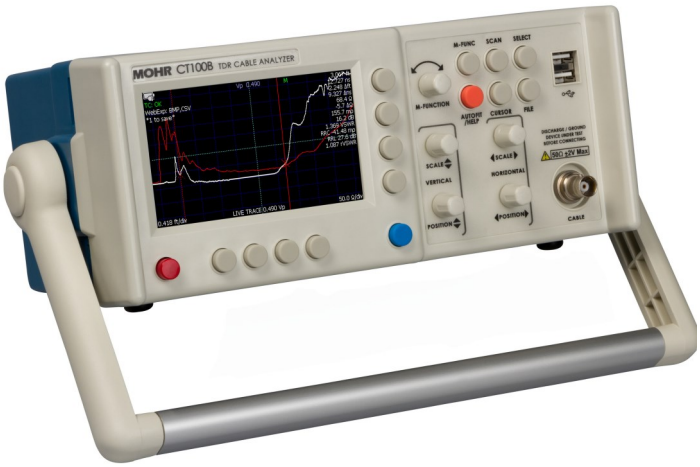
MOHR™ CT100B Series TDR Cable Analyzers CT100B/CT100HF

High-Resolution Portable TDR with Frequency-Domain Analysis Tools

Ideal for testing all types of metallic cables and connectors



Key Specifications and Features

- *DC to 8 GHz frequency equivalent*
- *Rugged portable TDR with S-parameter tools*
- *Captures transient and intermittent faults*
- *Resolves connector detail (< 1 cm separation)*
- *0.76 ps cursor resolution (~ 25 µm or 0.001 in.)*
- *Measures up to 250,000 samples per second*
- *Stores thousands of TDR waveforms*
- *Built-in help library*
- *Sunlight-readable color display*
- *Internet streaming and remote control*

MOHR CT100B TDR Cable Analyzers provide state-of-the-art TDR measurements in a rugged portable package. These instruments are ideal for precision testing of all types of coaxial, twisted-pair, and multiconductor cables in the field or the lab.

Features and Benefits

Industry's Best Cable Fault Sensitivity

- Detect subtle cable and connector faults with industry-leading vertical sampling resolution.
- Measure cable length and localize faults with 25 micron (approximately 0.001 in.) precision.
- Resolve cable, interconnect, and PCB features located less than 1 cm apart.

Industry's Only Portable TDR with S-Parameters

- Measure S-parameters and estimate frequency-specific return loss (S_{11}) and cable loss.†
- Measure return loss between cursors to isolate specific features (e.g., connector or cable fault).
- Visualize results using real-time frequency-domain plots, Smith charts, and normalized TDR traces.

High-Resolution Cable Waveforms and Scanning

- View or scan a cable at high resolution.
- Store cable records of up to 1.5 million points.
- Compare multiple traces on the device or using the provided CT Viewer™ 2 software package.

Capture Transient and Intermittent Faults

- Collect up to 500 waveforms per second.
- Identify and localize intermittent faults that other instruments would miss.
- Capture faults using the CT100B Envelope Plot mode.
- Record waveform movies with CT Viewer™ 2.

Versatile Connectivity Options

- USB and Ethernet connectivity
- Live network streaming and remote control

Measurement Features

- Digital filtering and exponential smoothing
- Dual cursors
- Pass/fail mask testing
- Cable systems with multiple Vps.
- Display-independent resolution

Ergonomics for Easy Use

- Rugged, portable, and compact (< 5 lbs. / 2.2 kg)
- Long battery life with built-in charger
- Bright daylight-readable color display

Applications

- Aerospace / Aviation
- Naval / Marine
- CATV, Power, Telephony
- Wireless Infrastructure
- PCB Impedance Measurements
- TDR Sensors (Soil Moisture, Geophysics)
- Tank Farms

† Availability of features and bandwidth may vary depending on application and on instrument configuration.

MOHR™
Test and Measurement Solutions for Industry™

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TDR Analysis Features (1/2)

High-Resolution TDR Waveform Comparisons

- Industry-leading 16-bit vertical resolution and 0.76 ps cursor resolution lets you detect subtle soft faults of less than 0.1 Ω.
- Use the high-resolution scan capability to track cable and connector performance and identify problems before they can seriously degrade system performance.
- **Figure 1** compares scans of normal BNC and SMA connectors.

