

Optical Electric Field Sensor (Optical E-Filed Sensor)

Applications

1. Measurement of electric field strength for EMC (Electro-Magnetic Compatibility)
2. Measurement of electric field distribution in the equipment
3. Detection of the electromagnetic spectrum or the distribution of electromagnetic radiation
4. Measurement of the strength and bandwidth of the impulse such as can be generated by an ESD (Electro-Static Discharge)
5. Compact size is beneficial to measuring even in narrow spaces of equipment and under hazardous environments.

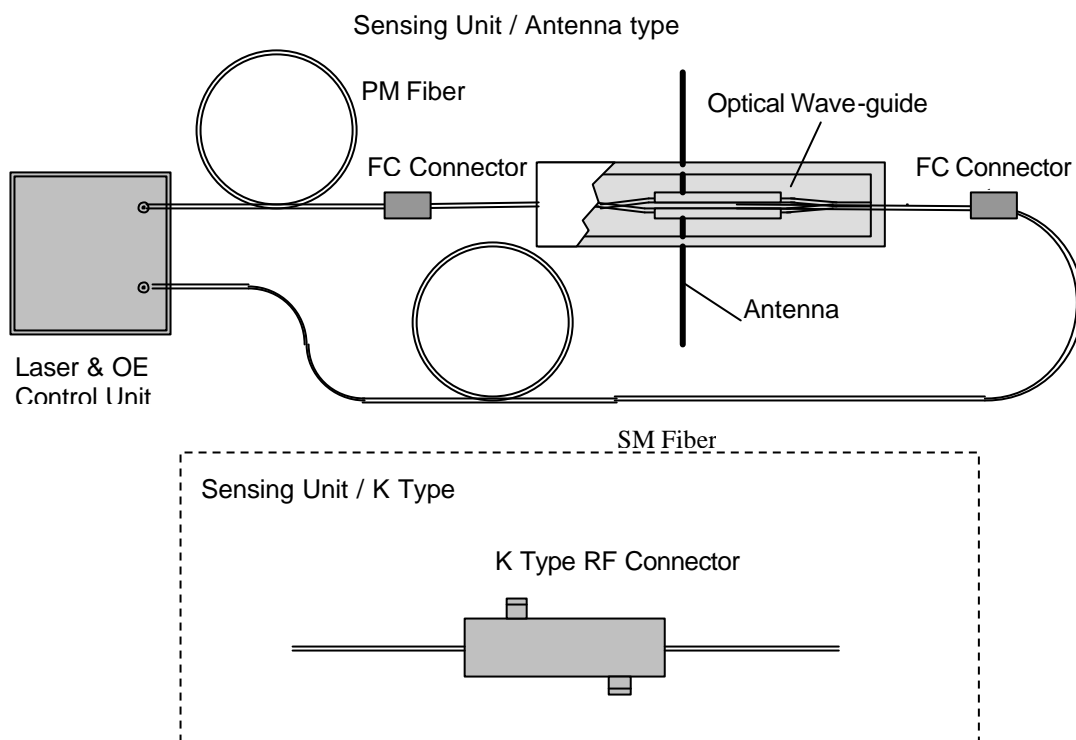
Practical use of Electro-Optic Modulator

Electric field or discharge impulse can be precisely measured by the highly sensitive optical interference through Mach-Zehnder interferometer fabricated on a LiNbO_3 crystal substrate wafer. Such signals are applied to the optical wave-guide through the connected antennas or probes, so that optical phase shift is generated between two optical paths by the electro-optic effect, called Pockels effect. This phase shift causes interfere each other to vary the optical intensity that is detected by the OE converter for obtaining a broad signal frequency distribution through spectrum analyzer.

Transmission type (T-type) and Reflection type(R-type)

As a light source, a wavelength-stabilized DFB laser is used and its optical beams is transmitted through a polarization-maintenance (PM) fiber. The OE converter consists of a high sensitive InGaAs photodiode with a built-in pre-amplifier. The fiber between the sensing unit and the light source or the detector can be extended to a hundred meters for remote sensing operation. (T-type)

A reflection type is also available as an option, which is beneficial to probing in proximity to an object. The reflection type has a single optical fiber port to which the source and receiver fibers are connected trough a fiber coupler. (R-type)



Configuration of the Optical Electric Field Sensor

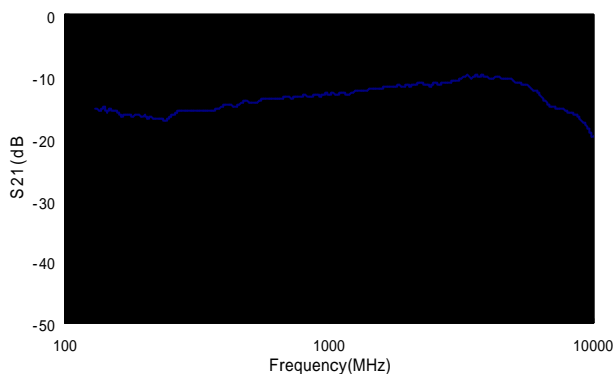
? Each Specification(Light source, Sensing Unit, Detector)

Item	Characteristics
Modulator	Asymmetric Mach-Zehnder Chip Size : $6 \times 26 \times 0.5\text{mm}$
Light Source	DFB-LD ($1.55\mu\text{m}$) Power : 10mW
Detector	InGaAs PIN Photo Diode Frequency band : DC~1GHz
Sensor RF Connection	K connectors or antennas (f= 100KHz – 7GHz) Antenna Size : 3 mm 100mm (f= 100KHz – 700MHz) Other antenna length is available as an option
Optical Fiber	PM Fiber : 1.5m SM Fiber : 1.5m Other fiber length is available as an option
Sensor Size	$80 \times 10 \times 10$ mm
Case	Acrylic case
Sensitivity	70 ~ 140 (dB μ V/m)
Output Voltage	60 (dB μ V/m) (at E=140dB μ V)
Response	1 (nsec)
Operating Temperature	10 () ~ 50 ()

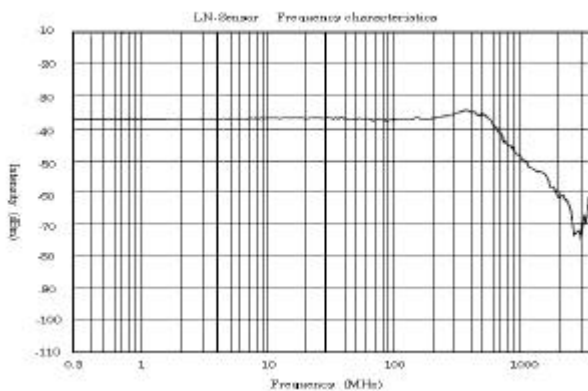
? Frequency Responses of RF Connector and Antenna, and Photos

Frequency Responses

Pictures



K Type RF Connector



Antenna Type