# Measuring Methods of Blue-light Reduced Visual Display Terminal

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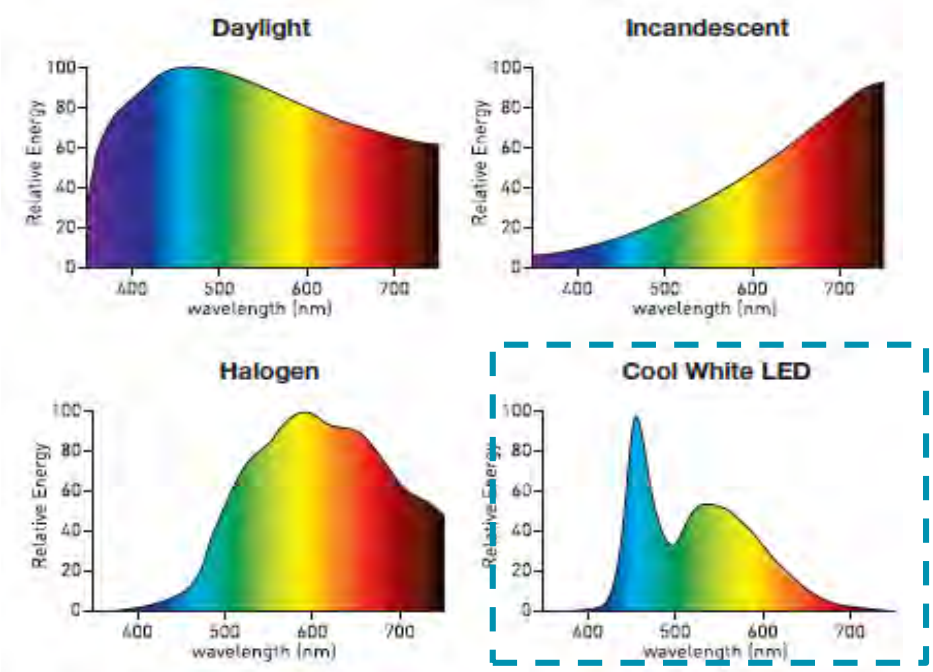
# 1. Background —— Blue-light hazard