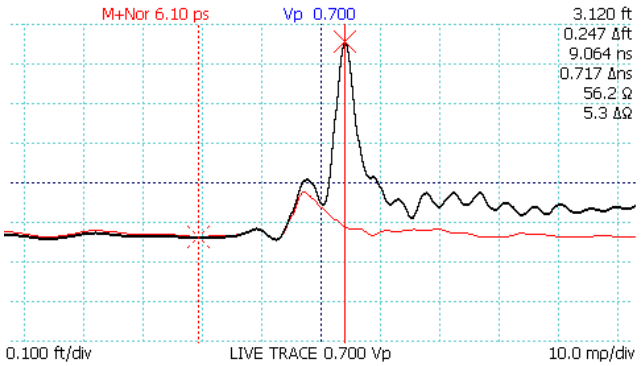

Figure 1: Comparison of normal BNC (black) vs SMA (red) connectors.

Rapid Digital Filtering and Smoothing

- In real time the CT100B takes up to 250,000 samples per second with waveforms of up to 1.5 million points in length, letting you store comprehensive high-resolution cable records for future comparison/analysis.
- Display-independent resolution ensures every fault is visible at every horizontal scale.
- **Figure 2** shows effect of display-independent resolution in a 820 ft. (250 m) cable. The highlighted fault is from a 3 cm connector (0.01% of the cable length).

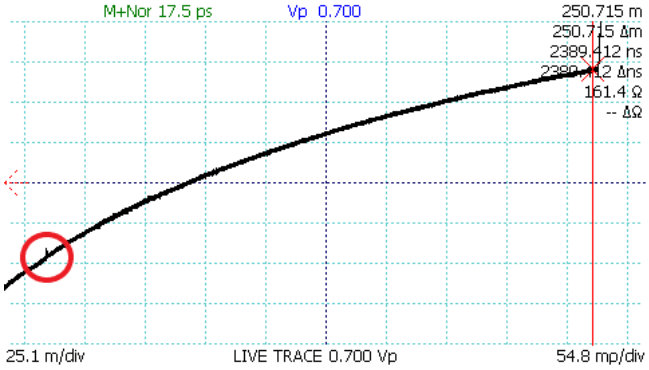

Figure 2: Small fault easily identified on a long cable.

Dual Cursors Simplify Waveform Measurements

- Measure relative distance, time, impedance, reflection coefficient, VSWR, return loss, and insertion loss between cursors.
- Scale and position the waveform at either cursor. Shift the waveform horizontally to align with comparison waveforms.
- **Figure 3** shows relative distance measurement between two soft faults (SMA connectors).

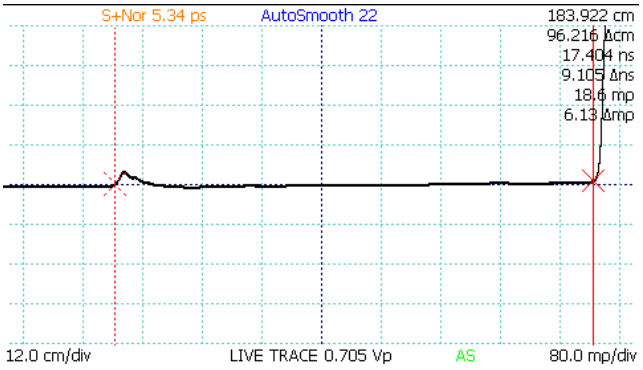

Figure 3: Measurement of distance between soft faults.

Accurate Distance-to-Fault with Multi-Cable Systems

- Designate regions of a compound cable assembly having segments of cable with different velocities of propagation (VoP, Vp).
- Directly measure distance-to-fault (DTF) at cursor and between cursors using the multisegment cable feature.
- **Figure 4** shows distance-at-cursor measurement through multiple cable segments with different velocities of propagation.

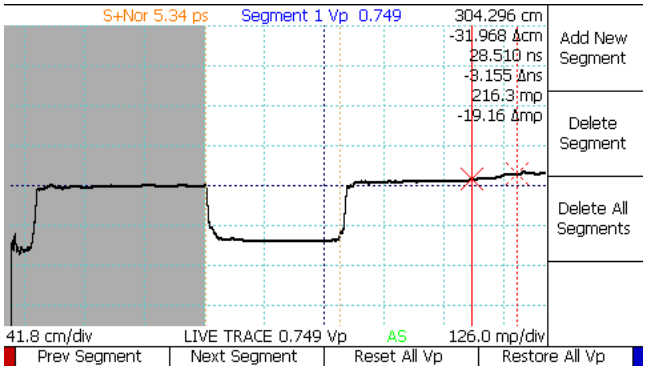

Figure 4: In this multi-cable system, the first cable has a Vp of 0.749. The other cables in this system have different Vp values. All of these values are used to produce an accurate distance-at-cursor measurement.

