



**RAINBOW
LIGHT**

Light Measuring Expert



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Company introduction

Rainbow Light Technology™ was founded by President Roger Yang in 2004, originally a distributor of sapphire wafer scribing system and supply equipment and consumable material for semiconductor industry. In 2010, President Roger Yang foreseeing the bright future of the optical measuring equipment and began to develop the new brand "Rainbow-Light" MEMS spectrometers and keep on developing spectral analysis instruments for lab, field, process environment for LED lighting industry and other applications.

Vision

We perform stable growth and create excellent reputation by developing key technologies and satisfying customers with dedicate service and full-range product support. However, in order to keep up the pace in measuring field, we keep expanding our engineering department and recruits more brilliant scientists in improving the technology and capabilities in measuring industry. We further invite you to experience our exceptional service and technical support.

Awards:

Products	Awards
1 LED Luminous Decay Monitoring Device	2011 Taipei International Invention Show & Technomart - Gold Medal
2 Full Spectrum Transmittance Measuring Equipment	2011 Taipei International Invention Show & Technomart - Silver Medal
3 Mini-Luxmeter (Brightness Test)	2012 Seoul International Invention Fair - Gold Prize
4 Mini-Luxmeter (Brightness Test)	2012 British Invention Award - Bronze Medal
5 Portable Lighting Measuring Equipment with Display	2013 Taitronics Technology Innovation Awards - The Quality Award
6 Portable Lighting Measuring Equipment with Display	2014 Taiwan Int'l Lighting Show Innovation Awards
7 Intelligent LED Lighting System	2014 Taiwan Int'l Lighting Show Innovation Awards
8 Automated Light Source Measurement System	2014 Taitronics Technology Innovation Awards - The Quality Award
9 Light Flux Integrating Sphere System	2014 Taitronics Technology Innovation Awards - The Quality Award
10 Portable Lighting Measuring Equipment with Display	2014 ICT Month Innovative Elite

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Illuminant Measuring and Testing Series

- 13 Portable Lighting Detection Equipment
- 17 LED Luminous Decay Monitoring Device
- 21 Goniophotometer
- 25 LED Testing & Measuring Equipment
- 29 Full Spectrum Transmittance Measuring Equipment
- 29 Touch Panel Transmittance Equipment

P17 LED Luminous Decay Monitoring Device



P21 Goniophotometer



P29 Full Spectrum Transmittance Measuring Equipment



Illuminant Measuring and Testing Series

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Light Measurement Terms

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Lighting Series

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P41 Light Flux Integrating Sphere System



P57 Mini-Luxmeter (Brightness Test)



P35 Portable Lighting Measuring Equipment with Display



Micro Spectro-module

The small size, low cost and high resolution of the newly developed Rainbow Light Micro Spectro-module give it a competitive edge over other products with easy integration hardware and software, and a wide range of applications.

Features

0.8-1.5 nm High resolution

Micro spectrometer is the best choice to embedded in the measurement applications

Ultra-small size

Low cost

Programmable Microcontroller

Product specification

	RLMM-1000	RLM-1000/RLM-1200
Features	Ultra-small size	High resolution
Resolution	4.2-5.0 nm FWHM	0.8-1.5 nm FWHM
Wavelength Range	380-780 nm	300-1100 nm / 200-800 nm 380-780 nm / 300-800nm
Input Fiber Connector	SMA905	SMA905
Interface	CCD/F	CCD/F,GPIO
Control panel interface (I)	USB1.1,GPIO	USB1.1,GPIO
Control panel interface (II)	USB2.0,UART,SPI,ADC,GPIO	USB2.0,UART,SPI,ADC,GPIO
Dimensions	35.8(W)x36.1(D)x8.7(H) mm	74(W)x86(D)x17(H) mm

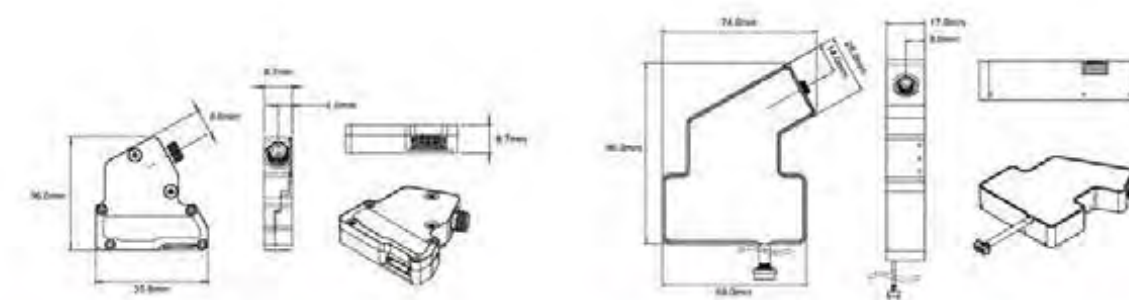


RLMM-1000(4.2-5.0 nm FWHM)



RLM-1000/RLM-1200(0.8-1.5 nm FWHM)

3 dimension view



RLMM-1000(4.2-5.0 nm FWHM)

RLM-1000/RLM-1200(0.8-1.5 nm FWHM)

Applications



Optical Testing and Measuring Equipment

Measuring equipment for LED manufacturers, wholesalers, and retailers, gamut examination equipment, etc.



Environmental monitoring system

Water quality, gas, chemical industry, and ultra-violet, etc.



Color detecting management

Color fixation, mixing, and verifying for textile, printing, coloring, electroplating, coating, etc.

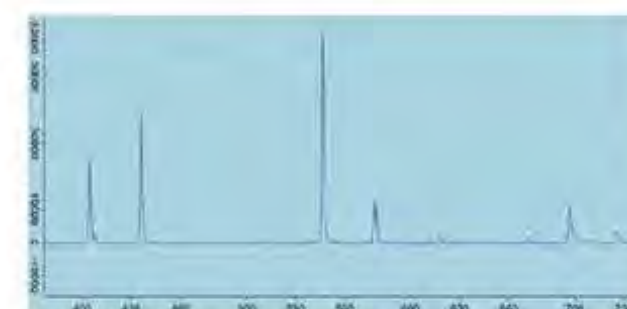


Biomedical application

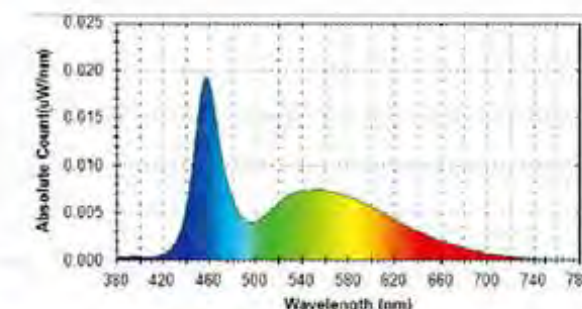
Blood test, preventive medicine, and personal health-care management etc.

Other applications about spectrometer- anything related to specifications listed above are welcome.

Argon-mercury spectrum



LED spectrum



Application of Spectro-module

Utilizing MEMs technology as core technology, Rainbow Light Technology Co., Ltd. Micro-spectrometer can be integrated into the software and hardware system of spectral correlation application product development platform, and help customers easily complete spectrum of relevant measurement applications development.

Function

Various spectral measurement, monitoring and correlation application

1. Can be integrated into existing automatic control system.
2. As a long-range spectral detection and monitoring.
3. Can provide a IOT spectrum detection and monitoring.

Applications



Features

1. Can be integrated into all kinds of soft hardware system development platform easily.
2. Provide software and system development.
3. Help customers complete the relevant application of spectrometer quickly and easily.

Product specification

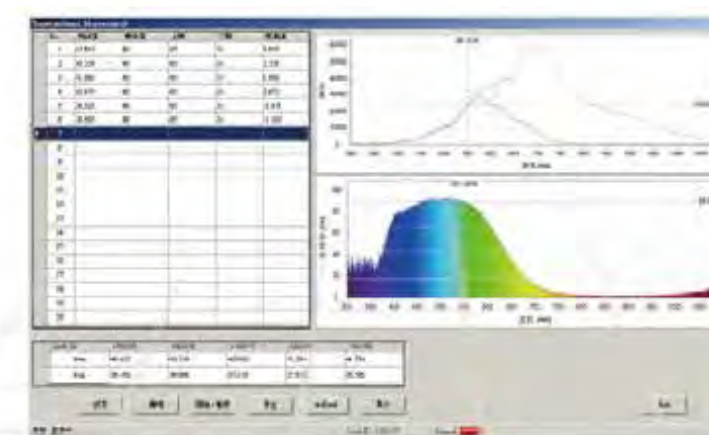
Spectrum spec

	RLCM-01	RLCM-02
Resolution	0.8 1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm - 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB GPIO	USB GPIO
Power	Default USB Power	Default USB Power
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

Micro-computer spec

Micro-computer's parameters	
CPU	quad core
DRAM	2G bytes
SSD	32G bytes
Display Card	Intel HD Graphics
Wireless LAN Card	Strong signal: 300M , double antenna WIFI
Sound Card	Six channel surround sound
WIFI	300M, double antenna WIFI
USB	USB slot*5 (USB 3.0*1 / USB 2.0*4)
Dimensions	140(W)x100(D)x30(H)mm

Interface



MEMS Micro-spectrometer

It's the only high resolution portable and handheld spectrometer in the world. Rainbow Light MEMS micro-spectrometer is different from the spectrometers in the market. It is made by concave grating which replaces quasi-face mirror, plane grating, and focusing lens; therefore, Rainbow Light MEMS micro-spectrometer has the advantage of anti-seismic, calibration demand is low, and low-cost with high capability/price.

Features

High spectral resolution 0.8~1.5 nm FWHM

The smallest spectrometer in the world

Low-cost

Programmable Microcontroller

Can be connected with 8 micro-spectrometers at the same time.

Cable transmission (Micro USB 2.0 interface – it can be easily connected to user's computer.)

Wireless transmission (Bluetooth – Within 4M / WIFI – Within 20M)

Applications

- Photonic testing equipment (Integrated with equipment system)
For all optical measurement equipment in the LED industry from upstream to downstream manufacturing process, and color gamut testing equipment in FPD industry.
- Environmental monitoring system (Integrated with wireless system)
Including the measurement of air pollution, water quality, pesticide, industrial gases, ultraviolet detection, and more.
- Color detection management (Integrated with wireless system)
Including the industries of textile, printing, dyeing, electroplating, painting for deciding, mixing and examining color.
- Biochemical measurement application (Integrated with biochemical equipment) including home testing device, lens measurement, heat-insulation paper measurement, animal testing equipment.
- Spectrometer analysis applications in niche market (Product has the advantage of low cost, high performance and high quality.) Gem identification, criminal identification, fruit sweetness detection, screen color correction, national defense industry, adulterated alcohol identification.



RLS-1000 : 0.8-1.5 nm FWHM



MRLS-1000 : 4.2-5nm FWHM

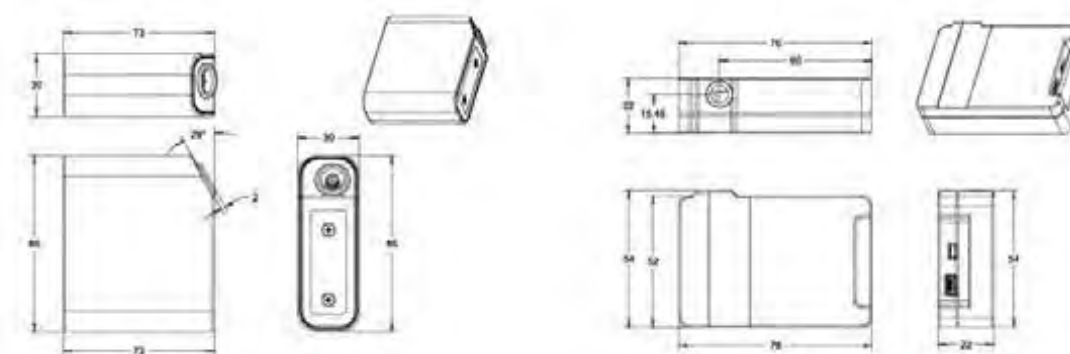


Wi-Fi / Bluetooth Spectrometer

Product specification

	RLS-1000	MRLS-1000
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm + 200-800 nm 380-780 nm + 300-800 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB - GPIO	USB - GPIO
Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	75(W)x51(D)x20(H) mm
Weight	292 grams	170 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista
Transmission mode	Cable transmission/ Bluetooth/WIFI	Cable transmission/ Bluetooth/WIFI

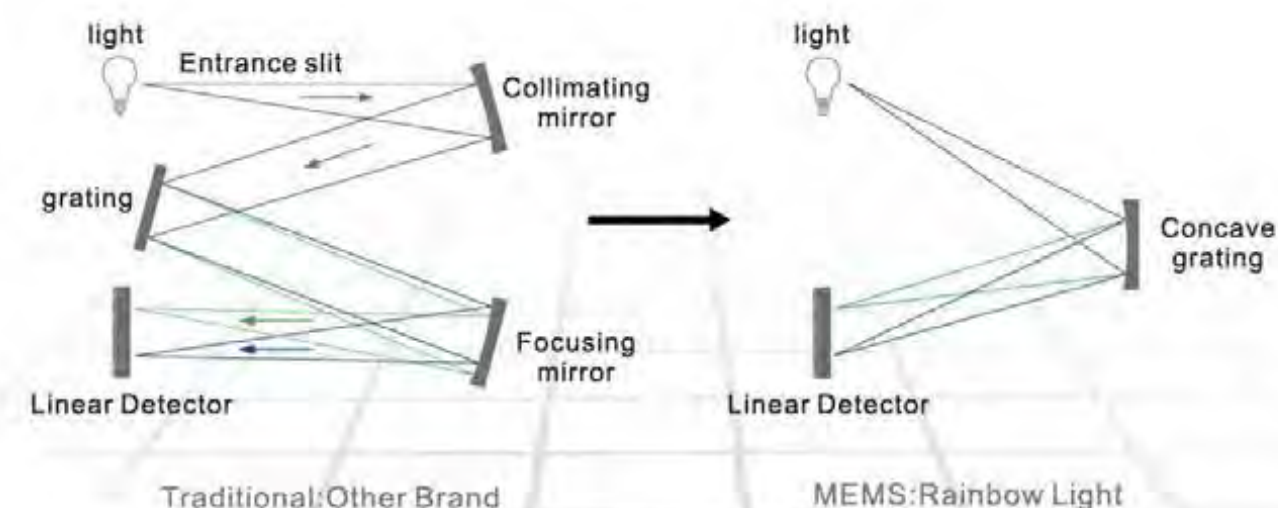
3 dimension view



RLS-1000 : 0.8-1.5 nm FWHM

MRLS-1000 : 4.2-5nm FWHM

Principle



Ultra-Violet/Visible/Infrared Micro-spectrometer Ultra-Violet Micro-spectrometer

Rainbow Light Technology Co., Ltd. is dedicating in research and development of micro-spectrometer which has competitive advantages of ultra-small size, low-cost, and high resolution and providing our customer a best solution with spectrometer application. A palm-sized micro-spectrometer has a wide range of wavelength, high stability, and easy to be integrated with all kinds of hardware and software.

