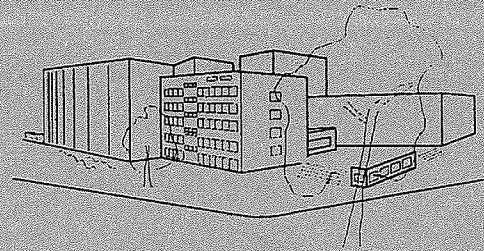


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submitted by: Fischer,
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Report No. 97071

Shielding Effectiveness of the Cases CONCEPTLINE 800 x 600 x 420 und 600 x 400 x 220

Customer: Schroff GmbH
75334 Straubenhardt

Examination Engineers: Dipl.-Ing. P. Fischer
Dipl.-Ing. H. Wolfsperger

This report consists of 9 numbered pages. The examination results are only related to the equipment under test.
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1. Summary

The shielding effectiveness of the cases CONCEPTLINE 800 x 600 x 420 and 600 x 400 x 220 was performed in the frequency range from 30 MHz to 1 GHz.

2. General

Equipment under test: Cases CONCEPTLINE 800 x 600 x 420 and 600 x 400 x 220

Delivery of EUT: October 15, 1997

Place of Examination: Anechoic chamber of the Institute of Electrical Energy
Systems and High-Voltage Technology
University of Karlsruhe
Kaiserstraße 12
76128 Karlsruhe

Date of Examination: October 15, 1997

Representative
Customer: Dipl.-Ing. V. Siemer

Examination
Engineers: Dipl.-Ing. H. Wolfesperger
Dipl.-Ing. P. Fischer

Examination: Shielding effectiveness in the frequency range from
30 MHz to 1000 MHz according to VG 95 373, Part 15.

3. Test Set-Up

The tests were performed in a shielded semi-anechoic chamber lined with absorbers of 1 m length (useful volume approx. $12 \times 4.5 \times 5 \text{ m}^3$, LxWxH). The test equipment consisted of:

- Test receiver ESVP (Rohde & Schwarz).
- Signal generator SMH (Rhode & Schwarz).
- Power amplifiers BTA 01221000 (9 kHz 220 MHz) and BLWA 2010200 (220 MHz ... 1000 MHz) from BONN GmbH.
- Logarithmic-periodical antenna VULP 9118-G (30 MHz - 1100 MHz, 1 kW) from Schwarzbeck as transmitting antenna.

Fig. 1 illustrates the test set-up measuring the shielding performance.

