

CI510 Color Analyzer

I Product Overview

CI510 is a portable luminance colorimeter. The instrument uses XYZ filter+CMOS detector to collect the three stimulus values XYZ of the light source, and then calculates the luminance and chromaticity coordinates of the light source. The instrument has a measuring angle of 1° , a minimum measuring area of $\Phi 22\text{mm}$ and a maximum measuring range of $200,000 \text{ cd/m}^2$.

The instrument is equipped with a 2.8-inch TFT capacitive touch screen, 3000 mAh lithium-ion battery, Bluetooth WIFI multifunctional chip, and large capacity memory.

The instrument can measure the luminance(Lv), color temperature, chromaticity coordinates, main wavelength, display gamut, panel uniformity, and other parameters.

The instrument is equipped with single measurement, average measurement, continuous measurement, flash measurement, and other measurement modes, easy to operate, accurate and stable measurement.

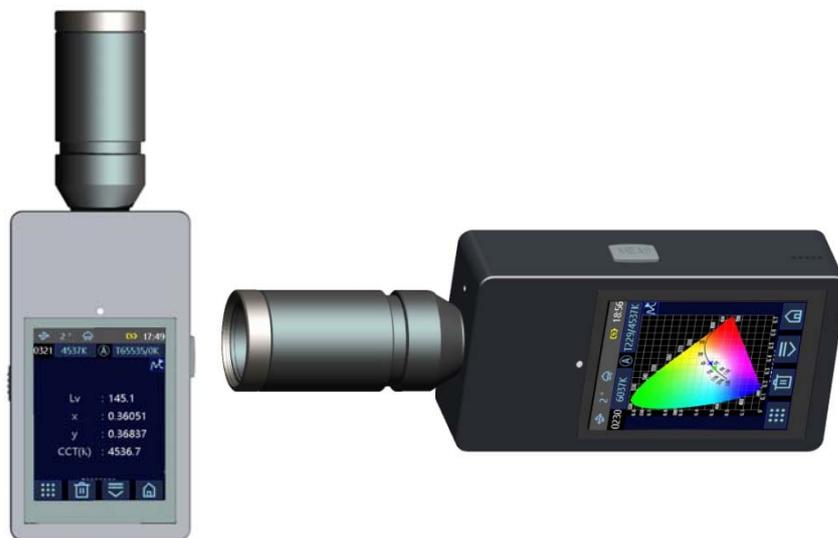


Figure 1

II Product Characteristics

1. The instrument uses XYZ filter+CMOS detector to collect the three stimulus values XYZ of the illumination light source or display in the range of 400-700nm, and then calculates the luminance(Lv), chromaticity coordinates, and color temperature of the sample to be tested, which is cost-effective.

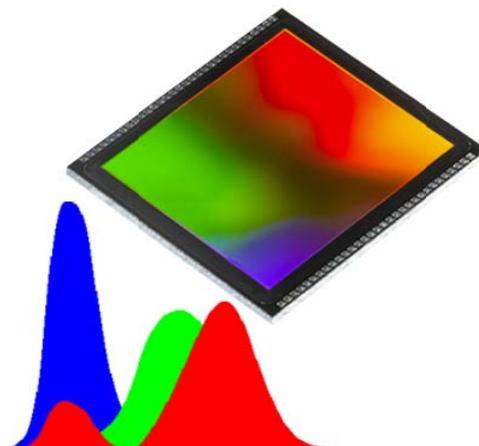


Figure 2

2. The instrument utilizes an industrial-grade MCU processor, equipped with a 2.8-inch TFT capacitive touch screen and up to 2,000 storage spaces. It features simple operation and stable performance.

