

Nemko EMC Newsletter

Volume 3, Issue 2

May 2001

EN 55022 Section 9.5: Telecom lines

The CISPR 22:1997 / EN 55022:1998 specifies conducted emission measurements on “Telecommunications lines”. There are several inconsistencies in the standard, leading to different interpretations from one laboratory to another.

In order to align as many labs as practicable, Nemko will suggest the following detailed procedures for balanced twisted pair cables.

Balanced 1- and 2-pair lines.

The preferred method is to use the ISN networks specified in section 9.5.2 in the standard. Such ISNs are now commercially available from at least 3 vendors.

Table-top equipment, ISN setup:

The preferred setup is according to Figure 4 in the standard (see below).

Setup and procedure:

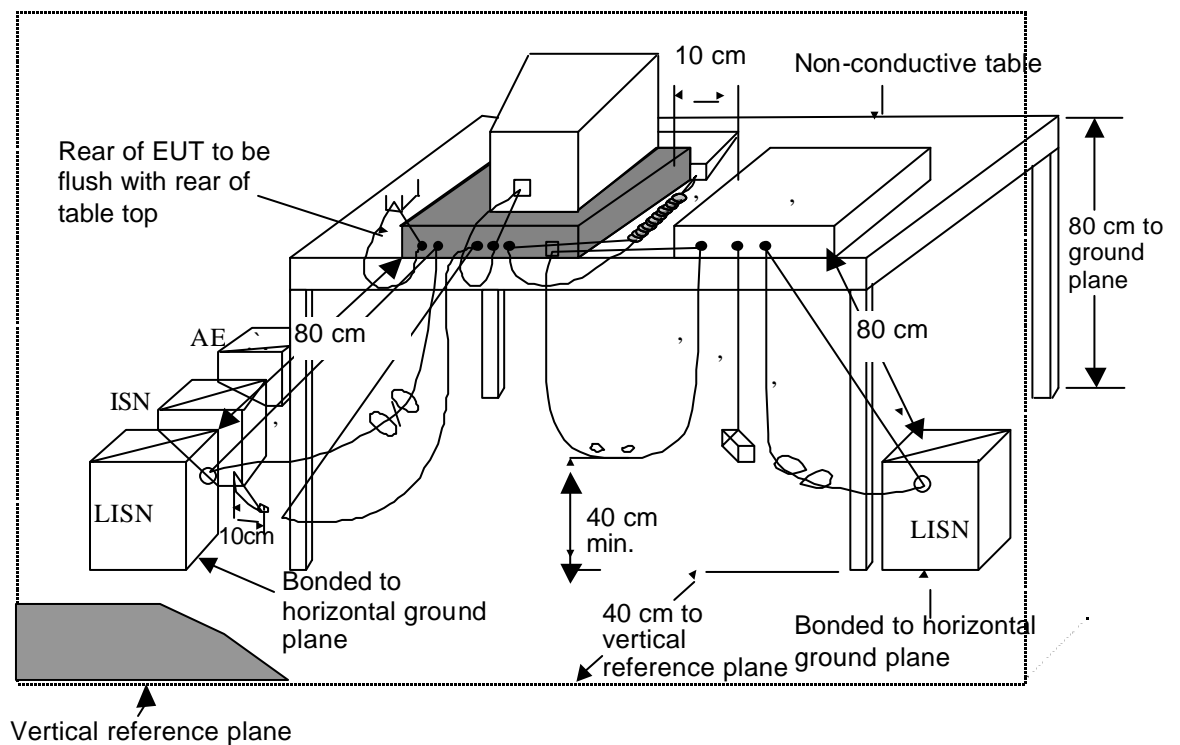
1. The EuT is mounted on an 80 cm high, non-conductive table. The table stands on the reference ground floor.
2. The EuT is placed 40 cm from the vertical reference plane (the chamber wall)
3. A LISN (AMN) is bonded to the reference ground floor and used for the EuT power supply.
4. The shortest distance EuT-to-LISN (corner-to-corner) shall be 80 cm.
5. The mains cord is exactly 100 cm long (if possible. Bundling of longer cables are not recommended, and only acceptable in case the EuT has a fixed mounted cable longer than 100 cm. Detachable cable is replaced with the dedicated 100 cm cable))
6. Mount the ISN bonded to the floor, and at 80 cm distance from the EuT (corner-to-corner)
7. Mount a 100 cm long (dedicated) UTP cable from the EuT to the ISN, of the same category as specified for the EuT. (Category 3 or category 5 cable, as applicable).
8. Use the ISN adaptor for the category cable the EuT has been specified for (For Cat 3 cable, use adaptor named 50/25 dB, for Cat. 5 cable, use adaptor named 60/35 dB, for other types of UTP, use 60/35 dB adaptor). Alternative 1 in section 9.5.1.1 should be reserved for diagnostic as described under “High-speed service
9. The AE is placed away from the table, preferable outside the measurement area (but normally inside the chamber as it would otherwise require filters at the chamber penetration).
10. The AE is powered (if applicable) from a second LISN; its RF port is terminated in 50 ohms.
11. The cable from the ISN to the AE may be any length convenient for connection. There is no reason for excessive length, however. The cable should preferably be of the same category as the EuT cable.
12. The EuT and AE combination is set up with traffic as per the standard (10% load), and the EuT is exercised to cover all operating modes while maintaining the traffic on the network line. (See also: “Traffic simulation”).
13. When measuring the mains emitted disturbance, the RF port of the ISN is terminated in 50 ohm. Measurement is as per 9.1 through 9.4.
14. When measuring the network port, the RF port of the LISN is terminated in 50 ohm. Measurement is as per section 9.5.3.1.