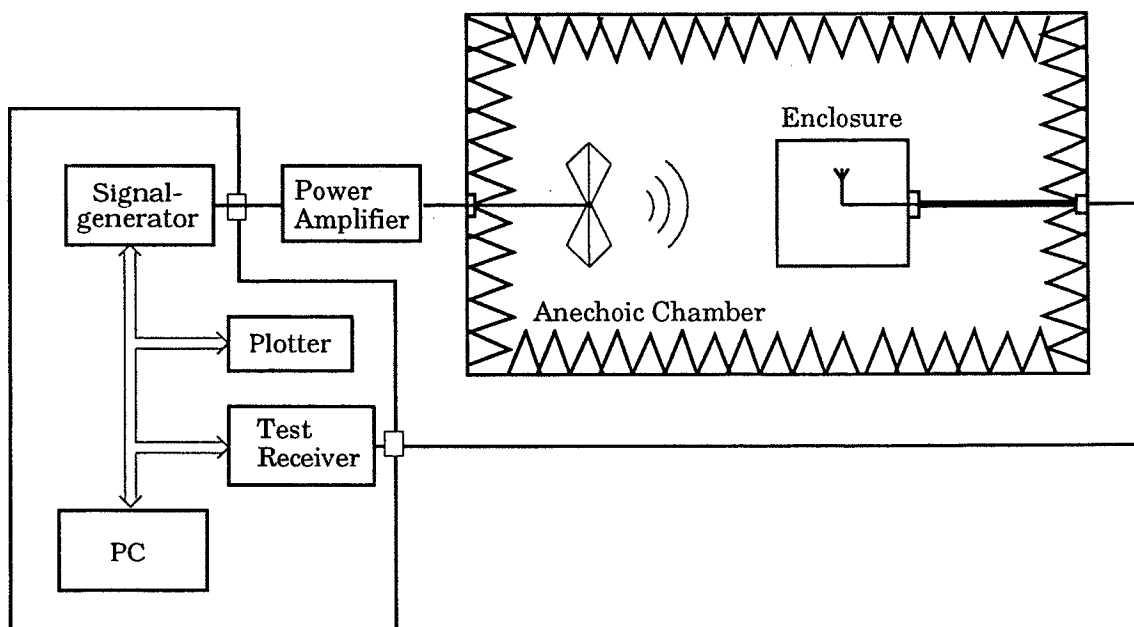


Fig. 1: Test set-up.

The distance between the EUT and the antenna was 3 m, the transmitting antenna was vertically polarized. A receiving antenna was located in the center of the case.

4. Measurement Procedures

4.1 Shielding Effectiveness

The measurement was performed according to the middle point method in the frequency range from 30 MHz to 1 GHz. This method is an insertion loss method. Coupling is first measured with no enclosure present and then with the enclosure inserted. During the measurement the antenna separation and orientation are kept constant.

The enclosure shielding effectiveness is the difference between the reference level A_0 (in the absence of the enclosure) and the level A_1 within the enclosure (Figure 2).

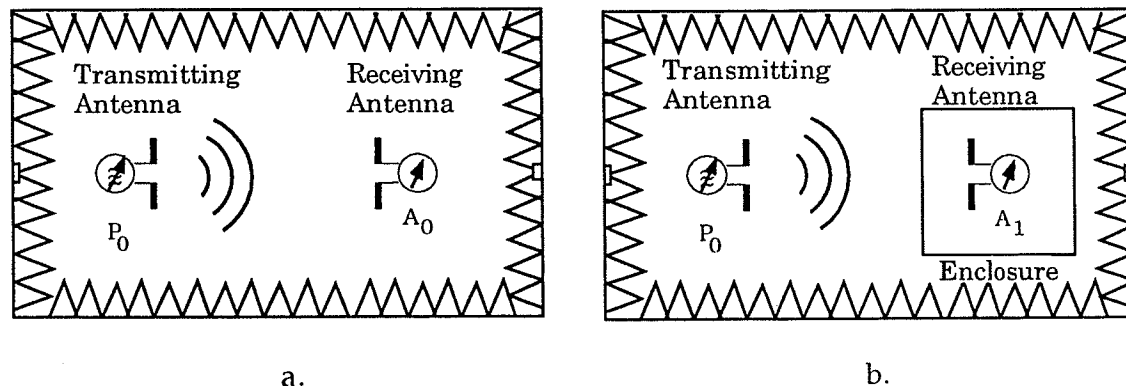


Fig 2: Shielding effectiveness of enclosures.
a) Measurement in the absence of the enclosure. b) Measurement within the enclosure.

The shielding effectiveness is calculated from

$$a_s = A_0 - A_1 \text{ in dB.}$$

4.2 Dynamic Range

The *dynamic range* is determined as the difference between the reference level A_0 and the level measured without receiving antenna. It depends on the noise level of the equipment (e.g., the shielding effectiveness of the cables and the intrinsic noise of the receiver). The dynamic range takes into account the maximum shielding effectiveness which can be measured with the actual test set-up. Fig. 3 illustrates the dynamic range, which is more than 95 dB in the frequency range from 30 MHz to 1 GHz.