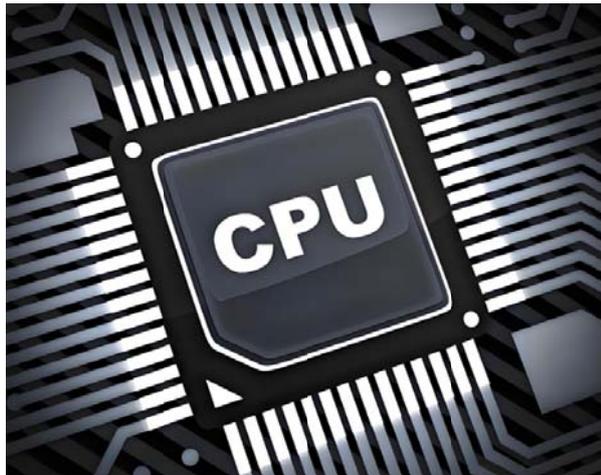


Figure 3

3. The instrument is equipped with a 3000 mAh lithium-ion battery, offering a long standby time. It is also equipped with Type-C and Bluetooth 5.0 interfaces, with a reserved WIFI interface. These rich expansion interfaces are highly suitable for secondary development and have a wide range of application scenarios.

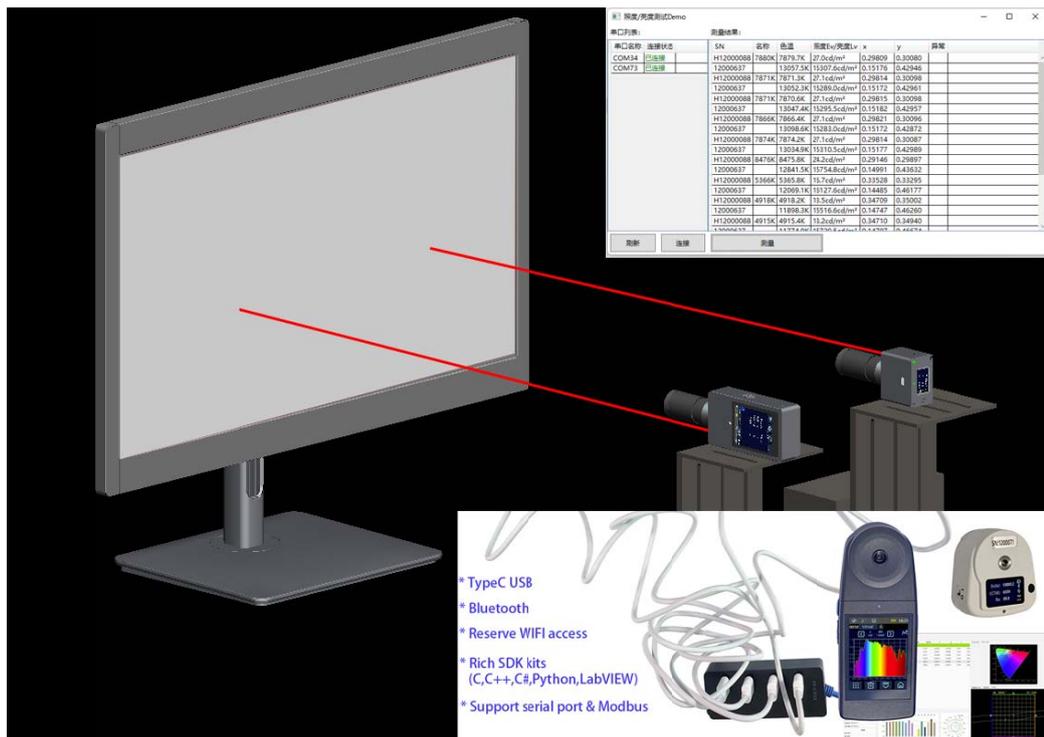


Figure 4

4. A novel and fashionable appearance design based on ergonomics. The instrument has 650nm laser assisted measurement and positioning, which is convenient to use.



Figure 5

5. The measurement interface of the instrument can be locked to avoid misoperation.

6. The instrument is widely applied in LED lighting industry, engineering lighting, display screens, TV multimedia, and so on.

7. A computer can connect multiple instrument simultaneously via USB or Bluetooth for synchronous measurement and control.

