

ICS 27.010  
F 01



# National Standards of the People's Republic of China

GB ××××—××××

---

Minimum allowable values of energy efficiency and energy  
efficiency grades for Computer Monitors

(Draft for approval)

**Issue Date: XXXX-XX-XX**

**Implemented on: XXXX-XX-XX**

---

Issued by the General Administration of Quality Supervision, Inspection and  
Quarantine of the People's Republic of China

## Preface

**It should be noted that Clauses 4.2 and 4.4 of this Standard are mandatory, whilst the rest are recommended.**

Appendix A to this Standard is a specification appendix.

This Standard is jointly enacted by the Resources & Environmental Protection Department of National Development & Reformation Commission and Industrial Department No 1 of the National Standardisation Management Commission.

This Standard has been prepared and put forward by the National Energy Foundation & Management Standardisation Technical Committee.

This standard is under the jurisdiction of the National Energy Foundation & Management Standardisation Technical Committee.

The units involved in preparing this Standard included China Standardization Institute, China Computer Quality Supervision Inspection Centre, the 5th Institute of Message Industrial Department, 3M (China) Corp., China Hewlett Packard Corp., Qinghwa Tongfang Co., Ltd., and Philips (China) Investment Corp.

The main drafters of this Standard are: Zhang Kuo-Qin, Chen Hai-Hong, Zhou Xing-Hua, Song Dan-Mei, Du Guang-Lei, Zhang Xu-Jie, Sun Hui-Fen, Zhang Yu-Qi, and Zhang-Xin.

---

# Minimum allowable values of energy efficiency and energy efficiency grades for Computer Monitors

## 1 Scope

- 1.1 This Standard sets the minimum allowable energy efficiency values, energy conservation evaluation values, target minimum allowable energy efficiency values, test methods and inspection rules for general purpose computer monitors (hereafter 'Monitor').
- 1.2 This Standard applies to positive CRT monitoring equipment (hereafter 'CRT Monitor') used for computers using normal electrical network voltages, and for computer monitor display equipment with modulator/receivers.

## 2 Normative References

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this Standard; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB 20943-2007: One-way Output Type AC-DC and AC-Ac external power energy efficiency minimum allowable values and energy conservation evaluation values.

## 3 Terms and Definition

The following terms and definitions apply to this Standard:

### 3.1 Off Mode

The status in which the Monitor is connected to the power source and the power switch of the Monitor is set to "Off".

### 3.2 Energy Efficiency of Computer Monitors

The ratio value (or Working Efficiency) between the screen illumination intensity of the screen and the actual input power of the monitor under the conditions set out in this Standard, for which the unit is expressed by " $\text{m}^2\text{nit/W}$ " or " $\text{cd/W}$ ".

### 3.3 Energy Consumption when set to Off Mode

The active power of the Monitor when in "off" mode, in which "W" expresses the unit.

**3.4 The Minimum Allowable Energy Efficiency values for Computer Monitors**

The minimum energy efficiency that should be achieved by the Monitor under standard testing conditions and the maximum active power when set to the “off” mode, for which the unit is expressed by “W”.

**3.5 The Evaluating Values of Energy Conservation for Computer Monitors**

The minimum energy efficiency that should be achieved by energy-saving Monitors when tested under the conditions and the maximum active power when set to the “off” mode, in which “W” expresses the unit.

**4 Technical Requirements**

**4.1 Monitor Energy Efficiency Grade**

**4.1.1 Energy Efficiency Grade**

The energy efficiency of the Monitor shall be divided into three grades, of which the holding power is the lowest. The holding power (VA) of each grade of Monitor shall not be lower than the requirements listed in Table 1, and the energy consumption when set to “off” shall not exceed the requirements set out in Table 1.

**Table 1: Monitor Energy Efficiency Grade**

Monitor Type	Energy Efficiency Grade					
	Grade 1		Grade 2		Grade 3	
	Energy Efficiency (m <sup>2</sup> nit/W or Cd/W)	Energy Consumption under “off” Status	Energy Efficiency (m <sup>2</sup> nit/W or Cd/W)	Energy Consumption under “off” Status	Energy Efficiency (m <sup>2</sup> nit/W or Cd/W)	Energy Consumption under “off” Status
CRT	0.18	•	0.16	3	0.14	5
LCD	1.05	0.5	0.85	•	0.55	2

**4.1.1.1 Calculation for Monitor Unit Time Energy Consumption Value**

Under certain working modes, the unit time energy consumption value (*Pi*) of the Monitor shall be calculated according to Formula (1):

$$P_i = \frac{Et}{t} \dots \dots \dots \cdot 1 \tilde{Z}$$

Where •

*Pi* - The unit time energy consumption value of the Monitor, in which “W” expresses the

unit.

*E<sub>t</sub>* - Actual measured energy consumption, in which “W/h” expresses the unit.

*t* - Actual measured continuing time, in which “h” expresses the unit.

