

Optical Electric-Field Sensing System

Optical Passive, Little Field Disturbance, Up to 40GHz, Up to 300kV



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Photonic Electric Field Sensing System (PEFS) is an instrument that optically measures the electric field. It integrates a fiber optic E-field sensor probe, a laser, a photo-receiver, an amplifier module, and associated electronics. The probe connects to the system via two fibers. The sensor system covers a broad frequency range from 10 MHz to 40 GHz. The E-field intensity is proportional to the readout signal. The amplifier gains are adjustable to optimize the sensitivity and the dynamic ranges. The E-field frequency information can be obtained by connecting to a spectrum analyzer or a frequency-tunable filter. A multichannel system is available with the configurations of either switching among the sensor heads or simultaneously reading all heads at once using independent laser and detector sets. The fiber optic EOFS and PEFS form an E-field sensor system that provides advanced attributes of fast response, extremely high damage threshold exceeding 5 MV/m, high fidelity with little disturbance to the E-field, and remote sensing capability.



Features

- No metal parts in probe
- Passive probe
- Miniature probe
- Optic fiber link
- High sensitivity
- Wide bandwidth
- High damage threshold

Applications

- Pulse E-field measurement
- CW RF field measurement

Specifications

Parameter		Min	Typical	Max	Unit
Frequency Bandwidth ^[1]	UHF version ^[1]		18	40	GHz
	HF version		7		GHz
	LF version		250	500	MHz
Sensitivity	UHF version	500 ^[2]	200		mV/m-Hz ^{1/2}
	HF version		100		mV/m-Hz ^{1/2}
	LF version		60 ^[3]		mV/m-Hz ^{1/2}
Frequency cut-off	UHF version		100	1000 ^[2]	MHz
	HF version		10		MHz
	LF version		30 ^[3]		Hz
Maximum detectable E-field ^[4]			200		kV/m
Damage E-field				5	MV/m
Fiber			PMF/SMF		
Fiber Connector			FC/APC		
Laser wavelength			1550		nm
Laser power ^[5]			10		mW
RF output impedance			50		Ω
RF connector			SMA		
Power supplier			100~240		VAC

Notes:

- [1]. Should be matched with the proper EOFS. 40GHz version is special, please contact us.
- [2]. For 40GHz version.
- [3]. Sensitivity drops significantly at $f < 50\text{Hz}$ in LF version.
- [4]. Possible to be increased up to 2MV/m, please contact us
- [5]. TBD per the frequency and sensitivity

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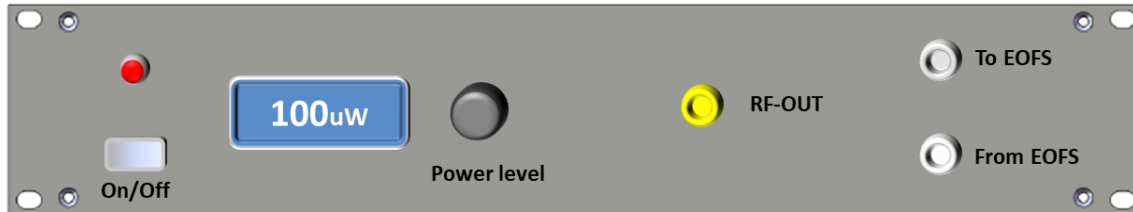
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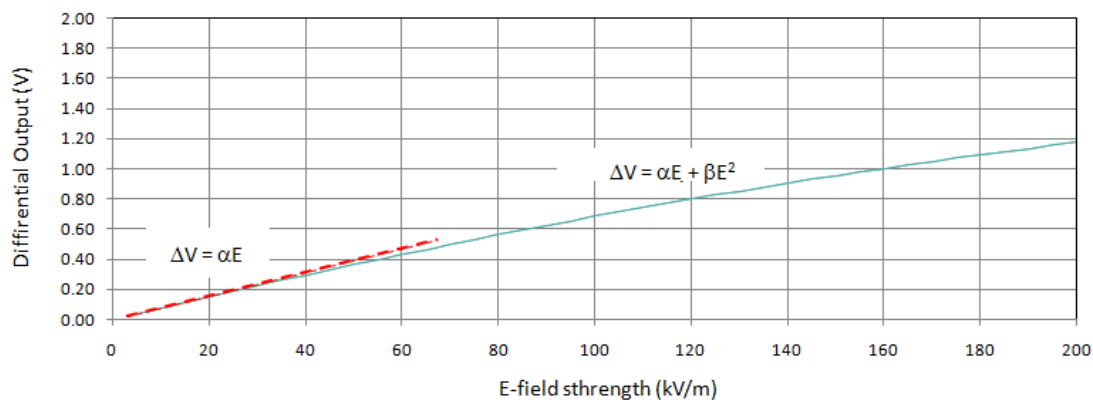
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Typical System & Probe Dimensions (Single channel only)

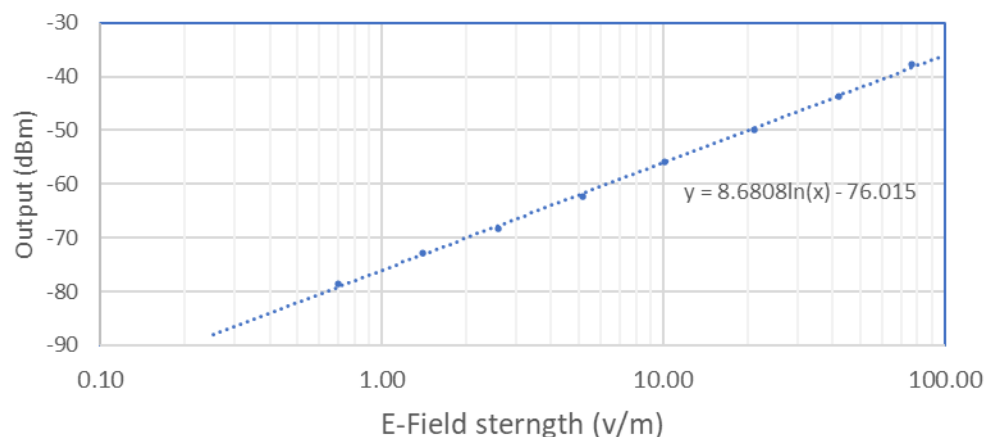


Schematic diagram of front panel in 2RU 19" rack

Typical RF output (V) vs. E-field strength (Examples)



- 1) Illustration of E-field calibration with oscilloscope measurement.
- 2) α and β coefficients need to be determined through the calibration.



One calibration example of weak E-field by using RF spectrum analyzer

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Ordering Information (Part Number)

	☐	☐	☐	☐	☐	☐	3	3
Prefix	Frequency	Config	Package ^[1]	Fiber Type	Channel	Redout ^[2]	Optical Connector ^[3]	
PEFS-	7GHz = S7 18GHz = S8 250MHz = P3 500MHz = P5 40G = 40 Special = 00	Standard = 2 Special = 0	2RU = 2 4RU = 4 Special = 0	MMF 50/125 = 1 SMF 9/125 = 3	1 = 1 2 = 2 3 = 3 6 = 6 Special = 0	Simultaneous = 1 Switchable = 3 Special = 0	FC/APC = 3 Special = 0	

[1]. 2RU rack is for single channel only with LCD for laser controller.

[2]. "Simultaneous" uses independent lasers and detectors while "switchable" uses the fiber optical switches to select the channel in multiple channel version. "Simultaneous" is default for single channel PEFS.

[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Red is specially made

Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.5 μ m.

Maximum power = 30 mW.



*Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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