

Sensor modules for POF optical back reflection measurements

In combination with low crosstalk splitters DieMount transmitter and receiver modules are used to realize sensitive optical setups for the measurement of optical back reflection.

Figure 1 sketches the basic setup: a 50kHz modulated optical signal is coupled to a branch of a low cross talk splitter and guided over an up to 20m POF cable to the reflecting test object. The measured quantity (depending on the sensor setup e.g. distance, material reflection coefficient, absorption) generates a back to the POF reflected signal that is guided back to the splitter and the receiver subsequently. A 50kHz selective amplifier circuit with high gain detects the signal with a sensitivity better than -40dBm .

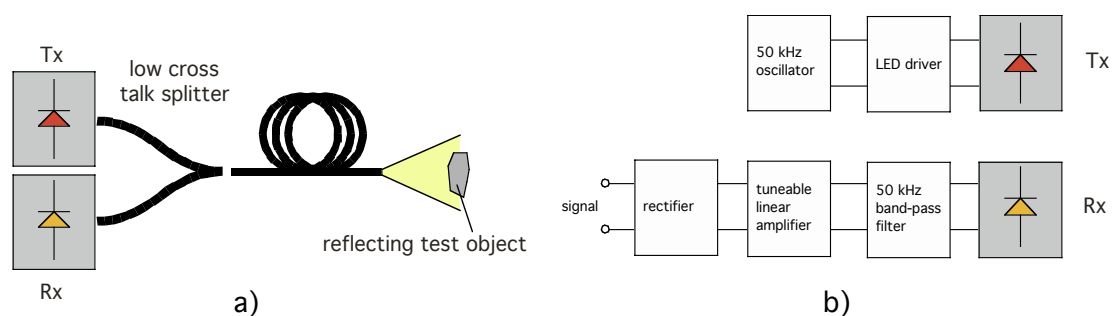


Figure 1: Basic measurement setup a) and electronic functional blocks b)

Features:

- External stray light does not influence the measurement setup because the receiver is sensitive for 50kHz modulated light only.
- An index matching glue fixes the connection between POF and splitter with very low back reflection factor. As the splitter has a cross talk attenuation better than 40dB, a low error signal is generated by the splitter and the splitter-POF connection. The main reason for error signals is the open POF endface opposite to the test object.
- An attractive feature for all practical implementations is the option to place all active electronic equipment and power supply far away from the sensor. Measurements at dirty places, in narrow spacing environments, in explosive surroundings or widely extended machines become much easier.
- Several optical wavelengths may be used for colour separation, if different wavelength transmitters are combined with an additional splitter coupled to the signal input. The receiver separates the signal easily by electrical filters, if each wavelength is modulated with a different modulation frequency. The setup of colour measurement systems is feasible in this way.