Features

Wavelength range · High resolution · Ultra-small size · Low cost · SDK micro-controller available · USB interface, no external · Power supply needed.

Applications

- (optical fiber, integrating sphere, Y-shape optical fiber, goniophotometer, etc.)
- Physics and optical analysis: Spectrum, filter, transmittance, ITO transmittance, UV, NIR
- Photoelectro analysis: photoelectric effect analysis, LED, LCD, OLED testing and measuring.
- LED measuring: luminous decay monitoring, CRI, color temperature, purity, color coordinate, wavelength, etc.
- Color detecting management: color fixation, mixing, and verifying for textile, printing, coloring, electroplating, coating, etc..
- Chemical analysis: chemical substance analysis, component analysis, quantitative analysis, qualitative analysis, consistency analysis, etc..
- Environmental Monitoring System: air pollution, water quality, pesticides, industrial gas, UV detection
- Biomedical application: blood test, preventive medicine, and personal health-care management, animal quarantine, etc..
- More applications: pesticide residue test, counterfeit alcohol detection, etc..

Product specification

Spectrum spec

	VLS-1000	CVLS-1000	UVLS-1000
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM	0.8-1.5 nm FWHM
Wavelength Range	300-1100 nm · 380-780 nm	380-780 nm	200-800 nm
Signal-to-noise Range	<0.1%	<0.3%	<0.1%
Spectral deviation	0.04%	0.12%	
Integration Time	1 ms-24 s	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	78(W)x51(D)x20(H) mm	73(W)x85(D)x30(H) mm
Weight	292 grams	170 grams	292 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

Deuterium lamp spec

Window material	Quartz window
Spectrum	160-400 nm
Trigger voltage min DC	350 V
DC voltage	80 V
DC current	300 A
Filament turnover parameter	
(V)	2.5
(A)	4
(S)	10-60
Working (V)	0.1
(A)	0.1-8



VLS-1000 : 0.8-1.5 nm FWHM
Light source: halogen lamp

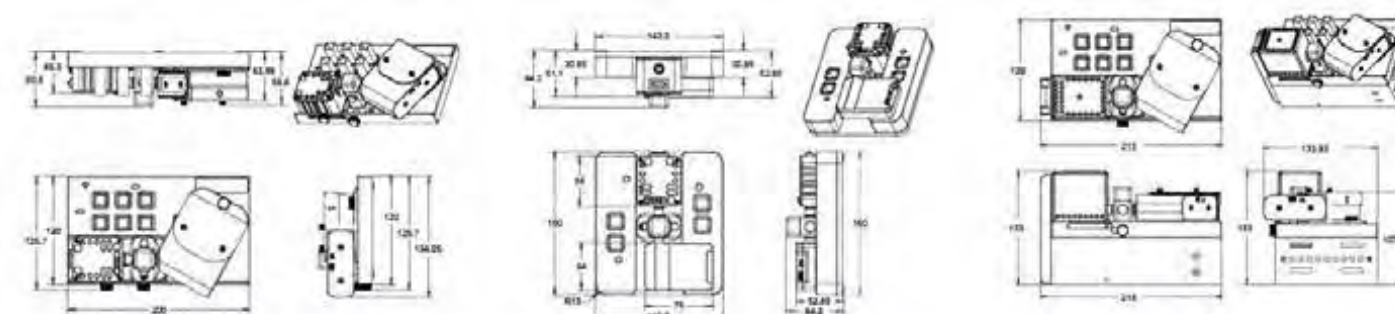


CVLS-1000 : 4.2-5nm FWHM
Light source: halogen lamp



UVLS-1000 : 0.8-1.5nm FWHM
Light source: deuterium lamp

3 dimension view

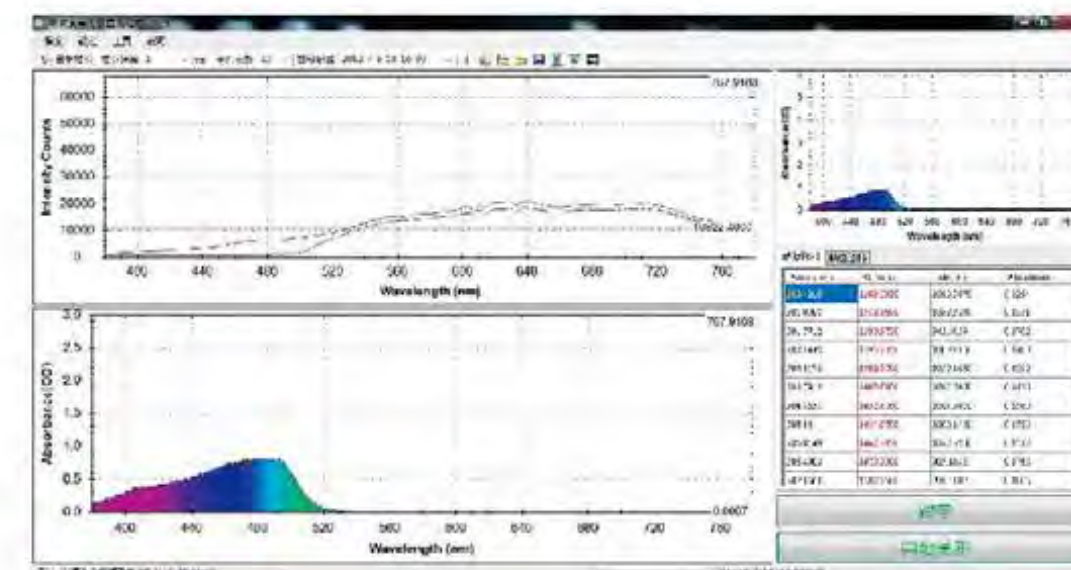


VLS-1000 : 0.8-1.5 nm FWHM

CVLS-1000 : 4.2-5nm FWHM

UVLS-1000 : 0.8-1.5nm FWHM

Interface



Principle

Automatic monochromatic light absorbance :

When a monochromatic light is irradiated to an absorbing medium, after passing through the medium of certain thickness, owing to part of the light energy absorbed by the medium, intensity of transmitted light will be weakened. The more concentration the absorbing medium, the more thickness the medium, the more obvious weakened the light intensity; the relation is shown as below:

$$A = \log_{10} \frac{I_0}{I_t} = \log_{10} \frac{1}{T} = K \cdot l \cdot c$$

A: Medium absorbing intensity

I₀: Irradiated light intensity

I_t: Transmitted light intensity

T: Transmittance or transmissivity

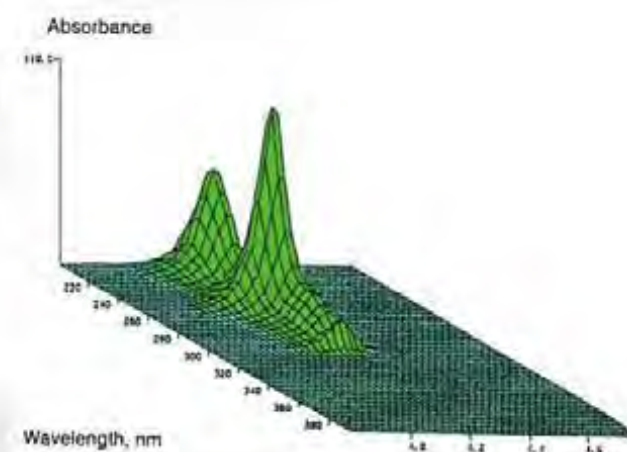
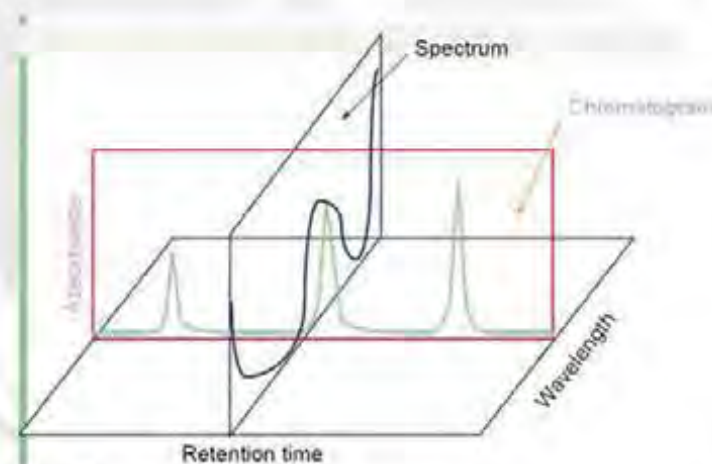
K: Coefficient, can be absorbing coefficient or molar absorption coefficient

l: Absorbing medium thickness

c: Absorbing medium concentration u/m can be g/L or mol

Dynamic absorption:

Fast scan UV-Vis spectrometric detector (190nm-800nm) is applied with MEMS concave grating as detecting device, constructed as multi-channel parallel tasks and detecting through grating spectrum, then irradiated to optical signals of all wavelengths in array receiver, then 3D chromatography spectrogram of function absorption value (A), reserved time (tR) and wavelength (l) can be obtained.

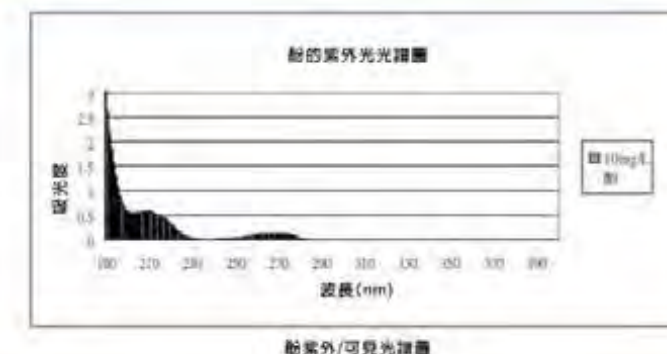


Applications

Phenol

Spectrogram instruction

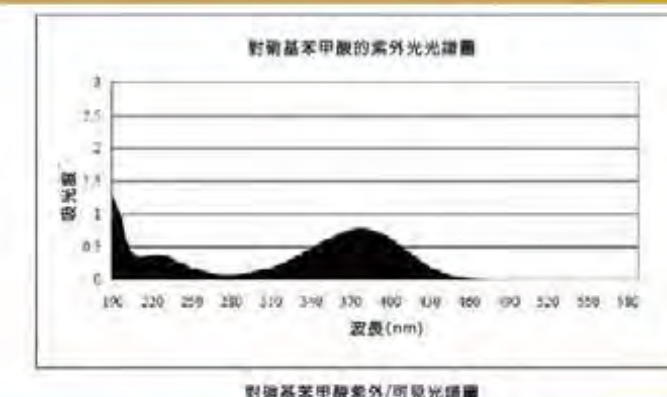
Phenol is white particle crystals, equipped with corrosiveness and toxicity, widely applied in industrial use, provided with two major absorption peaks in ultraviolet light area, at 209 nm and 268nm respectively, and completely no absorbing intensity in visible light area.



Para-nitroaniline

Spectrogram instruction

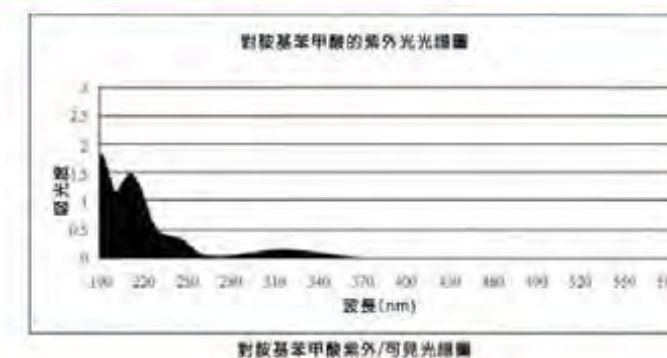
Spectrogram explains 10 mg/L para-nitroaniline's ultraviolet / visible light spectrum diagram is shown on the right. It provided no absorbing intensity at above 480 nm, and maximum absorbing intensity at 377 nm.



Para-aminobenzoic acid

Spectrogram instruction

10mg/L para aminobenzoic acid's ultraviolet / visible light spectrum diagram shown on the right. It provided with no absorbing intensity at wavelength above 370 nm, and absorption peaks at 210 nm, 248 nm and 316 nm respectively, and its absorption coefficient variations are shown in the diagram.



Dodecyl benzene sulfonate

Spectrogram instruction

It provided two functional groups of major absorbing absorption spectra, divided into two parts of benzene ring and sulfonic acid group, its absorption ultraviolet / visible light spectrum diagram is shown on the right. Its major absorption peak is at 222 nm and no absorbing intensity after wavelength 280 nm.

