E-Field Probes Types 25, 26 and 27 with shaped frequency response

REG.NO 572 - 02
Wandel & Goltermann Germany

E-Field Probes Types 25, 26 and 27, with shaped frequency response 300 kHz to 40 GHz

For isotropic measurement of electric fields

Type 25, shaped frequency response conforming to

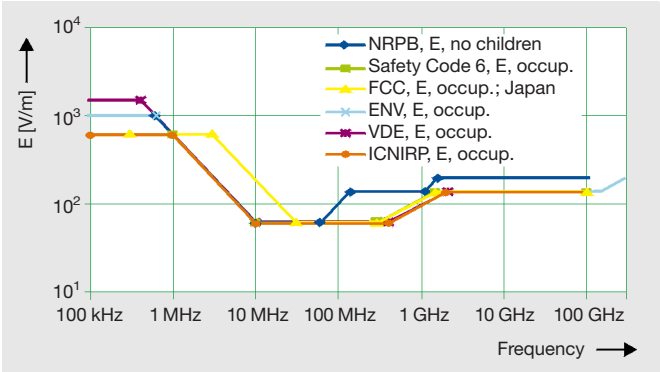
- **FCC 96-326, Aug. 1996, occupational**
- **Japan, RCR-STD-38, working**

Type 26, shaped frequency response conforming to

- **ICNIRP, 1998, occupational**
- **CENELEC ENV 50166-2, Jan. 1995, occupational**
- **DIN VDE 0848, Part 2, 1991, exposure range 1**
- **Canada Safety Code 6, 1993, occupational**

Type 27, shaped frequency response conforming to

- **NRPB, 1993, no children**



Various human safety limit values in the frequency range from 100 kHz to 100 GHz

Applications

These probes are additions to the EMR measuring system. They ideally complement the Personal Monitor (RadMan), which also has a shaped frequency response. The small differences between the characteristics specified by the various standards mean that one probe can be used for the FCC and Japanese Standards and another for the ICNIRP, CENELEC, DIN VDE and Canadian Standards:

Compared with monitor equipment for personal protection, however, the EMR system has a much greater dynamic range, better display resolution and measurement accuracy, and a range of additional functions such as results storage as well as time averaging and spatial averaging.
These shaped frequency response probes deliver a direct display as a percentage of the limit value when used with the EMR-200/-300. Knowledge of field strength limit values is not

Wandel & Goltermann GmbH & Co. Elektronische Meßtechnik | **Postfach 12 62 72795 Eningen, Germany** | **Tel. +49 (0) 7121-86 16 16 Fax +49 (0) 7121-86 14 80** | **e-mail: support@safety-test-solutions.de http://www.safety-test-solutions.de**

required; high field strength areas can be determined quickly and easily. The probes are designed for shaped frequency response measurements of electric fields.
Widely differing frequencies are present in antenna arrays providing various services such as broadcast radio, TV, mobile radio and telecommunications. The limit values for low frequencies up to 3 MHz are much higher than those permitted for the range from 30 MHz up to 300 MHz, for example. Correct weighting of these different signals is only possible if the probe used has a frequency response that corresponds to the shape of the limit value curve. Without needing to know the signal composition, the probe gives you an exact display as a percentage of the standard value, independent of the contributing frequencies. Measurements in a complex environment can thus be made quickly and effectively.

Features
The shaped frequency response probes cover the wide frequency range from 300 kHz to 40 GHz. The measurement range from 0.3% up to 600% of the standard value means that the limit values for occupational, working, exposure range 1, and no children exposure as well as the public exposure limit value, which is one fifth of the occupational limit (i.e. display indicates 20%) can be measured. If a particular signal predominates in the field, values up to 10,000% of the limit value can be measured.

Ruggedness
The probes are mechanically and electrically designed for field use. They can be carried by the probe head without damaging the sensors. The electrical destruction limit is well above the health hazard range, which is not normally reached.

Function
The probes use three separate sensors. The sensor elements for the electric field comprise three dipoles with detector diodes. The three channels are led out separately and processed digitally in the EMR-200/-300. The diode characteristics are compensated out for each channel individually. The three spatial components are then combined as prescribed by the standard to give the equivalent field strength. This ensures that the true RMS value can be represented over a wide measurement range.

True RMS measurement
The special design ensures that the rectifier diodes operate within a range that guarantees excellent “true RMS” performance for values up to 1,000% of the standard limit value. This characteristic has been tested for multi-tone signals. If the probe is used to measure a single, known frequency, the result is valid up to a display value of 10,000%.
Wandel & Goltermann defines “true RMS” performance as a display deviation from the actual RMS value of less than 0.5 dB for a 2-tone signal and less than 1 dB for an 8-tone signal.

Measurement accuracy and calibration
A shaped frequency response probe should be referred to the appropriate standard. As it is technically impossible to generate a characteristic with sharp corners, Wandel & Goltermann uses the closest technically possible approximation to the standard as reference. All error tolerances are referred to this characteristic.

Specifications* of the E-Field Probes **Type 25, 26 and 27**

Sensor type . . . . . electric field (E)

Directional characteristic . . . . . isotropic, 3-dimensional

Frequency range . . . . . 300 kHz to 40 GHz

Display . . . . . power density as a percentage of standard limit value

Measurement range
True RMS . . . . . 0.3% to 600%
CW signals . . . . . 0.3% to 10,000%

Dynamic range . . . . . typically 33 dB true RMS

Absolute error at 100 MHz, 50% of standard . . . . . ±1 dB
Temperature range . . . . . –10 to +55 °C

Linearity
0.3% to 1.3% . . . . . ±3 dB
1.3% to 5% . . . . . ±1 dB
5.0% to 10,000% . . . . . ±0.5 dB

Overload limit protection
CW signals . . . . . 32 dB (< 10 kV/m)
Pulsed signals ($T_i \leq 10$ µs) . . . . . 50 dB(< 100 kV/m)

Thermal response (–10 to +55 °C) . . . . . +0.8/–1dB

Dimensions
Diameter . . . . . 64 mm
Length . . . . . 310 mm

* These specifications apply under the following conditions unless otherwise stated:
The unit is located in the far-field region of a CW source; the probe leads are parallel to the magnetic field component PH; ambient temperature +23 °C ±3 K; relative humidity 25% to 75%.
Detailed technical data available if required.

Ordering information

Standard	Probe type	Order number
FCC 96-326, Aug. 1996, occupational Japan, RCR-STD-38, working	**E-Field Probe Type 25**	**BN 2244/90.62**
ICNIRP, 1998, occupational CENELEC ENV 50166-2, Jan. 1995, occupational DIN VDE 0848, Part 2, 1991, Exposure Range 1 Canada Safety Code 6, 1993, occupational	**E-Field Probe Type 26**	**BN 2244/90.60**
NRPB, 1993, no children	**E-Field Probe Type 27**	**BN 2244/90.68**

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