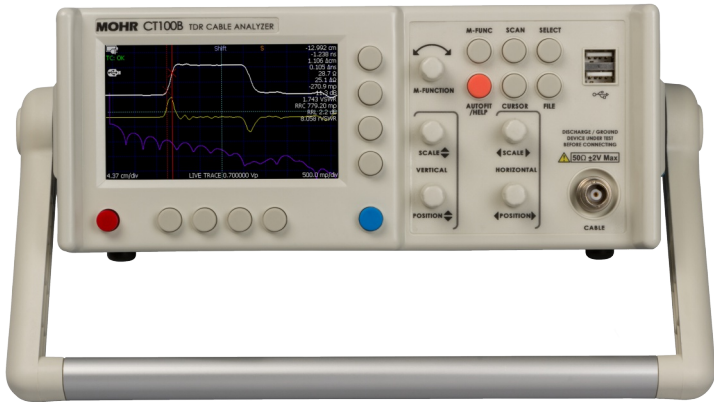


# MOHR™ CT100B Series TDR Cable Analyzers

High-Resolution Portable TDR with Frequency-Domain Analysis Tools  
Ideal for testing all types of microwave/RF and digital cables and connectors



### Key Specifications and Features

- *Rugged portable TDR with S-parameter tools*
- *Resolves connector detail (<1 cm)*
- *75  $\mu\text{m}$  (0.003 in.) cursor resolution*
- *16-bit digital sampling at up to 250 KSPS*
- *Stores thousands of TDR traces*
- *USB host/client, 10/100 Ethernet*
- *Lightweight, bright color screen*
- *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 16-bit vertical sampling resolution.
- Resolve faults and interconnect and PCB features located less than 1 cm apart.
- Measure cable length and localize faults with 75 micron (0.003 in.) precision.

## Industry's Only Portable TDR with S-Parameters

- Measure 1-port S-parameters and estimate frequency-specific return loss (S11) and cable loss (S21).\*
- Measure return loss between cursors to de-embed features of interest (e.g. connector or cable fault).
- Visualize results using real-time frequency-domain plots, Smith charts, and normalized TDR traces with adjustable rise time.

## High-Resolution Cable Waveforms and Scanning

- View or scan a cable at high resolution with cable records of up to 1.5 million points.
- Compare to other traces, either on the device itself or using the CT Viewer™ software package.

## Capture Rapid Transient / Intermittent Faults

- Identify and localize intermittent faults that other instruments would miss.
- 250 KSPS sample rate with 2 ms full-waveform transient fault detection
- Capture faults using the CT100B Envelope mode.
- Record waveform movies with CT Viewer™.

## Versatile Connectivity Options

- Host/Client USB.
- 10/100 Mb Ethernet.
- Live network streaming and remote control of any CT100 Series TDR via CT Viewer™

## Ergonomics for Easy Use

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

## Applications

- Aerospace / Aviation
- Naval / Marine
- CATV, Power, Telephone
- Wireless Infrastructure
- PCB Controlled Impedance
- TDR Sensors (Soil Moisture, Geophysics)

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

## TDR Analysis Features (1/2)

### High-Resolution TDR Waveform Comparisons

- Industry-leading 16-bit vertical resolution and 760 fs cursor resolution lets you detect subtle soft faults of less than  $0.1\ \Omega$ .
- Use the high resolution scan capability to track cable and connector performance and identify problems before they can seriously degrade system performance.
- **Figure 1** shows difference between normal BNC and SMA connectors with approximately  $0.8\ \Omega$  and  $0.4\ \Omega$  excess impedance, respectively.

### Rapid Digital Filtering and Smoothing

- The CT100B samples in real time at up to 250 KSPS with waveforms up to 1.5 million points in length, letting you store comprehensive high-resolution cable records for future comparison / analysis.
- *Subpixel sampling* ensures every fault is visible at every horizontal scale.
- **Figure 2** shows effect of subpixel sampling in a 820 ft. (250 m) cable. The highlighted  $8\ \Omega$  fault is from a 3 cm connector (0.01% of the cable length).

