

FTB-610 Wideband Copper Test Module

ADVANCED COPPER CABLE TESTER
WITH SMARTR™ FAULT ANALYSIS



 EXFO Connect
Compatible

 smartR™

The easiest and smartest tool for advanced wideband copper troubleshooting of FTN circuits.

KEY FEATURES AND BENEFITS

SmartR technology automatically identifies and locates common circuit faults using intuitive graphical displays and plain language

High-voltage isolation tests for long wire pairs and power span circuits

High-performance time and frequency scope for analysis of impulse noises, including a unique impulse duration distribution histogram with cumulative impulse disruption time

Advanced wideband copper test module and built-in optical power meter and VFL—the ideal tool for multiskilled engineers troubleshooting FTN circuits

PART OF THE
FTB COPPER ACCESS SERIES



FTB-635
Wideband Copper and
DSL Test Module

EXFO

THE PERFECT TOOL FOR WIDEBAND COPPER TESTING

EXFO's FTB-610 Wideband Copper Tester, housed in the handheld FTB-1 modular platform, makes wideband copper circuit testing easy for today's technicians through automatic analysis and location of broadband cable faults in a large, colorful, touchscreen graphical interface. This solution combines the optical options of the FTB-1 with an advanced copper test module to create a complete tool for troubleshooting FTTN circuits.

The FTB-610 delivers all the typical cable test tools for basic troubleshooting, such as a multimeter, balance, VF noise meter, locator and POTS dialer, TDR and RFL, fault finding and advanced signal and noise analysis. Featuring SmartR™ technology, it automatically analyzes test results, eliminating guesswork and enabling users to view, find and fix common cable faults. The FTB-1 platform's large, seven-inch color touchscreen presents an intuitive graphical depiction of cable faults. The Windows-based architecture provides many connectivity options to capture and upload test results and reports on the spot, as well as to manage the test set in the field with on-board EXFO Connect.



WORK SMARTER WITH THE FTB-610



Equipped with SmartR technology, the FTB-610 enables technicians and engineers alike to work smarter—not harder. It is the next generation of telco cable testing that automatically identifies and locates common circuit faults and presents results using intuitive graphical displays and plain language. The PairDetective™ feature automatically runs the most common line tests and provides graphical, color-coded, plain language results and pass/fail indications to detect conditions, including shorts, grounds, opens, battery, splits and imbalances. FaultMapper™ provides the additional capability of identifying the location of the service-affecting line faults, including bridged taps, shorts, grounds and opens. EXFO's unique SmartR draws an easy-to-understand graph of the wire pair, making copper troubleshooting easier than ever.

MORE POWER, EXTENDED RANGE

More reach means more revenue and more customers—and the FTB-610 has the power for insulation testing of the longest loops.

WIDEBAND NOISE ANALYSIS

The FTB-610 enables noise testing at up to 30 MHz and accurately identifies wideband cable noise issues. Both narrowband and wideband tests provide visibility into service-affecting noise issues. The FTB-610 also offers an advanced impulse noise analysis feature that includes a time and frequency analysis scope mode for REIN, PEIN and SHINE, and impulses affecting DSL. And, its unique impulse duration and disruption histogram is the first field tool capable of capturing, categorizing and reporting impulses in a histogram. This makes it possible to understand the distribution of impulses based on their duration occurring at different periods of time, including cumulative disruption time caused by impulse noises.

FTTN MULTITECHNOLOGY PLATFORM: OPTICAL AND COPPER ALL-IN-ONE

The FTB-1 Platform comes with optional built-in optical test tools, including a power meter and visual fault locator. When combined with the FTB-610 module, it creates the perfect platform for hybrid and FTTN networks. With interfaces and tests for wideband copper circuits, fiber-optic links, Ethernet and Wi-Fi, it's the perfect tool to maintain FTTN circuits and services—all with one technician.

KEY COPPER APPLICATIONS

Perfect for troubleshooting fiber-to-the-node service

Simultaneously combines optical power meter, visual fault locator (VFL), fiber probe and wideband copper

Complete suite of manual and automated advanced metallic tests, from multimeter to TDR to wideband impulse noise

30 MHz wideband spectrum analysis for analyzing any circuit cable qualification, up to VDSL2 band plan (8, 12, 17, 30 MHz)

High-power isolation (as high as 500 V) for finding resistive faults and insulation failures

Leverage FTB-1 platform connectivity to capture, upload and analyze cable measurements

Advanced impulse noise (including REIN, PEIN and SHINE) time and frequency domain analysis