Note: Both the LISN and the ISN networks shall be installed during measurement. This is shown clearly in Figure 4, so there should be no room for any other interpretation. The disadvantage is that EuTs that has been tested previously according to the 1994 version of the standard has been tested without the ISN. Since it then passed the test for mains conducted disturbance, it is desirable to maintain this result, and only extend the test to network ports. However, this is not in compliance with the 1998 version of the standard, and retesting is necessary. It has been reported cases where an EuT tested according to the 1994 version and passed the mains conducted test, now fails the same test due to a stronger current loop via the ISN.

High speed service

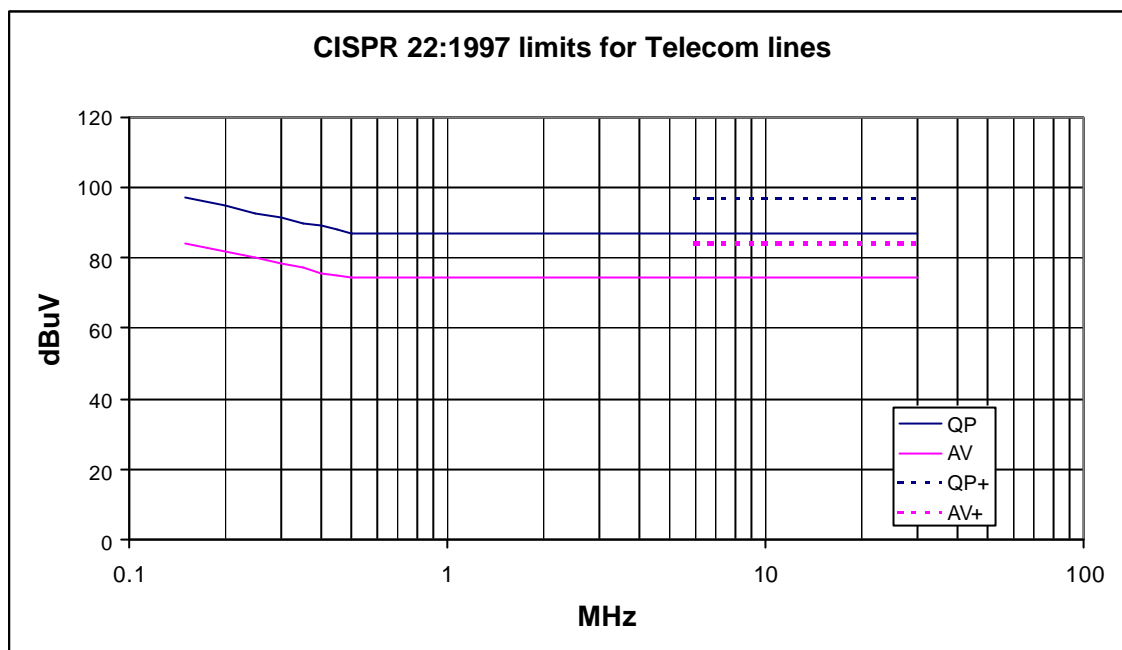
Table 4 has a note 3 stating that for high-speed service, a relaxation of 10 dB may be acceptable under certain conditions, e.g. when the spectral components stem from traffic that has been converted to common mode in the cable. To determine if the relaxation may be used, the following procedure should be followed:

1. Perform the measurement as described above, using the proper ISN adaptor (For Cat 3 cable, use adaptor named 50/25 dB, for Cat. 5 cable, use adaptor named 60/35 dB, for other types of UTP, use 60/35 dB adaptor). If emissions in the frequency range 6 to 30 MHz, is observed above the limit of Table 4, the actual frequencies and levels are noted.
2. Replace the ISN adaptor with the 80/55 dB adaptor (Alternative 1 adaptor) and measure at the specific frequencies found under (1) above.
3. If the levels are reduced by 10 dB or more, the emission may be deemed to stem from the ISN (and hence cable), and the relaxation is permitted. (Since the adaptor has at least 20 dB less coupling, 20 dB would have been expected. Some deviation from theory is accepted, and therefore, a reduction of 10 dB is accepted. If much less than that is observed, it is reason to believe that the emission stems from the EuT, and the relaxation should not be allowed).
 - a. Then, using the results from (1) above, compare the levels with the limit + 10 dB in the range 6-30 MHz. (See graph)
 - b. If the levels are below the new limit, the EuT passes the test.
 - c. If the limit is still exceeded, the EuT has failed the test, and the EuT has to be modified.



AMN = Artificial mains network
AE = Associated equipment
EuT = Equipment under test
ISN = Impedance stabilization network

Figure 4 of CISPR 22:1997



Conducted emission limits for Telecom. lines