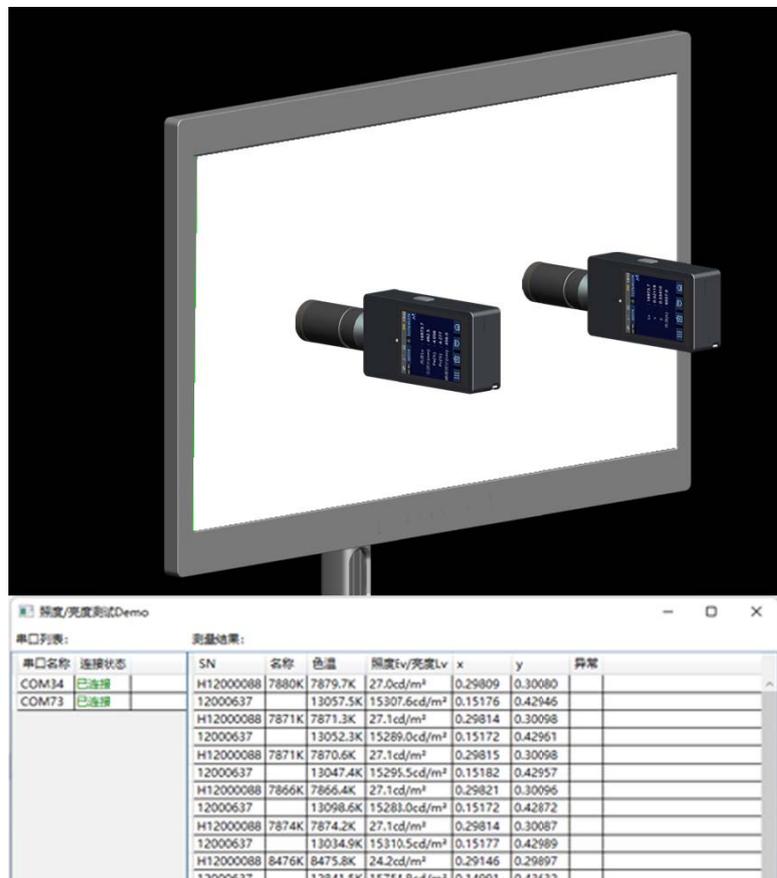


Figure 6

8. The instrument has professional PC software, Rich SDK (support C # , C + + , Python, LabView and other platforms) .



Figure 7

III Applications

3.1 Lv and chromaticity coordinates measurement of Display panel/LCD

In a darkroom environment, the display/LCD panel is powered on and warmed up for half an hour. The CI510 is fixed on a mounting fixture, ensuring its optical axis is perpendicular to the display surface, with the probe positioned approximately 30mm from the display surface (or the measurement port is pressed tightly against the screen). The display panel is controlled to show different colors, and the CI510 captures the Lv, chromaticity coordinates, and spectral radiance of the screen at a 1° measurement angle. Based on this data, the display's color gamut and uniformity can be calculated, and functions such as GAMMA/DICOM/color calibration can be performed.

