SLOVENSKI STANDARD

SIST EN 55016-2-1:2005/A1:2005

november 2005

Specifikacija za merilne naprave in metode za merjenje radijskih motenj in odpornosti – 2-1. del: Metode za merjenje radijskih motenj in odpornosti – Merjenje motenj po vodnikih (CISPR 16-2-1:2003/A1:2005)

Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements (CISPR 16-2-1:2003/A1:2005)

ICS 17.220.20; 33.100.20

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SIST EN 55016-2-1:2005/A1:2005(en)

EUROPEAN STANDARD

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EN 55016-2-1/A1

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ICS 33.100.10; 33.100.20

English version

Specification for radio disturbance and immunity measuring apparatus and methods
Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements
(CISPR 16-2-1:2003/A1:2005)

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques
Partie 2-1: Méthodes de mesure des perturbations et de l'immunité - Mesures des perturbations conduites
(CISPR 16-2-1:2003/A1:2005)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit
Teil 2-1: Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Messung der leitungsgeführten Störaussendung
(CISPR 16-2-1:2003/A1:2005)

This amendment A1 modifies the European Standard EN 55016-2-1:2004; it was approved by CENELEC on 2005-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 55016-2-1:2004/A1:2005 E

Foreword

The text of document CISPR/A/582/FDIS, future amendment 1 to CISPR 16-2-1:2003, prepared by CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 55016-2-1:2004 on 2005-08-01.

The following dates were fixed:

– latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-05-01

– latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2008-08-01

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Endorsement notice

The text of amendment 1:2005 to the International Standard CISPR 16-2-1:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CISPR 16-2-1

2003

AMENDEMENT 1
AMENDMENT 1
2005-07

COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Amendement 1

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques –

Partie 2-1:
Méthodes de mesure des perturbations et de l'immunité – Mesures des perturbations conduites

Amendment 1

Specification for radio disturbance and immunity measuring apparatus and methods –

Part 2-1:
Methods of measurement of disturbances and immunity – Conducted disturbance measurements

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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FOREWORD

This amendment has been prepared by CISPR subcommittee A: Radio interference measurements and statistical methods.

The text of this amendment is based on the following documents:

FDIS	Report on voting
CISPR/A/582/FDIS	CISPR/A/597/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

Page 3

Add the title of Annex D as follows:

Annex D (informative) Scan rates and measurement times for use with the average detector

Page 31

6.5.1 Minimum measurement times

Add, after the second paragraph, the following new paragraph:

Scan rates and measurement times for use with the average detector will be found in Annex D.

Page 129

Add, after the existing Annex C, the following new Annex D:

Annex D
(informative)

Scan rates and measurement times for use with the average detector

D.1 General

This annex is intended to give guidance on the selection of scan rates and measurement times when measuring impulsive disturbance with the average detector.

The average detector serves the following purposes:

a) to suppress impulsive noise and thus to enhance the measurement of CW components in disturbance signals to be measured;

b) to suppress amplitude modulation (AM) in order to measure the carrier level of amplitude modulated signals;

c) to show the weighted peak reading for intermittent, unsteady or drifting narrowband disturbances using a standardized meter time constant.

Clause 6 of CISPR 16-2-1 defines the average measuring receiver for the frequency range 9 kHz to 1 GHz.

In order to select the proper video bandwidth and the corresponding scan rate or measurement time, the following considerations apply:

D.1.1 Suppression of impulsive disturbance

The pulse duration T_p of impulsive disturbance is often determined by the IF bandwidth B_{res}: $T_p = 1/B_{res}$. For the suppression of such noise, the suppression factor a is then determined by the video bandwidth B_{video} relative to the IF bandwidth: $a = 20 \lg (B_{res}/B_{video})$. B_{video} is determined by the bandwidth of the lowpass filter following the envelope detector. For longer pulses, the suppression factor will be lower than a. The minimum scan time $T_{s\ min}$ (and maximum scan rate $R_{s\ max}$) is determined using:

$$T_{s\,min} = (k \cdot \Delta f)/(B_{res} \cdot B_{video}) \quad \text{(D.1)}$$

$$R_{smax} = \Delta f / T_{smin} = (B_{res} \cdot B_{video})/k \quad \text{(D.2)}$$

where Δf is the frequency span and k is a proportionality factor which depends on the speed of the measuring receiver/spectrum analyzer.

For the longer scan times, k is very close to 1. If a video bandwidth of 100 Hz is selected, the maximum scan rates and pulse suppression factors in Table D.1 will be obtained.

Table D.1 – Pulse suppression factors and scan rates for a 100 Hz video bandwidth

	Band A	Band B	Bands C and D
Frequency range	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 1 000 MHz
IF bandwidth B_{res}	200 Hz	9 kHz	120 kHz
Video bandwidth B_{video}	100 Hz	100 Hz	100 Hz
Max. scan rate	17,4 kHz/s	0,9 MHz/s	12 MHz/s
Max. suppression factor	6 dB	39 dB	61,5 dB

This can be applied for product standards calling out quasi-peak and average limits in bands B (and C) if short pulses are expected in the disturbance signal. Compliance of the EUT with both limits has to be demonstrated. If the pulse repetition frequency is greater than 100 Hz and the quasi-peak limit is not exceeded by the impulsive disturbance, then the short pulses are sufficiently suppressed for average detection with a video bandwidth of 100 Hz.