DESIGNED FOR EFFICIENCY

- | | | |
|-------------------------------------|---------------------|----------------------------|
| 1 Power meter and VFL | 7 AC adapter | 13 Brightness |
| 2 Stylus | 8 Copper connectors | 14 Keyboard/screen capture |
| 3 Two USB 2.0 ports | 9 POTS speaker | 15 Switch application |
| 4 1 GigE port | 10 Headset jack | 16 Power on/off |
| 5 Head set | 11 Back stand | 17 Battery LED |
| 6 Fiber inspection probe video port | 12 Speaker out | 18 Module compartment |
| | | 19 Battery |



ALL THE RIGHT FEATURES

Ease of Use

The next-generation interface of the FTB-610 is more like modern tablets than your previous field testers. The large seven-inch color touchscreen display makes use of colored icons and graphics for easy configuration and operation to present findings in plain language, for an enjoyable user experience.

Customizable Automatic Testing

Besides SmartR™ automatic analysis, users and managers can customize their FTB-610 to create custom tests and pass/fail indications for repeated troubleshooting or closeout testing. Work smarter, and just the way you like.

Results Capture and Connectivity

In today's highly competitive market, quality of service is paramount for service providers. The FTB-610 allows test reports to be uploaded in a variety of formats. Therefore, service providers can keep all the results on file for future reference and confirm that the required tests have been completed by the technician. The USB connectors accept memory sticks, mouse, keyboard and other approved accessories. What's more, the FTB-610 enables connectivity through Wi-Fi, Bluetooth as well as optional mobile WAN adapters, plus third-part applications.

Battery Power Options

The FTB-610 can be fitted with a normal- or high-capacity modern technology battery to meet your needs, using the latest technology in rechargeable cells. It provides the maximum testing time between charges, even when using the high power demands of VDSL2. When charging is required, technicians can either use the optional 12 volt vehicle charger or the supplied AC adapter.

Features

The features of the FTB-610 Advances Wideband Copper Tester include: color touch-screen multimeter, POTS, fault locator, VF transmitter/receiver, power influence with harmonics, VF noise, loadcoils, balance, spare pair locator, series resistance detection, TDR including dual/multiple trace TDR and XTALK TDR, RFL (2/4 wire and K-Test), SmartR™ Pair Detective and Fault Mapper, wideband signal transmitter/receiver, wideband noise, time and frequency impulse scope, single-ended attenuation, pre-defined and flexible auto tests.

EXFO Connect

EXFO | Connect

AUTOMATE ASSET MANAGEMENT. PUSH TEST DATA IN THE CLOUD. GET CONNECTED.

EXFO Connect stores and pushes test equipment and test data content automatically in the cloud, allowing you to streamline test operations from build-out to maintenance.

COPPER SPECIFICATIONS ^{a, b, c}

Transmitter characteristics

Frequency range (200 Hz to 20 kHz)	Frequency resolution	1 Hz steps
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 1 \text{ Hz})$
	Level range	-20 dBm to 0 dBm at 600 Ω
	Level resolution	0.1 dB
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$
Frequency range (20 kHz to 2.2 MHz)	Frequency resolution	1 kHz steps
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 100 \text{ Hz})$
	Level range	-20 dBm to 0 dBm at 100 Ω
	Level resolution	0.1 dB
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$
Frequency range (2.2 MHz to 17 MHz)	Frequency resolution	1 kHz steps
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 100 \text{ Hz})$
	Level range	-20 dBm to 0 dBm at 100 Ω
	Level resolution	0.1 dB
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$
Frequency range (17 MHz to 30 MHz)	Frequency resolution	1 kHz steps
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 100 \text{ Hz})$
	Level range	-20 dBm to 0 dBm at 100 Ω
	Level resolution	0.1 dB
	Level uncertainty (accuracy)	$\pm 1 \text{ dB}$
	Impedance	100 Ω , 120 Ω , 135 Ω , 150 Ω , 600 Ω

Receiver characteristics

Reception frequency range	200 Hz to 20 kHz 20 kHz to 30 MHz
Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 1 \text{ digit})$
VF reception level range	-90 dBm to 15 dBm at 600 Ω
VF level uncertainty (accuracy)	200 Hz to 20 kHz -90 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$
WB reception level range	-80 dBm to 15 dBm at 100 Ω , 120 Ω , 135 Ω , 150 Ω
WB level uncertainty (accuracy)	20 kHz to 2.2 MHz -80 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$
	2.2 MHz to 30 MHz -80 dBm to -50 dBm, uncertainty (accuracy) $\pm 2 \text{ dB}$ -50 dBm to 15 dBm, uncertainty (accuracy) $\pm 1 \text{ dB}$
Impedance	100 Ω , 120 Ω , 135 Ω , 150 Ω , 600 Ω

POTS dialer

DTMF	0 – 9, #, *
Phonebook	25 entries

Digital multimeter (DMM)

Test type	Snapshot and continuous
Impedance selection (for voltage measurement)	100 k Ω , 1 M Ω , 10 M Ω

Notes

- Subject to change without notice.
- Typical, at 23 °C \pm 3 °C, on batteries, with no USB connection.
- Specifications based on 24 AWG (PE 0.5 mm) cabling.