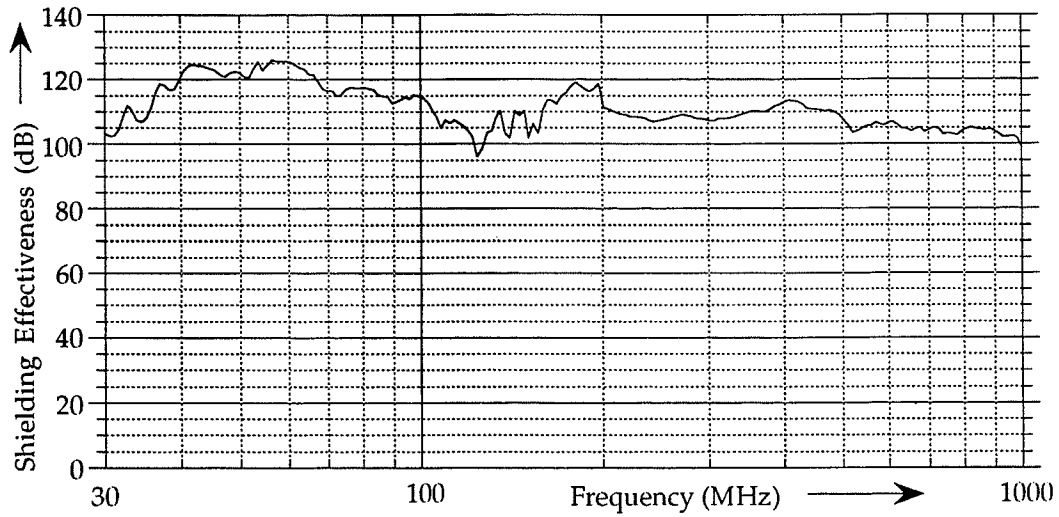


Fig. 3: Dynamic range for the shielding effectiveness measurement in the frequency range from 30 MHz to 1 GHz, vertical polarization.

4.3 Measurement Results

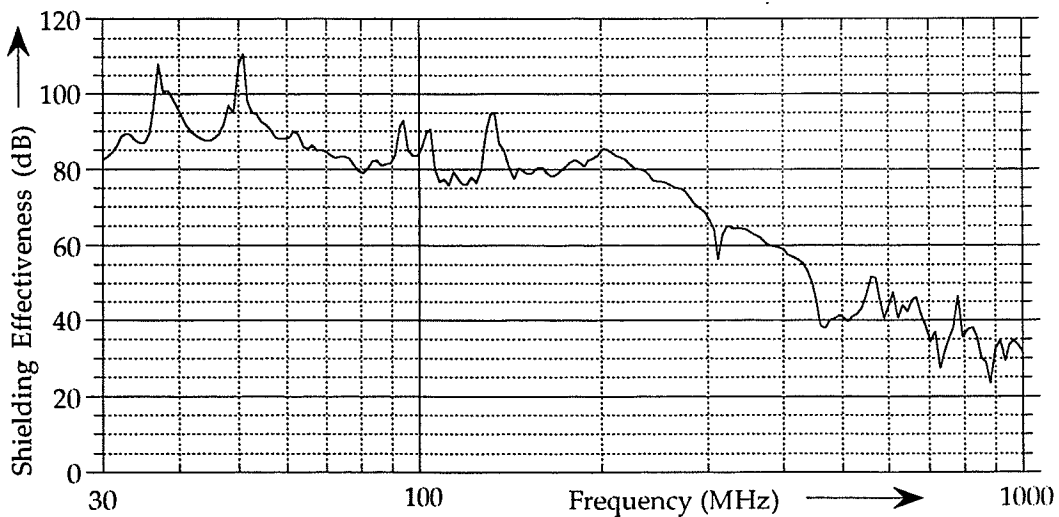


Fig. 4: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 800 x 600 x420, direct radiation on the rear side, vertical polarization.

