Measuring Methods of Blue-light Reduced Visual Display Terminal

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Content

1. Background —— Blue-light hazard

2. The necessity of blue-light reduced Visual Display Terminal standards

3. Blue-light reduced Visual Display Terminal standard main contents
1. Background —— Blue-light hazard

➢ What is Blue-light hazard?
  • the actual or potential retinal damage caused by photochemical effect, which comes from the radiation exposure of wavelength between 400 to 500 nm.

➢ The source of Blue-light
  • Natural light has the continuous spectrum, the ratio of blue-light is low.
  • In Visual Display Terminal, LED blue light as the excitation light, the ratio of blue-light is high. There are a large number of blue-light in computers, mobile phones and other VDT products.
1. Background —— Blue-light hazard

- The Blue-light damage to the eye is similar with the UV damage to the skin, it’s not easy to detect, but long-term hazard can not be repaired.

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<th>Visible-light</th>
<th>Infrared-light</th>
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<td>Blue-light</td>
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<td></td>
<td>High energy</td>
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<tr>
<td></td>
<td>visible light</td>
<td>close to the</td>
</tr>
<tr>
<td></td>
<td>UV zone</td>
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The blue-light pass through the cornea and lens to the macular area, harm the macular area.

Normal macular ➢ Injured macular by blue-light

High-energy blue-light overflow
1. Background —— Blue-light hazard

- **Blue-light hazard mechanism and symptom**
  - **Maculopathy**
    - Accelerate the toxin in macular area
  - **VDT Asthenopia**
    - Increase the color offset and dimness of vision
  - **Cause Glare**
    - Dazzling
  - The Blue-light causes color difference and dimness of vision, increasing the fatigue of the eye

- The Blue-light accelerate the toxin in macular area, threaten the health of fundus

- The damage of blue-light is more serious for long time using VDT

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2. The necessity of blue-light reduced visual display terminal standards

- The way to reduce the blue-light including **hardware method** and **software method**, the hardware method can be divided into offset peaks and reduce peaks two sub methods. While reducing the blue-light, **we should ensure** the brightness, contrast ratio, color gamut, viewing angle and other parameters of the display.

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<th>Technical principle</th>
<th>Program</th>
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<td><strong>Hardware Method</strong></td>
<td>reduce peaks</td>
<td>Using the anti blue-light film to reduce the blue-light. The film can be placed in the back light, attached with the screen surface, also can be plated in the Panel.</td>
</tr>
<tr>
<td></td>
<td>offset peaks</td>
<td>Innovation the phosphor powder in LED back light, by changing the blue light intensity peak spectral distribution to reduce blue-light.</td>
</tr>
<tr>
<td><strong>Software Method</strong></td>
<td></td>
<td>Lower the brightness of “B” sub pixel in the image. It may cause color offset.</td>
</tr>
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</table>
2. The necessity of blue-light reduced visual display terminal standards

With the popularization of televisions, personal computers and smartphones, the display health issues have become increasingly prominent.

In recent years, blue-light reduced Visual Display Terminals are more and more popular. It gradually being concerned by consumers and attracts more and more display manufactures to seize this market.

With such a huge market demand of blue-light reduced Visual Display Terminal and the blank of industry standards. **There is an urgent need to develop standards for testing the blue-light of the VDT to regulate the technology and the product.**
2. The necessity of blue-light reduced visual display terminal standards

➢ “Blue-light reduced VDT” get a lot of attention

- Sex ratio
- math intake of high

- geographical distribution

- Age distribution

People attention: Obvious rising trend

Many manufactories has produced Blue-light reduced VDT products

*Data from Baidu index
3. Blue-light reduced visual display terminal standard main contents

**Conventional optical performance test items**

- Luminance
- Contrast Ratio
- Color Gamut
- Viewing Angle
- White Balance
- ......

**Blue-light reduced related test items**

- Blue light radiation brightness
- Blue light weighted radiation brightness
- Blue light radiation brightness ratio
- ......

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3. Blue-light reduced visual display terminal standard main contents

➢ Blue-light reduced related test items

1) Blue-light radiation brightness
   - Using luminance meter to measure 400 to 500 nm band spectrum radial brightness in all white picture (Wavelength interval: 1 nm), then add them all.

2) Blue-light weighted radiation brightness
   - Adding the Blue-light weighted function into the blue-light radiation brightness formula, which shows the different hazard between different wavelength.

3) Blue light radiation brightness ratio
   - The ratio of the Blue-light weighted radiation brightness and the luminance of the visual display terminal.
3. Blue-light reduced visual display terminal standard main contents

➢ Standard Catalogue

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THANKS