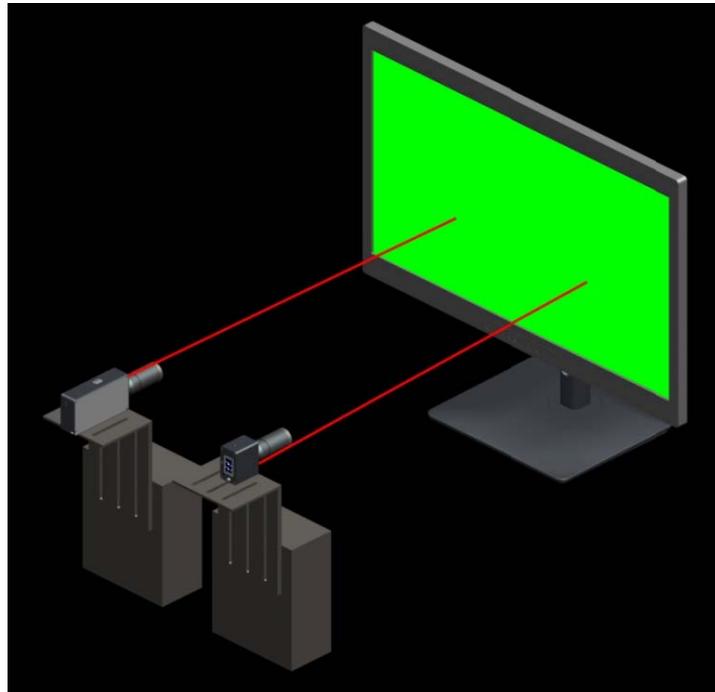


Figure 8

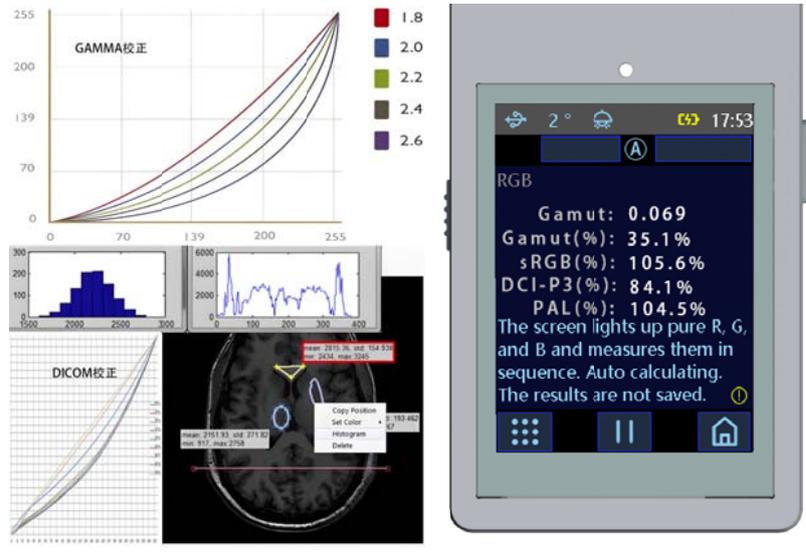


Figure 9

3.2 LED and solid-state lighting source spectrum, L_v , color temperature, uniformity, dominant wavelength, and other parameters test

CI510 luminance colorimeter stand-alone instrument can easily realize L_v , color temperature, dominant wavelength, and other parameters measurement.

The luminous flux can be measured by integrating sphere. With the help of professional HIQC software, the chromaticity coordinate measurement and classification of LED solid-state light source can be easily realized.