### Dual cursors Simplify Waveform Measurements

- Measure relative distance, time, impedance, reflection coefficient, VSWR, return loss, 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  $\sim 1$  ohm soft faults (SMA connectors).

### Accurate Distance-to-Fault with Multisegment Cables

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



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

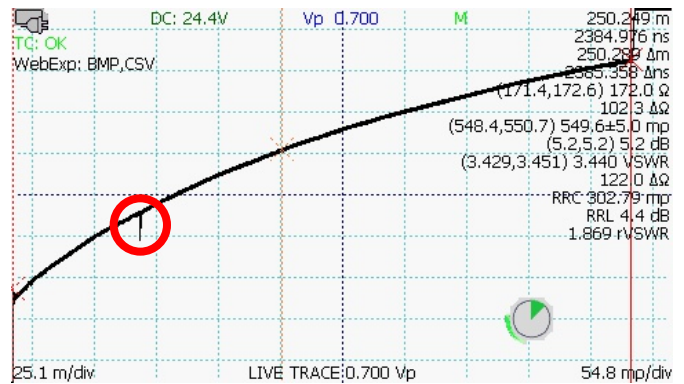


Figure 2: Subpixel fault easily identified on a long cable.

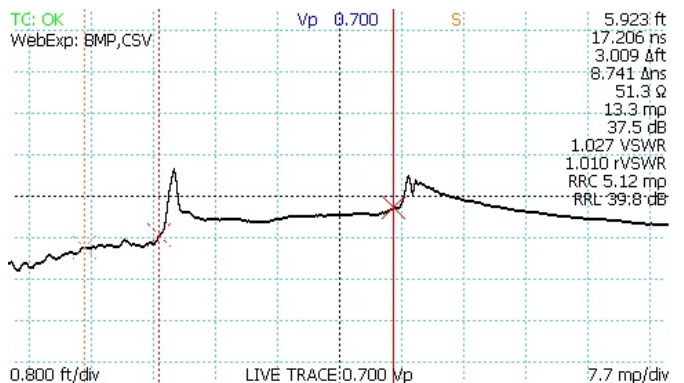


Figure 3: Measurement of distance between  $\sim 0.7$  ohm soft faults.



Figure 4: Multisegment cable with first segment VoP of 0.400.

## TDR Analysis Features (2/2)

### Capture Rapid Intermittent / Transient Faults

- Use the CT100B's Envelope Mode display to capture transient faults down to 2 ms temporal resolution.
- Use CT Viewer'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 using the probability density plot mode with the left cursor at the fault location.

### Use S-Parameter Frequency Domain Measurements

- Measure 1-port S-parameters and estimate frequency-specific return loss (S11) and cable loss (S21) to 6 GHz.\*
- Visualize results using frequency-domain plots, Smith charts, and normalized TDR traces with adjustable rise time. Use the CT100B as an all-in-one cable analyzer for a wide range of applications.
- **Figure 6** shows TDR and return loss plots of 2.4 GHz WiFi patch antenna with average return loss of 21.5 dB from 2.3-2.7 GHz.

### Smith Chart Display of Frequency-Domain Data

- Use Smith charts to simplify complex impedance matching tasks.
- Measure complex impedance at the cursor position along the Smith chart waveform.
- **Figure 7** shows Smith chart of 200 ohm terminator with cursor at 0.0 MHz.

### S11 Return Loss Between Cursors

- Leverage the power of time windowing by de-embedding S11 return loss for faults or connectors within a cable assembly.
- Compare with historical data to track changes in connector performance.
- **Figure 8** shows return loss between cursors with time-windowing of an SMA connector between two cable segments.