COPPER SPECIFICATIONS ^{a, b, c} (continued)				
	Measurement	Range	Resolution	Uncertainty (accuracy)
	DC voltage	0 to 400 V	0.1 V for 0 to 99.9 V 1 V for 100 to 400 V	±(1 % + 0.5 VDC)
	AC voltage	0 to 280 Vrms	0.1 VAC for 0 to 99.9 VAC 1 VAC for 100 to 280 VAC	±(1 % + 0.5 VAC)
	Isolation resistance (stress/leakage)	0 to 1 GΩ, auto-ranging 1 kΩ to 99 MΩ 100 MΩ to 999 MΩ	Three digits	±(2 % + 1 digit) ±(5 % + 1 digit)
	Resistance	0 to 100 MΩ 0 to 999 Ω 1 kΩ to 100 MΩ	Three digits	±(1 % + 5 Ω) ±(2 % + 1 digit)
	Capacitance	0 nF to 2 μF	Four digits	±(2 % + 50 pF)
	DC current	0 to 110 mA	0.1 mA	±(2 % + 1 mA)
	AC current	0 to 110 mA	0.1 mA	±(2 % + 1 mA) ^d
	Station Ground	0 to 1 MΩ 0 to 999 Ω 1 kΩ to 1 MΩ	Up to three digits	±(1 % + 3 Ω) ±(2 % + 1 digit)
Isolation resistance (stress/leakage) (continued)	Source	50 V to 500 V (current safely limited to 0.5 mA)		
	Soak timer	1 s to 59.9 min		
VF noise measurement	Frequency range	200 Hz to 20 kHz		
	Level range	-90 dBm to 20 dBm		
	Resolution	0.1 dB		
	Uncertainty (accuracy)	-90 dBm to -50 dBm, uncertainty (accuracy) ±2 dB -50 dBm to 20 dBm, uncertainty (accuracy) ±1 dB		
	Filters	ITU: none, psophometric, P-notched, 3.4 kHz, D-filter, 15 kHz ANSI: none, C-message, C-notched, 3.4 kHz, D-filter, 15 kHz		
	Impedance	600 Ω		
VF impulse noise	Low threshold	-40 dBm to 0 dBm, in 1 dB steps		
	Mid threshold	Low threshold plus separation		
	High threshold	Mid threshold plus separation		
	Test duration	Minutes: 1, 5, 10, 15, 30, 60 Hours: 4, 8, 12, 24, 100		
	Separation	1 dB to 6 dB, in 1 dB steps		
	Dead time	125 ms		
	Filters	None, 3 kHz flat, C-message, psophometric, notched and D-filter (IEEE 743-1995)		
	Counter	Maximum 999 for each threshold		
	Timer	1 min to 24 h, default is 15 min		
Power influence (noise to ground)	Noise range	-60 dBm to 10 dBm		
	Uncertainty (accuracy)	-60 dBm to -50 dBm ± 2 dB -50 dBm to 10 dBm ± 1 dB		
	Graphical display	Third triplet harmonics to 20 kHz		
VF longitudinal balance	Frequency	1004 Hz		
	Level range	0 dB to 100 dB		
	Level uncertainty (accuracy)	±1 dB		
	Impedance	600 Ω		
Time-domain reflectometer (TDR)	Modes	Automatic, Manual, and Crosstalk (Xtalk) operation with location of most significant event(s)		
	Distance range	0 m to 6700 m (0 ft up to 22 000 ft) on 24 AWG (0.5 mm) cable		
	Pulse width	15 ns to 20 μs (automatic control)		
	Amplitude	7.5 V p-p on cable, 9 V p-p open circuit		
	Velocity of propagation (VOP)	0.40 to 0.99		
	Distance uncertainty (accuracy) ^e	±(0.5 m + 1 % x distance)		
	Units	Meters and feet		

Notes

- a. Subject to change without notice.
- b. Typical, at 23 °C ± 3 °C, on batteries, with no USB connection.
- c. Specifications based on 24 AWG (PE 0.5 mm) cabling.
- d. From 10 mA to 110 mA.
- e. Qualified up to 300 m (1000 ft) and does not include the uncertainty due to VOP.