## ➢ 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.

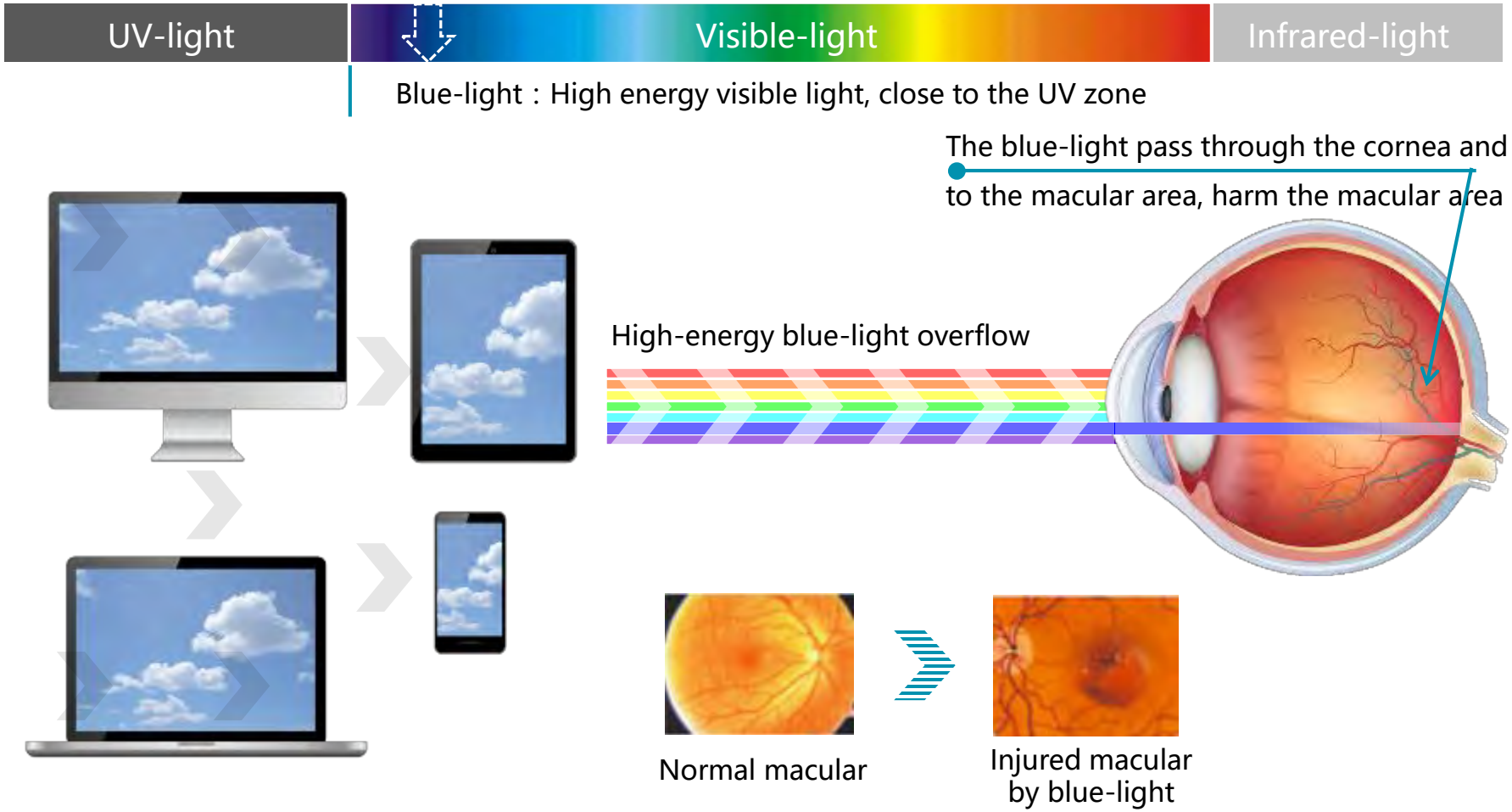



## ➢ The source of Blue-light

- 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.**



# 1. Background —— Blue-light hazard

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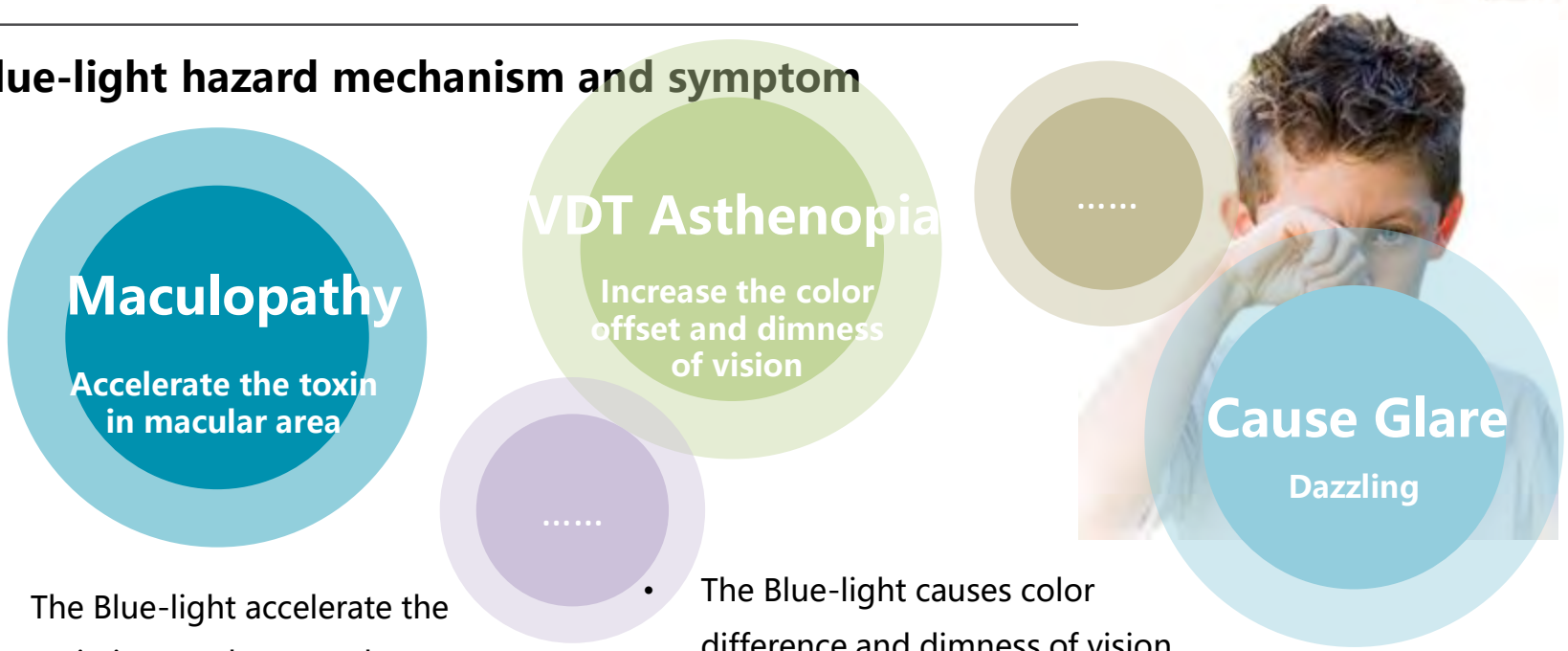
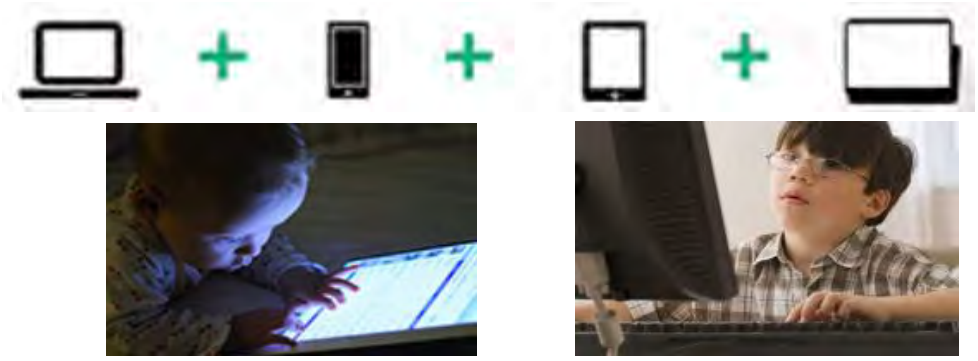
➢ **Blue-light hazard mechanism and symptom**



