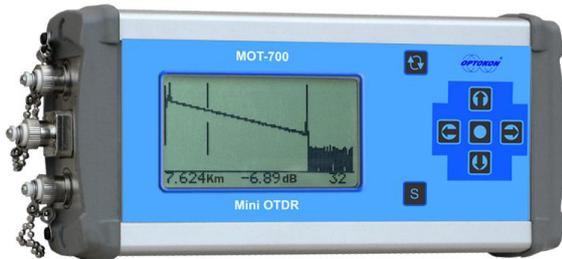


OPTOKON MOT-700 Mini OTDR Tester

The Mini OTDR MOT-700 product line is designed for measuring optical traces in ranges up to 50 km, which makes it suitable for use during installation and measurement of the last mile in FTTX networks. The compact metal box, robust construction and high contrast display make it easy to operate in field conditions. The included software makes it easy to show a trace profile and evaluate events on a trace with an approximate distance wherever it occurs.



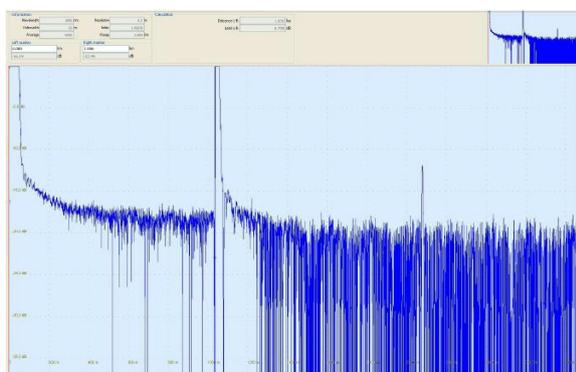
OTDR – Optical Time Domain Reflectometer

The optical reflectometer used a method based on injecting a series of optical pulses into the fiber under test conditions. It also extracts scattered light from the same end of the fiber (Rayleigh backscatter) or reflected back from points along the fiber. The strength of the return pulses is measured and integrated as a time function and is plotted as a fiber length function.

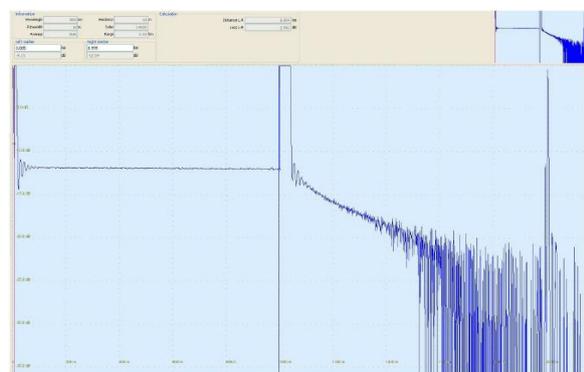
Mini OTDR MOT-700 specification

	MOT-700	MOT-700D
Light source		Laser
Wavelength, nm	850, 1300, 1310, 1490, 1550, 1625, 1650	
Dynamic range, dB @ 10 ms pulse	20	32
Pulse length, ns	10, 80, 240, 500, 1000, 3000, 10000	
Dead zone (even), m		3
Dead zone attenuation, m		10
Number of reflectogram points		2048
Resolution, m		1
Dimensions (W x L x D) mm	80 x 170 x 42	
Weight, kg	0,6	
Working temperature °C, (humidity, %)	-10 to +40, (95)	
Powered by	NiMH batteries	
Working time	10	

Comparison of traces from MOT-700 and MOT-700D



data from MOT-700



data from MOT-700D

The pictures clearly show that a higher dynamic range has a positive impact on output data – reflectogram. MOT-700D shows lesser noise values that describe the tested trace more accurately so the data can be better interpreted.

Launch cable



Launch cable

The launch cable is used during measurements with OTDR meters and can suppress a "dead zone" impact, which can show the first connector on the trace. OPTOKON launch cable is also offered in a robust metal box with exchangeable connector heads.

Mini OTDR Equipment:

The Mini OTDR testers can also be equipped with a Light Source and Power Meter, which enables easy measurement of Insertion Loss. It can also contain a visible light source for visual fault location.