#### 4.1.1.2 Calculation for Monitor Energy Efficiency

The energy efficiency (Eff) of the Monitor shall be calculated by Formula (2):

$$Eff = \frac{S \times L}{P_w} \dots\dots\dots \cdot 2\tilde{Z}$$

Where •

*Eff* - Energy efficiency, in which “cd/W” expresses the unit.

*P<sub>w</sub>* - Unit time energy consumption value of the Monitor working mode, in which “W” expresses the unit.

*S* - Screen size of the Monitor, in which “W” expresses the unit.

*L* - Actually measures brightness of the Monitor screen, in which “cd/ m<sup>2</sup>” expresses the unit.

#### 4.2 Energy Efficiency Minimum Allowable Values

The energy efficiency minimum allowable value shall be Grade 3 in energy efficiency grade.

#### 4.3 Energy conservation Evaluation Value

The energy conservation evaluation value shall be Grade 2 of the energy efficiency grade.

If the Monitor uses an external power source, then such power shall meet the requirements set out in Clause 3.2 of GB 20943-2007.

#### 4.4 Target Minimum Allowable Energy Efficiency Value

The target minimum allowable energy efficiency value shall be Grade 2 energy efficiency three years following the day on which this Standard is implemented.

### 5 Test Method

The screen size, brightness, working mode, energy consumption and “off” mode will be tested according to the test method specified in Appendix A.

### 6 Inspection Rules

## **6.1 Ex-Factory Inspection**

**6.1.1** The minimum allowable energy efficiency value shall be indicated in the ex-factory inspection of the Monitor, and the sampling method shall be determined by the Production Industrial Quality Inspection Department.

**6.1.2** If the inspection results indicate that the minimum allowable energy efficiency value fails to meet the requirements set out in Clauses 4.2 and 4.4 of this Standard, then it shall be prevented from being shipped out of the factory.

## **6.2 Type Inspection**

**6.2.1** If any of the following happens to the Monitor, then a type inspection for the minimum allowable energy efficiency value shall be carried out:

- a) if new items are added after the pilot run;
- b) if the product design changes, or if the workmanship or materials used have noticeably affected the performance;
- c) when production is restored following more than one year of downtime;
- d) when an inspection is required by the Quality & Technical Supervision Department.

### **6.2.2 Sampling Program for the Type Inspection**

During the type inspection, one unit shall be selected for each batch. If the minimum allowable energy efficiency value of the selected sample fails to meet the requirements set out in this Standard, then a further two units shall be selected from the same batch for inspection. If these units pass the inspection, then the products of the same batch shall be deemed to meet the Standard; however, if one of the units still fails to meet the requirements, then all the products from that batch shall be deemed as having failed to meet the Standard.

---

**Appendix A**  
(Standardised Appendix)

**Test Method for Monitor Energy Efficiency and Energy Consumption when in Shutdown Mode**

**A.1 Test Conditions**

The test environment shall be as follows: room temperature, 15 ~35 ; relative humidity, 45%~75%; atmospheric pressure, 86~106 kPa; test power source, AC voltage 220±5V; and frequency, 50±0.5 Hz.

**A.2 Test Instrument Accuracy**

The total harmonic distortion of the test power must not exceed 3% and resistance shall be below 0.25 ohm. The WH Meter shall be able to test for energy consumption at a level of below 20mW, and the unit shall be W/h.

When the Power Gauge shows 1W of active power, accuracy shall be expressed within 0.1W and the Peak Factor of the current below 2A shall be less than 5.

**A.3 Test Method**

**A.3.1 Test Setup**

- a) Dark Room Conditions: disconnect the power of the Monitor and place the optical measuring device vertically at the centre of the screen. The measured illumination value of the Monitor shall not exceed 10Lx.
- b) Colour Control and Peripheral Equipment: All colour control functions (hue and saturation, etc.) should be adjusted to factory saving values and should not be connected to any external equipment, including USB Hubs or Ports. The adjustable built-in Amplifier and TV Tuner, etc. shall be adjusted to the minimum level of energy consumption.
- c) Scanning Frequency: when under 75Hz of scanning frequency, the pixel type of the CRT shall present the preferred pixel type to be the maximum resolution. As for the LCD and other monitors using conventional pixel technology, the pixel type shall be set to a constant level. The scanning frequency of the LCD shall be set to 60Hz or at a different frequency as recommended by the manufacturer.
- d) Monitor Image Dimension, Brightness and Contrast Setup:

The non-homogeneity brightness index of the Monitor brightness shall meet the requirements set out in SJ/T 11292 and shall be tested under the following setup modes:

Monitor	Brightness	Contrast	Test Picture
---------	------------	----------	--------------

Type			
CRT	Meet the Setup Status 1 requirements.	Meet the Setup Status 1 requirements.	Taking 80% of white zone in the picture (Fig. A1).
LCD	Meet the Setup Status 2 requirements.	Meet the Setup Status 2 requirements.	Taking 80% of white zone in the picture (Fig. A1).