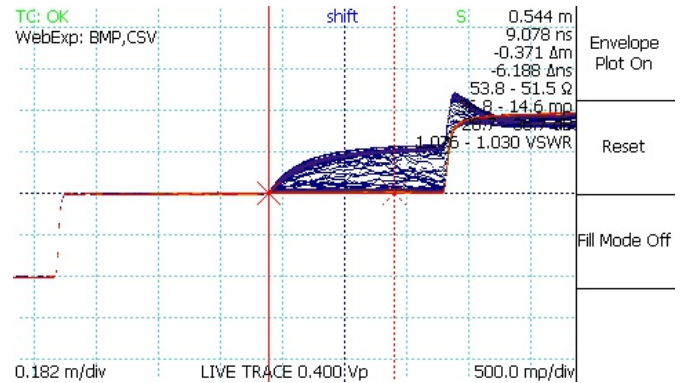


Figure 5: Intermittent fault detection, probability density plot.



Figure 6: TDR and S11 return loss plots of a 2.4 GHz WiFi patch

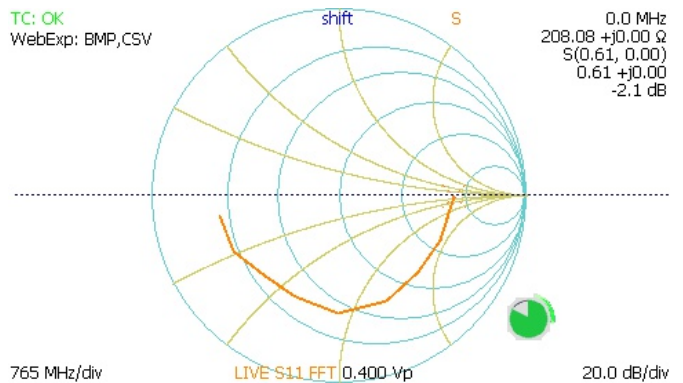


Figure 7: Smith chart plot of S11 return loss from Figure 6.

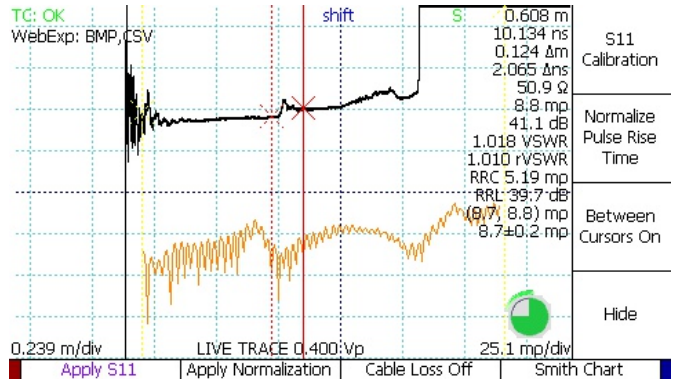


Figure 8: S11 return loss between cursors for an SMA connector.



## Specifications

### TDR System Characteristics

Excitation Signal: Step-rise, 300 mV into 50  $\Omega$  load  
System Risettime (20-80%, typ.): 60 ps, 100 ps (CT100HF, CT100B)  
Timebase Resolution: 760 fs  
Timebase Random Jitter (typ.): < 1 ps rms  
Timebase Non-Linearity (typ.): < 0.1%  
Sample Resolution: 16 bits  
Sequential Sample Rate: 2 - 250 kHz  
TDR Framerate: up to 500 waveforms/s

### Horizontal System

Range: 0 - 40,000 ft. (0 - 12 km) [Depending on cable properties]  
Scales: 0.003 - 400 ft./div (0 - 125 m/div)  
Cursor Resolution: 0.003 in. (75  $\mu$ m) at VoP 0.66  
Accuracy (max, 0-50°C): < 1% of measured distance, typ. < 1 mm

