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Methods of measurement and limits for radiated disturbances from plasma display panel TVs in the frequency range 150 kHz to 30 MHz

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

METHODS OF MEASUREMENT AND LIMITS FOR RADIATED DISTURBANCES FROM PLASMA DISPLAY PANEL TVS IN THE FREQUENCY RANGE 150 KHZ TO 30 MHZ

FOREWORD

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IEC/PAS 62825 has been processed by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:
Draft PAS	Report on voting
CISPR/I/417/PAS	CISPR/I/424/RVD

Following publication of this PAS, which is a pre-standard publication, CISPR subcommittee I may decide to incorporate the contents of this PAS as it is, or in a modified form, into CISPR 13 and/or CISPR 32.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

The task of CISPR consists of providing methods of measurement and limits for control and limitation of RF disturbances from electric and electronic equipment, which may cause harmful interference to radio reception in the field. For these purposes CISPR has identified essential EMC emission requirements in the frequency range 9 kHz to 400 GHz.

http://www.iec.ch/Scope of CISPR

In regard of the frequency range up to 30 MHz, minimum emission requirements for radiated RF disturbances have been established for induction cooking appliances (see CISPR 11 and CISPR 14-1) and for lighting equipment (see CISPR 15).

According to the CISPR standardization policy

http://www.iec.ch/emc/pdf/cispr_standardisation_policy.pdf

these requirements shall be regarded as applying, as minimum requirements, to any type of product.

In addition to the above fact it is noted that accurate measurements below 30 MHz are difficult and that the measurement method with the 60 cm loop antenna is not yet described in the CISPR 16 parts.

Historically, emission standards for IT equipment and radio broadcast receivers have addressed limits only for conducted emissions below 30 MHz (CISPR convention). This has been justified by the low “antenna efficiency” of an EUT whose dimensions are small compared with the wavelength of emission concerned, and by limited use of high-power, high frequency electromagnetic components and circuitry within the EUT. However, the introduction of large-scale flat screen displays for many appliances such as TV-sets, traffic management and information systems, monitor walls in professional entertainment, education white boards, etc. calls into question the convention that measurement of disturbance on external cabling is sufficient.

Besides aspects of physical dimension, evolving display technologies too call for a regular re-assessment of the upper justification concerning antenna efficiency. Particular attention should be given to such technological implementations, which use current loops in form of matrices of magnetic dipoles resulting in a large overall magnetic dipole causing significant magnetic field levels.

Users of this specification are hence invited to check whether the classical CISPR convention applies to their display implementations. Depending on the display’s characteristics (voltage, current and size) they may decide, upon their own discretion, that measurements according to this specification can be disregarded, for principle reasons.

During the annual CISPR subcommittee I Working Group (WG) 1 meeting in Sydney in 2007, a Task Force was formed to investigate radiated emissions of large Plasma TV-sets below 30 MHz following several cases of complaints of interference by amateur radio users. The TF met several times and carried out long investigations and round robin exercises in several laboratories in Japan, Korea and Europe. The results of the investigation presented in Lyon in 2009, in Seattle in 2010, showed that supplementary requirements for control and limitation of radiated disturbances from large scale flat screen displays are necessary to enforce CISPR’s mission and policy.

Finally CISPR subcommittee I decided, at its meeting in Seoul in October 2011, that a PAS shall be drafted and provided to the users setting out an interim solution up until CISPR 13 or its successor CISPR 32 is supplemented with appropriate requirements.

Work is ongoing in CISPR subcommittee I and meanwhile also CISPR subcommittee A and CISPR subcommittee H are involved in the process of validating their respective methods of measurement and associated limits.

The limits defined in this PAS have successfully taken the following points into consideration:

a) Table 12 of CISPR 11:2009, Amendment 1 (2010) defines limits for radiated emissions in the frequency range 9 kHz to 30 MHz for induction cooking appliances operating in residential and commercial environments. It is assumed that these limits provide adequate protection of radio reception and so formed basis for the limits in this PAS.

b) Current state of the art of plasma display panel TVs including economically feasible mitigation measures is such that they generate radiated emissions in the frequency range 150 kHz to 30 MHz above the limits of Table 12 of CISPR 11:2009, Amendment 1 (2010). Additionally, it is more difficult to mitigate against low frequency magnetic field emissions below approximately 1 MHz. In particular, the emissions at the fundamental operating frequency of the displays cannot be attenuated without unacceptable loss of picture quality.

Therefore a compromise was proposed in CISPR subcommittee I Working Group (WG) 1 to add 10 dB to the limits in Table 12 of CISPR 11:2009, Amendment 1 (2010). Following further discussions and review of measurements obtained from several plasma TVs manufacturers, it was noted that higher frequency emissions were more likely to meet this increased limit. Emissions below 3,5 MHz although typically over the limit were below the lower boundary of commonly-used radio amateur band. Therefore an additional 5 dB increase was allowed in the frequency range 150 kHz to 3,5 MHz and emissions at the fundamental frequency would be exempted from the limit. Although this proposal was not agreed unanimously during drafting of the PAS, consensus was reached.

Therefore the limits defined in this PAS do not provide protection of radio reception in all cases.

METHODS OF MEASUREMENT AND LIMITS FOR RADIATED DISTURBANCES FROM PLASMA DISPLAY PANEL TVS IN THE FREQUENCY RANGE 150 KHZ TO 30 MHZ

1 Scope

This Publicly Available Specification (PAS) applies to plasma display panel TVs which are intended for use in residential or commercial environments, which have a visible display area with a diagonal dimension of 1 m or greater, and which are within the scope of CISPR 13 or CISPR 32.

NOTE Although this PAS is applied to plasma display technology, it should be noted that in any future International Standard, or amendment to existing International Standard, it may be necessary to ensure technology neutrality. To this end, users of this PAS are invited to investigate the compliance of other display technologies with the limits of this PAS. Depending on the characteristics (voltage, current and size) of other display technologies, users may decide, upon their own discretion, that measurements according to this specification are not necessary.

This specification covers emission requirements related to radiated radio-frequency (RF) disturbances in the frequency range 150 kHz to 30 MHz. It specifies suitable limits and methods of measurement for the assessment of radiated RF disturbances.

The requirements specified in this specification are essential EMC requirements which should be met in order to protect radio reception in the frequency range up to 30 MHz at locations where these display devices are operated in the field.

While application of this specification is recommended, the comprehensive set of normative EMC emission requirements is found in CISPR 13 or CISPR 32. Use of this specification does not remove the obligation to apply any other CISPR publication.

The objectives of this specification are:

a) to establish supplementary requirements which provide an adequate level of protection of the radio frequency spectrum, allowing radio reception as intended in the frequency range 150 kHz to 30 MHz;

b) to specify procedures to ensure the reproducibility of measurement and the repeatability of obtained results.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 13:2009, *Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement*

CISPR 16-1-1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*

CISPR 32:2012, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

IEC 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*
Amendment 1:1990
Amendment 2:1998

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161 and CISPR 13, as well as the following apply.

3.1
boundary of the EUT
imaginary circular periphery (circle) just encompassing the equipment under test (EUT), including all interconnecting cables