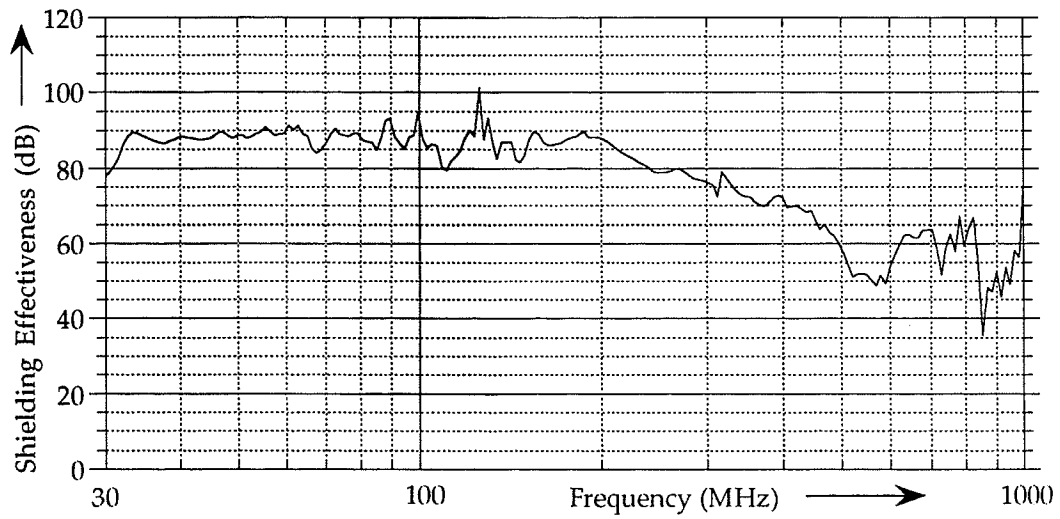


Fig. 5: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 800 x 600 x420, direct radiation on the right side, vertical polarization.

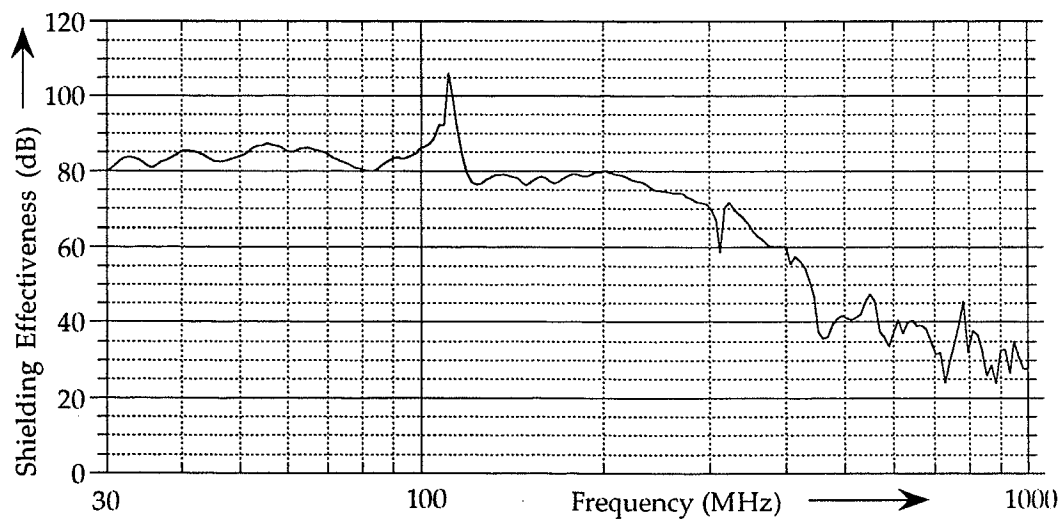


Fig. 6: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 800 x 600 x420, direct radiation on the front side, vertical polarization.

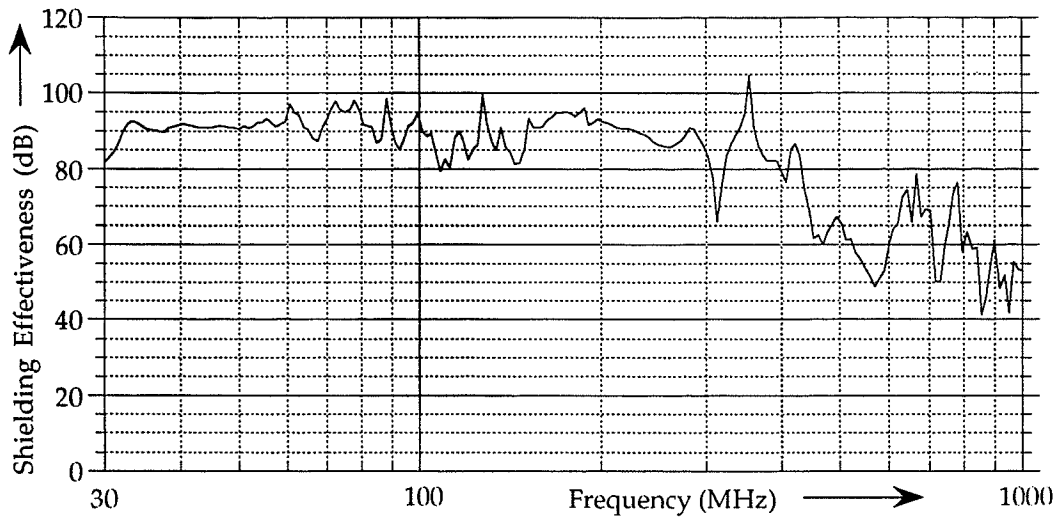


Fig. 7: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 800 x 600 x420, direct radiation on the left side, vertical polarization.