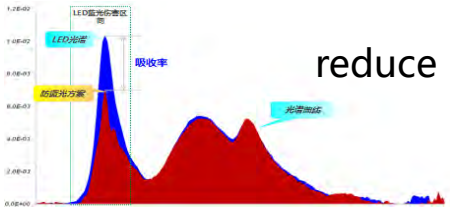
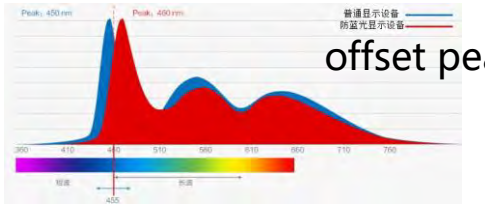
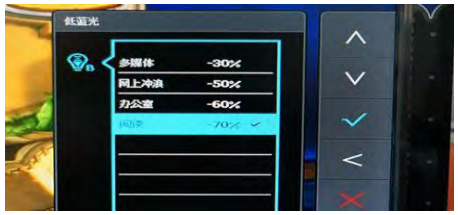

- The Blue-light accelerate the toxin in macular area, threaten the health of fundus
- The Blue-light causes color difference and dimness of vision, increasing the fatigue of the eye

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



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

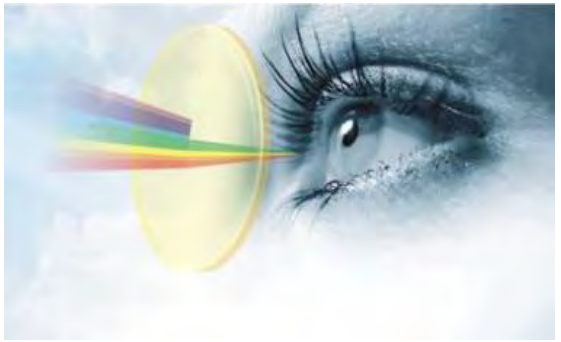
- The way to reduce the blue-light including **hardware method** and **software method**, the hardware method can be divided into offset peaks and reduce peaks two sub methods. While reducing the blue-light, **we should ensure** the brightness, contrast ratio, color gamut, viewing angle and other parameters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

| Methods | Technical principle | Program |
|---|---|---|
| **Hardware Method** |  reduce peaks | 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. |
| |  offset peaks | Innovation the phosphor powder in LED back light, by changing the blue light intensity peak spectral distribution to reduce blue-light. |
| **Software Method** |  | Lower the brightness of “B” sub pixel in the image. It may cause color offset. |