Technical parameters of OPTOKON Mini OTDR sub modules:

Power meter

Range, dBm	-70 to +6 or -55 to +20
Accuracy, dB	0.3
Resolution, dB	0.01
Calibrated wavelength	850, 1310, 1490, 1550, 1625
Units	dBm, dB, mW, μ W, nW,

Light source

Specter width, nm	< 5
Output power level, dBm	> -6.0
Relative instability for 15 min, dB	\pm 0.07

Visual fault location

Light source	Laser
Wavelength, nm	650
Nominal output power level (for 9 μ m SM fiber), W	0.8

Accessories:

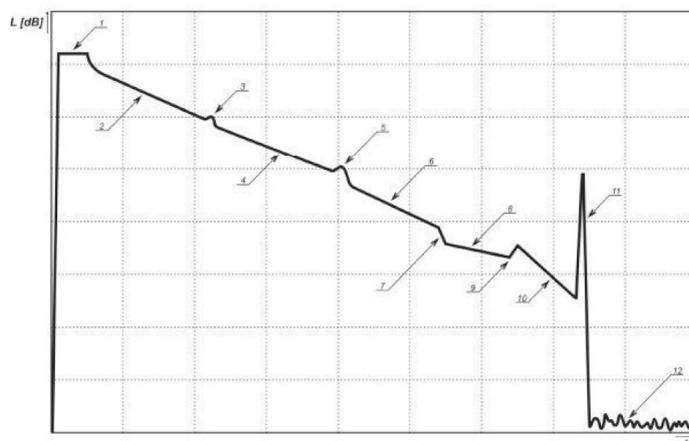
- FC/PC adaptor
- protection caps
- battery charger
- soft case
- USB cable
- CD with SW and User manual

Options:

- adaptor set
- master patchcord
- launch cable

Measurement with OTDR

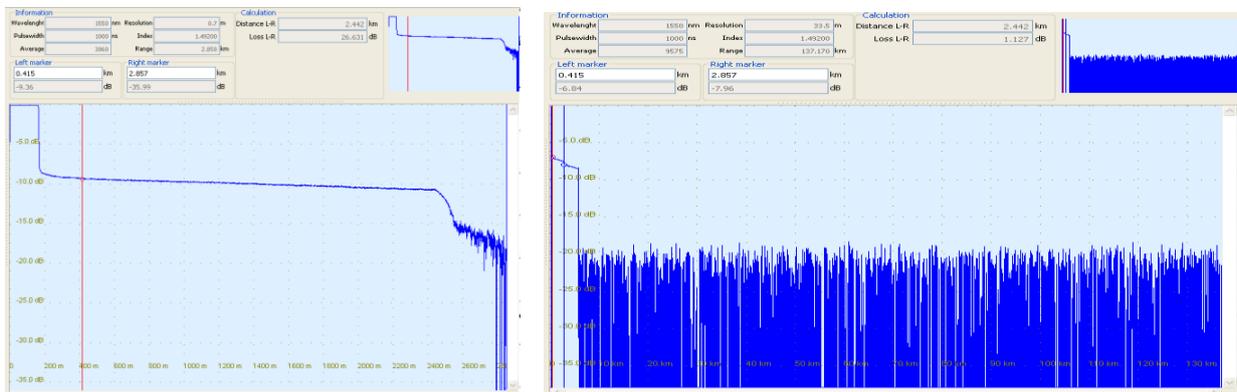
This is the standard case describing inhomogeneities which can occur in the optical path. The shape and size can be determined by the distance and size of the attenuation as well as the type of event in the optical path.



- 1 - Reflection due to the first connector.
- 2 - Optical fiber - attenuation (dB/km) is shown by the slope of the line.
- 3 - Reflection and insertion loss (connector).
- 4 - Optical fiber
- 5 - Reflection and insertion loss (connector).
- 6 - Optical fiber
- 7 - Fiber insertion loss of contention.
- 8 - Optical fiber - different attenuation.
- 9 - Transition between the fibers with different diameters modes fields (gain).
- 10 - Optical fiber - different attenuation.
- 11 - Fresnel's reflection on the end of fiber (30 - 50dB).
- 12 - Inherent detector noise.

