IEC/IEEE 62582-5 Optical time domain reflectrometry

- Scope and what we measure

Scope and object

This part of IEC/IEEE 62582 contains methods for monitoring the attenuation condition of optical fibres and cables in instrumentation and control systems using optical time domain reflectometer (OTDR) measurements in the detail necessary to produce accurate and reproducible measurements.

Condition indicator

Attenuation is a measure of the decreasing optical power in a fibre at a given wavelength. It depends on the nature and length of the fibre and is also affected by measurement conditions. The definition is

$$A(\lambda) = \left| 10 \log^{10} (P1(\lambda)/P2(\lambda)) \right|$$

where

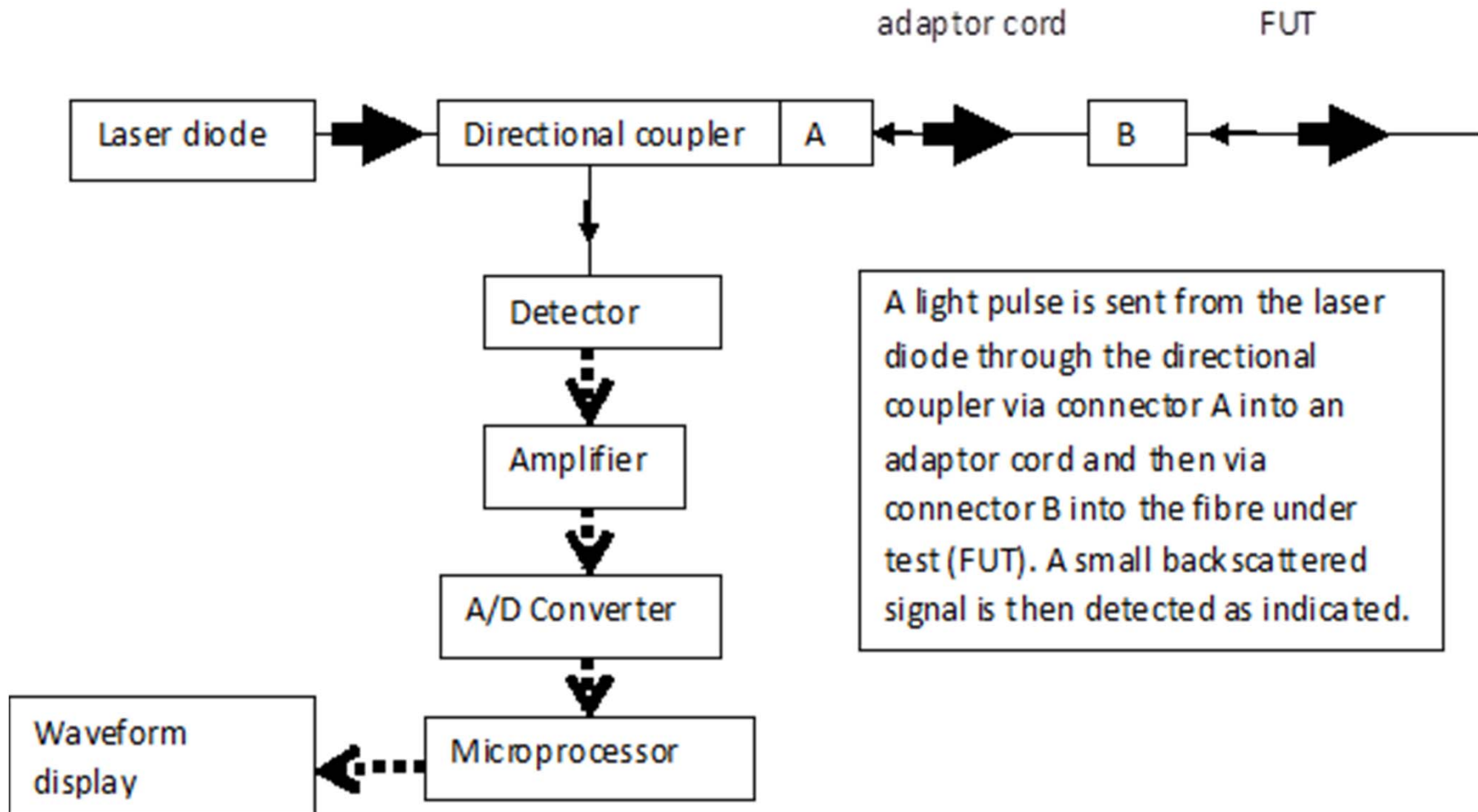A(λ) is the attenuation, in dB, at wavelength λ;

P1(λ) is the optical power traversing one cross-section (marker 1);