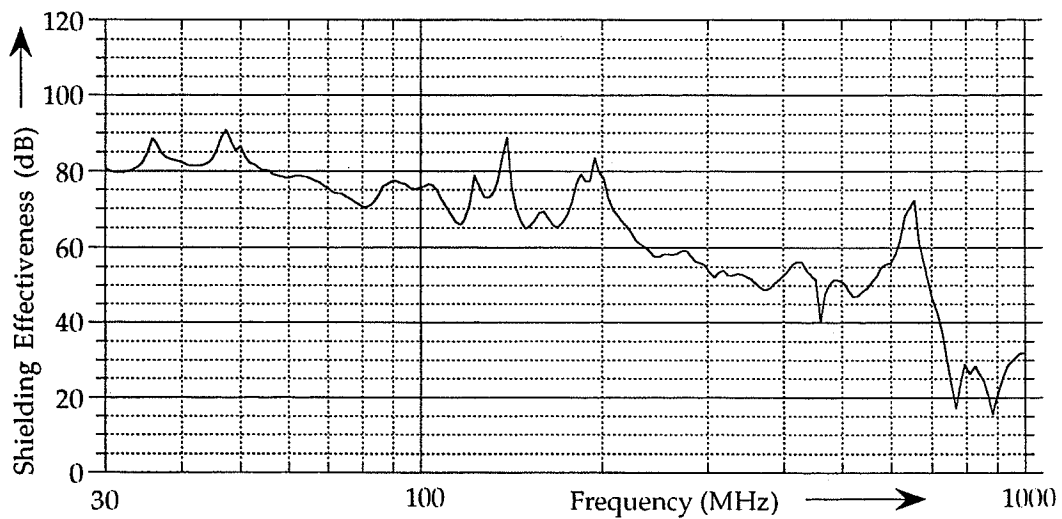


Fig. 8: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 600 x 400 x220, direct radiation on the rear side, vertical polarization.

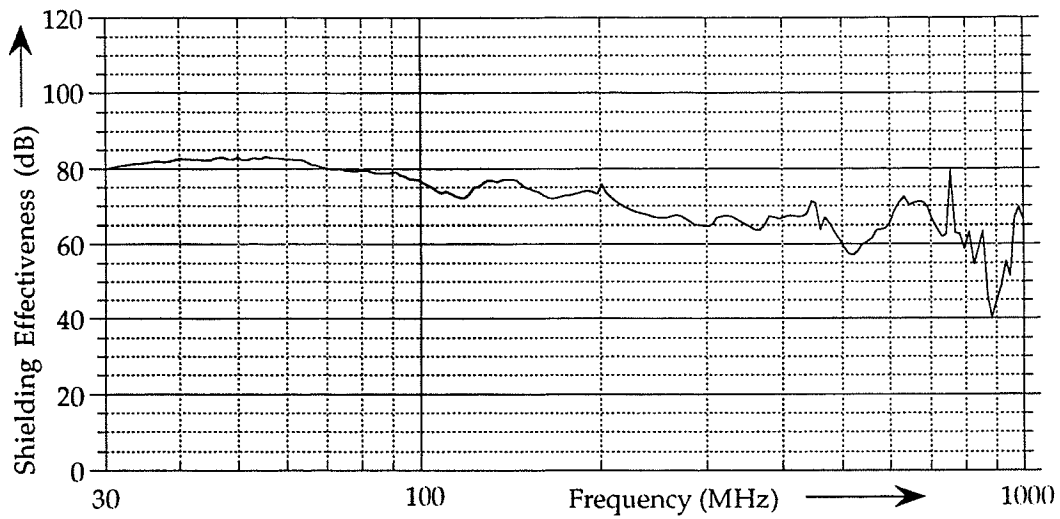


Fig. 9: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 600 x 400 x220, direct radiation on the right side, vertical polarization.