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TDR Analysis Features (2/2)

Capture Rapid Intermittent and Transient Faults

- Use the CT100B's Envelope Plot mode display to capture transient faults down to 2 milliseconds duration.
- Use CT Viewer 2's waveform capture mode to record real time waveform movies with step-by-step playback of the impedance profile of the cable under test.
- **Figure 5** shows intermittent fault detection of a loosened connector using the frequency density plot mode.

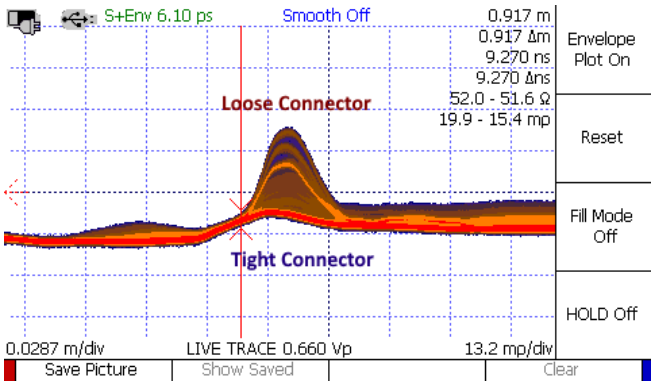

Figure 5: Intermittent fault detection with frequency density plot.

Pass/Fail Mask Testing

- Create TDR test limits and apply them to an active waveform.
- Masks can rapidly be created, live, on the CT100B or built from vector matrices.
- Thousands of masks can be stored on the CT100B or exported, archived, and transferred between systems.
- Combining user configurations with mask tests allows inexperienced users to quickly analyze installed systems.
- **Figure 6** shows a failed mask test due to a loose connector (red background). The inset shows an acceptable connector (green background).

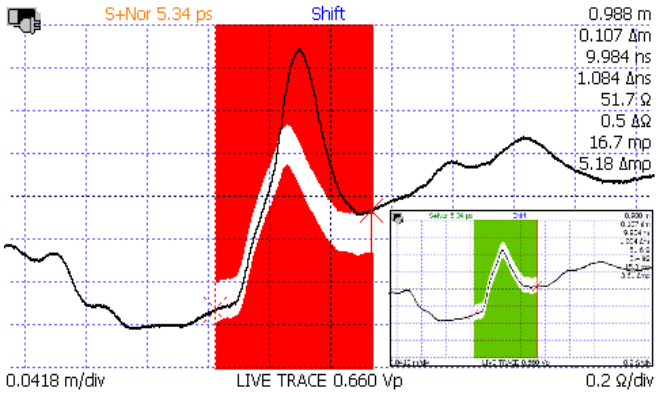

Figure 6: The red background indicates a trace that fails the mask test. The inset shows a passing trace.

Use S-Parameter Frequency-Domain Measurements

- Measure 1-port S-parameters.
- Estimate frequency-specific return loss (S_{11}) and cable loss to 8 GHz.†
- Use the CT100B as an all-in-one cable analyzer for a wide range of applications. Visualize results using frequency-domain plots, Smith charts, and normalized TDR traces.
- **Figure 7** shows a comparison of return loss plots of a CT100B and an Agilent FieldFox measuring an ultra-wideband antenna. The CT100B gives similar measurements to a vector network analyzer.

S_{11} Return Loss Between Cursors

- Isolate S_{11} return loss for faults or connectors within a cable assembly.
- Compare with historical data to track changes in connector performance.

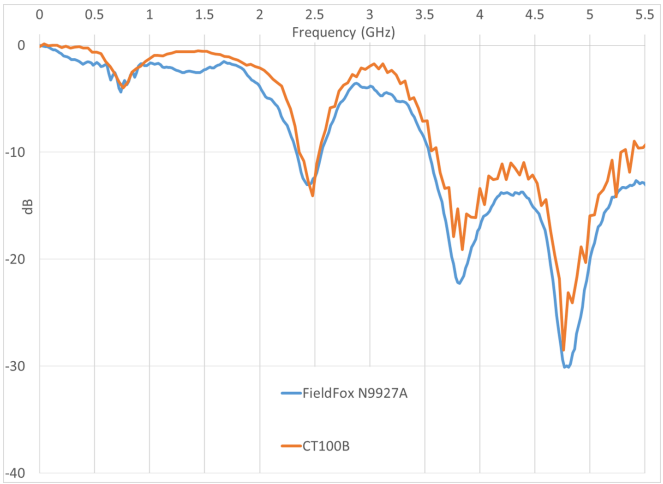

Figure 7: A comparison of return loss plots of a CT100B and an Agilent FieldFox measuring an ultra-wideband antenna.