COPPER SPECIFICATIONS ^{a, b, c} (continued)		
Load coil detection	Count	Up to 5
	Plot	Up to 10 kHz
	Distance range	Up to 8000 m (up to 27 000 ft)
Near End Crosstalk (NEXT)	Frequency Range	10 kHz to 30 MHz
	Level Range	0 to 90 dB
	Level Resolution	0.1 dB
	Level uncertainty (accuracy)	2.2 MHz: ± 2.0 dB, from 0 to 90 dB 8 MHz: ± 2.0 dB, from 0 to 85 dB 12 MHz: ± 2.0 dB, from 0 to 80 dB 17.6 MHz: ± 3.0 dB, from 0 to 80 dB 30 MHz: ± 3.0 dB, from 0 to 80 dB
	Terminations	100, 120, 135, 150 Ω
Power spectral density (PSD)	Test type	Continuous with peak-hold, disturber identification, spectral mask overlay, and bridging impedance features
	Vertical scale	15 dBm/Hz to -140 dBm/Hz or 20 dBm to -100 dBm
	Horizontal scale	4.3125 kHz to 17 MHz, in 4.3125 kHz steps or 8.625 kHz to 30 MHz, in 8.625 kHz steps
	Noise filters	None or E, F, G, ADSL, ADSL2+, VDSL, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30
Wideband impulse noise	Test type	Counter, count histogram, time and frequency scope, duration and disruption histogram (IDD)
	Counter, count histogram threshold	-60 dBm (30 dB _{rn}) to 0 dBm (90 dB _{rn}) in 1 dB steps
	Scope threshold	0.000 V to 7.000 V in 0.001 increments (0 V provides continuous triggering)
	IDD threshold	-60 dBm to 15 dBm
	Total impulse hit count	65 000 000
	Total impulse disruption time	65 000 000 ms
	Range	Scope: 10 μ s to 10 ms IDD: 1 μ s to 20 ms
	Test duration	Counter, histogram – minutes: 1, 5, 10, 15, 30 and 60 Counter, histogram – hours: 4, 8, 12, 24 and 100 Scope: continuous and capture/trigger modes
	Impulse separation time (IST)	1 μ s to 999 μ s
	Noise filters	None or E, F, G, ADSL, ADSL2+, VDSL, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30
Wideband longitudinal balance	Level scale	0 to 100 dB
	Level range uncertainty (accuracy)	2.2 MHz: ± 2.0 dB, from 0 to 55 dB 8 MHz: ± 2.0 dB, from 0 to 45 dB 12 MHz: ± 3.0 dB, from 0 to 45 dB 17.6 MHz: ± 3.0 dB, from 0 to 40 dB 30 MHz: ± 4.0 dB, from 0 to 40 dB
	Level resolution	0.1 dB
	Frequency resolution	1 kHz
	Frequency uncertainty (accuracy)	$\pm(50 \text{ ppm} + 1 \text{ digit})$
	Frequency scale	ADSL/2+: 10 kHz to 2.2 MHz VDSL2-8 : 20 kHz to 8 MHz VDSL2-12: 20 kHz to 12 MHz VDSL2-17: 35 kHz to 17.6 MHz VDSL2-30: 35 kHz to 30 MHz
	Fault location	Total resistance, near-end to fault resistance, fault to strap resistance (three significant digits, least significant digit 0.1 Ω). Total length, distance to fault, distance from fault to strap (three significant digits, least significant digit 1 m)
	Uncertainty (accuracy)	$\pm(0.1 \Omega + 1 \% \times \text{RTS})$

NOTES

- a. Subject to change without notice.
b. Typical, at 23 °C \pm 3 °C, on batteries, with no USB connection.
c. Specifications based on 24 AWG (PE 0.5 mm) cabling.

COPPER SPECIFICATIONS^{a,b,c} (continued)

Single-ended frequency response (attenuation) ^d	Distance range	100 m to 5000 m (300 ft to 16000 ft)
	Frequency range	4.3 kHz to 30 MHz
	Frequency uncertainty (accuracy)	±(50 ppm + 1 digit)
	Level uncertainty (accuracy)	±2 dB typical for 2.2 MHz and 8 MHz ranges ±3 dB for VDSL2-12 and VDSL2-17 ±4 dB for VDSL2-30 ranges
	Resolution	0.1 dB
	Horizontal scale	ADSL2+ = 2.208 MHz, VDSL2-8 = 8 MHz, VDSL2-12 = 12 MHz, VDSL2-17 = 17.66 MHz, VDSL2-30 = 30 MHz
	Vertical scale	0 dB to 100 dB
Resistive fault location (RFL)	Test type	Single pair (two wire) and separate good pair (four wire) and K�pfm�ller (K-Test)
	Fault detection	0 to 20 M�
	Resolution	Three digits
	Loop resistance	10 k� maximum
	Multiple cable sections	Five (includes gauge and temperature setting)
	Fault location	Total resistance, near-end to fault resistance, fault to strap resistance (three significant digits, least significant digit 0.1 �). Total length, distance to fault, distance from fault to strap (three significant digits, least significant digit 1 m)
	Uncertainty (accuracy)	±(0.1 � + 1 % x RTS)
	K-Test uncertainty (accuracy)	± (1.0 � + 1 % RTS + (Rf1 + Rf2)/10 M�) - double fault ± (1.0 � + 1% RTS) - single fault

