Draft CD for the insertion loss measurement of common mode absorbing devices (CMAD) in the frequency range 30MHz to 1000MHz

5.XX Insertion loss measurement of common mode absorbing devices (CMAD)

5.XX.1 Application of the CMAD

The CMAD are used according to CISPR 22 Amendment 1 during radiated emission measurement as cable terminations on the cables leaving the test setup. The basic aim of the CMAD is to avoid uncontrollable influence of the unknown total common mode impedance at the point where the cables leave the turntable.

Other applications of the same devices are:
- cable termination for radiated emission measurements in fully anechoic chambers
- cable termination for radiated immunity tests
- use as "secondary absorbing device" for the absorbing clamp measurement method

Note:
The verification and calibration of the absorbing clamp used for the interference power measurement is described in CISPR 16-1 clause 5.3 and Annex H.

5.XX.2 Test set up for the insertion loss measurement

The specification is given as insertion loss in a 50 Ohm system.

The basic test setup is given in Fig YY(1) and Fig YY(2)

The reference measurement (Fig YY(2)) is performed without the test jig by connecting the two 10dB attenuators directly together.

As measurement equipment for the attenuation measurment the following instruments can be used:
- Network analyser
- Spectrum analyser with tracking generator
- Measurement receiver with tracking generator

Note:
If a network analyzer is used and if the calibration of the network analyzer includes the cables up to the connections of the test jig, the 10dB attenuators are not necessary.

The basic dimensions of the testjig are given in Fig. YY 3.

The testjig is adapted in length to the size of the device under test in such a way that the distance between the electrically active parts of the CMAD (normally the end of the ferrite cores) is 30mm+/-5mm.

It is recommended that the position of the end of the electrically active parts is marked by a "reference point" at the surface of the CMAD.

The test wire shall have an outside diameter of 4 mm +/-0.3 mm.
Using the outside surface of a typical coaxial cable is a practical example of such a test wire.

The heigth of the testwire connection above the ground reference plane is 65mm+/-1mm. This allows to use the testjig to be used for different forms of CMAD including the secondary absorbing device and the absorbing clamp used in the absorbing clamp measeurement (CISPR 16-1, clause 5.3 and Annex H). The position of the CMAD has to be adapted by insulation material in order to fit the higth of the testwire in the jig (see Fig. YY 3)

A test jig with adaptable length can be realized by using two metal angles in combination with a metallic groundplane. The contact of the vertical part of the metal angles to the ground plane is important and should be insured by placing appropriate metal weigths or by screwing the metal angle to the groundplane at the position given by the CMAD dimensions.

A possible realisation of the test wire connection in the jig is shown in Fig. YY 4

5.XX.3 Measurement procedure for the insertion loss measurement

The insertion loss measurement is the difference between the attenuation of the system including the device under test in the test jig (setup Fig. YY 1), minus the attenuation if the two 10dB attenuators are directly connected together (setup Fig. YY 2).

5.XX.4 Specification

The insertion loss should be higher than 20dB in the frequency range 30MHz to 1000MHz.