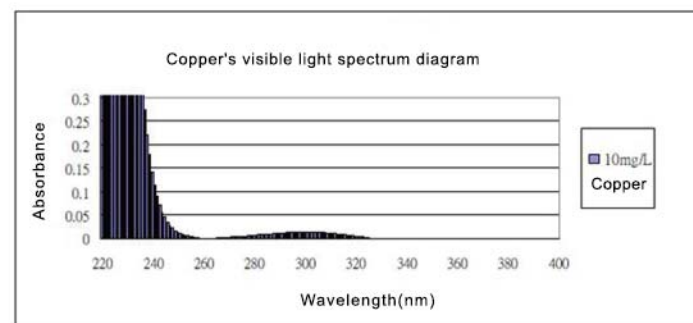


Applications

Copper

Spectrogram instruction

It is measured by flamboyant atomic absorption spectrum method , its optimal copper detecting range falls into 0.2-10ppm, and selected wavelength is 324.7 nm.

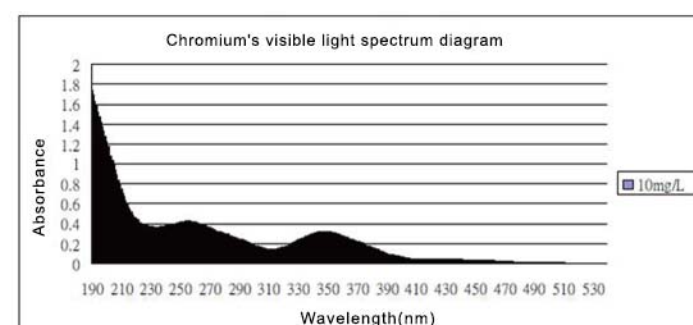


Copper's ultraviolet / visible light spectrum diagram

Chromium

Spectrogram instruction

It is also measured by flamboyant atomic absorption spectrum method , its optimal chromium detecting range falls into 0.2-10ppm, and selected wavelengths are 357nm, 351 nm.

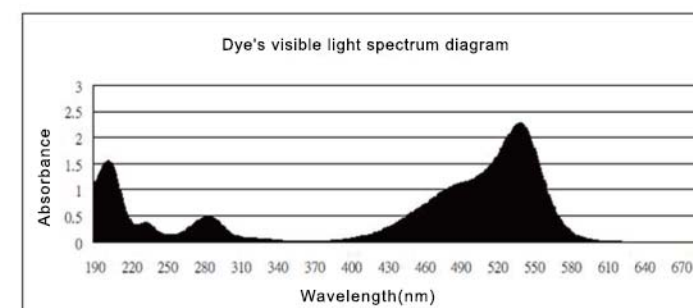


Chromium's ultraviolet / visible light spectrum diagram

Dye

Spectrogram instruction

10 mg/L dye's ultraviolet / visible light spectrum diagram is as shown on below. It provided with no absorbing intensity at wavelength above 610 nm, and absorption peaks at 204 nm , 233 nm , 284 nm , and 540 nm respectively.

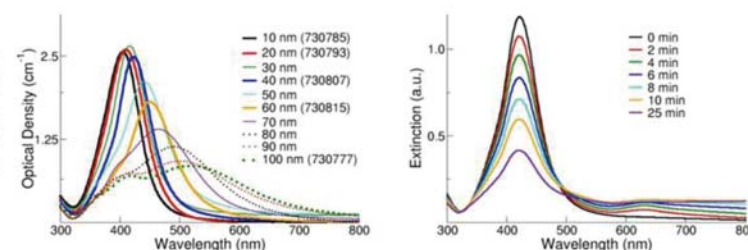


Dye's ultraviolet / visible light spectrum diagram

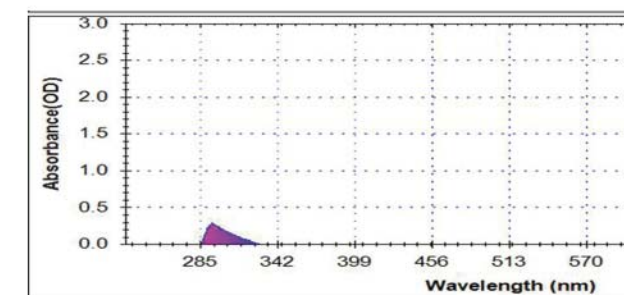
Silver Nanoparticle

Spectrogram instruction

In nano silver particle qualitative analysis, UV visible spectrometer usually conduct full coverage scanning , from the spectrum, it is apparently shown that luminous yellow nano silver solvent provided with absorption peak around wavelength 410nm.



G6PDH

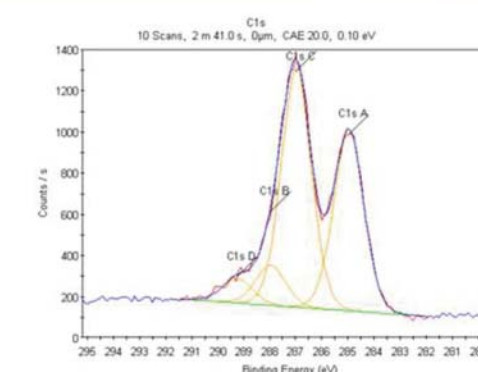


Wavelength	Reference	Intensity	Absorbance
288.62241	1119.105	794.8265	0.1486
289.22091	1054.687	812.7947	0.1984
289.89889	1321.096	795.7794	0.2202
290.47781	1428.713	825.1096	0.2384
291.09721	1529.463	903.4631	0.2286
291.71689	1624.121	905.9984	0.2535
292.33701	1733.411	952.9899	0.2648
292.95761	1846.998	983.1008	0.2739
293.57849	2007.191	1004.8421	0.3005
294.19969	2130.99	112.715	0.2822
294.82059	2227.086	161.005	0.2809
295.44191	2304.899	1250.606	0.2636
296.0665	2380.346	1305.532	0.2609
296.68961	2469.159	1359.635	0.2591
297.31099	2567.409	1448.421	0.2486
297.93689	2669.126	1503.96	0.2491
298.56199	2730.865	1534.063	0.2595

Graphene Oxide

Spectrogram instruction

Grapheme oxide (GO) is a grapheme material of bonding oxygen radical group, acquired by chemical method stripping graphite block. Therefore various chemical modifications can be applied and dissolved to disperse solution, provided with advantages of low temperature, low cost , large scaled mass production , so that grapheme oxide is provided with development prospect.

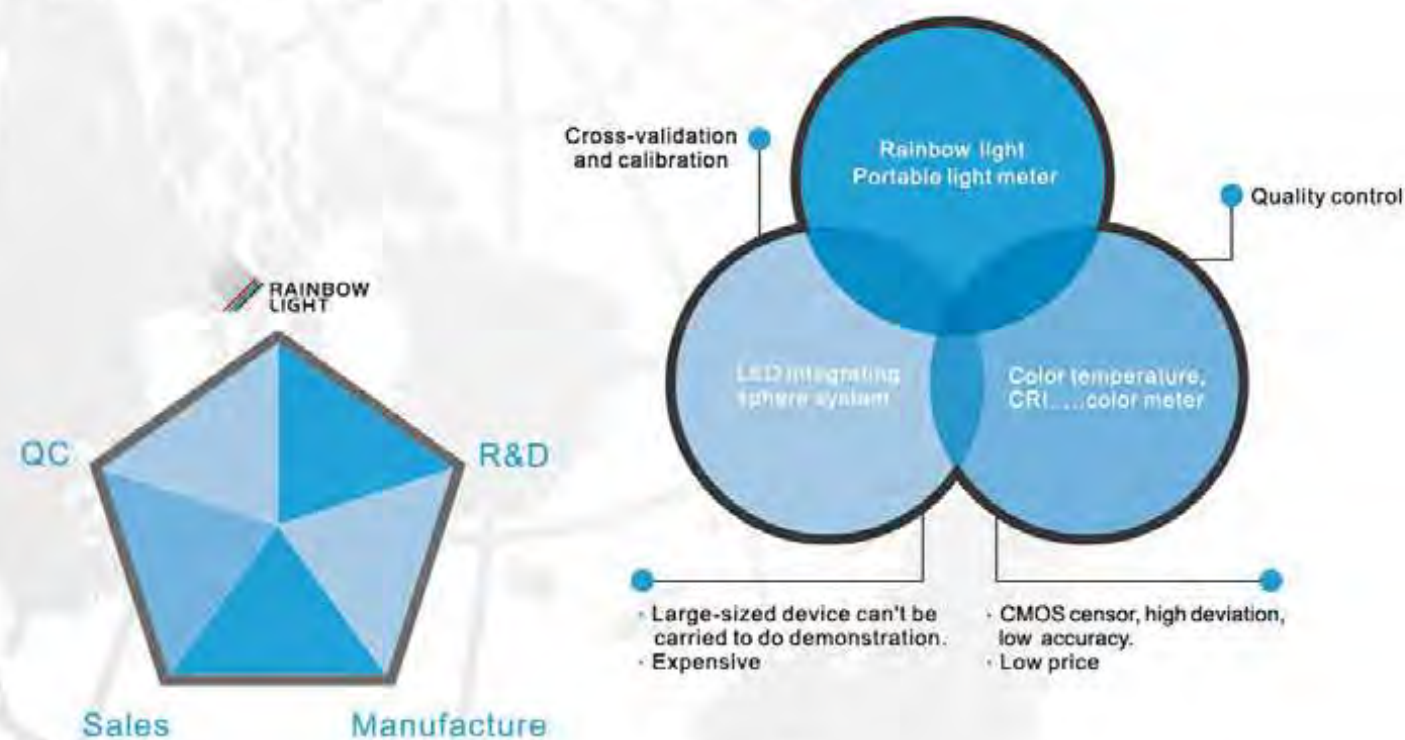




Portable Lighting Detection Equipment

Rainbow Light Technology Co. Ltd. groundbreaking single detection is easy to measure and offer you a solution to measure at any light source in different environment. The spectral deviation is not only controlled on plus or minus 0.1nm, the testing data is controlled in the four ten thousandths and can be used and measured under many environments. It is the only measuring instrument equipment has both advantage of precision and accuracy in the market.

- High accuracy LED testing device manufactured with MEMS technology.
- Exclusive system calibration makes the test result comparable to large-sized equipment.
- Full spectrum, color temperature, CRI, purity, color coordinate system.
- High performance/cost and high resolution
- Cable transmission (Micro USB 2.0 interface – it can be easily connected to user's computer.)
- Wireless transmission (Bluetooth - Within 4M / WIFI - Within 20M)



- LED testing equipment providing R&D, manufacture, QC, and sales.

Product specification

	HSM-01	HSM-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm / 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	75(W)x51(D)x20(H) mm
Weight	292 grams	170 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista
Transmission mode	Cable transmission/ Bluetooth/WIFI	Cable transmission/ Bluetooth/WIFI

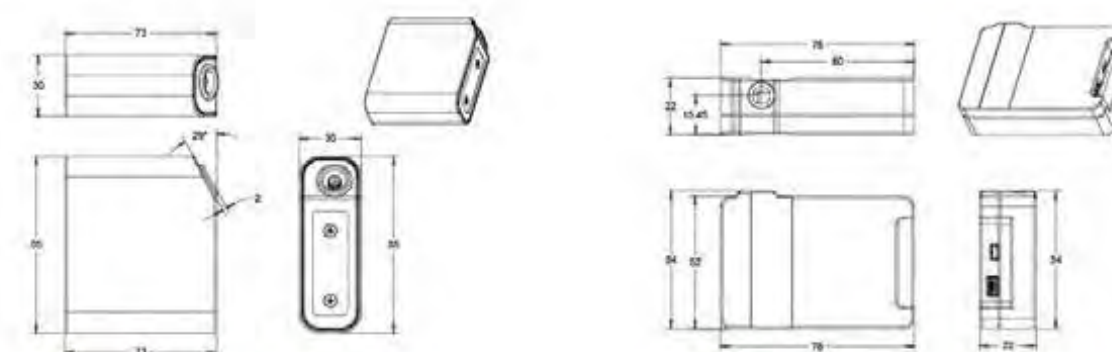


HSM-01 : 0.8-1.5 nm FWHM
Fiber & Small integrating sphere
(Optional)



HSM-02 : 4.2-5nm FWHM
Fiber & Small integrating sphere
(Optional)