### Velocity of Propagation (VoP)

Range: 0.250000 to 1.000000  
Resolution: 0.000001

### Vertical System

Range: < 1.0  $\Omega$  to > 1500.0  $\Omega$   
Resolution:  $\leq$  0.1  $\Omega$ , depending on scale  
Accuracy (typ.): < 1% of measured value or < 1  $\Omega$ , 0 to 1000  $\Omega$   
Accuracy (max, 0-50°C): < 10% of measured value, 0 to 1000  $\Omega$

### Measurements/Math

Measurements: Time-to-fault, distance-to-fault, Ohms-at-cursor, reflection coefficient, return loss,  $\Delta$ time,  $\Delta$ distance,  $\Delta$ Ohms,  $\Delta$ reflection coefficient, relative return loss  
Waveform Processing: smoothing, subtraction, 1st derivative, FFT, S11/S21 estimation, impedance, layer-peeling

### Special Features

Functions: AutoFit™, Envelope Mode, Vert. Ref. Mode  
Libraries: Waveform library, cable-type library, configuration library

### Data Storage

2+ GB flash memory, thousands of high-resolution cable scans

### Connectivity

Standard Features: USB host (front panel) and client (rear panel), 10/100 Mb Ethernet, optional 802.11b/g wireless networking  
Special Features: Live streaming and remote control of any CT100 Series TDR over LAN/WAN/Internet using CT Viewer™

### Display

Color LED-BL 4.3 in. (10.9 cm) WQVGA TFT-LCD, > 600 cd/m<sup>2</sup>

### Power System

AC Power: 90-264 VAC, 50-60 Hz using AC adapter  
Battery Power: Internal 2500 mAh 14.4 VDC NiMH battery  
Battery Life: >6h (typical use), unlimited with external battery packs  
Battery Charging: <1 h low-battery, <4 h fully-discharged

### Environmental and Mechanical

Operating / Non-Operating Temp.: -10°C to +55°C / -20°C to +60°C  
Dimensions: 4.3(H) x 11.5(W) x 6.9(L) in. (10.9 x 29.2 x 17.5 cm)  
Weight: 5.1 lbs. (2.3 kg) with cover, 4.7 lbs. (2.2 kg) without cover

### Regulatory



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

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 Atm: MIL-STD-810G 511.5 Procedure 1 (+55°C, 0-4600 m)

## Ordering Information

### General Options

CT100B -- BNC test port (self-grounding)  
CT100HF -- SMA test port  
CT100-OP-SMA -- CT100B SMA test port option

### Standard Accessories (Included)

One (1) License CT Viewer™ Software  
Standard Adapters  
Operator's Manuals  
Rugged Soft-Sided Carrying Case  
External AC Power Adapter  
USB / Ethernet Cables  
NIST-Traceable Calibration / Certificate  
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)

#### Impedance Matching Adapters

50  $\Omega$  to 75  $\Omega$  (CT100-AC-I5075-BNC)  
50  $\Omega$  to 93  $\Omega$  (CT100-AC-I5093-BNC)  
50  $\Omega$  to 125  $\Omega$  (CT100-AC-I50125-BNC)

#### S-Parameter Test Accessories

OSL Calibration Kit SMA (CT100-AK-CALSMA)  
OSL Calibration Kit BNC (CT100-AK-CALBNC)  
OSL Calibration Kit N (CT100-AK-CALN)  
SMA Torque Wrench 8 in-lbs / 0.9 Nm (CT100-AC-TWSMA)  
Phase-Stable Cable 2 ft. SMA(M-M) (CT100-AC-PSCSMSM24)  
Phase-Stable Cable 2 ft. SMA(M-F) (CT100-AC-PSCSMSF24)  
Phase-Stable Cable 2 ft. BNC(M-M) (CT100-AC-PSCBMBM24)  
Phase-Stable Cable 2 ft. BNC(M-F) (CT100-AC-PSCBMBF24)

# MOHR™

Test and Measurement Solutions for Industry™

#### SALES CONTACT:

info@mohrtrm.com  
ph: +1 (509) 946-0941  
fx: +1 (888) 278-8037