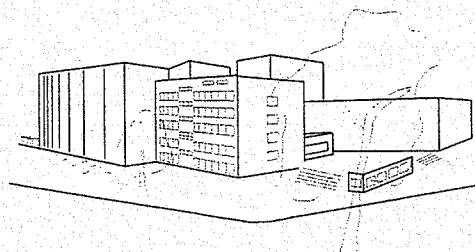


# Bereich EMV-Prüftechnik

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April 15, 1997  
submitted by: Fischer,  
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## Report No. 97029

### Shielding Effectiveness of the Cabinet proline 600x600x1800

Customer: Schroff GmbH  
75334 Straubenhardt

Examination Engineers: Dipl.-Ing. P. Fischer  
Dipl.-Ing. J. Bernauer

This report consists of 7 numbered pages. The examination results are only related to the equipment under test.

Without permission of the examination engineers it is not allowed to extract copys from this report.

## 1. Summary

The shielding effectiveness of the cabinet proline 600x600x1800 was performed in the frequency range from 30 MHz to 1 GHz.

## 2. General

Equipment under test: Cabinet proline 600x600x1800

Delivery of EUT: April 10, 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: April 10, 1997

Representative  
Customer: Dipl.-Ing. Siemer

Examination  
Engineers: Dipl.-Ing. J. Bernauer  
Dipl.-Ing. P. Fischer

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

Climate Conditions: Temperature 24 °C Humidity 56 %

## 3. Test Setup

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 setup measuring the shielding performance.

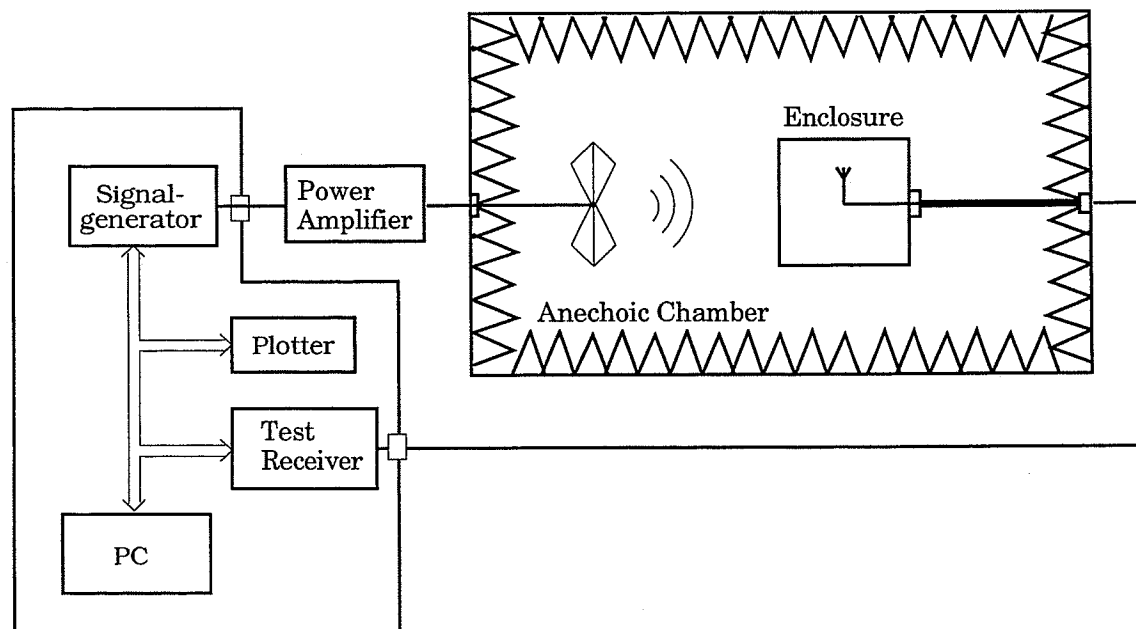


Fig. 1: Test setup

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 cabinet.

