

# Measuring electric fields from 300 MHz to 50 GHz

using instruments in the NBM-500 family

- ▲ **Field exposure from satellite communications and radar in the occupational environment, leak detection**
- ▲ **Isotropic (non-directional) measurement**
- ▲ **True RMS indication even with multiple, superimposed, strong pulsed signals**

The probe contains three orthogonally-arranged thermocouple sensors. Each sensor consists of several thermocouples, which together form a dipole. The output voltage from the thermocouple is proportional to the coupled power level, regardless of the signal shape. The isotropic measurement value is obtained by addition within the probe.

## APPLICATIONS

The probe detects electric fields from 300 MHz to 50 GHz, covering the fields found in 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.

## PROPERTIES

The probe is mechanically and electrically robust. The probe head is made of foam material to provide effective protection for the sensors, while having excellent RF characteristics. The sensors can handle high impulse power levels.

## CALIBRATION

The probe is calibrated at several frequencies. The correction values are stored in an EPROM in the probe and are automatically taken into account by the NBM instrument. Calibrated accuracy is thus obtained regardless of the combination of probe and instrument.



## SPECIFICATIONS <sup>a</sup>

Probe EF5091	Electric (E-)Field	
Frequency range <sup>(b)</sup>	300 MHz to 50 GHz	
Type of frequency response	Flat	
Measurement range	8 to 614 V/m	17 $\mu$ W/cm <sup>2</sup> to 100 mW/cm <sup>2</sup>
Dynamic range	37 dB	
CW damage level	1500 V/m	0.6 W/cm <sup>2</sup>
Peak damage level <sup>(c)</sup>	27 kV/m	200 W/cm <sup>2</sup>
Sensor type	Thermocouple (inherent True RMS detection)	
Directivity	Isotropic (Tri-axial)	
Readout mode / spatial assessment	Combined 3-axis (RSS)	
<b>UNCERTAINTY</b>		
Flatness of frequency response <sup>(d)</sup> Calibration uncertainty not included	$\pm 1.25$ dB (1.8 GHz to 40 GHz)	
Calibration uncertainty <sup>(e)</sup> @ 1 mW/cm <sup>2</sup> (61.4 V/m)	$\pm 1.5$ dB (300 MHz to 1.2 GHz) $\pm 1.3$ dB ( $\geq 1.2$ GHz to 45.5 GHz)	
Linearity Referred to 1 mW/cm <sup>2</sup> (61.4 V/m)	$\pm 1$ dB (24 to 61.4 V/m)	$\pm 1$ dB (0.15 to 1 mW/cm <sup>2</sup> )
Isotropic response <sup>(f)</sup>	$\pm 0.3$ dB ( $> 61.4$ V/m)	
Temperature response <sup>(g)</sup>	$\pm 0.3$ dB ( $> 1$ mW/cm <sup>2</sup> )	
<b>GENERAL SPECIFICATIONS</b>		
Calibration frequencies	0.3/ 0.75/ 1.8/ 2.45/ 4/ 5/ 6/ 8.2/ 9.3/ 10/ 11/ 18/ 26.5/ 40/ 45.5 GHz	
Recommended calibration interval	24 months	
Temperature range		
Operating	0 °C to +50 °C	
Non-operating (transport)	-40 °C to +70 °C	
Humidity	5 to 95 % RH @ $\leq 25$ °C	$\leq 23$ g/m <sup>3</sup> absolute humidity
Size	318 mm x 66 mm $\varnothing$	
Weight	90 g	
Compatibility	NBM-500 series meters	
Country of origin	USA	

(a) Unless otherwise noted specifications apply at reference condition: device in far-field of source, ambient temperature  $23 \pm 3$  °C, relative air humidity 40% to 60%, sinusoidal signal

(b) Cutoff frequency at approx. -3 dB

(c) Within any interval of 10ms an average value of 0.6 W/cm<sup>2</sup> and a peak value of 200 W/cm<sup>2</sup> should not be exceeded

(d) Frequency response can be compensated for by the use of correction factors stored in the probe memory

(e) Accuracy of the fields generated to calibrate the probes

(f) Uncertainty due to varying polarization (verified by type approval test for meter with probe). Ellipse ratio included and calibrated for each probe

(g) The conversion factor of thermocouple sensors is inherently not dependent on environmental temperature

## ORDERING INFORMATION

	Part number
Probe EF5091, E-field for NBM, thermocouple, 300 MHz – 50 GHz, isotropic	<b>2402/03B</b>
Probe EF5091, E-field, ACC - with accredited (DAkkS) calibration, basic unit required	<b>2402/03B/ACC</b>

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