# 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.

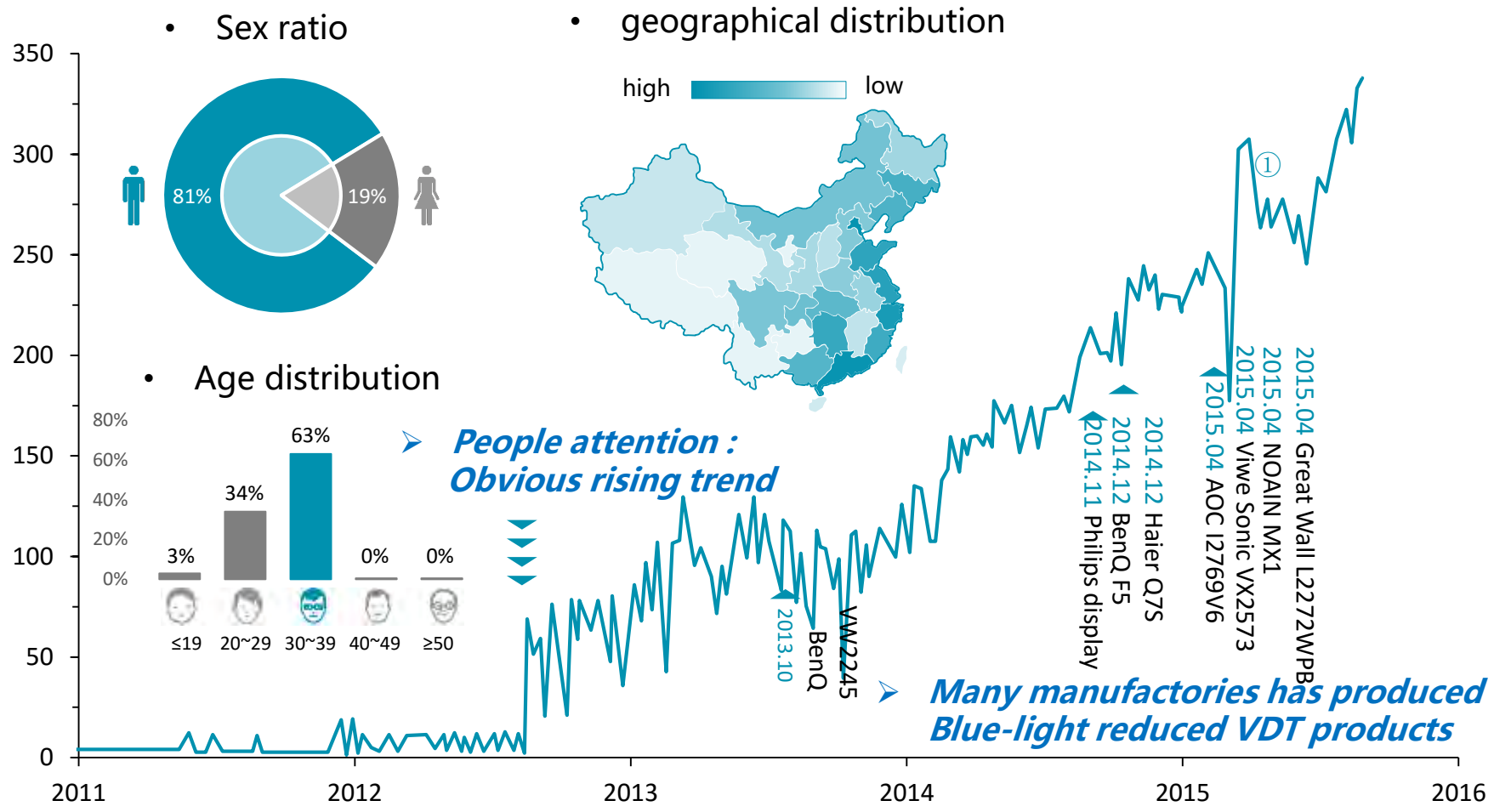
In recent years, blue-light reduced Visual Display Terminals are more and more popular. It gradually being concerned by consumers and attracts more and more display manufactures to seize this market.



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**




*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

-. ……

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

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## ➢ 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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