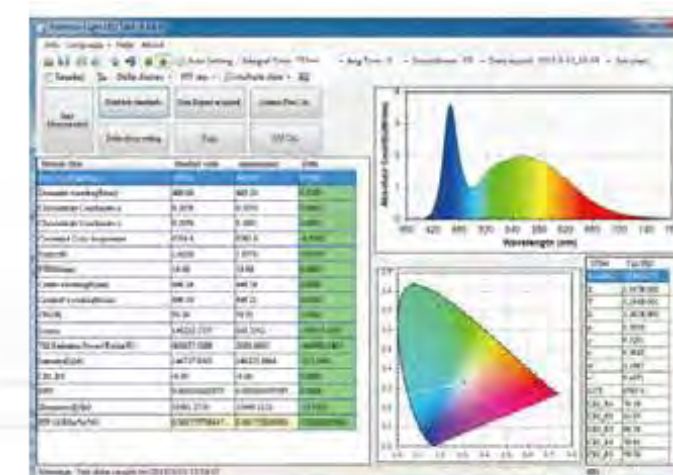
3 dimension view



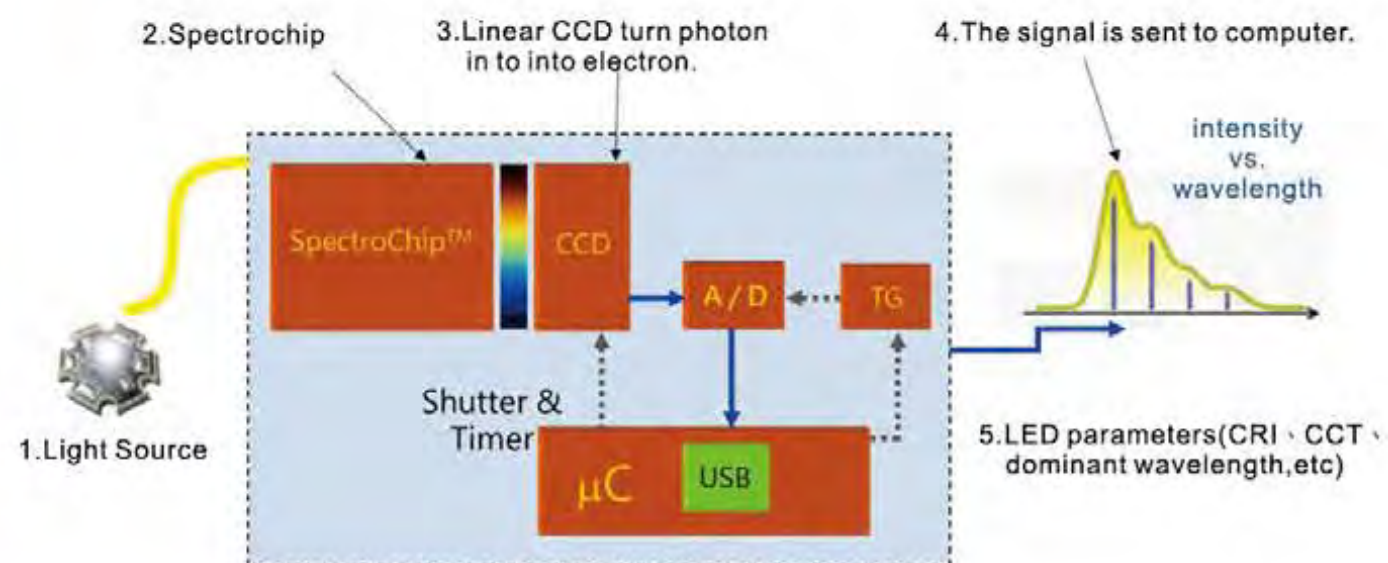
HSM-01 : 0.8-1.5 nm FWHM

HSM-02 : 4.2-5nm FWHM

Interface



Principle

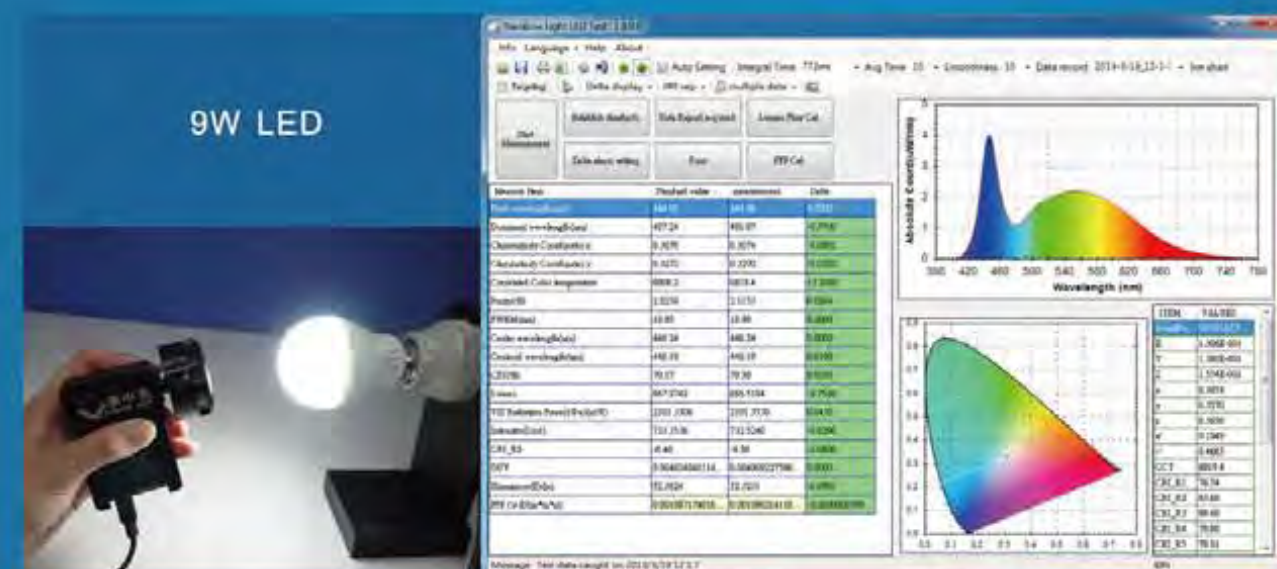
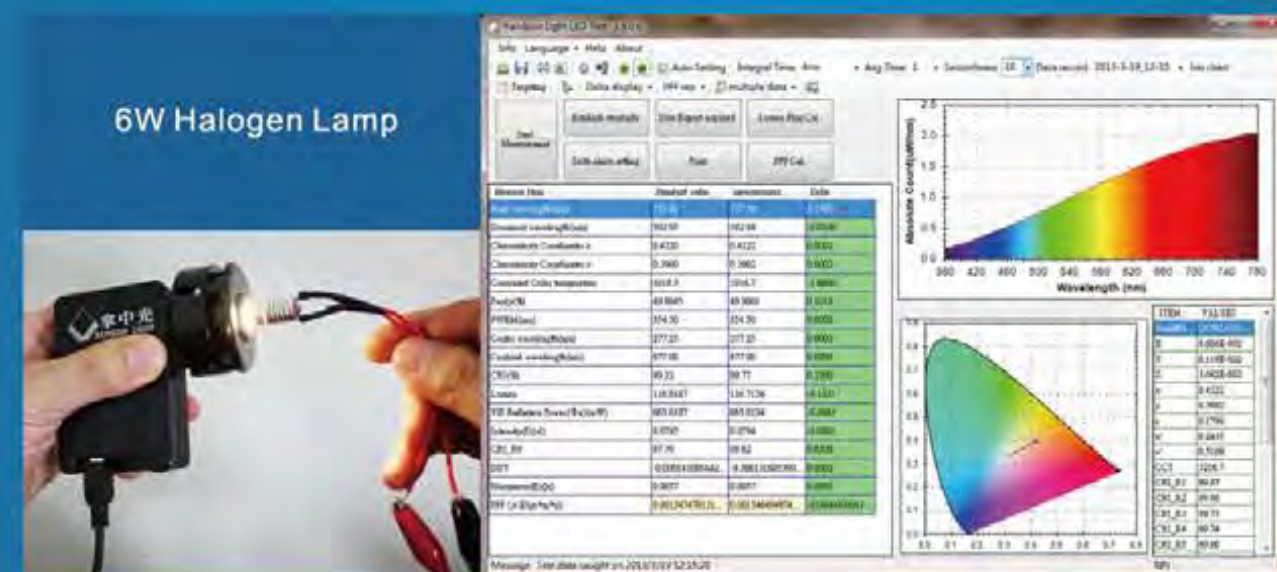


Method



Connect micro-spectrometer with computer, open the software, aim the spectrometer at the light source till the device read the correct spectrum.

Applications





LED Luminous Decay Monitoring Device

Nowadays LED luminous decay detection equipment either lux meter or integrating sphere system are all limited on its design and principle which lead to the large gap between experimental environment erroneous production process field condition, factors cause on LED luminous decay measurement and cannot be monitored

Rainbow Light Technology launch LED Luminous Decay Monitoring Special Instrument which spectral deviation is not only within plus and minus 0.1nm monitoring data within four ten thousandths (1/10,000), it can monitoring any light sources under any conditions of environments. It is unique and the only LED Luminous Decay Monitoring Special Instrument has both advantages of precision and accuracy on the market.

Product specification

	LDM-01	LDM-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm / 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	75(W)x51(D)x20(H) mm
Weight	292 grams	170 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

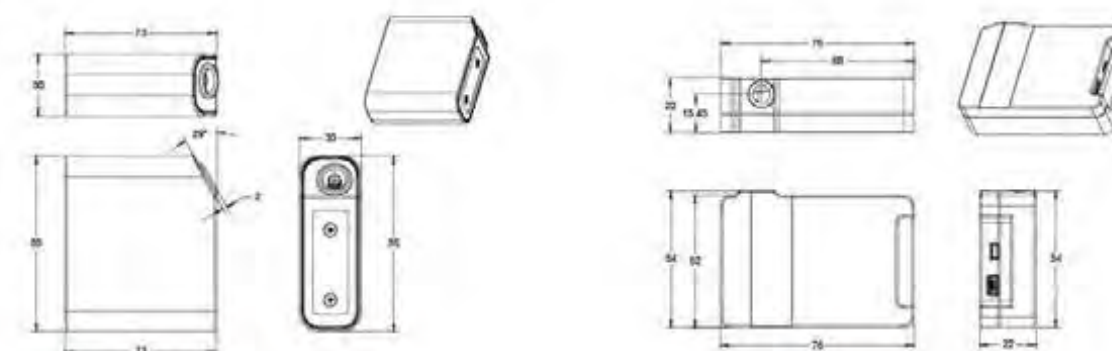


LDM-01 : 0.8-1.5 nm FWHM



LDM-02 : 4.2-5nm FWHM

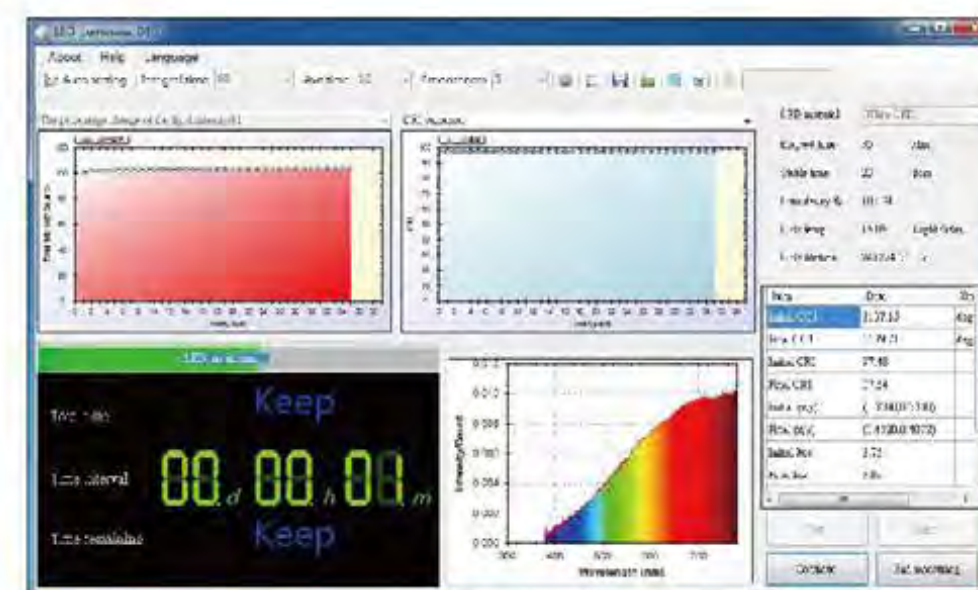
3 dimension view



LDM-01 : 0.8-1.5 nm FWHM

LDM-02 : 4.2-5nm FWHM

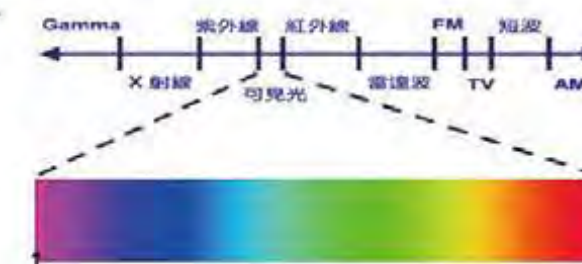
Interface



Principle

Intensity · decay · CRI · CCT · illuminance monitor

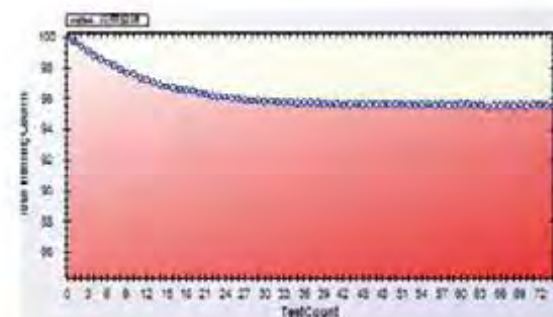
Rainbow Light Technology CO., Ltd designs luminous decay monitoring instrument. The spectral deviation is not only within plus and minus 0.1nm but also stability of monitoring data is within four ten thousandths(1/10000). Plus, it also can monitor any light sources at any conditions.



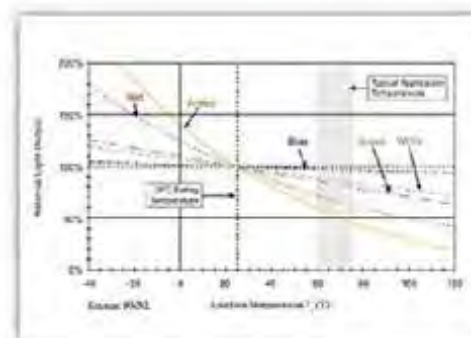
Principle

LED junction temperature and lifetime

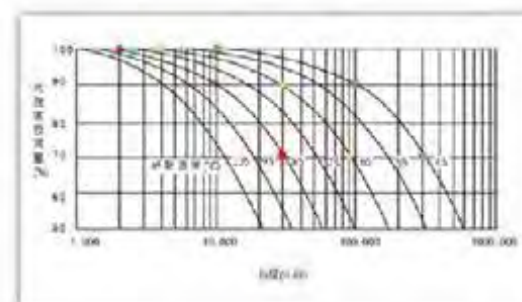
1. With the LED light enter the spectrometer, with the software, the spectrometer monitors transformation of the light with time to calculate initial light intensity and actual light intensity.



2. Commonly, light intensity will decay according to different junction temperature of different material. And this is reversible. When the temperature is back to initial temperature, the light intensity will go back to initial light intensity. As a result, light decay is somewhat related to junction temperature as the picture on the right.



3. When junction temperature calculated, LED lifespan can be calculated according to the relation of junction temperature as the following picture.