**Setup Mode 1:** For CRT Monitors, set the monitor to the image dimensions recommended by the manufacturer (such dimensions shall normally be slightly smaller than the maximum visible screen size), and then set the brightness and contrast levels to maximum. Display a full black to full white image for providing an 8-class grey level test image (Fig. A2). Firstly, adjust the “Bright” for appropriately identifying 0% and 5% grey level in the first row and then diminishing the “Contrast” from the maximum value to 100% and 95% grey levels in the second row can be appropriately identified with each other.

**Setup Mode 2:** For LCD Monitors, display a full black to full white image for providing 8-class grey level test image (Fig. A2). When the maximum brightness and contrast levels are reached, two grey levels of 0% and 5% in the first row should be distinguished; if this is not, adjust the contrast until distinguishable.



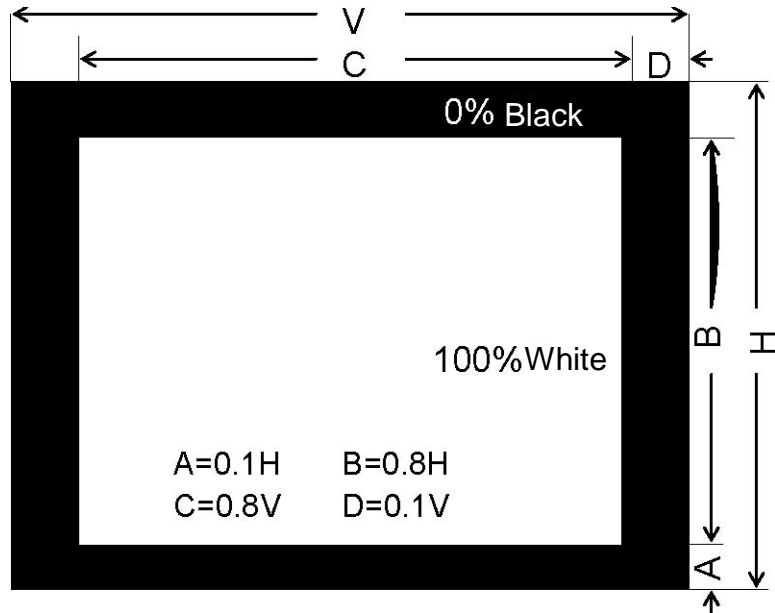


Fig. 1: The white block image taking up 80% of the picture.

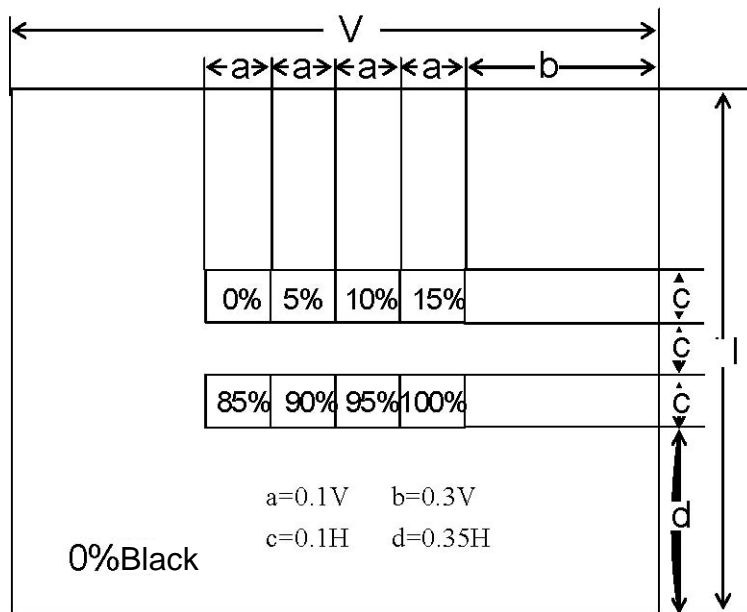


Fig. 2: 8-class Gray Level

- e) Under dark room conditions, place the optical measuring device vertically at the centre of the screen to carry out the measuring. The measured screen size shall cover at least 500 pixels. Under no circumstances should the illuminated size be smaller than the size scanned by the measuring device.

### A.3.2 Energy Efficiency Test Method

- Connect the test sample to the power and testing equipment.
- Connect the power to all pieces of testing equipment and adjust the voltage and frequency to the appropriate levels.
- Check the working mode of the test sample, as per **A.3.1.b**.

- 
- d) Set the appropriate scanning frequency, as per **A.3.1.c.**
  - e) Set the test sample under the desired working type and then maintain stability for over 20 minutes.
  - f) Confirm that the size, brightness and contrast meet the test requirements, as per **A.3.1.d.**
  - g) Test the brightness at the centre of the sample screen and then also test the screen size.
  - h) Test the energy consumption of the sample: the test time should not be less than 10 minutes.
  - i) Register the test conditions and test figures.

**A.3.3 Energy Consumption Test Method When Set to “Off” Mode:**

- a) Connect the power to all pieces of test equipment and adjust the voltage and frequency to the appropriate levels.
- b) Maintain the Monitor at “off” until the measured power reading stabilises.
- c) Test the energy consumption of the sample: the test time should not be less than 10 minutes.
- d) Register the test conditions and test figures.