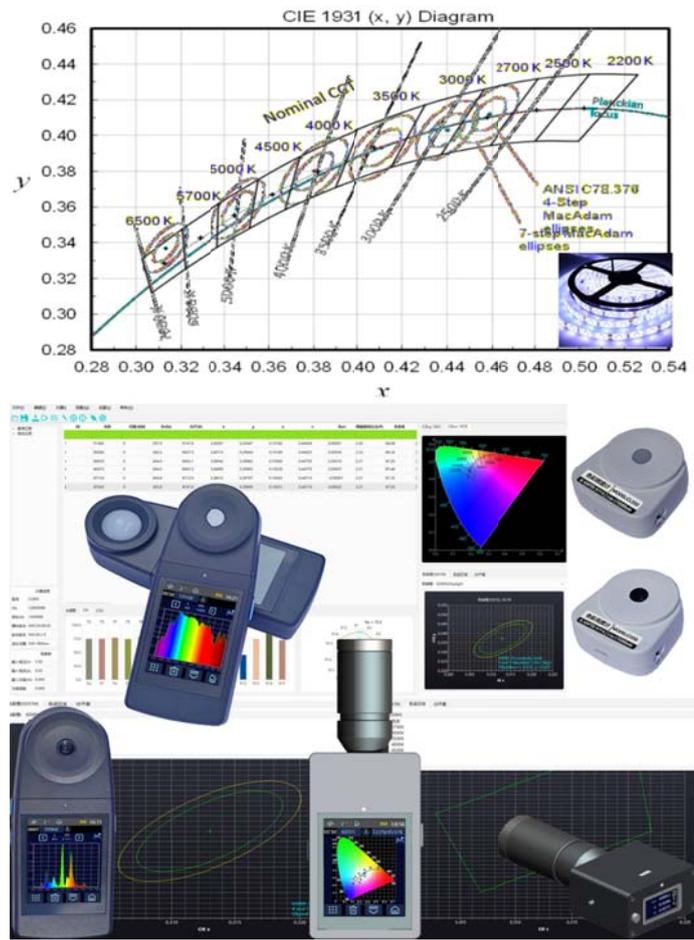


Figure 10

3.3 Color temperature(CCT), Uniformity measurement of Light box or Display panel

The main technical indexes of the light box include the following: the standardization of the spectral distribution of the light source, the display uniformity of the illumination of the light source, the stability of the light source, the color temperature and color rendering index of the light source, and the life of the light source. The CI510 can easily measure the stability, uniformity and spectral matching of the light box.



Figure 11

3.4 Transmittance Test

Transmittance is the ratio of the luminous flux (radiant flux) of light passing through the measured object to the incident luminous flux (radiant flux). The transmittance of visible light is usually the ratio of the luminous flux of visible light at wavelengths of 380-780 nm, UVA transmissivity is usually the ratio of UVA to UVA radiation flux, and IR transmissivity is the ratio of IR radiation flux at wavelengths over 780 nm.

LED light source or halogen tungsten lamp is usually used as the lighting source in the transmissometer. From the test results, different lighting sources have a certain influence on the transmittance test results, usually affecting about 5%.

Many standards and documents clearly state that the D65 standard illuminator is the most ideal illuminator for transmissometers. The D65 standard lighting source is the Earth's average northern hemisphere solar spectrum, so the transmittance tested under this light source condition is very representative and easily accepted by the public. For example, outdoor glass, UV sunscreen glasses and other related standards clearly state that the D65 light source should be used for transmittance testing. However, the light source used by the common transmittance meter is far from the D65 standard lighting source, so the test results are not very good.

CI510 can use outdoor sunlight (as close as possible to the D65 standard lighting source) as the lighting source, after two tests, very convenient test glasses, architectural glass in D65 standard lighting source under the condition of transmittance.



Figure 12

3.5 Reflectance Test

Reflectance refers to the ratio of the reflected luminous flux (or radiant flux) of an object to the

incident luminous flux (or radiant flux). Visible light reflectance is typically the ratio of luminous flux within the wavelength range of 380~780 nm. UVA ultraviolet reflectance is usually the ratio of UVA ultraviolet radiant flux, while infrared (IR) transmittance is the ratio of infrared radiant flux with wavelengths exceeding 780 nm.

In a darkroom environment, the CI510 is fixed on a mounting fixture. A sample plate is placed at an appropriate distance directly in front of the probe, and the light source illuminates the center of the sample plate at a 45-degree angle from the normal of the sample plate. The light source can be a full-spectrum visible light source, such as a halogen tungsten lamp or a full-spectrum LED.

First, place a standard white board with a known reflectance (R_{STD}), and use the CI510 to measure the radiance spectrum of the standard white board, recorded as P_{STD} . Then, place the sample to be tested, and use the CI510 to measure the radiance spectrum of the sample, recorded as P_{SAP} . The reflectance of the sample can then be calculated as $R = R_{STD} * (P_{SAP} / P_{STD})$, from which the reflectance for visible light, ultraviolet, infrared, or each specific wavelength can be determined. Based on the reflectance and colorimetric knowledge, further calculations can be performed to obtain various parameters of the sample, such as tristimulus values (XYZ), chromaticity coordinates (xy), and Lab values.