Method



USB



Micro-spectrometer

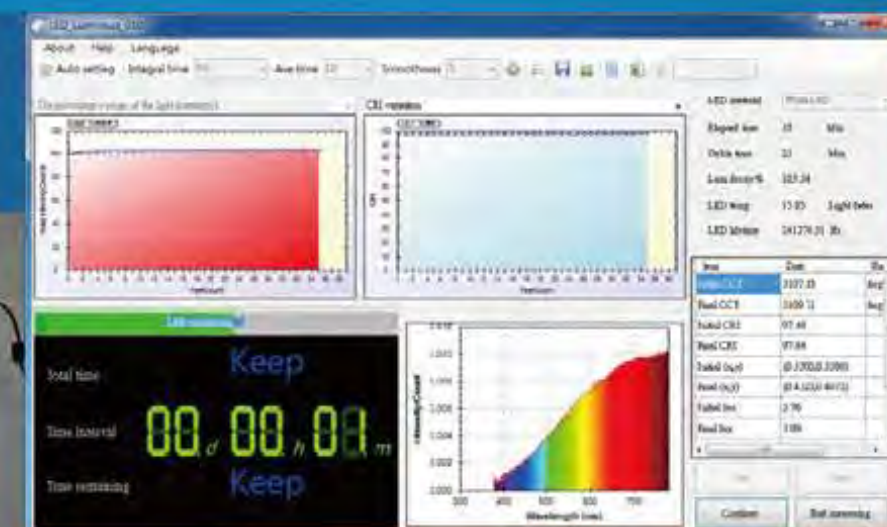


Light source

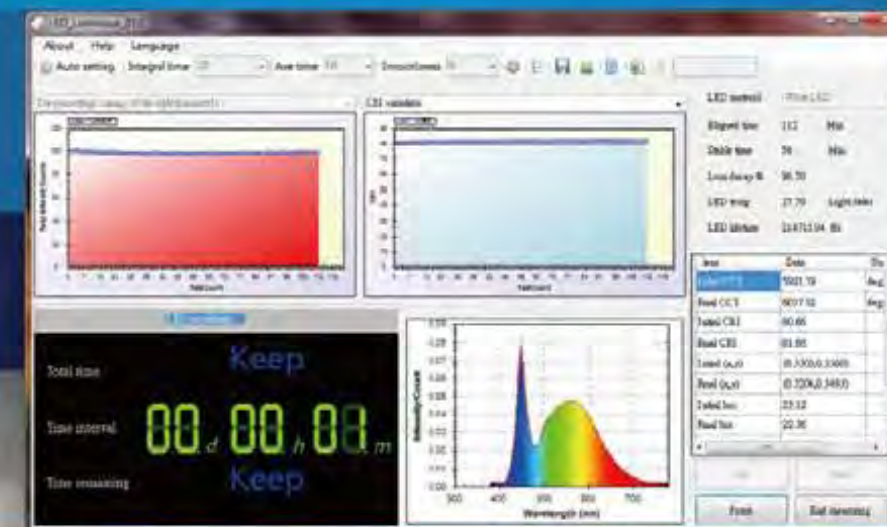
Connect micro-spectrometer with computer, open the software, aim the spectrometer at the light source till the device read the correct spectrum.

Applications

6W Halogen Lamp



9W LED





Goniophotometer

1. 20cm-∞ spatial photometric distribution
2. Luminous intensity distribution
3. Total luminous flux
4. Lux, CCT, color, CRI etc. in a 3-dimension graph display
5. Lux, CCT, color, CRI, testing point etc. in graph display
6. Providing Rainbow Light Goniophotometer software and customized vertical profile
7. Cartesian Coordinates System
8. Display of illuminance at a distance comparison
9. Center Illuminance
10. Hue determination and the relationship between DUV and angle of view
11. IES files and SDK available
12. Max hue determination and the position
13. Average color coordinates (Xa, Ya)
14. Beam angle
15. CIE Glare Index(CGI)
16. Rainbow Light Luminous Decay software, monitoring luminous decay and calculating the curve for time needed of stable light output, junction temperature, and LED lifetime, etc.

Product specification

	CDM-01	CDM-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm / 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	75(W)x51(D)x20(H) mm
Weight	292 grams	170 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

1. Size of measuring object
A. For LED chips: $\Phi 3, \Phi 5, \Phi 8, \Phi 10$ cm
B. $\leq \Phi 18$ cm
2. Lamp Mounting Surface: aircraft aluminum alloy
3. Sample Weight
Type A/B about 20 Kg(Max test weight 8Kg)
Type C about 200 Kg(Max test weight 20 Kg)
4. Power Supply: 100V-220V
5. Driver: Servo Motors
6. Interface: USB
7. Travel Path(θ): $\leq \pm 165^\circ$, Positioning Accuracy: $\pm 0.01^\circ$
8. Angular Range C axis w/ End Switch(Φ): $0^\circ - 360^\circ$
Positioning Accuracy: $\pm 0.01^\circ$
9. Test Distance: 20 cm-∞
10. Vertical Adjusting System: adjustable tripod
11. Horizontal Adjusting System: Laser Position Locator
12. Software: Rainbow Light Goniophotometer software
13. Chinese/English available

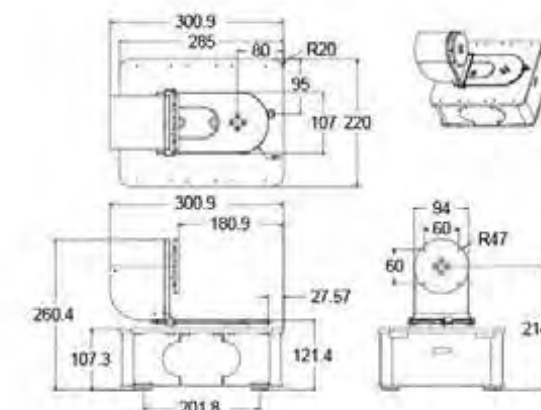


CDM-01 : 0.8-1.5 nm FWHM



CDM-02 : 4.2-5nm FWHM

3 dimension view

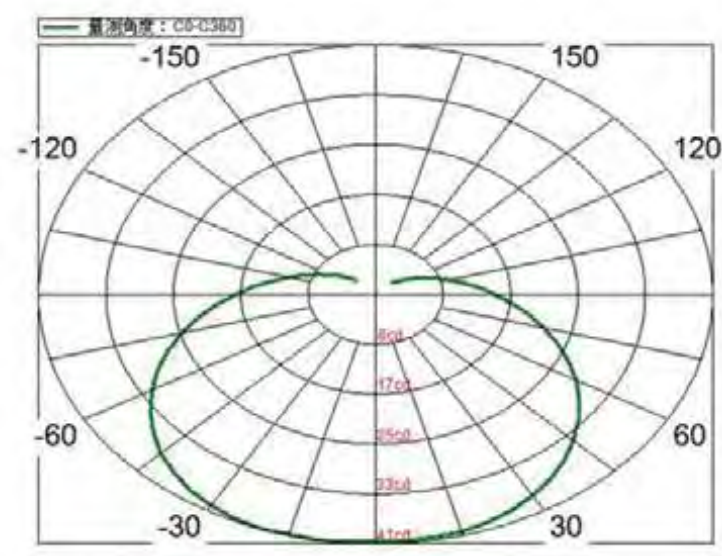


Interface



Principle

A goniometer is an instrument that either measures an angle or allows an object to be rotated to a precise angular position. Goniometers measure the spatial distribution of light visible to the human eye at a specific angular position. And we can thus calculate illuminance, light intensity, distance, light efficacy and flashing degree.

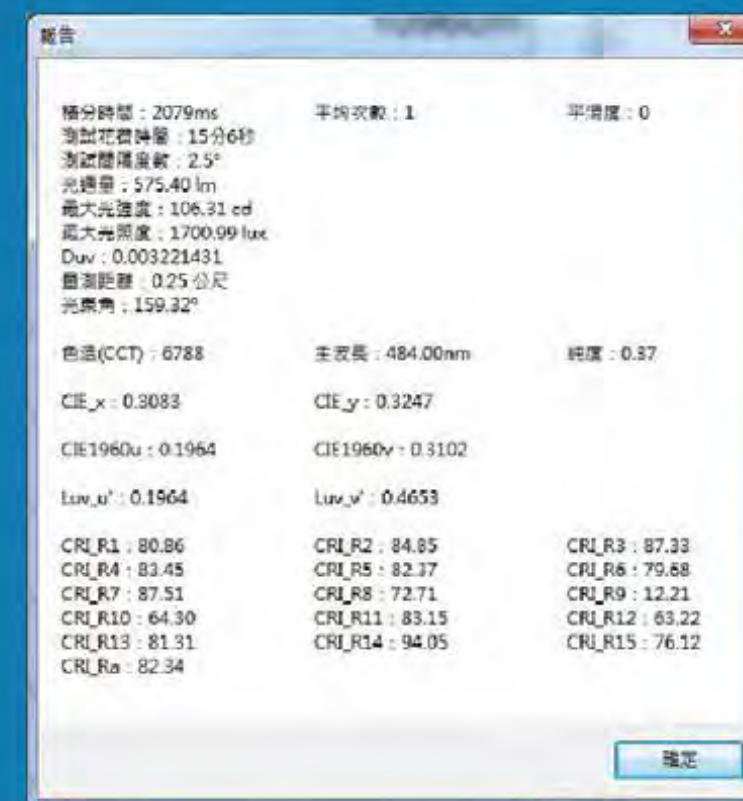
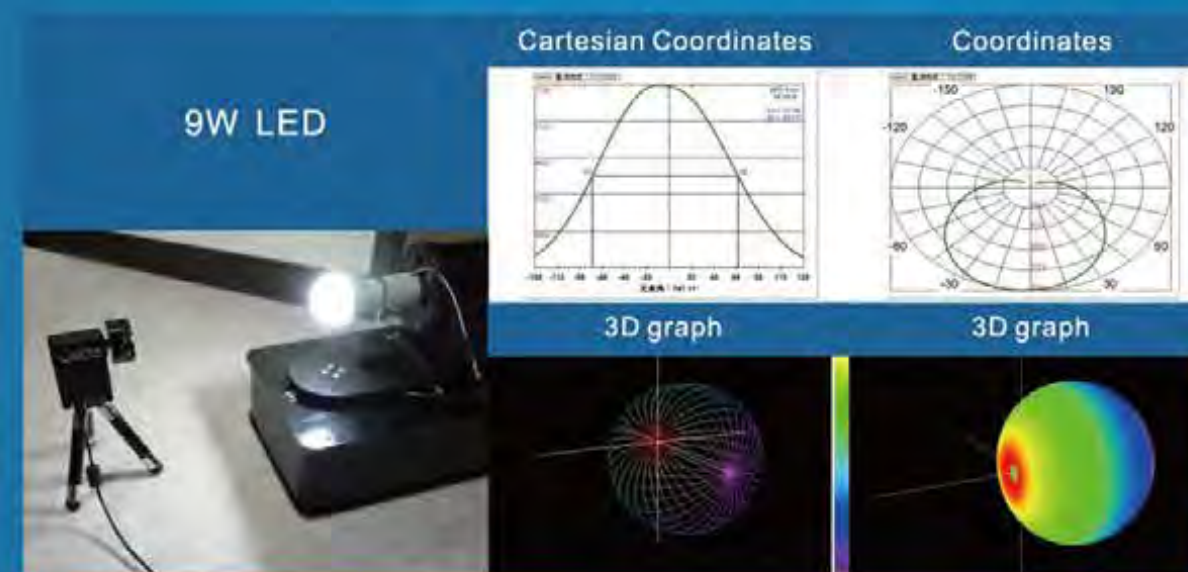


Method



Connect micro-spectrometer with computer, open the software, aim the spectrometer at the light source till the device read the correct spectrum.

Applications





LED Testing & Measuring Equipment

Different from the traditional testing and measuring equipment, Rainbow Light LED Testing & Measuring Equipment provides industry-leading features below....

1. The calibration demand is low. We help users to save the calibration fees of \$7,000 to \$10,000 U.S dollars every year.
2. System environment; users defined based on the requirements.
3. Any combination of different type and sizes of integrating sphere, fiber optics, and other peripherals.
4. Bespoke software simplified the operation and review the result instantly.

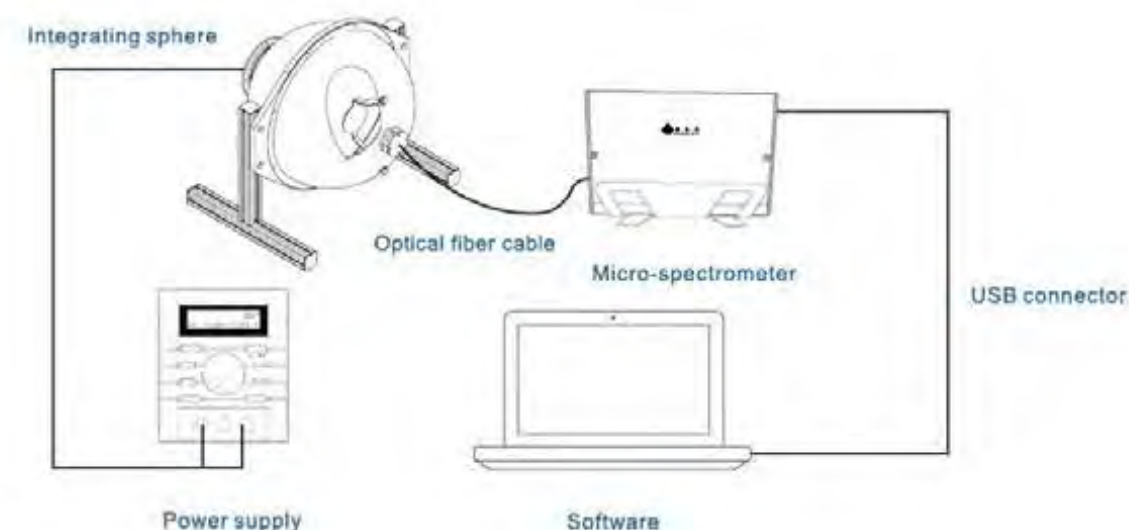
Advanced features

1. System calibration and lumen calibration function available.
 - Easy DIY calibration and lots of calibration fee saved
 - Calibrate with designated testing equipment so the test result can be the same
2. Can be applied to different accessories
 - Pair with integrating sphere and optical fiber
3. Provide professional software
 - Clear and straightforward test result
4. Basic light decay monitoring function available
 - Light decay is the time required for LED light output to achieve stability
5. Inspection function
 - Users can set up deviation by themselves.