D.1.2 Suppression of impulsive disturbance by digital averaging

Average detection may be done by digital averaging of the signal amplitude. An equivalent suppression effect can be achieved if the averaging time is equal to the inverse of the video filter bandwidth. In this case, the suppression factor a = 20 lg (T_{av}*B_{res}), where T_{av} is the averaging (or measuring) time at a certain frequency. Consequently a measurement time of 10 ms will result in the same suppression factor as the video bandwidth of 100 Hz. Digital averaging has the advantage of zero delay time, when switching from one frequency to another. On the other hand, for averaging of a certain pulse repetition frequency f_p, the result may vary depending on whether n or n+1 pulses are averaged. This effect is less than 1 dB, if T_{av}*f_p > 10.

D.2 Suppression of amplitude modulation

In order to measure the carrier of a modulated signal, the modulation has to be suppressed by signal averaging over a sufficiently long time, or by using a video filter of sufficient attenuation at the lowest frequency. If f_m is the lowest modulation frequency and if we assume that the max. measurement error due to the 100 % modulation is limited to 1 dB, then the measurement time T_m should be $T_m = 10 / f_m$.

D.3 Measurement of slowly intermittent, unsteady or drifting narrowband disturbances

In subclause 6.4.3 of CISPR 16-1-1, the response to intermittent, unsteady or drifting narrowband disturbances is defined using the peak reading with meter time constants of 160 ms (for bands A and B) and 100 ms (for bands C and D). These time constants correspond to second order video filter bandwidths of 0,64 Hz or 1 Hz respectively. For correct measurements, these bandwidths would require very long measurement times (see Table D.2).

Table D.2 – Meter time constants and the corresponding video bandwidths and maximum scan rates

	Band A	Band B	Bands C and D
Frequency range	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 1 000 MHz
IF bandwidth B_{res}	200 Hz	9 kHz	120 kHz
Meter time constant	160 ms	160 ms	100 ms
Video bandwidth B_{video}	0,64 Hz	0,64 Hz	1 Hz
Maximum scan rate	8,9 s/kHz	172 s/MHz	8,3 s/MHz

This applies however only for pulse repetition frequencies of 5 Hz or less. For all higher pulse widths and modulation frequencies, higher video filter bandwidths may be used (see D.1.1). Figures D.1 and D.2 show the weighting function of a pulse with 10 ms pulse duration versus pulse repetition frequency f_p with peak reading ("CISPR AV") and with true averaging ("AV") for meter time constants of 160 ms (Figure D.1) and 100 ms (Figure D.2).

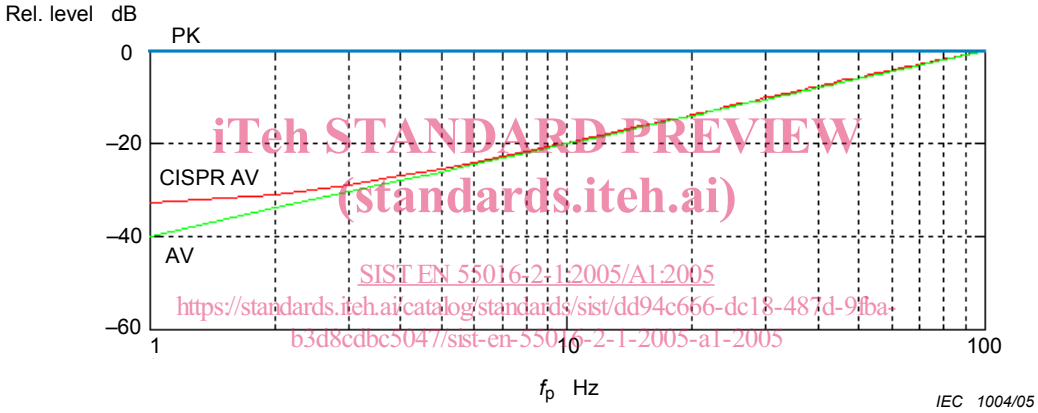

Figure D.1 – Weighting function of a 10 ms pulse for peak ("PK") and average detections with ("CISPR AV") and without ("AV") peak reading; meter time constant 160 ms

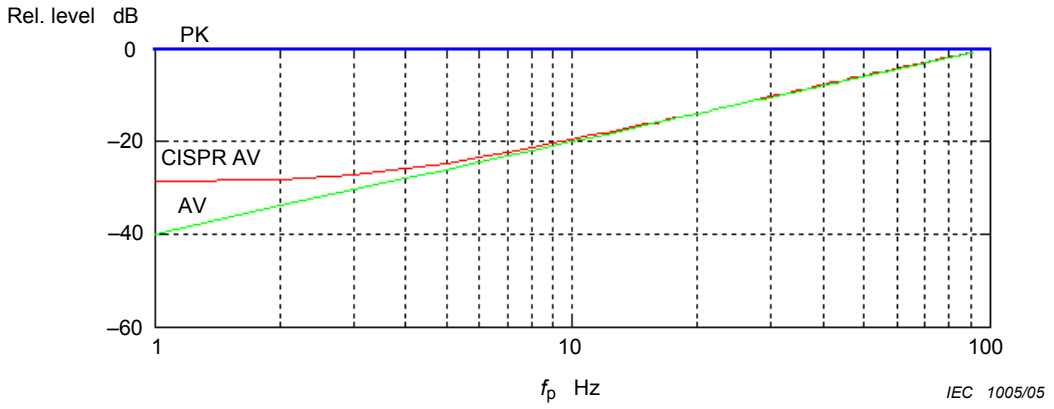

Figure D.2 – Weighting functions of a 10 ms pulse for peak ("PK") and average detections with ("CISPR AV") and without ("AV") peak reading; meter time constant 100 ms