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INTERNATIONAL STANDARD

INTERNATIONAL SPECIAL COMMITEE ON RADIO INTERFERENCE

Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

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COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

Appareils de traitement de l'information – Caractéristiques des perturbations radioélectriques – Limites et méthodes de mesure

SC CIS/I/Publication CISPR 22 (2008), Sixth edition/I-SH 01

INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
CISPR/I/299/ISH	CISPR/I/312/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

Introduction:

At the CISPR SC I plenary, held on the 27th October 2007, a decision was taken to set the maintenance date for CISPR 22, Edition 6 to 2012. As a result the work identified within CISPR/I/279/MCR will not be started for the time being. At the subsequent meeting of CISPR SC I WG3 it was decided that certain items within the MCR would benefit now from further clarification and an interpretation sheet would be helpful to users of the standard, with the intent of including this information in a future amendment to the standard.

This information does not change the standard; it serves only to clarify the points noted.

CISPR SC I WG3 hopes that these clarifications will be of use to users and especially laboratories testing to CISPR 22, Edition 6.0. The document is based on the comments received on CISPR/I/290/DC.

Interpretation:

1. Selection of Average detector

CISPR 22 defines limits for radiated emissions at frequencies between 1 GHz and 6 GHz with respect to both average and peak detectors. CISPR 16-1-1 defines two types of Average detector for use above 1 GHz. For the limits given in CISPR 22 the appropriate average detector is the linear average detector defined in 6.4.1 of CISPR 16-1-1:2006 with its Amendments 1:2006 and 2:2007.

2. Measurement of conducted emissions on cabinets containing multiple items of equipment

Where the EUT is a cabinet or rack that contains multiple items of equipment that are powered from an AC power distribution strip and where the AC power distribution strip is an integral part of the EUT as declared by the manufacturer, the AC power line conducted emissions should be measured on the input cable of power distribution strip that leaves the cabinet or rack, not the power cables from the individual items of equipment. This is consistent with the requirements in 9.5.1 paragraph 1 and sub paragraph c).

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INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

INTERPRETATION SHEET 2

This interpretation sheet has been prepared by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
CISPR/I//323/ISH	CISPR/I/326/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

Introduction

At the CISPR SC I plenary, held on the 27th October 2007, a decision was taken to set the maintenance date for CISPR 22, Edition 6 to 2012. As a result the work identified within CISPR/I/279/MCR will not be started for the time being. At the subsequent meeting of CISPR SC I WG3 it was decided that 3 items within the MCR would benefit now from further clarification and an interpretation sheet would be helpful to users of the standard, with the intent of including this information in a future amendment to the standard.

The first draft of an interpretation sheet CISPR/I/290/DC addressed the 3 items, however it was clear from the comments received (CISPR/I/293A/INF) that further work was required on the 3rd item related to ISN selection, and it was decided that this would be the subject of a separate document.

This information does not change the standard; it serves only to clarify the points noted.

CISPR SC I WG3 hopes that these clarifications will be of use to users and especially laboratories testing to CISPR 22:2008 (Edition 6.0).

Selection of ISN for unscreened balanced multi-pair cables

Subclause 9.6.3.1 of CISPR 22 states that:

> *"When disturbance voltage measurements are performed on a single unscreened balanced pair, an adequate ISN for two wires shall be used; when performed on unscreened cables containing two balanced pairs, an adequate ISN for four wires shall be used; when performed on unscreened cables containing four balanced pairs, an adequate ISN for eight wires shall be used (see Annex D)"*

Therefore the selection of ISN is based on the number of pairs physically in the cable, not the number of pairs actually used by the interface in question.

However, selection of a suitable ISN design from the examples given in Annex D requires further consideration. The ISN designs given in Figures D.4 to D.7 are only appropriate for use where all of the balanced pairs in the cable are 'active' and hence their use requires a more detailed knowledge of the EUT port being tested. The ISN designs given in Figures D.1 to D.3 have no such limitation and are better suited to applications where the actual use of the pairs is unknown.

The ISN designs given in Figures D.2 and D.3 are also suitable for measurements on unscreened cables containing fewer balanced pairs than the maximum number of pairs the ISN is designed for (see example 2).

The following definitions have been developed to help in determining what should be considered an 'active' pair of conductors:

> An **active pair** is a pair of conductors that completes an active digital, analogue, or power circuit, or is terminated in a defined impedance, or is connected to earth or the equipment frame/chassis.
>
> NOTE These circuits include such applications as "Power over Ethernet".
>
> A circuit is an a**ctive circuit** when it is in a state that is performing its intended function, which may include communications, voltage/current sensing, impedance matching or power supply.
>
> NOTE A conductor with no intended function is not part of an active circuit.