Notes

- Subject to change without notice.
- Typical, at 23  C ± 3  C, on batteries, with no USB connection.
- Specifications based on 24 AWG (PE 0.5 mm) cabling.
- Specification based on 1 kft 24 AWG cabling. Range depends on cable type and condition.

TECHNICAL SPECIFICATIONS

Display	Color touchscreen, 800 x 480 TFT, 178 mm (7 in)
Interfaces	Two USB 2.0 ports RJ45 LAN 10/100/1000 Mbit/s Fiber inspection probe connector port (video) Built-in Bluetooth and Wi-Fi (hardware option) Five-color coded 2 mm analog safety shrouded line interfaces
Storage	8 GB internal memory (flash) 16 GB internal memory (flash), optional
Batteries	Rechargeable lithium-ion batteries Operating time: 4.75 h (typical with extended battery)

GENERAL SPECIFICATIONS (MODULE ONLY)

Size (H x W x D)	130 mm x 252 mm x 56 mm (5 1/8 in x 9 15/16 in x 2 3/16 in)
Weight	0.93 kg (2 lb)
Temperature operating storage	0 �C to 40 �C (32 �F to 104 �F) ^a -40 �C to 70 �C (-40 �F to 158 �F)

Note

- DC voltage, isolation resistance, VF and WB receiver = 0  C to 45  C (32  F to 113  F).

PM-1 BUILT-IN POWER METER SPECIFICATIONS^a

Calibrated wavelengths (nm)	850, 1300, 1310, 1490, 1550, 1625, 1650
Optional CWDM calibrated wavelengths (nm)	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1383, 1625
Power range (dBm)	10 to -86 (InGaAs) 26 to -64 (GeX)
Uncertainty (%) ^b	±5 % ± 3 pW (InGaAs) ±5 % ± 0.4 nW (GeX)
Display resolution (dB)	
InGaAs	0.01 = max to -76 dBm 0.1 = -76 dBm to -86 dBm 1 = -86 dBm to min
GeX	0.01 = max to -54 dBm 0.1 = -50 dBm to -60 dBm 1 = -60 dBm to min
Automatic offset nulling range ^c	Max power to -63 dBm for InGaAs Max power to -40 dBm for GeX
Tone detection (Hz)	270/1000/2000

Notes

- a. At 23 °C ± 1 °C, 1550 nm and FC connector. With modules in Idle mode. Battery-operated.
b. Up to 5 dBm.
c. For ±0.05 dB, from 18 °C to 28 °C.

ORDERING INFORMATION**FTB-610-XX****Model**

FTB-610 = Wideband Copper Test Set Module

Copper Software Options

00 = Without software options
TDR = Time-domain reflectometry
RFL = Resistive fault location
WBAND = Extends frequency testing to 30 MHz, includes impulse scope
SMARTR = Pair Detective and FaultMapper option^a
HIVOLT = Extends isolation resistance testing output from 125 VDC to 500 V
NEXT = Near End Crosstalk^b
IDD = Impulse Duration and Disruption^b

Example: FTB-610-WBAND

Notes

- a. Includes TDR option.
b. Requires the WBAND option.

EXFO CONNECT FLOATING OPTIONS (REQUIRES EXFO CONNECT SUBSCRIPTION)

Copper	HIVOLT-FLT = Enables floating license for extended isolation resistance testing output from 125 VDC to 500 V
	RFL-FLT = Enables floating license for RFL
	SmartR-FLT = Enables floating license for Pair Detective and FaultMapper (includes TDR)
	TDR-FLT = Enables floating license for TDR
	WBAND-FLT = Enables floating license to add 30 MHz wideband testing
	NEXT-FLT = Enables floating license to add Near End Crosstalk (NEXT). Requires WBAND-FLT
	IDD-FLT = Enables floating license to add impulse duration and disruption (IDD) measurement. Requires WBAND-FLT.

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