P2(λ) is the optical power traversing a second cross-section (marker 2) .
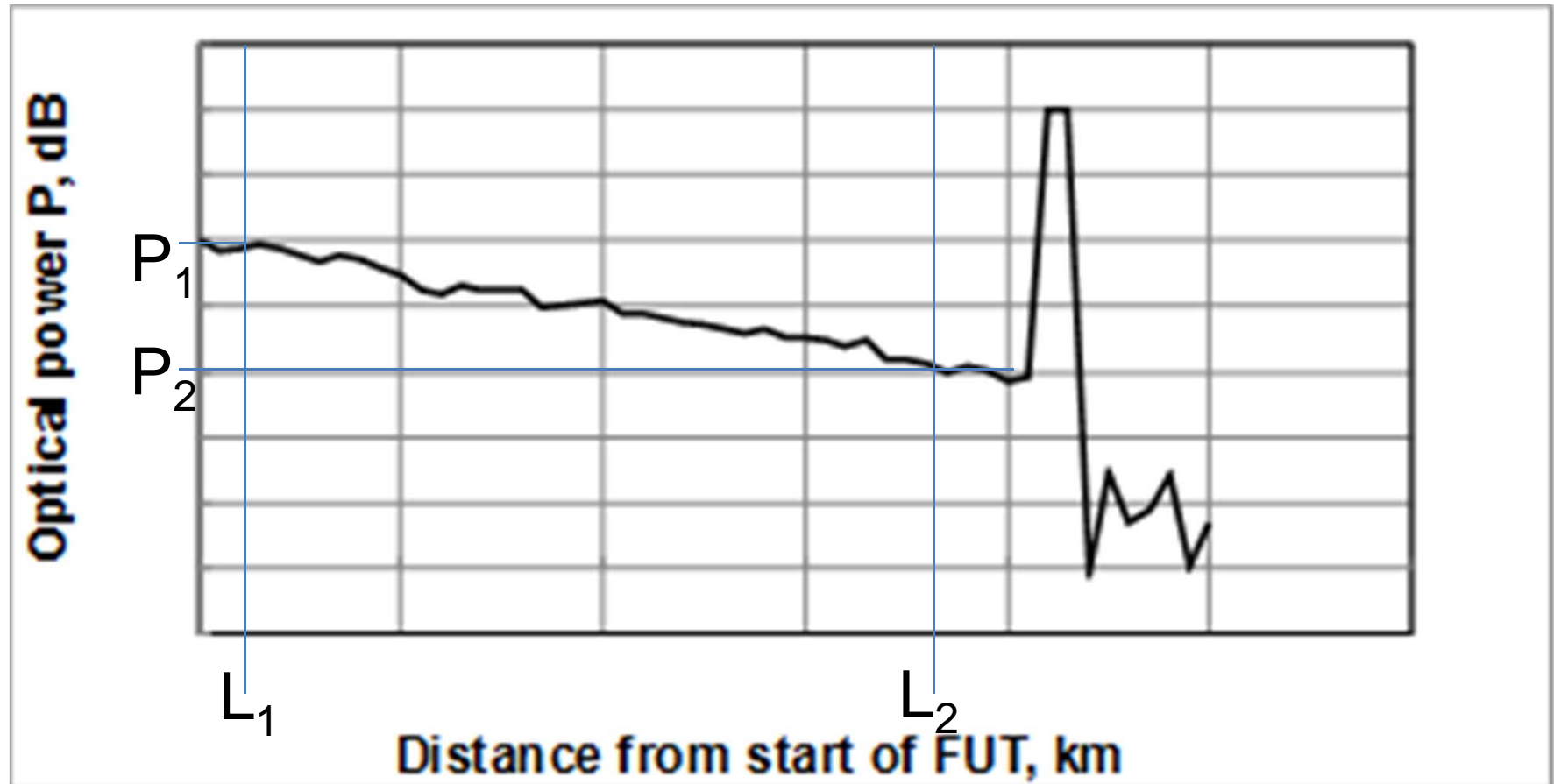
Attenuation per unit length is defined as

a(λ) = A(λ)/L   in dB/km

Block function of the OTDR

adaptor cord   FUT

| Laser diode | Directional coupler | A |

| B |

Detector

Amplifier

A/D Converter

Microprocessor

Waveform display

A light pulse is sent from the laser diode through the directional coupler via connector A into an adaptor cord and then via connector B into the fibre under test (FUT). A small back scattered signal is then detected as indicated.

Typical OTDR waveform.
Backscattered power vs distance

Calculation of attenuation coefficient in the example

- L_1 is selected at 0.050 km
- L_2 is selected at 0.950 km
- Attenuation between markers $P_1 - P_2 = 0,18$ dB
- Distance between markers $L_2 - L_1 = 0,9$ km

Attenuation coefficient = 0,20 dB/km