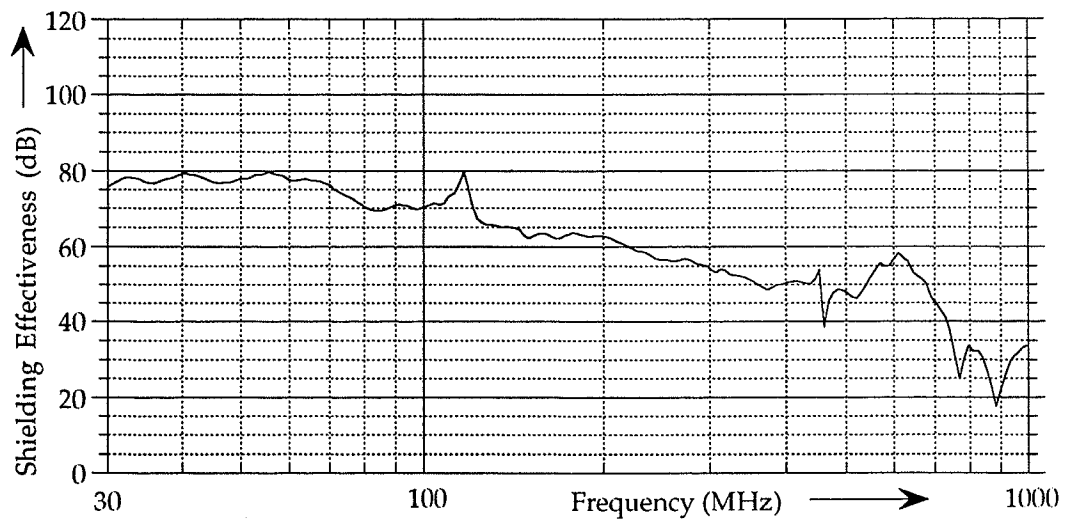


Fig. 10: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 600 x 400 x220, direct radiation on the front side, vertical polarization.

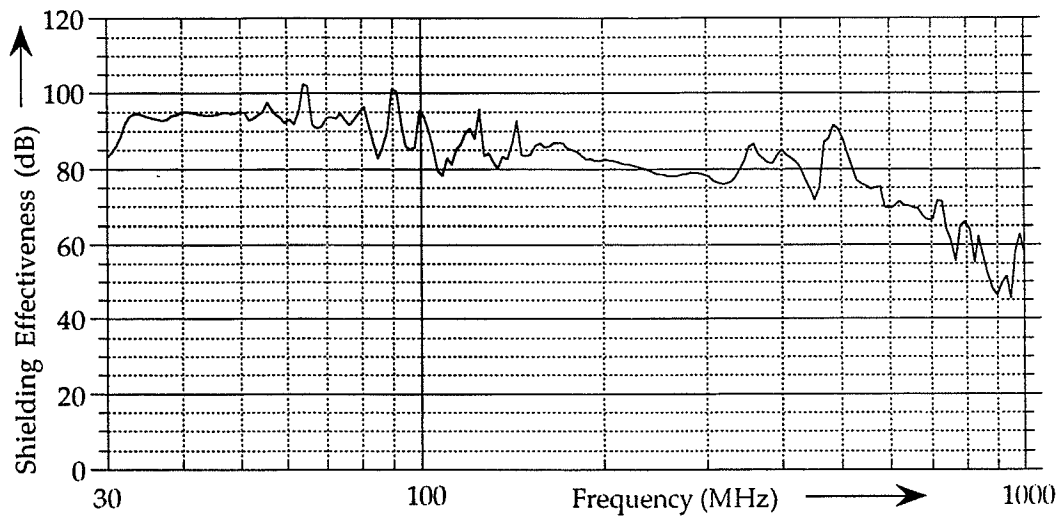



Fig. 11: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, case CONCEPTLINE 600 x 400 x220, direct radiation on the left side, vertical polarization.


November 10, 1997, Karlsruhe



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