

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

K.80

(07/2009)

SERIES K: PROTECTION AGAINST INTERFERENCE

**EMC requirements for telecommunication
network equipment (1 GHz-6 GHz)**

Recommendation ITU-T K.80



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EMC requirements for telecommunication network equipment (1 GHz-6 GHz)

Summary

Recommendation ITU-T K.80 presents electromagnetic compatibility (EMC) requirements for telecommunication equipment in the frequency range between 1 GHz and 6 GHz.

Source

Recommendation ITU-T K.80 was approved on 14 July 2009 by ITU-T Study Group 5 (2009-2012) under Recommendation ITU-T A.8 procedures.

Keywords

EMC, protection.

FOREWORD

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Introduction

This Recommendation completes the EMC requirements for telecommunication equipment contained in Recommendations ITU-T K.48 and ITU-T K.76, specifying requirements for phenomena at frequencies between 1 GHz and 6 GHz.

Telecommunication equipment can be influenced or can influence the electromagnetic environment at frequencies between 1 GHz and 6 GHz.

The need to analyse this frequency range was highlighted due to the use of radio devices in this frequency range, including mobile phone IMT-2000, wireless LAN and broadband access radio equipment.

The requirements given in specific product family Recommendations supersede those given in this Recommendation.

Recommendation ITU-T K.80

EMC requirements for telecommunication network equipment (1 GHz-6 GHz)

1 Scope

This Recommendation is applicable to telecommunication equipment and considers electromagnetic emission and immunity phenomena at frequencies between 1 GHz and 6 GHz.

EMC emission phenomena below 1 GHz are covered by [ITU-T K.48] and [ITU-T K.76].

EMC immunity phenomena below 2 GHz are covered by [ITU-T K.48] and [ITU-T K.76].

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T K.48] Recommendation ITU-T K.48 (2006), *EMC requirements for telecommunication equipment – Product family Recommendation*.
- [ITU-T K.76] Recommendation ITU-T K.76 (2008), *EMC requirements for telecommunication network equipment – (9 kHz-150 kHz)*.
- [ITU-R SM.329] Recommendation ITU-R SM.329-10 (2003), *Unwanted emissions in the spurious domain*.
- [CISPR 16-2-3] CISPR 16-2-3 (2006), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*.
- [CISPR 22] CISPR 22 (2008), *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*.
- [IEC 60050-161] IEC 60050-161:1990, *International Electrotechnical Vocabulary. Chapter 161: Electromagnetic Compatibility*.
- [IEC 61000-4-3] IEC 61000-4-3 (2008), *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*.

3 Definitions

This Recommendation uses the following terms defined elsewhere:

3.1 (electromagnetic) emission [IEC 60050-161]: The phenomenon by which electromagnetic energy emanates from a source.

3.2 immunity (to a disturbance) [IEC 60050-161]: The ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DSL	Digital Subscriber Line
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
LAN	Local Area Network

5 Radiated emission between 1 GHz and 6 GHz

Radiated emissions measurements between 1 GHz and 6 GHz shall be performed in accordance with clause 10 of [CISPR 22] and clause 7.3 of [CISPR 16-2-3].

5.1 Limits

Telecommunication equipment installed in telecommunication centres shall meet the radiated emission limits reported in Table 1 or Table 3. The emissions shall satisfy both limits when measured with the corresponding CISPR detector.

Telecommunication equipment installed outside the telecommunication centres shall meet the radiated emission limits reported in Table 2 or Table 4. The emissions shall satisfy both limits when measured with the corresponding CISPR detector.

The limits presented in Tables 1 and 2 assume a 3 m measurement distance.

The limits presented in Tables 3 and 4 assume a 10 m measurement distance.

**Table 1 – Radiated emission limits
equipment installed in the telecommunication centre**

Frequency range (GHz)	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	56	76
3 to 6	60	80

NOTE – The lower limit applies at the transition frequency.

**Table 2 – Radiated emission limits
equipment installed outside of the telecommunication centre**

Frequency range (GHz)	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	50	70
3 to 6	54	74

NOTE – The lower limit applies at the transition frequency.