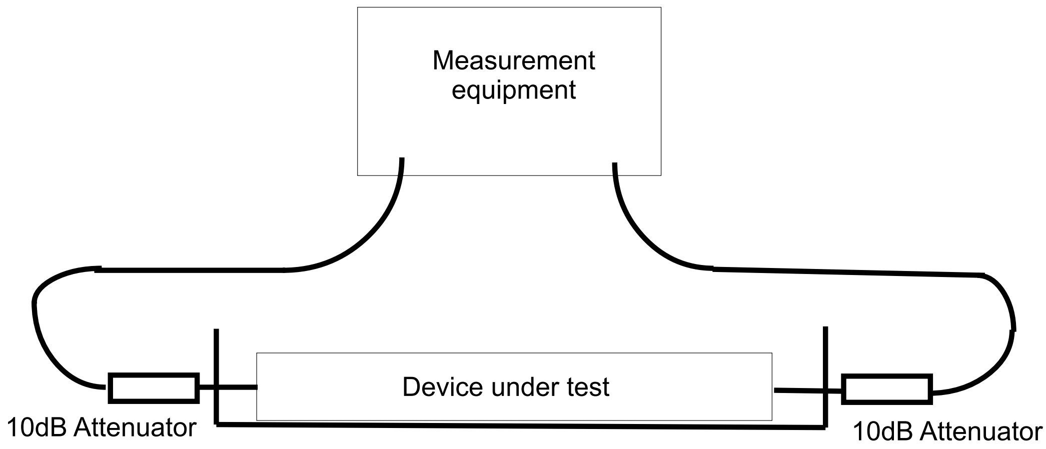


Fig. YY 1 Basic test setup for the insertion loss measurement in the testjig

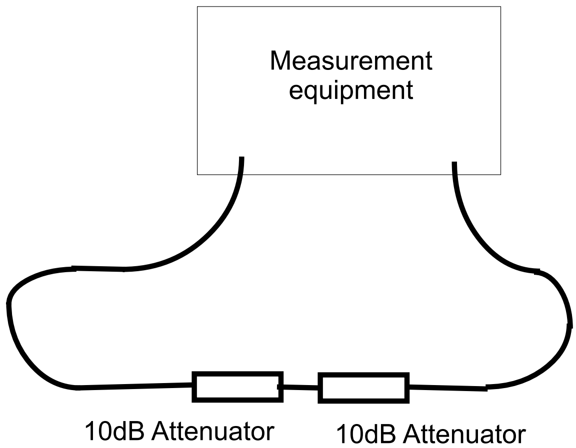


Fig. YY 2 Test setup for the reference measurement without Testjig

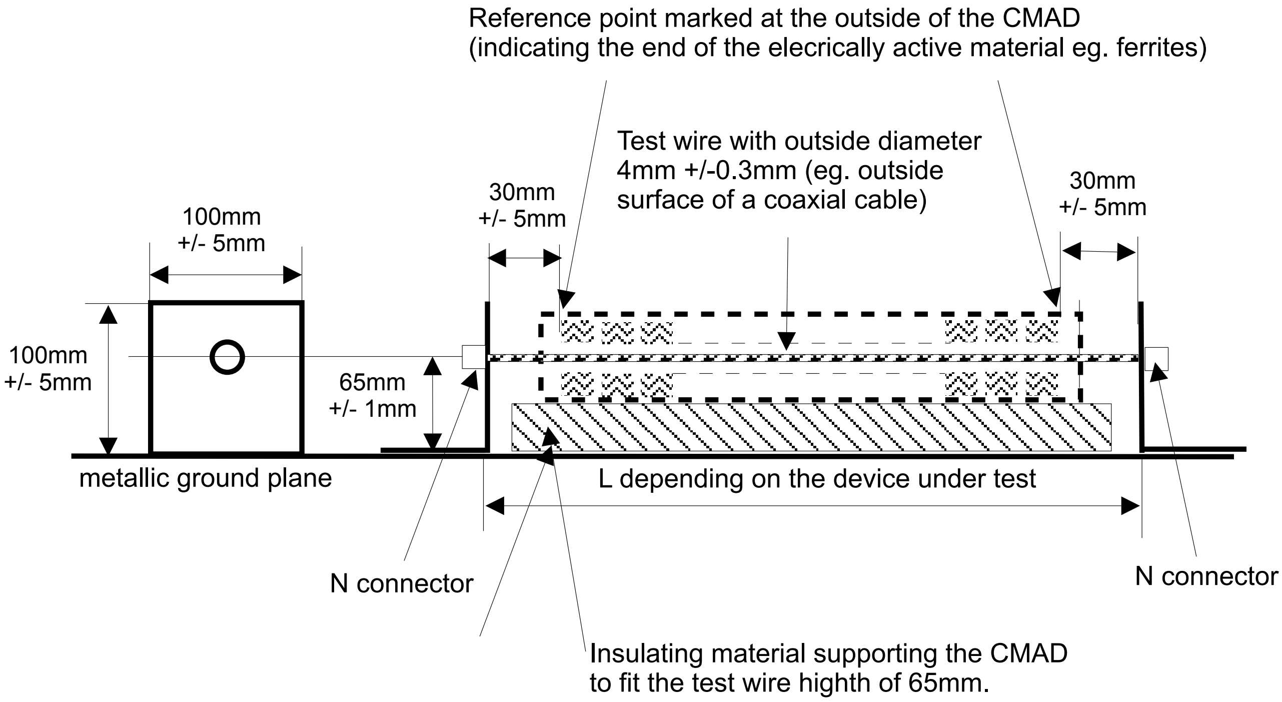
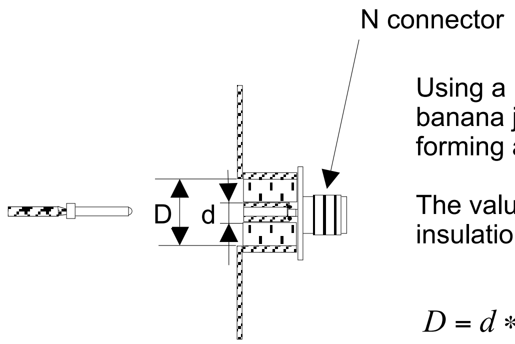


Fig. YY 3 Basic dimensions of the test jig



Using a banana plug soldered to the test wire and a banana jack integrated into the test jig connection, forming a 50 Ohm adaptor.

The value of D has to be selected depending on the insulation material in order to create a 50 Ohm line.

$$D = d * e^{0.833 * \sqrt{\varepsilon_r}}$$

Fig. YY 4 Possible realization of the testwire connection in the jig