## 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 a 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).

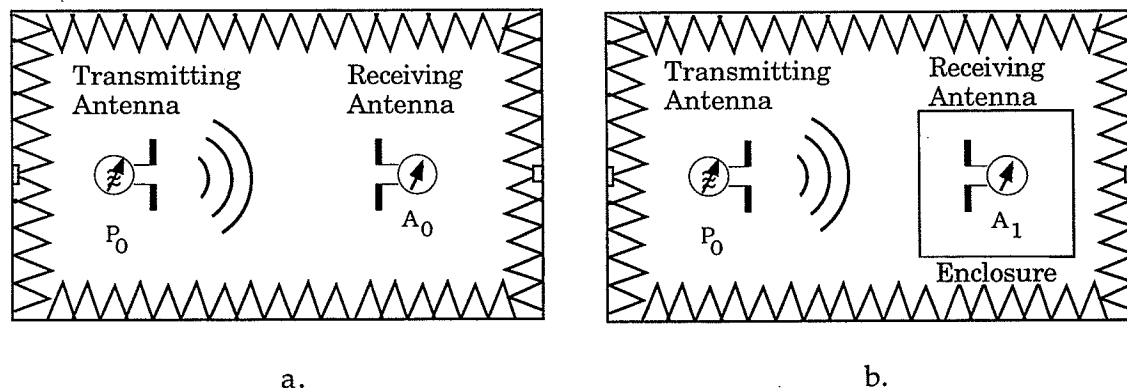


Fig 2: Shielding effectiveness of enclosures.

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 setup. Fig. 3 illustrates the dynamic range, which is more than 90 dB in the frequency range from 30 MHz to 1 GHz.

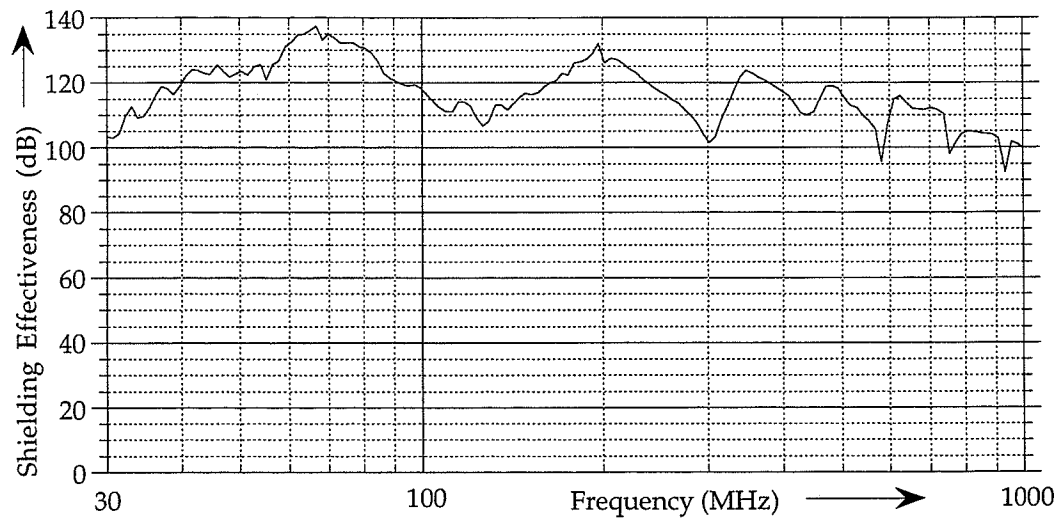


Fig. 3: Dynamic range for the shielding effectiveness measurement in the frequency range from 30 MHz to 1 GHz, vertical polarization.