Length of trace (5.5 km)

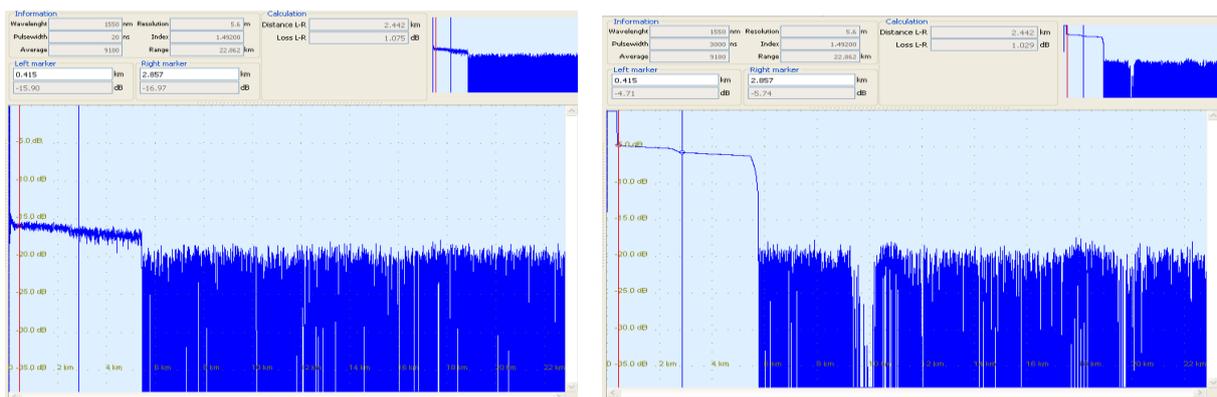
The length of the trace is a key parameter for the measurement. If the length of the selected trace too small (left diagram) it leads to the deformation of the detected signal.



If the length of the route chosen is too large (right diagram), useful information is suppressed.

Pulse width

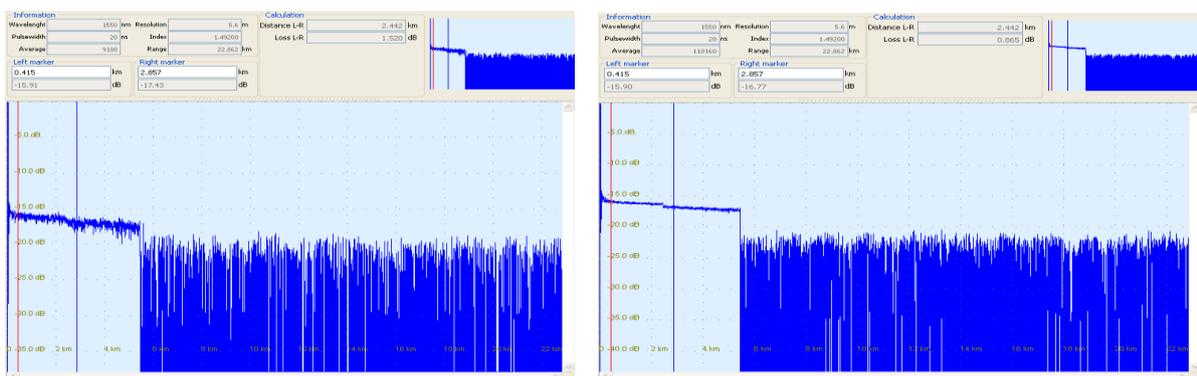
In the small pulse (left diagram) the width conceals a low ability to detect inhomogeneity and a low value measured distance (limited dynamic range).



Increasing the size of the pulse (right diagram) width leads to better detection of inhomogeneity and increases measurable distance (limited dynamic range).

