GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 13.280

CCS C 71

GB 21288-2022

Replacing GB 21288-2007

Limits for human exposure to electromagnetic fields emitted by mobile communication terminals

移动通信终端电磁辐射暴露限值

Issued on: December 29, 2022 **Implemented on: January 1, 2024**

Issued by: State Administration for Market Regulation;
Standardization Administration of PRC.

Table of Contents

Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 *Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents*.

This document replaces GB 21288-2007 *Limits for human local exposure to electromagnetic fields emitted by mobile phones*. Compared with GB 21288-2007, except for the structural adjustment and editorial revisions, the main technical changes are as follows:

-- The name of the document is changed from “Limits for human local exposure to electromagnetic fields emitted by mobile phones” to “Limits for human exposure to electromagnetic fields emitted by mobile communication terminals”;

-- The scope of application is changed from “mobile phones used close to the head” to “mobile communication terminal equipment operating at 100 kHz~300 GHz and within 20 cm of the human body during use, such as mobile phones, cordless group telephones, satellite mobile terminals, wearable devices, and portable mobile terminals” (see Chapter 1);

-- The definition of occupational exposure is added (see 3.2);

-- The definition of absorbed power density is added (see 3.5);

-- The exposure limits applicable to different frequencies and different body parts are added (see Chapter 5);

-- The labeling content in the product manual is changed, and the annotation to the product manual is added (see Chapter 6; see Chapter 4 of the 2007 edition).

This document was proposed and shall be under the jurisdiction of the Ministry of Industry and Information Technology of the People’s Republic of China.

The publication of previous versions of this document and the documents it replaces are as follows:

-- In 2007, it was first released as GB 21288-2007;

-- This is the first revision.

Limits for human exposure to electromagnetic fields emitted by mobile communication terminals

1 Scope

This document specifies limits for exposure to electromagnetic radiation of mobile communication terminals connected to public telecommunication networks.

This document is applicable to mobile communication terminal equipment operating at 100 kHz~300 GHz and within 20 cm of the human body during use.

NOTE: The mobile communication terminal equipment involved in this document includes but is not limited to mobile phones, cordless group telephones, satellite mobile terminals, wearable devices, portable mobile terminals, etc.

2 Normative references

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 public exposure

Under uncontrolled conditions, the exposure that is undergone by individuals, who are of various ages, in different health conditions, not aware of the occurrence of exposure and the harm to their bodies, and cannot effectively take protective measures.

3.2 occupational exposure

Under known conditions, the exposure against which professionals take appropriate precautions after being trained and understanding the associated risks.

3.3 electromagnetic radiation

The phenomenon in which energy is emitted from a source into space in the form of electromagnetic waves.

NOTE: The meaning of the term “electromagnetic radiation” can sometimes be extended to include electromagnetic induction phenomena.

SAR(x, y, z) -- the specific absorption rate at the point (x, y, z), the unit is Watts per kilogram (W/kg);

z -- the distance between the evaluation point and the body, in meters (m); when z=0, it is located on the body surface;

A -- average area, the unit is square meter (m^2);

Z_{max} -- the depth related to the area, in meters (m); where Z_{max} is much larger than the skin depth, it can be replaced by infinity.

The absorbed power density based on the Poynting vector is calculated as shown in formula (5).

$$S_{ab}=\iint_A \mathrm{Re}[S]\cdot \mathrm{d}s/A=\iint_A \mathrm{Re}[E\times H^*]\cdot \mathrm{d}s/A \quad \cdots\cdots(5)$$

where:

S -- Poynting vector, the unit is Watts per square meter (W/m^2);

E -- the effective value of the electric field intensity in the tissue, the unit is Volts per meter (V/m);

H -- the effective value of the magnetic field strength in the tissue, the unit is ampere per meter (A/m);

ds -- the vector of the integral variable in the normal direction of the integral area A.

NOTE: Re[X] -- the real part of the complex number "X";

X^* -- the conjugate complex number of complex number "X".

4 Abbreviations

The following abbreviation applies to this document.

TER: Total Exposure Ratio

5 Basic limits for exposure to electromagnetic radiation

5.1 Basic limits for exposure to electromagnetic radiation of mobile communication terminals

The basic limits for exposure to electromagnetic radiation of mobile communication

(SAR) of local exposure (limbs) of any 10 g tissue and any continuous 6 min shall not exceed 20 W/kg.

5.3.3 In the frequency range of >6 GHz~30 GHz, the average value of the absorbed power density in any 4 cm^2 radiation area of local exposure for any continuous 6 min shall not exceed 100 W/m^2.

5.3.4 In the frequency range of >30 GHz~300 GHz, the average value of the absorbed power density in any 4 cm^2 radiation area of local exposure for any continuous 6 min shall not exceed 100 W/m^2, and at the same time, the average value in any 1 cm^2 radiation area shall not exceed 200 W/m^2.

5.4 Total exposure ratio

When there is public and occupational exposure to multiple frequencies of electric fields, magnetic fields, and electromagnetic fields, it shall be comprehensively calculated whether the exposure to multiple frequencies of electric fields, magnetic fields, and electromagnetic fields has a superimposed effect. When there is a superposition effect, the requirements of formula (6) shall be met within the frequency range of 100 kHz~300 GHz.

$$TER = \sum_{i=100\ kHz}^{6\ GHz} \frac{SAR_i}{SAR_{BR}} + \sum_{i>6\ GHz}^{30\ GHz} \frac{S_{ab,4\ cm,i}}{S_{ab,4\ cm,BR}} + \sum_{i>30\ GHz}^{300\ GHz} MAX\left\{\left(\frac{S_{ab,4\ cm,i}}{S_{ab,4\ cm,BR}}\right),\left(\frac{S_{ab,1\ cm,i}}{S_{ab,1\ cm,BR}}\right)\right\} \leqslant 1 \quad \cdots\cdots(6)$$

where:

TER -- total exposure ratio;

SAR_i -- the SAR value of the exposure at frequency i, the unit is watts per kilogram (W/kg);

SAR_{BR} -- the basic limit for SAR of exposure given in Table 1, the unit is watts per kilogram (W/kg);

$S_{ab,\ 4\ cm,\ i}$ -- the value of absorbed power density in 4 cm^2 at frequency i, the unit is watts per square meter (W/m^2);

$S_{ab,\ 4\ cm,\ BR}$ -- the basic limit for 4 cm^2 absorbed power density given in Table 1, the unit is watts per square meter (W/m^2);

$S_{ab,1\ cm,\ i}$ -- the value of absorbed power density in 1 cm^2 at frequency i, the unit is watts per square meter (W/m^2);

$S_{ab,\ 1\ cm,\ BR}$ -- the basic limit for 1 cm^2 absorbed power density given in Table 1, the unit is watts per square meter (W/m^2).

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------