Telemeter Electronic

narda
Safety Test Solutions

Datasheet | Probes ExD-5091

Isotropic measurement of electric fields with shaped frequency response up to 50 GHz

using the Field Meter FieldMan®

The probe contains 6 dipoles, three diode-based for the lower and three thermocouple-based dipoles for the upper frequency range. The correctly tuned overlap of two dipoles, one acting as a high pass filter the other as a low pass filter, provides a frequency sensitivity that mirrors a particular standard. Testing for compliance to that standard is very easy to perform, since you no longer have the need to know the emitted frequency. 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.

- Frequency shaping to match the ICNIRP, FCC, IEEE or Safety Code 6 standard for occupational/ controlled environment
- Results are directly displayed in “% of Standard“
- Precise results without the need to know the emitted frequency
- True RMS value display in the upper frequency range
- 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
- Accredited calibration included

Shaped Probes

The goal in designing and manufacturing a traditional, “flat” frequency response probe is to make the probe equally responsive to energy at every frequency within its rated frequency range. In contrast, Narda’s patented shaped frequency response probes are designed and manufactured so that their sensitivity mirrors the inversely proportional course of a particular standard (or guidance) as closely as possible.

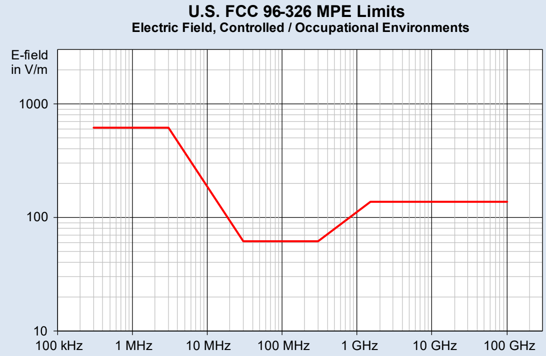
For example, many of the major guidance’s and standards in the world set E-field limits for maximum human exposure at 614 V/m (1000 W/m2) at lower frequencies (~1 MHz). At frequencies of 30 to 300 MHz the limits are typically much lower, 61.4 V/m (10 W/m2), a difference of 20 dB (100 times the power). A shaped frequency response probe designed for such limits is 100 times more sensitive in the 100 MHz region, than at 1 MHz

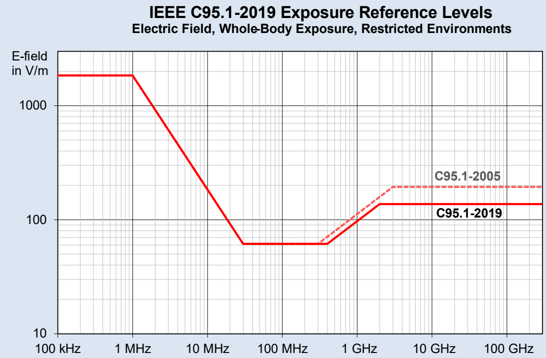
If you were performing a survey of a site with a flat frequency response probe that has both of the above frequency ranges and your survey indicated a measurement result of e.g. 137 V/m (or 50 W/m2), it would be difficult to determine if the site was out of compliance without turning one of the emitters off. Again, given the example above, the site could be generating anywhere from 5% to 500% of the human exposure limit. There are many sites with multiple emissions (rooftops, flight lines, broadcast towers) that have emitters at different exposure limits.

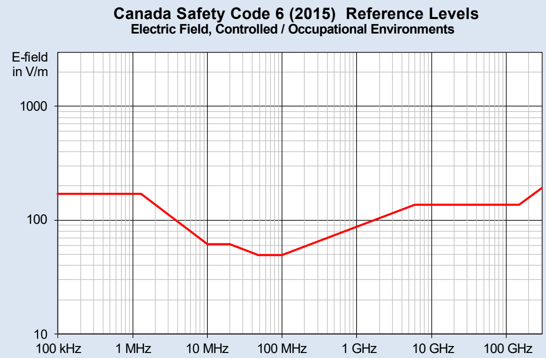
If your interest is general safety measurements, to know if you comply with an exposure limit or not, you will find shaped probes easy to use in any environment. The display of total field strength with shaped probes is not in terms of V/m or W/m2, it is “% of Standard”. So, at a multiple emitter site, a result of 15% is simple to understand. The total detected field strength of each emitter (to its limit, at its frequency) has added up to 15%. Besides the ease of use, the main advantage is that you no longer have the “need to know” the frequency when using a shaped probe.