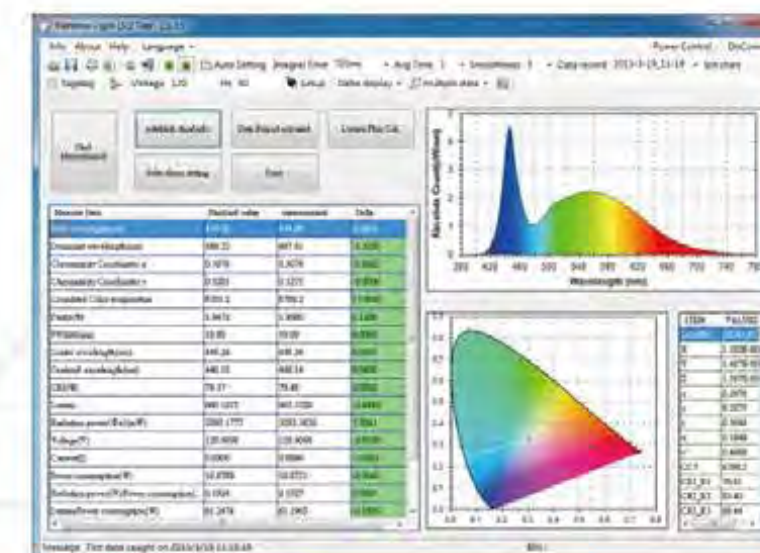
Product specification

	LSM-01	LSM-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm / 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB / GPIO	USB / GPIO
Power	Default USB Power	Default USB Power
Dimensions	73(W)x85(D)x30(H) mm	75(W)x51(D)x20(H) mm
Weight	292 grams	170 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

System



Interface



Principle

Light rays incidents on any point on the inner surface by multiple scattering reflections, distributed equally to all other points. By using integrating sphere to test luminous flux, test result is more reliable. The effects of the original direction of light are minimized.

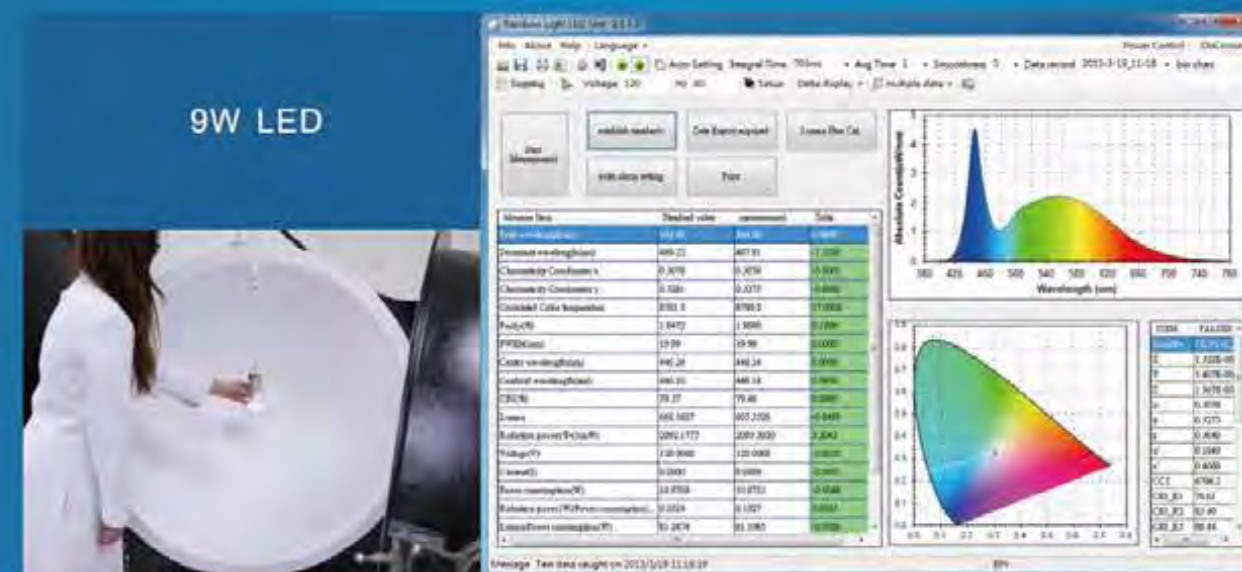
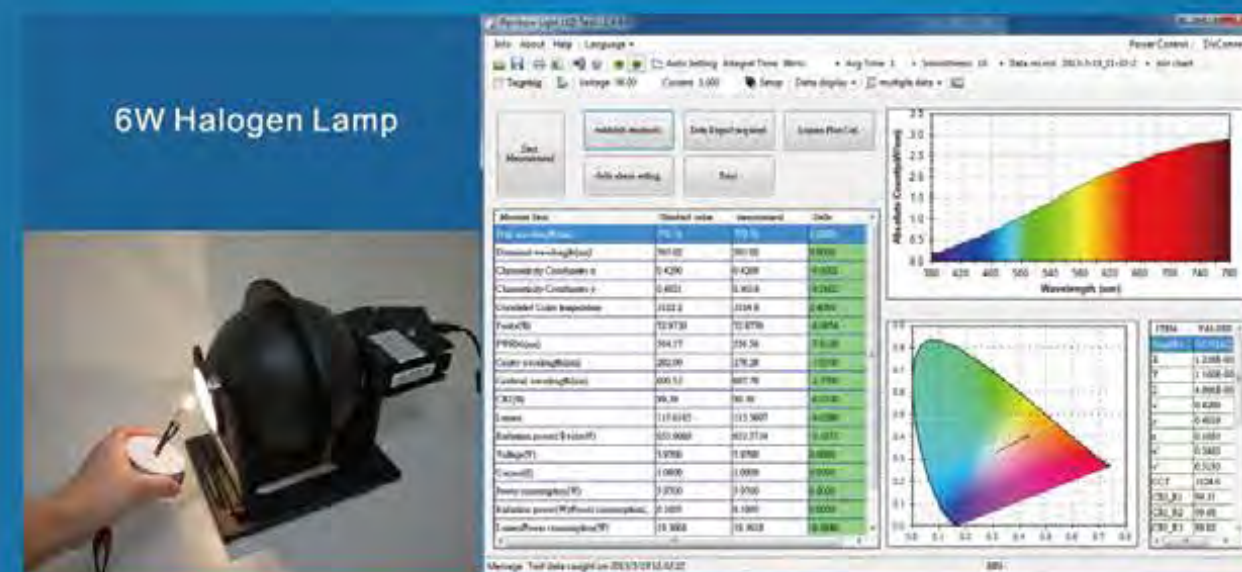


Different sizes of integrating sphere available. Custom-made integrating sphere welcome!

Method



Applications





Full Spectrum Transmittance Measuring Equipment Touch Panel Transmittance Equipment

Rainbow Light Technology Co., Ltd. developed and research Full Spectrograph Transmittance Measuring Instrument and create our own brand (Rainbow-Light). Full Spectrograph Transmittance Measuring Instrument is using MEMS technology on micro-spectrometer. Transmittance Measurement Instrument can be applied on many fields: LED diffusion plate transmittance, lens transmittance, glass transmittance, heat-insulation paper transmittance, and every kinds of coating transmittance.

Features

Quick, easy, and accurate measurement

Spectral deviation is within ± 0.1 nm

Data repeatability is 0.04%.

Halogen lamp light source with full visible spectrum (380nm-780nm) testing result.

Test items: UV VIS and average VIS transmittance

Product specification

	TSM-01	TSM-12
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm - 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
A/D Resolution	16 bit	16 bit
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB + GPIO	USB
Power	Default USB Power + DC Power	Rechargeable Li-Ion Battery DC Power
Dimensions	14(W)x10.3(D)x23.4(H) cm	14(W)x10.1(D)x22.9(H) cm
Weight	3.5 kg	4 kg
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

Product specification



TSM-01 : 0.8-1.5 nm FWHM



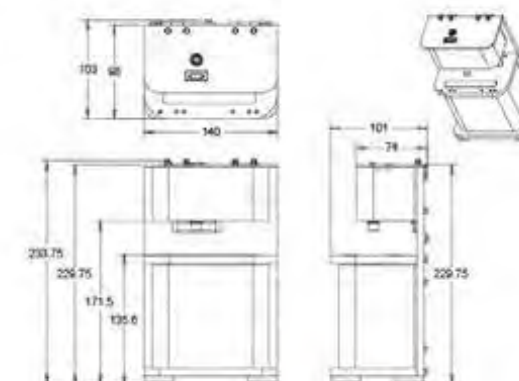
TSM-12 : 4.2-5 nm FWHM



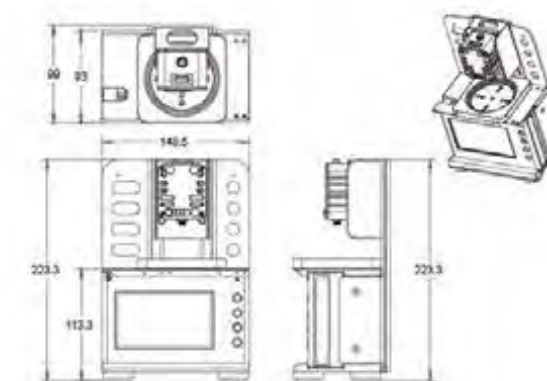
Haze measure according to standard ASTM D1003
Full spectrum transmittance according to ASTM D 1003
Transmittance according to ASTM E 275-93

Small integrating sphere
(Optional)

3 dimension view

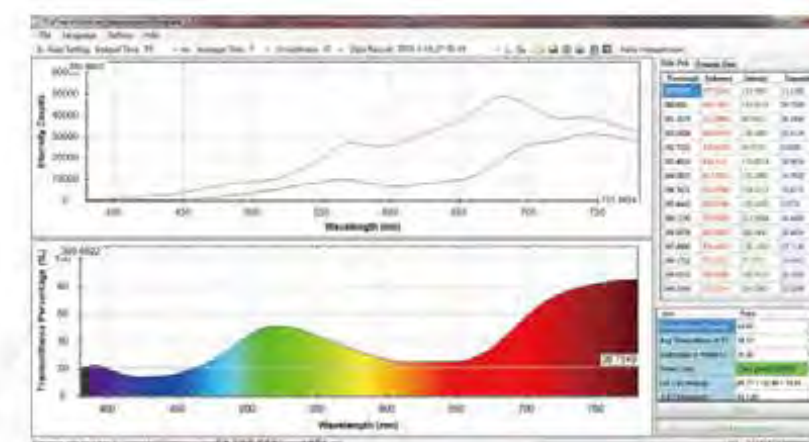


TSM-01 : 0.8-1.5 nm FWHM



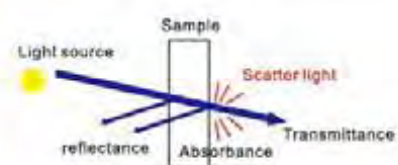
TSM-12 : 4.2-5 nm FWHM

Interface



Principle

Sample interface character

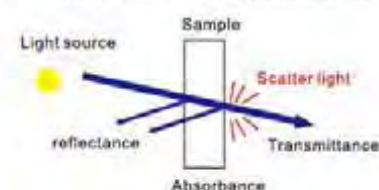


$$\text{Transmittance} + \text{reflectance} + \text{absorbance} + \text{scattering} = 100\%$$

According to ASTM E275-93 Standard which providing accurate transmittance measurement standard. This is not including scattering light so it provide accurate full spectrum transmittance measurement.

ASTM E275-93

ASTM D1003 standard full spectrum calculation



Test transmittance and calculate full spectrum transmittance so it's not necessary to set an integrating sphere.

Haze

Definition: Haze= diffuse/transmittance
Standard:
ASTM D 1033(JIS K7105, BS2782-5)
JIS K7361 (ISO 13468)
ISO 147(JIS7136)
Accuracy:

Method	Item	Diffuse Transmittance	Total Transmittance	Haze
ASTM D 1033		X	X	X
JIS K7361		X	X	X
ISO 147		X	X	X

ASTM D1003 is a standard for testing haze. It needs an integrating sphere. The calculation includes scattering light.

ASTM D1003

ASTM D1003 standard full spectrum calculation



Use integrating sphere to collect transmittance and scattering light to do indirect calculation transmittance at 550nm so it need to be set up integrating sphere.

