes | CW and 1 Hz flashing |
| **OPTICAL LASER SOURCE (OLS) - TS100-30/60/70** | |
| Emitter Type | Laser |
| Safety Class[b] | Class I |
| Fiber Type | Compatible with all G.65x single-mode fiber |
| Wavelengths (nm) | TS100-30: 1625 nm, TS100-60/70: 1650 nm |
| Center λ Tolerance (CW) | ±20 nm |
| Spectral Width (FWHM) | ≤5 nm |
| Internal Modulation | 270, 330, 1000, 2000 Hz, TS110-60/70 only: CW, Wave ID |
| Wave ID (TS100-60/70 only) | Compatible with AFL's OLS/OPM |
| Output Power Stability[f] | ≤±0.5 dB |
| Output Power | > -5 dBm |
| **OPTICAL POWER METER (OPM) - TS100-30/60/70** | |
| Calibrated Wavelengths | TS100-30: 1490, 1577 nm, TS100-60/70: 1270, 1310, 1490, 1550, 1577 nm |
| Detector Type | Filtered InGaAs (x2) |
| Measurement Range | +10 to -50 dBm |
| Tone Detect Range | +3 to -35 dBm; auto-detects 270, 330, 1k, 2k Hz |
| Wavel ID Detect Range | TS100-60/70 only: +3 to -35 dBm; auto-detects 1310/1550 Wave ID |
| Accuracy | ±0.5 dB at -10 dBm |
| Loss Resolution | 0.01 dB |
| Measurement Units | TS100-30: dBm, TS100-60/70: dB, dBm or Watts (nW, µW, mW) |
| **General - TS100-30/60/70** | |
| Size (in boot) | 86 x 160 x 43 mm |
| Weight | 0.4 kg |
| Operational Temperature[g] | -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, not available for TS100-30) | Compatible with Windows PC, Android, iOS |

**Notes:**

a.  All specifications valid at 23 °C ± 3 °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 ≤ 4 dB and reflectance ≥ -45 dB. Excludes uncertainty due to index of refraction.
f.  Applies when operating from battery with charge level >20%, or from AC when fully charged.
g.  Max temperature while charging is +45 °C.

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## FlexScan TS100 Kit Configurations

All kits include selected FlexScan TS100 with AC charger, battery, carry strap, SC/2.5 mm connector adapters, FlexReports, USB cable, and soft carry case. PLUS kits add a 150 m fiber ring, One-Click cleaner, and upgrade to FlexReports 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 |
|---|---|
| 30 | 1625 nm filtered Live PON Troubleshooter; Test to Splitter |
| 60 | 1650 nm filtered Live PON Troubleshooter; Test to Splitter |
| 70 | 1650 nm filtered Live PON Troubleshooter; Test through Splitter |

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

| [Pn] | Power Meter Option |
|---|---|
| P2 | TS100-60/70: Broadband power meter plus dual-wavelength PON power meter for GPON / Video / XG/XGS/10GE PON |
| P3 | Dual-Wavelength PON power meter for GPON / XG/XGS-PON |

| [Wn] | Bluetooth and Wi-Fi[c] 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 |

| [FR1] | 150 m SMF Fiber Ring |
|---|---|
| Absent | N/A in Basic kits |
| ASC/USC | FR-SMF-150-ASC-USC |
| 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/ALC | FR-SMF-150-ASC-ALC |

| [TIP][b] | 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 |

**Notes:**

a. Results can be transferred from FlexScan to FlexReports using USB cable, or uploaded via Bluetooth using FlexApp downloaded from 'Google play' or 'App Store'.

b. For additional FOCIS Flex adapter tips, see the FOCIS Flex specification sheet or Buyer's Guide.

c. Wi-Fi not available for TS100-30.

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# FlexScan® TS100 PON Troubleshooter

## Ordering Information

### Accessories

| AFL NO. | Description |
|---|---|
| 1400-05-0230PZ | FlexScan wrist strap |
| 1400-05-0231PZ | FlexScan neck strap, 36" |
| 4050-00-0931PR | AC charger 100-240 VAC to 5 VDC |
| 1400-01-0111PZ | Soft carry case for TS100 kits with FOCIS Flex and Fiber Ring |
| 1400-01-0128PZ | Soft carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring |
| 1400-01-0134PZ | Hard carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring |
| 1400-21-0004PZ | Glove case with neck strap and carabiner |
| 4050-00-0033MR | Vehicle charger, 12VDC to 5VDC @2A |
| 6000-00-0031MR | Cable, USB-micro B, 5 pin, 6' |
| 6000-00-0034PR | 5V USB charging cable (1.5 m), type A to barrel (0.9 X 3.2 X 9 mm) |
| Cleaning Supplies | One-Clicks, fluid, wipes, etc. See www.AFLglobal.com |

### Optical Port Saver

Protect your FlexScan TS100 Troubleshooter 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 Optical Port Saver, which installs in seconds and accepts AFL's tool-free interchangeable SC, LC, FC and ST connector adapters.

Replace damaged port savers 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 troubleshooter to a service center for an expensive and time-consuming repair.

| AFL NO. | Description |
|---|---|
| 2900-58-0001MR | Optical Port Saver; APC female to APC male |
| 2900-58-0002MR | Optical Port Saver; APC female to UPC male |
| 2900-58-0003MR | Optical Port Saver, UPC female to APC male |
| 2900-58-0004MR | Optical Port Saver; UPC female to UPC male |

### Connector Adapters

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

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# FlexScan® TS100 PON Troubleshooter

## Test Management and Reporting Software

| AFL NO. | Description |
|---|---|
| RPTS-AD-USB-1 | FlexReports Advanced, one seat license on USB |
| RPTS-UP-TRM3-1 | FLexReports Advanced, one seat, Upgrade from TRM® 3 Advanced on USB. Users must have TRM-3 Advanced license |
| FlexReports Basic | FlexReports Basic, available for download on AFL Software Resources website |
| FlexApp | FlexApp data transfer mobile App, available on Google Play and Apple App Storee |

## Recommended Products

**FOCIS Flex and FOCIS Lightning2 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 |
| | IEC | Compliant to IEC 60825-1 for safety of laser products |
| RoHS | 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 to schedule a demonstration or learn how to buy.

Visit www.AFLglobal.com/Test to learn more about FlexScan TS100 Troubleshooters.

International Sales and Service Contact Information available at www.AFLglobal.com/Test/Contacts