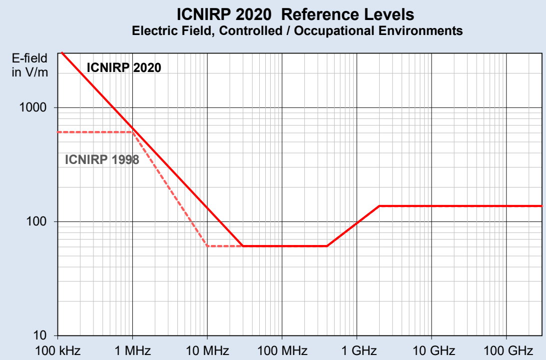
Standard	Probe model	Application
U.S. FCC, 1997	**EAD-5091**	Occupational exposure and controlled environments
IEEE C95.1-2019	**EBD-5091**	
Safety Code 6, 2015	**ECD-5091**	
ICNIRP 2020 compliant with ICNIRP 1998 above 30 MHz	**EDD-5091**	

Table: Standards and matching probe models









Specifications [1]

Product Features	
Frequency range [2]	Probe EAD-5091 (FCC 1997): 300 kHz to 50 GHz, E-Field Probe EBD-5091 (IEEE 2019): 3 MHz to 50 GHz, E-Field Probe ECD-5091 (SC 6, 2015): 300 kHz to 50 GHz, E-Field Probe EDD-5091 (ICNIRP 2020): 1 MHz to 50 GHz, E-Field
Type of frequency response	Shaped, see table on page 2
Measurement range (nom.)	0.8 to 600 % of Standard (TC) (related to the power density), True RMS range Part A (Diodes) 0.8 to 130% [f ≤ 1GHz] | Part B (TC): 0.8 to 600% [f > 1GHz]
Dynamic range (nom.)	29 dB
CW damage level (nom.)	2000 % of Standard
Peak damage level (nom.) [3]	30 dB above Standard
Sensor type	Combined diodes/ thermocouples
Directivity	Isotropic (Tri-axial)
Spatial assessment	Combined 3-axis (RSS)
Sampling rate / integration time (nom.)	5 Hz / 275 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 25% of Standard	typ. ±2 dB of Std. (< 3 MHz) ±2 dB of Std. (3 MHz to 38 GHz) typ. +2/-3 dB of Std. (> 38 GHz)	
Linearity deviation (nom.) Referred to 25% of Standard @ 100 MHz	±3 dB (< 4% of Standard) ±1 dB (4% to 12% of Standard) ±0.5 (12% to 600% of Standard)	
Isotropic deviation [5] Referred to 25% of Standard	±1 dB (10 MHz to 5 GHz)	±1.5 dB (> 5 GHz to 50 GHz)
Temperature response (nom.) [6] Referred to 25% of Standard @ 100 MHz	±0 dB (≥ 2 GHz), ± 0.3 dB (< 400 MHz)	(-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		350 mm x 104 mm Ø
Weight		250 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. -3 dB.
3 Within any interval of 10ms an average value of 0.5 W/cm^2 and a peak value of 100 W/cm^2 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 EAD-5091, FCC 1997 Controlled, Shaped, 300 kHz–50 GHz, E-Field	**2462/07**
Probe EBD-5091, IEEE 2019 Restricted, Shaped, 3 MHz–50 GHz, E-Field	**2462/21**
Probe ECD-5091, SC 6 2015 Controlled, Shaped, 300 kHz–50 GHz, E-Field	**2462/16**
Probe EDD-5091, ICNIRP 2020 Occupational, Shaped, 1 MHz–50 GHz, E-Field (compliant with ICNIRP 1998 above 30 MHz)	**2462/22**

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

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

Telemeter Electronic

Deutschland
Telemeter Electronic GmbH
Joseph-Gänsler-Straße 10
86609 Donauwörth
Telefon +4990670693-0
Telefax +4990670693-50
info@telemeter.de
www.telemeter.info

Schweiz
Telemeter Electronic GmbH
Romanshornerstrasse 117
8280 Kreuzlingen
Telefon +41716992020
Telefax +41716992024
info@telemeter.ch
www.telemeter.info

Tschechische Republik
Telemeter Electronic s.r.o.
České Vrbné 2364
370 11 České Budějovice
Telefon +420385310637
Telefon +420385510143
info@telemeter.cz
www.telemeter.cz