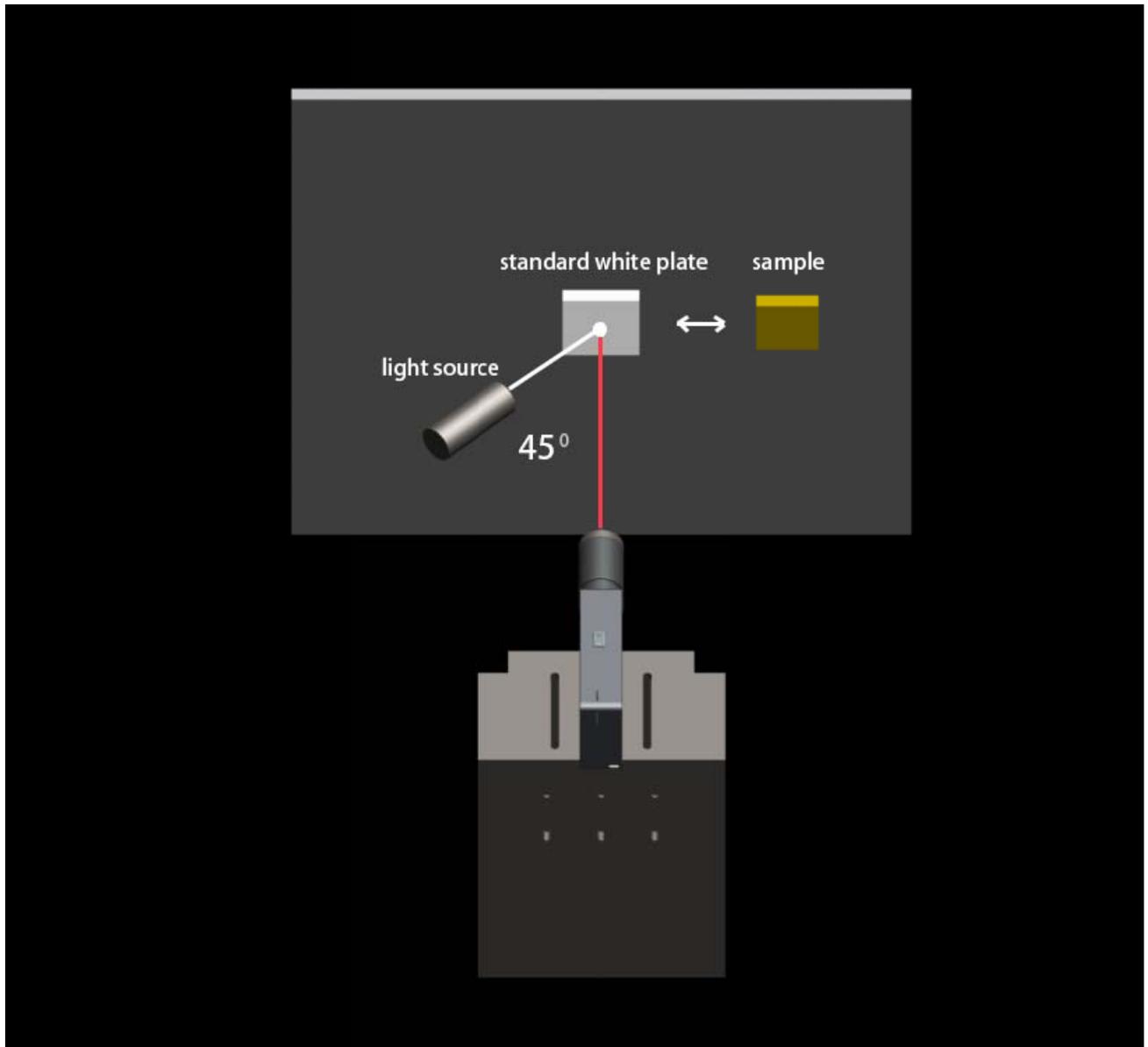


Figure 13

3.6 LED Synchronous Measurement of Chromaticity Coordinates, Color Gamut, and Brightness for LED Outdoor Advertising Screens

Large-sized LED displays or LCD screens are typically composed of smaller display modules. Due to differences in these small-sized display modules and their driving modules, the consistency and uniformity of the assembled large display screen may deteriorate. In such cases, it is necessary to adapt the driving circuits and color gamut mapping according to the display characteristics of different modules to ensure uniform performance of the assembled large display.