Method

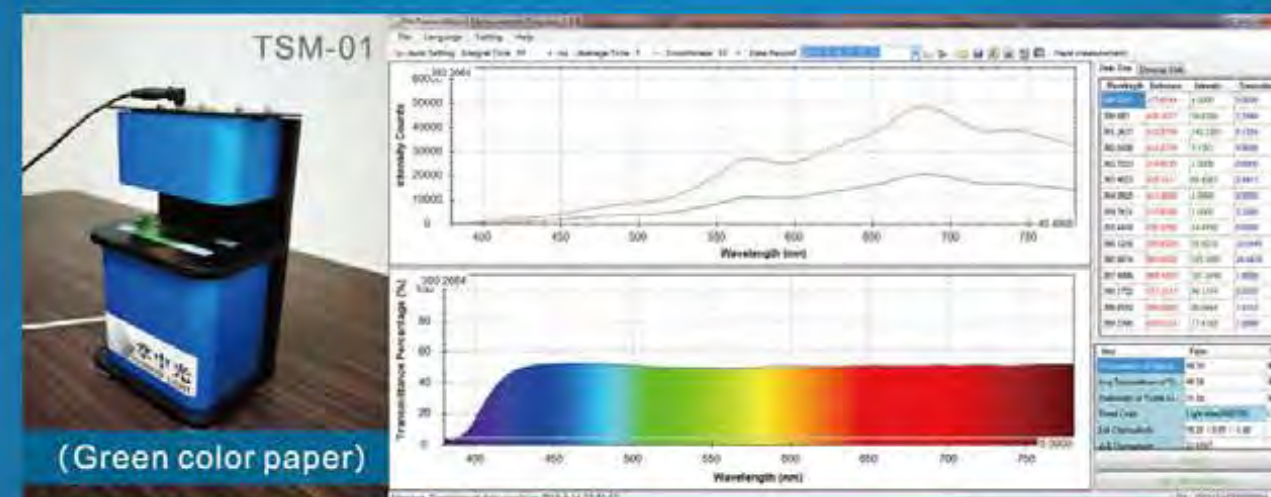


USB

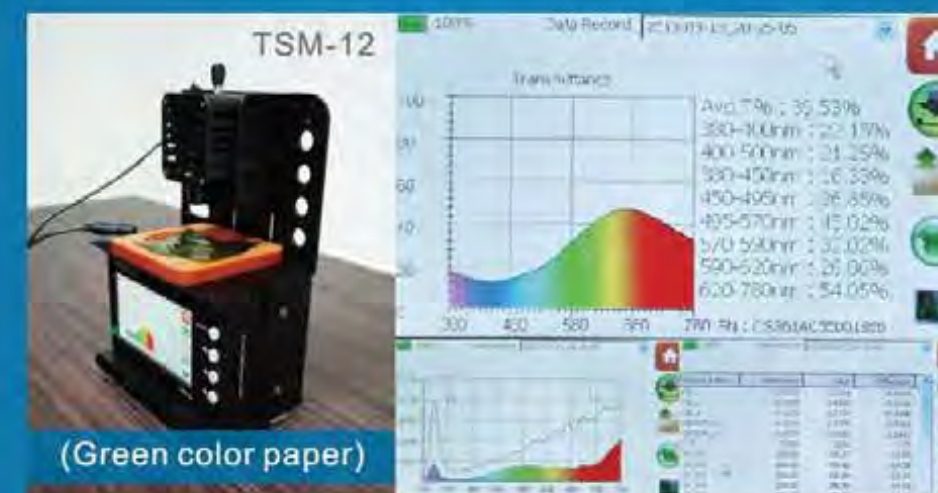


Connect micro-spectrometer with computer, open the software, aim the spectrometer at the light source till the device read the correct spectrum.

Applications

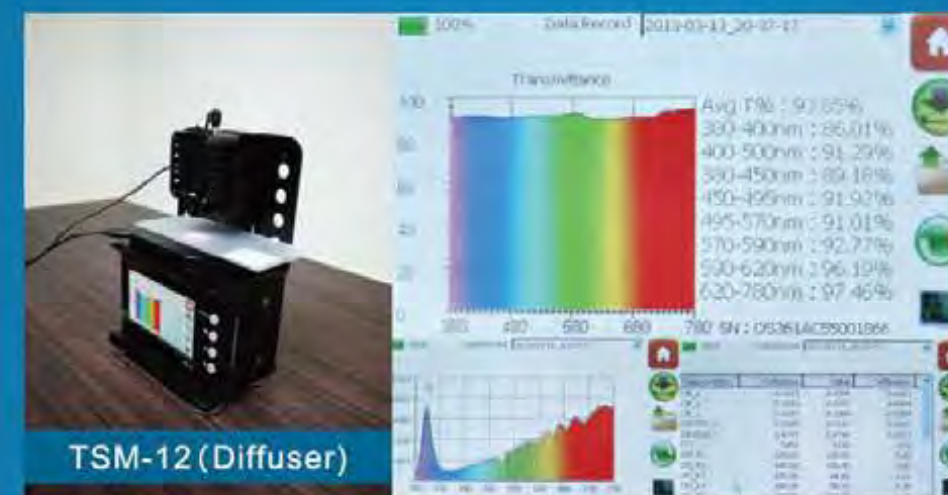
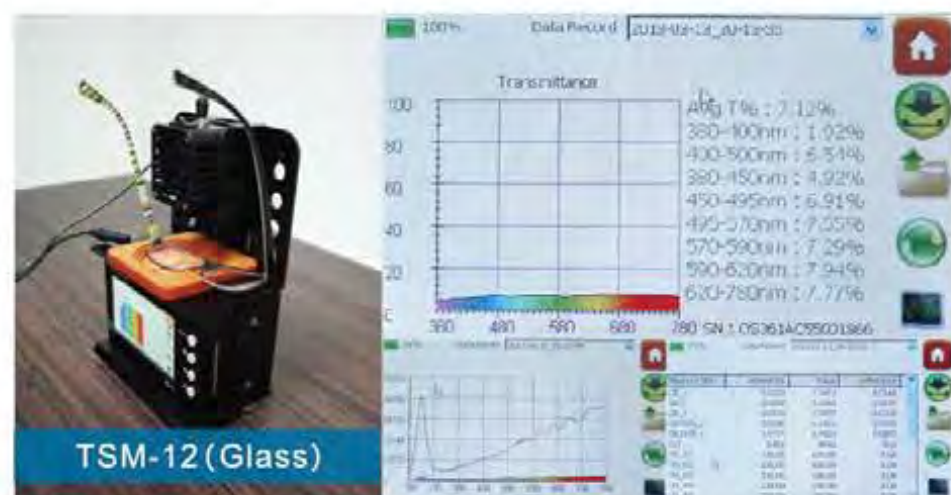
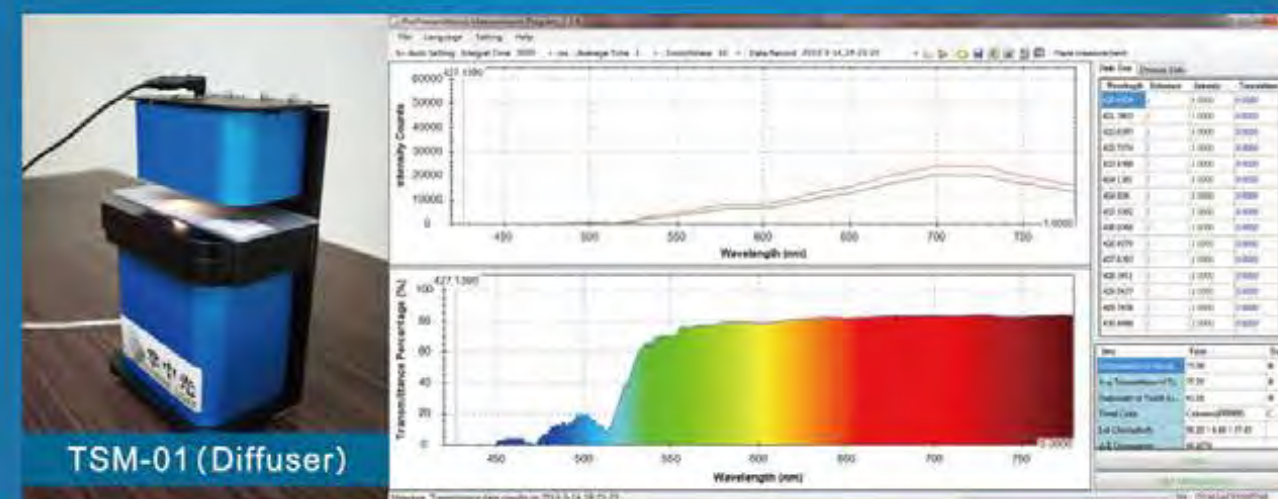
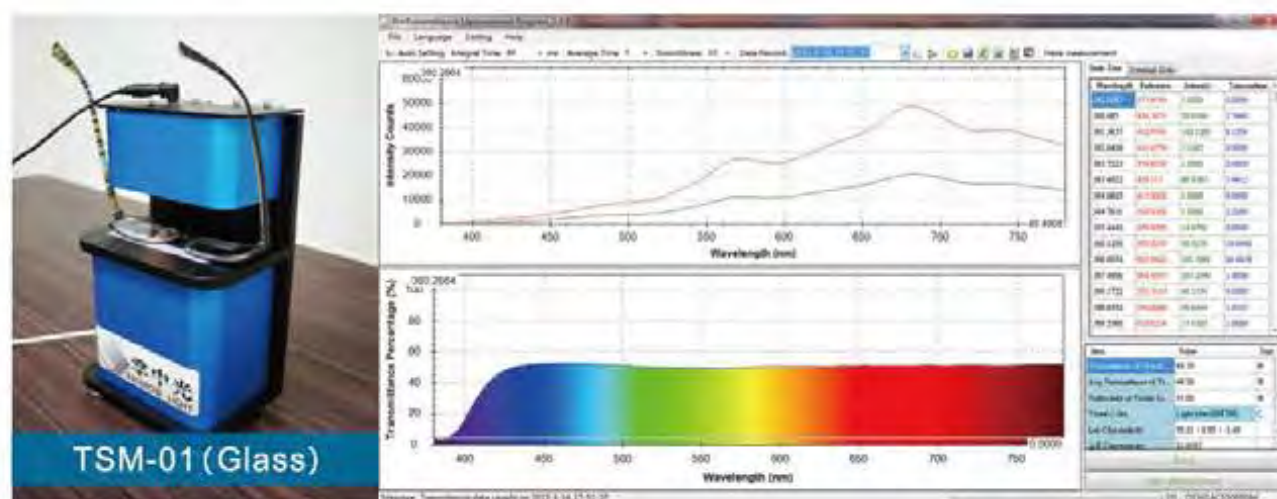


(Green color paper)



(Green color paper)

Applications



RAINBOW
LIGHT

Portable Lighting Measuring Equipment with Display

As the first CCD micro-spectrometer in the world, it can capture any visible light source and operate the device through touch panel intuitively, it will show you spectrum and testing data immediately. We also provide PPF version and LED BINS version for different application.

Product specification

MR-16/MR-16-PPF/MR-16-BINS	
Resolution	4.2-5 nm FWHM
Wavelength Range	380-780 nm
Signal-to-noise Range	<0.3%
Spectral deviation	0.12%
Integration Time	1 ms-24 s
Input Fiber Connector	SMA905
Storage Media	Micro-SD
Power	Rechargeable Li-ion Battery
Dimensions	14.85(W)x9.6(D)x3.45(H) cm
Weight	550 g

Model number

	MR-16	MR-16-PPF	MR-16-BINS
Spectrum testing	●	●	●
Light measurement	●	●	●
LED Bins			●
CIE 1931	●	●	●
CIE 1976	●	●	●
Spectrum analyzing	●	●	●
CRI	●	●	●
CQS	●	●	●
PPF		●	
Distance calibration	●	●	●
Illuminance calibration	●	●	●
Luminous flux calibration		●	●
PPF calibration		●	
SDCM	●	●	●