A measurement using an ISN described in Figures D.4 to D.7, when not all of the pairs are 'active', may result in a significant error in the measured emissions. It is therefore important that test laboratories determine on which of the designs given in the annexes their particular ISNs are based. From this they can then determine if they need to establish the number of 'active' pairs within the cable or not and then whether their ISNs are suitable for the port being measured or whether an alternative measurement technique needs to be used.

This is applicable when measuring in accordance with 9.6.3.1 or 9.6.3.2.

It is recommended that test reports should make reference to:

- the ISN category used;
- the Annex D figure corresponding to their particular ISN design;
- the total number of pairs in the cable and number of these that where active.

Example 1:

The EUT has an Ethernet port to which either a CAT 5 or 6 cable is connected. Typically these cables have four pairs requiring use of a four pair ISN. Transmission using 1000Base-T Ethernet protocol uses all four pairs of a typical cable. Transmission using 10Base-T and 100 Base-T Ethernet protocol uses only two of the four pairs for communication. One of the following ISNs could therefore be used:

1) ISN as shown in Figure D.3, or
2) ISN as shown in Figures D.6 or D.7 if it is known that all the pairs within the cable are 'active'. This would be the case if a 1000BaseT Ethernet protocol were being used. These ISNs would also be suitable for 10BaseT or 100BaseT protocol if the unused pairs have controlled terminations in the EUT port by design, making all pairs 'active' from an EMC perspective.

Should an EUT with an Ethernet port be provided with a cable that contains only 2 pairs within it, then any of the following types of ISN could be used: D2, D3, D4 or D5.

Example 2:

The EUT has a single ADSL port and is provided with a cable containing 2 pairs. ADSL is a single pair system so only 1 pair is active. The following ISNs could be used:

1) ISN as shown in Figure D.2 or D.3.

Cable length between ISN and EUT when measuring telecommunication ports

Subclause 9.5.1 of CISPR 22 requires that the distance between the ISN and the EUT be nominally 0.8m and also clause 9.5.2 states that:

> *"Signal cables shall be positioned for their entire lengths, as far as possible, at a nominal distance of 0,4 m from the ground reference plane (using a non-conductive fixture, if necessary)."*

No other requirement is given on the actual length of the cable to be used.

Measurements have shown that non-inductive bundling of any excess cable can result in slightly higher emission levels measured at the ISN.

It is therefore recommended that the cable between the telecommunication port and the ISN should be kept as short as possible, in order to avoid the need to bundle any excess, while maintaining the requirements given in 9.5.1 and 9.5.2.

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INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

INTERPRETATION SHEET 3

T3his interpretation sheet has been prepared by subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
CISPR/I/402/ISH	CISPR/I/408/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

Introduction:

At the CISPR SC I plenary, held on the 19th October 2011, it was noted that some laboratories and manufacturers are having difficulty understanding Figure C.5 in the standard and are applying the wrong branch in the decision tree to identify the correct method for testing different types of equipment with a telecommunication port .

This information does not change the standard; it serves only to clarify the point noted.

CISPR SC I WG3 hopes that these clarifications will be of use to users and especially laboratories testing to CISPR 22, Edition 6.0 or Edition 5. The document is based on the comments received on CISPR/I/402/ISH.

Interpretation:

Figure C.5 provides a flowchart to correctly identify the process and limits for measuring conducted emissions on a telecommunications port.

The first question to be answered is "*Is the EUT port a telecommunications port as defined in clause 3.6?*" The following interpretation assumes the response to this first question is "yes".

The intention of the next part of the flow chart is to relate the telecommunication port being measured to the type of cable or network to which it is to be connected. The purpose here is to guide the user to the appropriate test method(s) that are defined in the standard for these cable/network types.

The user should determine which of the options given best describes the type of cable or network that the telecommunication port is ultimately connected to. The following interpretations provide further guidance on the cable or network options given:

"*Unscreened balanced pair*" should be interpreted as a cable or network consisting of a single pair or multiple pairs of balanced unscreened twisted pair conductors, for example those categorized as CAT5, CAT6 etc in accordance with ANSI/TIA/EIA-568-A.

"*Screened or Coaxial*" should be interpreted as a cable or network where there is an outer metallic foil or braid that encompasses all the other conductors within the cable.

"*Mains*" should be interpreted as any cable or network that is intended to carry AC mains power, whether or not it carries other signals; generally these contain 2 or 3 untwisted conductors.

"*Other*" should be interpreted as a cable or network whose definition is not covered by the other three definitions. You will note that within the flowchart the user may also be directed to this option when suitable test methods do not exist within the Unscreened balanced pair option.

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