Multiple CI510 units can be fixed at the center of each small-sized display module. The host computer uses specialized synchronous testing software to control multiple CI510 units via USB cables or Bluetooth for synchronized testing. The host computer directs the display to show different colors and controls the CI510 units to collect photometric data. Subsequently, the display parameters of each small-sized module are characterized, and individualized adaptations are performed. This ensures that the assembled large display achieves consistent and uniform performance.



Figure 14

V Technical Parameter

Model	CI510	CI510S
Measurement Mode	CIE XYZ Filter + CMOS sensor	
Lv Range	0.1~200000cd/m ²	
Unit	cd/m ² ,fL	
Accuracy (Light A)	Lv:±3%±1 display value xy:±0.005(>5cd/m ²)	Lv:±4%±1 display value xy:±0.006(>5cd/m ²)
Repeatability (Light A)	Lv:0.2%±1 display value xy:0.0015(>10cd/m ²) xy:0.0025(5~10cd/m ²)	Lv:0.2%±1 display value xy:0.0015(>10cd/m ²) xy:0.0025(5~10cd/m ²)
Measure Angle	1°	
Aperture	Φ22mm	Φ2mm
Measurement Area	minimum area Φ22mm; Distance=30mm,min area Φ24mm; Distance=100mm,min area Φ26mm; Distance=500mm,min area Φ42mm; Distance=1000mm,min area Φ65mm;	Distance=0mm,min area Φ2mm;
Aim	650nm laser positioning	
Measurement Mode	Auto mode,Continuous mode,Average mode	
Measuring Time	Auto mode:0.1~5 s	
Observer Angle	2°(CIE1931)	
Color Space	CIE XYZ, Lv xy, Lv u'v'	
Colorimetric Index	1.Lv,CCT(K);CIE31x,y;CIE76u',v';CIE31X,Y,Z;Duv,SDCM;λd,Pe,Pc; 2.Display screen Gamut,Gamut Area(%),ΔCuv; 3.Points/9 Points Uniformity; 4.CIE31 xy diagram,CIE76 u'v' diagram,MacAdam ellipse diagram	
Data Storage	2000 Pcs	
Dimension	Host:L*W*H=116X60X28mm,Lens:Φ30X62mm,Lens:Φ20X62mm(CI510S)	
Weight	about 340g	
Battery	Li-ion battery,3.7V,4000mAh(8000 measurements within 24 hours)	
Display	2.8-inch TFT color LCD, Capacitive Touch Screen	
Interface	Type C USB, Bluetooth 5.0(Customizable WIFI)	
Language	English, Chinese	
Operating Environment	-10~40℃(0~85%RH/no condensing)	
Storage Environment	-20~50℃(0~85%RH/no condensing)	
Standard Accessory	Power adapter,USB cable,manual(Electronic Version),Wrist strap, Wiping Cloth,PC Software(Download from office website)	

Figure 16

VI About Huicolor

Shenzhen HUICOLOR Technology Co., Ltd. was established in Nanshan District, Shenzhen, P.R.China. in 2015, it is a high-tech enterprise focusing on the research and development and manufacturing of precision optical detection instruments.

HUICOLOR Company adheres to the concept of "continuous innovation", aspires to build a well-known brand in the precision optical detection instrument industry, contributes to China's intelligent manufacturing. HUICOLOR Company has obtained multiple national technology patents, and hold the trademarks "HUICOLOR", simultaneously possessing multiple software copyrights.

HUICOLOR Company adheres to independent R&D, design, production and manufacturing. Since the establishment of the company, it has successfully launched multiple high-precision optical products with independent intellectual property rights, such as CI800 series spectral LUMINANCE COLORIMETER, CL500 series LUMINANCE COLORIMETER, CI800 series spectral Luminance Colorimeter, CL300 series spectrometer / UV energy meter and CI350 Display Calibration system, which are widely used in LED lighting, spectral analysis, liquid crystal display, intelligent agriculture, scientific research and other fields.

Shenzhen HUICOLOR Technology Co., Ltd. adheres to the concept of "continuous innovation", manufactures "excellent quality" precision optical equipment, provides professional technical services, and "creates value" for users to achieve a win-win situation.

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