## 4.3 Measurement Results

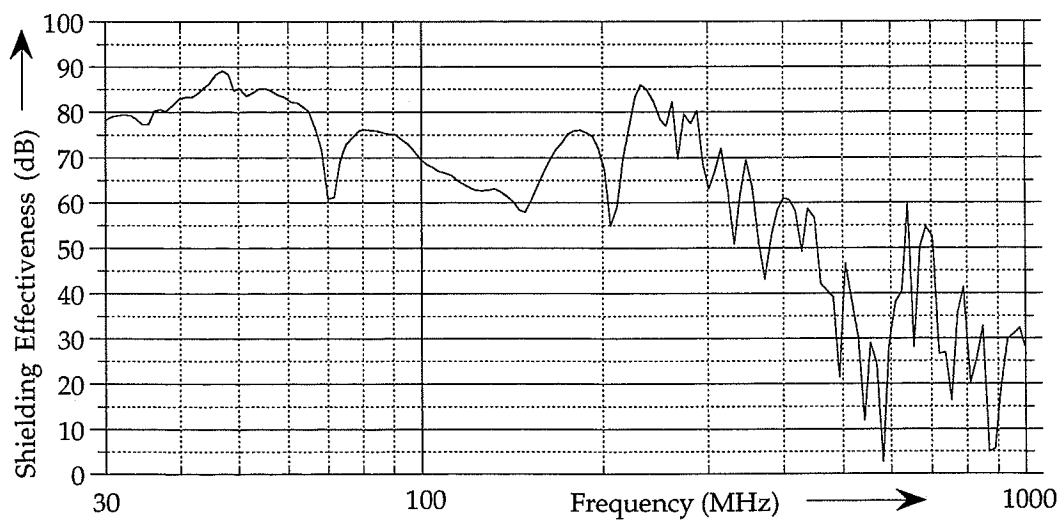


Fig. 4: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, cabinet proline 600x600x1800, direct radiation on the right side, vertical polarization.

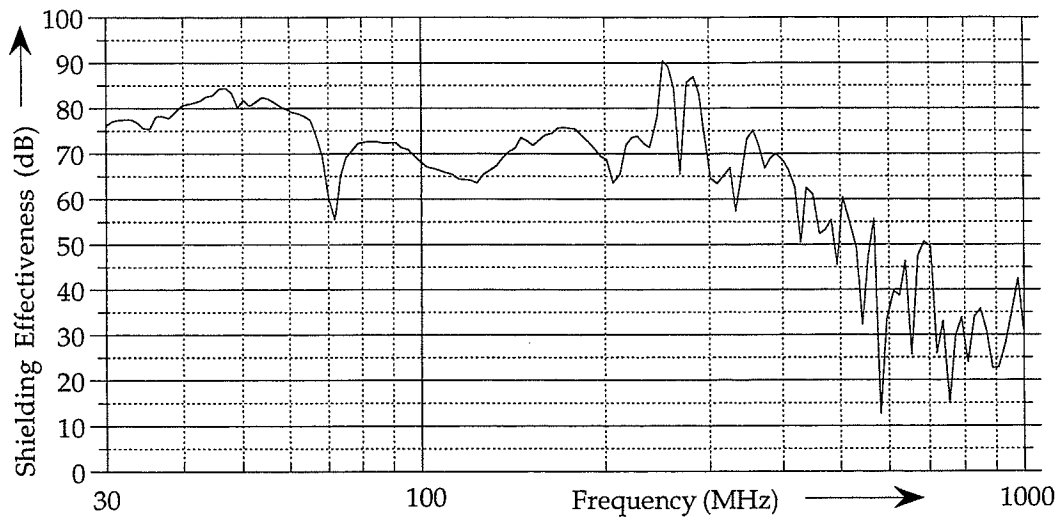


Fig. 5: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, cabinet proline 600x600x1800, direct radiation on the left side, vertical polarization.

