narda
Safety Test Solutions

Datasheet | Probe EFD-5091

Isotropic measurement of electric fields from 300 MHz to 50 GHz

using the Field Meter FieldMan®

The probe contains three orthogonally-arranged thermo-couple sensors and detects electric fields from 300 MHz to 50 GHz, covering the fields found in telecommunications, satellite communications and radar equipment. The use of thermocouples naturally results in a true RMS reading, making the probe particularly suitable for measuring human safety limit values in a multi-frequency environment.

The probe's interface digitally transmits the measurement data to the base unit, which has no individual influence on the measured values and therefore does not need to be calibrated. The accredited probe calibration is carried out at several frequencies. The calibration data is stored in the probe and is automatically taken into account during the measurement. If the frequency of the predominating field strength is known, a correction factor can additionally be applied to increase the measurement accuracy.

- Measurement of field exposure from telecommunications, satellite communications and radar in working environments
- True RMS value display even when several, strongly pulsed signals are superimposed
- Isotropic (non-directional) measurement
- Digital probe interface - no more meter calibration
- Self-test of the probe interface with integrated sensor function test
- Automatic offset correction, no zero adjustment required
- Lowest temperature response due to thermocouple sensor technology and wide temperature range down to -20 °C
- High Immunity at 50/60 Hz
- Accredited calibration included

Specifications [1]

Product Features		
Frequency range [2]	300 MHz to 50 GHz	
Type of frequency response	Flat	
Measurement range (nom.)	8 to 614 V/m (True RMS)	17 µW/cm² to 100 mW/cm² (True RMS)
Dynamic range (nom.)	37 dB	
CW damage level (nom.)	1350 V/m	0.5 W/cm²
Peak damage level (nom.) [3]	20 kV/m	100 W/cm²
Sensor type	Thermocouple (inherent True RMS detection)	
Directivity	Isotropic (Tri-axial)	
Spatial assessment	Combined 3-axis (RSS)	
Sampling rate / integration time (nom.)	5 Hz / 270 ms	
Temperature sensors	Integrated sensors for displaying the ambient temperature and for automatic offset compensation	
Self-test	Interface function test and sensor test for interruption of the sensors	

Uncertainty		
Flatness of frequency response [4, 5] Calibration uncertainty not included Referred to 1 mW/cm² (61.4 V/m)	±1.5 dB (1.8 GHz to 26.5 GHz) +1.5/-2 dB (> 26.5 GHz to 40 GHz)	
Linearity deviation (nom.) Referred to 1 mW/cm² (61.4 V/m) @ 1800 MHz	±1 dB (19.5 to 61.4 V/m) ±0.3 dB (> 61.4 V/m)	±1 dB (0.1 to 1 mW/cm²) ±0.3 dB (>1 mW/cm²)
Isotropic deviation [5] Referred to 1 mW/cm² (61.4 V/m)	±1 dB (0.6 GHz to 8 GHz) ±1.4 dB (8 GHz to 45.5 GHz)	
Temperature response (nom.) [6] Referred to 1 mW/cm² (61.4 V/m) @ 2450 MHz	±0 dB (-20°C to +50°C)	

General Specifications		
Accredited calibration		DAkkS, ILAC-MRA (DIN EN ISO/IEC 17025, IEEE Std. 1309) For measurands outside the scope, a factory calibration is performed.
Recommended calibration interval		24 months
Operating temperature		-20 °C to +50 °C
Humidity		< 29 g/m³ (< 93 % RH at +30 °C), non-condensing
Ingress protection		IP54 (probe screwed on)
Climatic conditions	Storage	1K5 (IEC 60721-3) -40 °C to +70 °C
	Transport	2K4 (IEC 60721-3) -40 °C to +70 °C
	Operating	7K2 (IEC 60721-3) extended to -20 °C to +50 °C
Size		308 mm x 66 mm Ø
Weight		< 100 g
Country of origin		Germany

1 Unless otherwise noted specifications apply at reference condition: device in far-field of source, ambient temperature 23±3 °C, relative air humidity 25% to 75%, sinusoidal signal, probe sampling rate 5 Hz.
2 Cutoff frequency at approx. -6 dB (300 MHz) and -3 dB (50 GHz).
3 Within any interval of 10ms an average value of 0.5 W/cm² and a peak value of 100 W/cm² should not be exceeded.
4 Frequency response can be compensated for by the use of correction factors stored in the probe memory.
5 Results are calculated from the maximum and minimum response obtained during the full revolution about the stem of the probe, oriented 54.7° to the electric field vector.
6 The conversion factor of thermocouple sensors is inherently not dependent on environmental temperature.

Definitions and Conditions

Conditions

Unless otherwise noted, specifications apply after 30 minutes warm-up time within the specified environmental conditions. The product is within the recommended calibration cycle.

Specifications with limits

These describe product performance for the given parameter covered by warranty. Specifications with limits (shown as <, ≤, >, ≥, ±, max., min.) apply under the given conditions for the product and are tested during production, considering measurement uncertainty.

Specifications without limits

These describe product performance for the given parameter covered by warranty. Specifications without limits represent values with negligible deviations, which are ensured by design (e.g. dimensions or resolution of a setting parameter).

Typical values (typ.)

These characterize product performance for the given parameter that is not covered by warranty. When stated as a range or as a limit (shown as <, ≤, >, ≥, ±, max., min.), they represent the performance met by approximately 80% of the instruments. Otherwise, they represent the mean value. The measurement uncertainty is not taken into account.

Nominal values (nom.)

These characterize expected product performance for the given parameter that is not covered by warranty. Nominal values are verified during product development but are not tested during production.

Uncertainties

These characterize the dispersion of the values attributed to the measurands with an estimated confidence level of approximately 95%. Uncertainty is stated as the standard uncertainty multiplied by the coverage factor k=2 based on the normal distribution. The evaluation has been carried out in accordance with the rules of the “Guide to the Expression of Uncertainty in Measurement” (GUM).

Ordering Information

Digital Broadband Probe	Part number
Probe EFD-5091, E-Field, 300 MHz–50 GHz, Thermocouple	**2462/03B**

Optional Accessories	Part number
Cable, Digital Probe Extension, 2m [7]	**2460/90.02**

[7] The device specifications apply without an extension cable.

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