Averaging

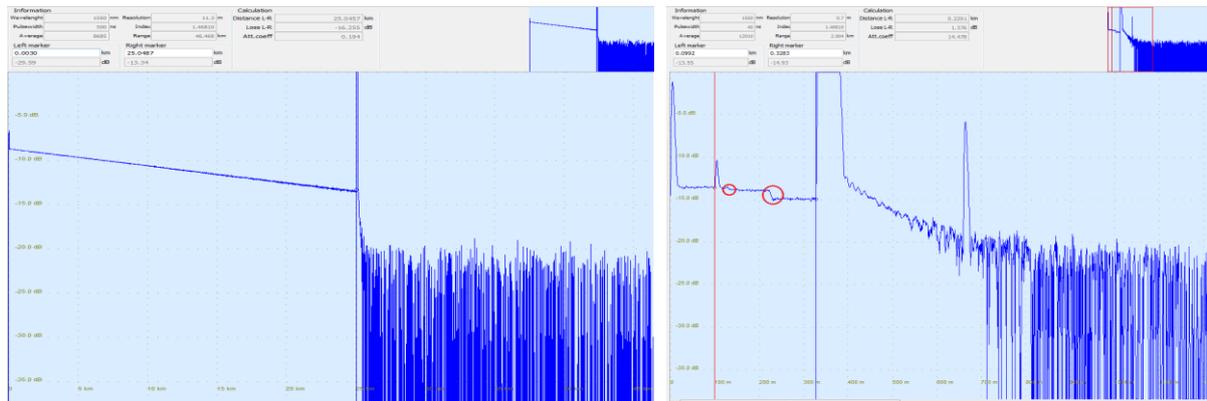
Small value averaging (left diagram) means that the measured signal has a relatively large dispersion and thus cannot be easily recognized on the route events.



Higher averaging (right diagram) reduces the amplitude of the detected signal, improves resolution and increases the time of the measurement.

Real measurement:

From the specification it is apparent that the Mini OTDR has suitable parameters for measuring shorter traces.



Measurement with OTDR, trace l = 25 043 m

Evaluation of inhomogeneity

Measurement was made of a real lab trace with known parameters of a length of 25 043 m and with 30 m launch cable (dead zone impact elimination). Using the cursors, the length was evaluated as 25 048 meters. The variation in the trace length is 0.01% (under real conditions, the values can be higher, but always a maximum of 5%). The next detected parameter is the insertion of fiber per kilometer. The defined value of insertion loss per km is 0.2 dB/km. The measured value with Mini OTDR is 0.194 dB/km.

A key parameter of any OTDR meter is the output data, which is the basic evaluation of inhomogeneity on the trace (connectors, splices, attenuations, etc.). The OPTOKON Mini OTDR is not equipped with direct event analysis; therefore we can show these anomalies on the measured trace through the internal display on the tester or on a PC monitor. The diagrams above show that these events are easy to detect and also show how to evaluate the type of event.

Inhomogeneity and events on the trace can be visually found from the trace profile. The events can be connected via connectors, splicing loss, mechanical stress, different fiber types and much more.

Important:

Measurement by OTDR is very easy for the user. However, it is necessary to consider what and how to measure to obtain the desired results.

Theoretical knowledge can derive the best parameters for measurement. However, this does NOT always lead to the ideal outcome. Measurement by OTDR requires experience and thus individually set measurement parameters.

The measured distance is directly proportional to the size of the dynamic range! For example:

These two cases can only occur in the ideal scenario. There is no event on the optical fiber!

MOT-700: Optical fiber with attenuation 0.2-0.3 dB/km and dynamic range 20 dB can be measured at a theoretical distance of 80-100 km.

MOT-700D: Optical fiber with attenuation 0.2-0.3 dB/km and dynamic range 32dB can be measured at a theoretical distance of 100-150 km.

Under real conditions it is recommended to measure distances not exceeding 50km for the MOT-700 and 80km for the MOT-700D.

Summary:

OPTOKON MiniOTDR MOT-700 series, with a wide range of options (power meter, light source, visible light source and launch cable) can be used as a tool for measuring optical networks up to 50 kilometers. The tester generates the profile of the measured trace; measures trace attenuation, shows events distance. The included software analyses events – connectors, splices, different fiber types, anomalies (wrong bending, disrupted jacket, etc.). The compact design of the tester enables easy handling within the limited space of rack cabinets. The high contrast display with backlight is appreciated by maintenance and installation crews working in the field and under difficult conditions. Compared to competitors larger OTDR with difficult handling and settings, measurement parameters and long evaluation time, the OPTOKON MiniOTDR MOT-700 series preserves similar values of uncertainty...