† Availability of features and bandwidth may vary depending on application and on instrument configuration.

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Specifications

TDR System Characteristics
Front Panel Connector (CT100B): self-shorting BNC
Front Panel Connector (CT100HF): SMA
Excitation Signal: Step-rise, 300 mV into 50 Ω load
System Risetime (20-80%, typ.): 50 ps
Timebase Resolution: 0.76 ps
Timebase Random Jitter (typ.): < 1 ps rms
Timebase Non-Linearity (typ.): < 0.1%
Sample Resolution: 16 bits
Sequential Sample Rate: 2 kHz - 250 kHz
TDR Framerate: up to 500 waveforms/second

Velocity of Propagation (Vp)
Vp Range: 0.250000 to 1.000000
Vp Resolution: 0.000001

Horizontal Measurements
Range: 0 - 48,000 ft. (0 - 14.6 km) at Vp of 0.66
No dead zone. No soft zone.
Scales: 0 - 3800 ft./div (0 - 1158 m/div)
Cursor Resolution: ~ 0.001 in. (25 µm) at Vp of 0.66
Accuracy (max): < 1% of measured distance, typ. < 1 mm

Vertical Measurements
Range: < 0.1 Ω to > 1500.0 Ω
Available Units: mRho, VSWR
Resolution: ≤ 0.1 Ω, depending on scale
Accuracy: ±3% full scale, short to open

Measurements and Transforms
Measurements: time-to-fault, distance-to-fault, ohms-at-cursor, reflection coefficient, return loss, Δtime, Δdistance, Δohms, Δreflection coefficient, relative return loss
Waveform Processing: smoothing, subtraction, 1st derivative, FFT, S_{11} parameter, S_{21} estimation, impedance, layer-peeling

Special Features
Functions: AutoFit™, Envelope Plot mode, Masks
Documentation: Built-in help library, on-device manual
Libraries: Waveform library, cable-type library, configuration library, masks library

Data Storage
4+ GB flash memory, stores thousands of high-resolution cable scans and thousands of custom cable types

Connectivity
USB host (front panel)
USB client (rear panel)
10/100 Mb Ethernet
Live streaming and remote control of any CT100 Series TDR over Ethernet
Python-based remote control library

Display
Sunlight-readable 4.3 in. color display

Power System
Power: 90-264 VAC, 50-60 Hz using supplied AC adapter
Battery Power: Internal 2700 mAh 14.4 VDC NiMH battery
Battery Life: > 6 hours (typical use)
Battery Charging: < 4 hours (2.5 hours typ.)

Environmental and Mechanical
Operating Temp.: -30ºC to +50ºC
Storage Temp.: -20ºC to +60ºC
Dimensions: 4.3 x 11.5 x 6.9 in. (10.9 x 29.2 x 17.5 cm)
Weight: 4.7 lbs. (2.2 kg), 5.1 lbs. (2.3 kg) with cover

Regulatory
CE Complies with all applicable EU directives, as specified by the instrument's Declaration of Conformity.

Complies with Canadian ICES-003
EMC: MIL-PRF-28800F. MIL-STD-461F RE102, CE102. IEC 61000
Shock/Vibration: MIL-PRF-28800F (Class 3)
Temperature/Humidity: MIL-PRF-28800F (Class 3)
Explosive Atmosphere: MIL-STD-810G 511.5 Procedure 1 (+55ºC, 0-4600 m)

Ordering Information

Models
CT100B
CT100HF

Options
CT100-OP-SMA — CT100B SMA test port option
Region-specific power supplies

Standard Accessories (Included)
One (1) License CT Viewer™ 2 Software (CT100-S-CTV2-xxx*)
Standard Adapters
Digital Operator's Manuals (CT100B-M-OM-xxx*)
Rugged Soft-Sided Carrying Case (CT100-AC-CS)
External AC Power Adapter / Charger Cable (CT100-AC-PS)
NIST-Traceable Calibration Certificate (CT100-AC-NISTCC)
12-Month Standard Limited Warranty

Optional Accessories

General
Small Form-Factor Keyboard (CT100-AC-KBD)
Hard Carrying Case (CT100-AC-CH)

Adapter Kits
SMA Adapter Kit (CT100-AK-SMA)
BNC Adapter Kit (CT100-AK-BNC)
Impedance Matching Kit (CT100-IK-BNC)
MIL-STD-1553B Data Bus Adapter Kit (1553-TRBKIT)
Ethernet Adapter Kit (CT100-AK-ETH)
Pin and Socket Probe Kit (CT100-AK-PSP)

* xxx applies to revision number. Accessory part is incremented per revision.

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