**Table 3 – Radiated emission limits
equipment installed in the telecommunication centre**

Frequency range (GHz)	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	46	66
3 to 6	50	70
NOTE – The lower limit applies at the transition frequency.		

**Table 4 – Radiated emission limits
equipment installed outside of the telecommunication centre**

Frequency range (GHz)	Average limit dB(μ V/m)	Peak limit dB(μ V/m)
1 to 3	40	60
3 to 6	44	64
NOTE – The lower limit applies at the transition frequency.		

5.1.1 Emission frequency range

The EUT shall meet these limits within a frequency range that is determined by the highest frequency present on the equipment as follows:

- if the highest frequency used by the EUT is between 108 MHz and 500 MHz, the radiated disturbance shall be measured between 1 GHz and 2 GHz;
- if the highest frequency used by the EUT is between 500 MHz and 1 GHz, the radiated disturbance shall be measured between 1 GHz and 5 GHz.
- if the highest frequency used by the EUT is above 1 GHz, the radiated disturbance shall be measured between 1 GHz and either 6 GHz or 5 times the highest frequency (whichever is lower).

5.1.2 Emission from radio equipment

Radio equipment that meets the unintentional emissions requirements of [ITU-R SM.329] does not need additional testing.

Radio equipment (other than digital mobile base station equipment) shall be classified in the following categories:

- Category 1: Equipment with an integral antenna.
 - Category 1.1: Equipment with transmitter frequency below 6 GHz.
 - Category 1.2: Equipment with transmitter frequency above 6 GHz.
- Category 2: Equipment with a non-integral antenna.

The radiated emissions from radio equipment shall be measured in accordance with the test procedure presented in [CISPR 22]. The emission limits reported in Table 1 shall be applied to Category 1.2 equipment; the emission limits reported in Table 2 shall be applied to Category 1.2 and Category 2 equipment.

Category 1.1 equipment shall comply with the spurious emission limits presented in [ITU-R SM.329].

The limits reported in [ITU-T SM.329] shall be selected in accordance with the national radio regulatory authority.

5.1.3 General test conditions

Prior to testing, telecommunication equipment shall be installed and configured at the test site in a manner that is representative of the normal installation conditions.

Equipment normally installed in a rack or cabinet shall be tested with the rack or cabinet normally used during installation.

General test conditions for telecommunication equipment are reported in clause 6 of [ITU-T K.48].

5.1.4 Specific test conditions

[ITU-T K.48] contains specific test conditions for: switching equipment (clause 7.1), transmission equipment (clause 7.2), power equipment (clause 7.3), supervisory equipment (clause 7.4), wireless LAN (clause 7.5), digital radio relay system (clause 7.7) and xDSL equipment (clause 7.8).

6 Radiated immunity between 2 GHz and 6 GHz

Radiated immunity tests between 2 GHz and 6 GHz shall be performed in accordance with [IEC 61000-4-3].

6.1 Test levels

The test levels are reported in Table 5.

Table 5 – Immunity test levels

Environmental phenomena	Test level	Units	Basic standard	Performance criteria	Frequency Range (MHz)
<i>Enclosure port</i>					
Radiofrequency electromagnetic field	10	V/m	[IEC 61000-4-3]	A	2000-2700
	3	V/m	[IEC 61000-4-3]	A	2700-6000

6.1.1 General test conditions

Prior to testing, telecommunication equipment shall be installed and configured at the test site in a manner that is representative of the normal installation conditions.

Equipment normally installed in a rack or cabinet shall be tested with the rack or cabinet normally used during installation.

The test equipment and test environment shall meet the requirements of [IEC 61000-4-3].

General test conditions for telecommunication equipment are reported in clause 6 of [ITU-T K.48].

6.1.2 Specific test conditions

[ITU-T K.48] contains specific test conditions for different types of telecommunication equipment, these being: switching equipment (clause 7.1), transmission equipment (clause 7.2), power equipment (clause 7.3), supervisory equipment (clause 7.4), wireless LAN (clause 7.5), radio base station (clause 7.6), digital radio relay system (clause 7.7) and xDSL equipment (clause 7.8).

6.1.3 Performance criteria

The general performance criteria contained in [ITU-T K.48] shall be applied.

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