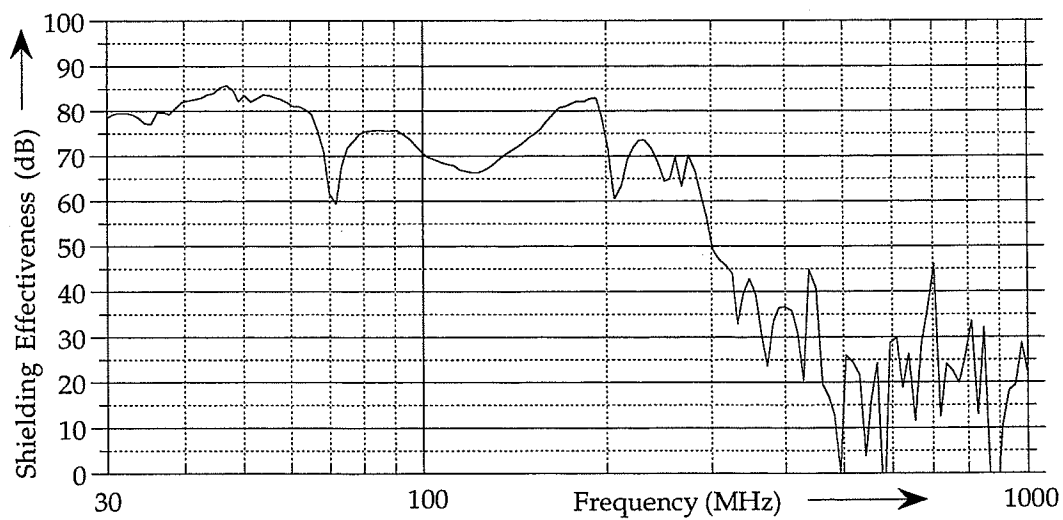


Fig. 6: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, cabinet proline 600x600x1800, direct radiation on the front side, vertical polarization.

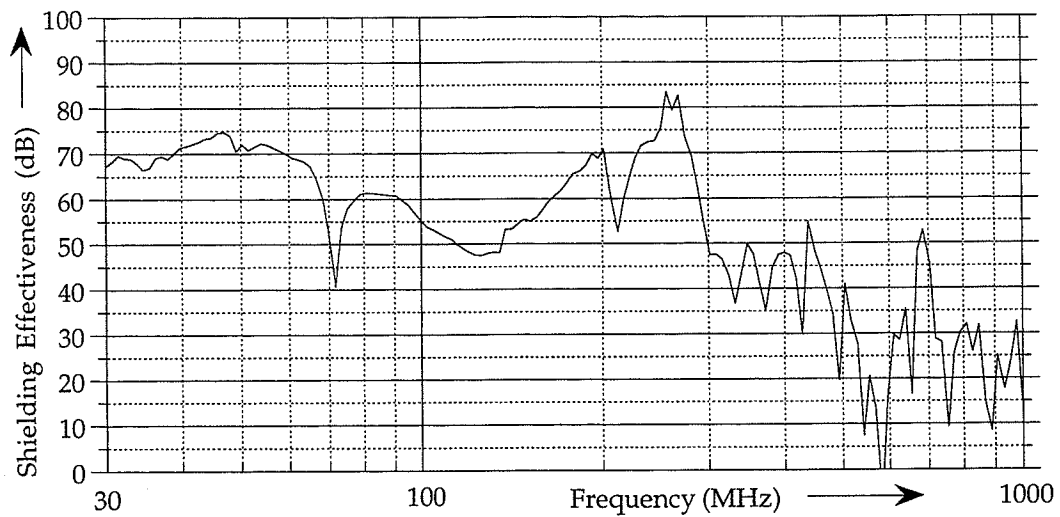
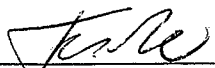
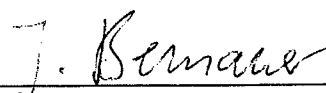
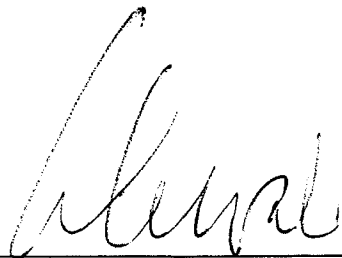


Fig. 7: Shielding effectiveness, frequency range from 30 MHz to 1 GHz, cabinet proline 600x600x1800, direct radiation on the rear side, vertical polarization.

April 15, 1997, Karlsruhe

  
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