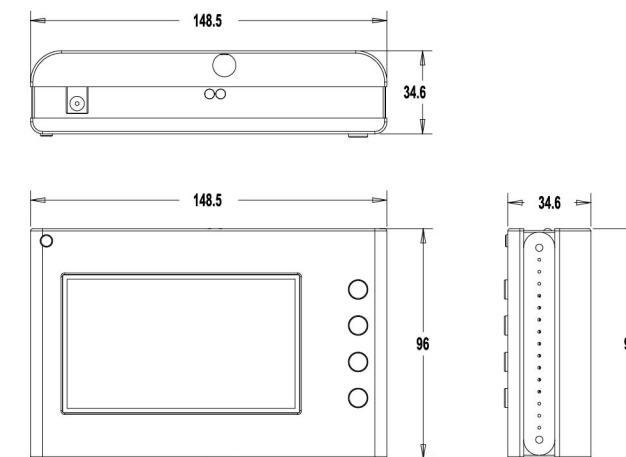
New color

MR-16-BINS

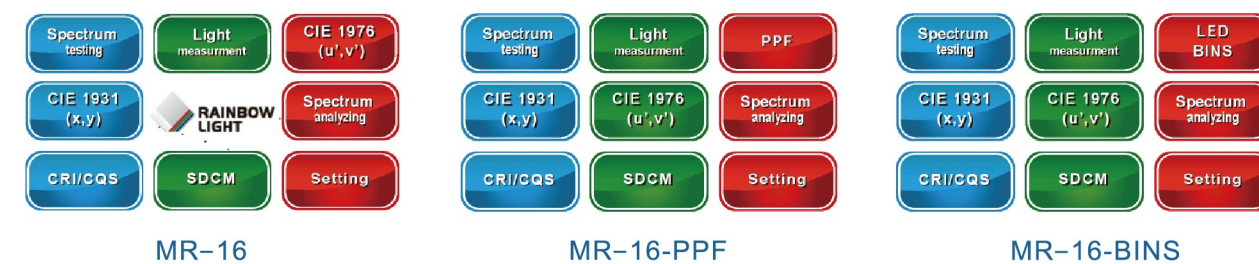
MR-16-PPF

MR-16

3 dimension view

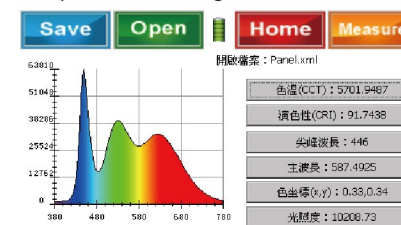


Main interface



Multi-functional interface

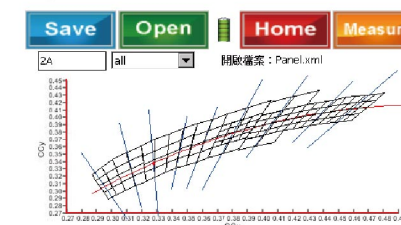
1. Spectrum Testing



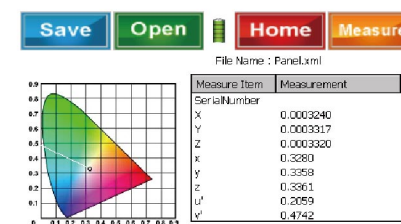
2. Light Measurement



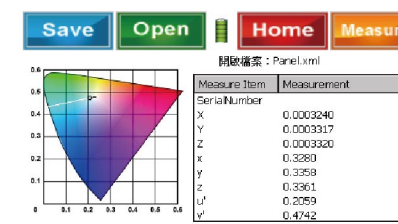
3. LED BINS



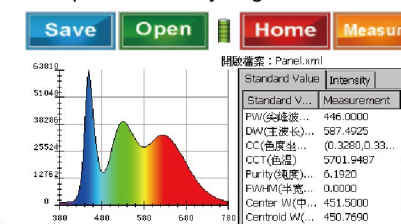
4. CIE 1931



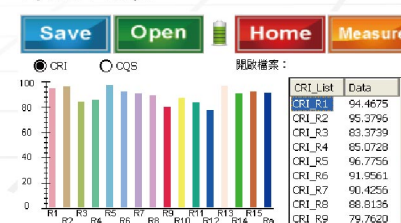
5. CIE 1976



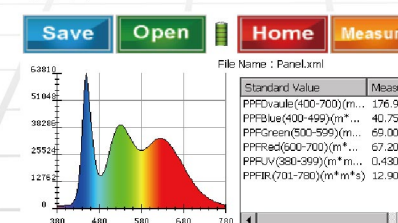
6. Spectrum Analyzing



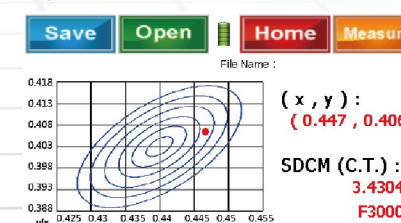
7. CRI / CQS



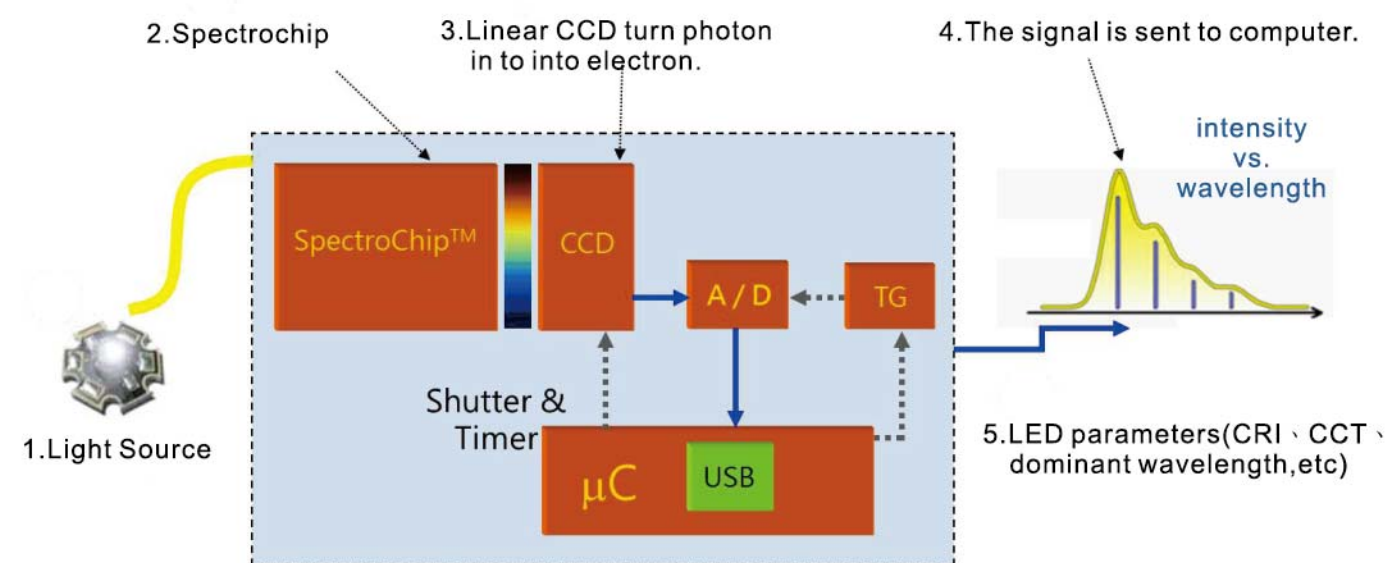
8. PPF



9. SDCM



Principle

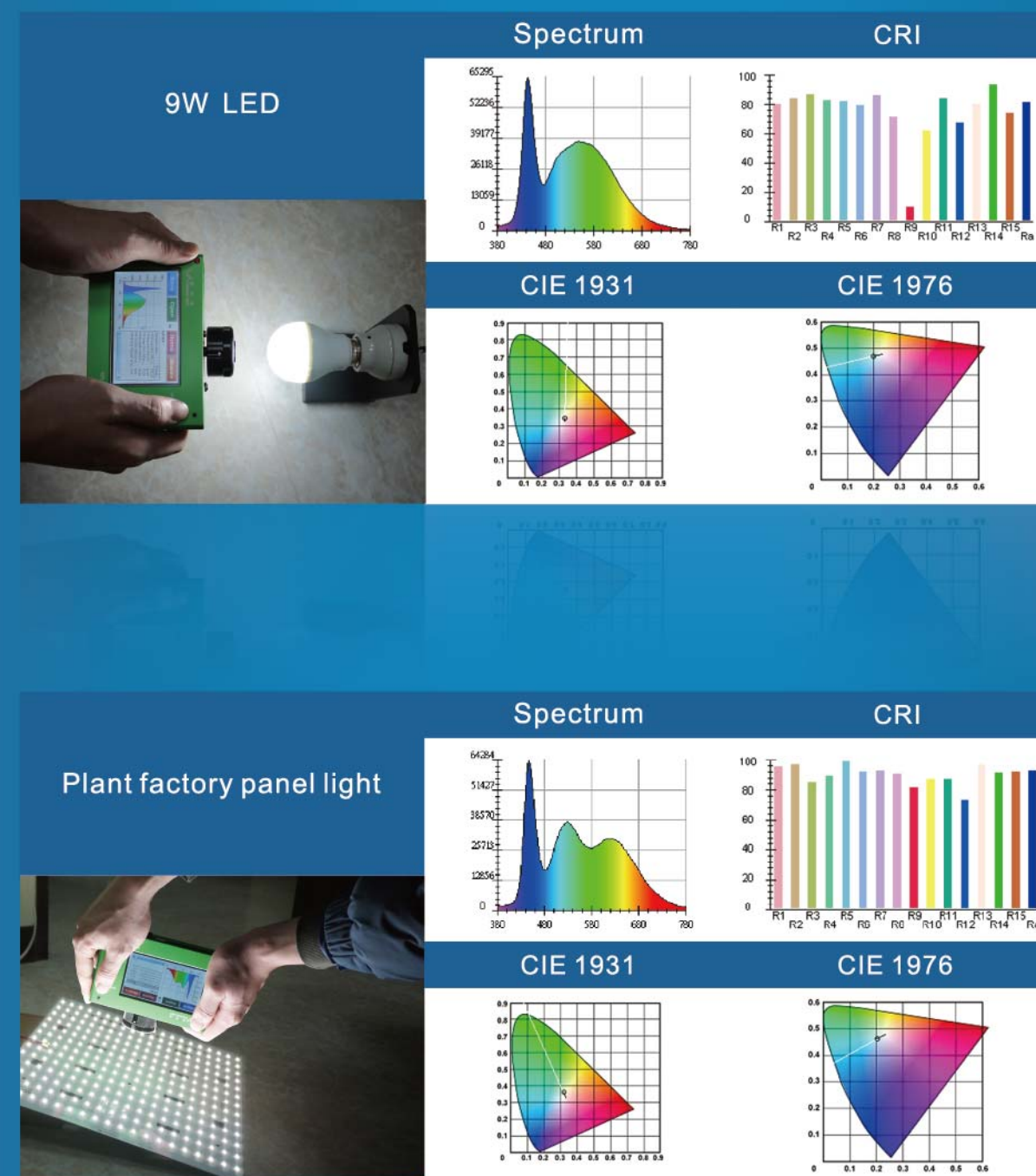


Method



Portable lighting measuring equipment with display just aims at the light source and click "measure" to test.

Applications





Automatic Spectrum Detection System

Rainbow Light holds a competitive niche in manufacturing micro-spectrometers with a compact size, low costs and high resolution capable of combining with various kinds of relevant equipment to provide the best online automated detection project.

It can also measure relevant spectrum information (color rendering index, correlated color temperature, spectral figure, CIE1931 and CIE1976 color coordinates, etc.).



Applications

It is composed of a micro-spectrometer, I/O control module, and customized software capable of coordinating with customized automated production lines. It has the advantages of fast and accurate measuring of LEDs on the production line.

System

- Spectrometer
- I/O control module
- Customized software



Product specification

Can be customized

	LSM-03	LSM-04
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm · 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	110(W)x81(D)x71(H) mm	110(W)x81(D)x71(H) mm
Weight	365 grams	235 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista
Measure maximum speed	3ms(0.1million times/hour)	3ms(0.1million times/hour)

The I/O control module can be used to control various devices, such as different AC/DC power supplies, push buttons, switches, infrared sensors, etc. through the USB port according to customer

I/O control module			
Communication Interface	USB Port	Power Dissipation	5V@500mA
Input	2 Input	Dimensions	115X90X40mm
Output	2 Output	Operating Temperature Range	0° C - +70° C
Max Current	5A	Storage Temperature Range	-20° C - +85° C
Max voltage	240V	Relative Humidity	Under 95% Non-Condensing

Interface

Can be customized





Luminous Flux Integrating Sphere System

The optical precision LED detector made through the use of Light Flux Integrating Sphere System and Micro-electro Mechanical Systems (MEMS) technology is able to provide a complete spectrum diagram, color temperature, color rendering, color coordinates, light flux volume and various relevant numerical measurements. Composing of a micro-spectrometer, integrating sphere, I/O control module and proprietary software, it is able to avoid inaccurate luminous decaying phenomenon when the light source has been switched on for too long. This can be done through only switching on the light source while performing software measurement with the help of I/O control module. The I/O control modules can also be customized to control various devices, such as different AC/DC power supplies, push buttons, switches, infrared sensors, etc. through the USB port.

System

- Spectrometer
- Integrating sphere
- I/O control module



Spectrometer

It is made by concave grating which replaces quasi-face mirror, plane grating, and focusing lens; therefore, Rainbow Light MEMS micro-spectrometer has the advantage of anti-seismic, calibrate-free, and low-cost with high capability/price.

Integrating sphere

Light rays incident on any point on the inner surface are, by multiple scattering reflections, distributed equally to all other points.

Light source

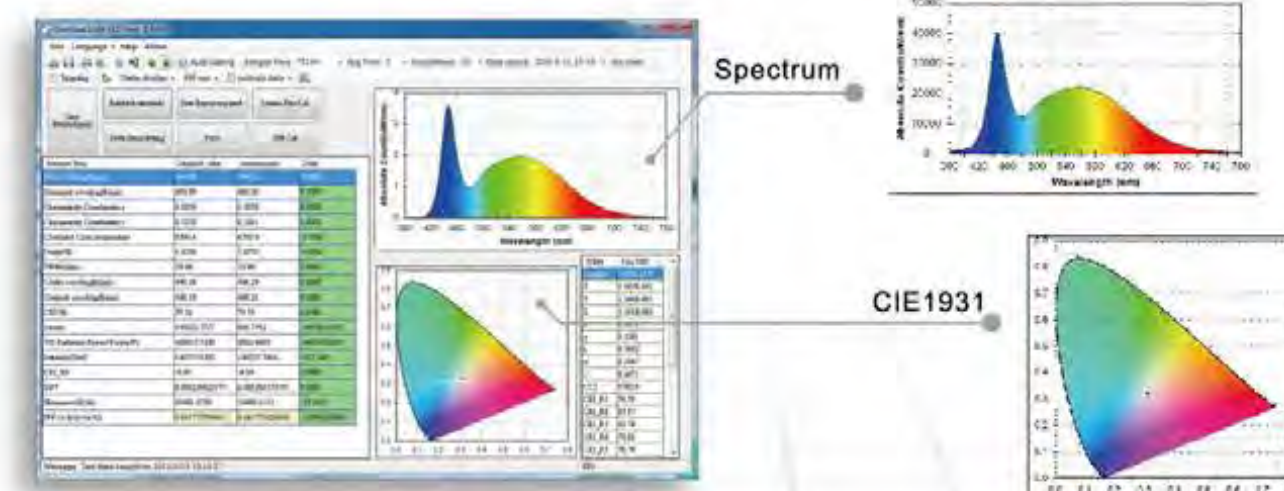
Product specification

	LSM-05	LSM-06
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm · 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	380(W)x150(D)x215(H) mm	380(W)x150(D)x215(H) mm
Weight	1505 grams	1375 grams
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

The I/O control module can be used to control various devices, such as different AC/DC power supplies, push buttons, switches, infrared sensors, etc. through the USB port according to customer.

	I/O control module		
Communication Interface	USB Port	Power Dissipation	5V@500mA
Input	2 Input	Dimensions	115X90X40mm
Output	2 Output	Operating Temperature Range	0°C - +70°C
Max Current	5A	Storage Temperature Range	-20°C - +85°C
Max voltage	240V	Relative Humidity	Under 95% Non-Condensing

Interface





45 ° Reflectance Measuring Instrument

Rainbow Light Technology Co., Ltd. developed and research 45 ° Reflectance Measuring Instrument, and we also create our own brand (Rainbow Light) and sell on our own.

45 ° Reflectance Measuring Instrument is produced by using MEMS technology and micro-spectrometer at the core. 45 ° Reflectance Measuring Instrument can be applied to many different business fields.

Function

1. Spectral deviation is within ± 0.1 nm
2. Data repeatability is 0.04%.
3. Test items: UV, VIS and average reflectance.
4. Xenon lamp light source. Full visible spectrum (200nm-1100nm) testing result.

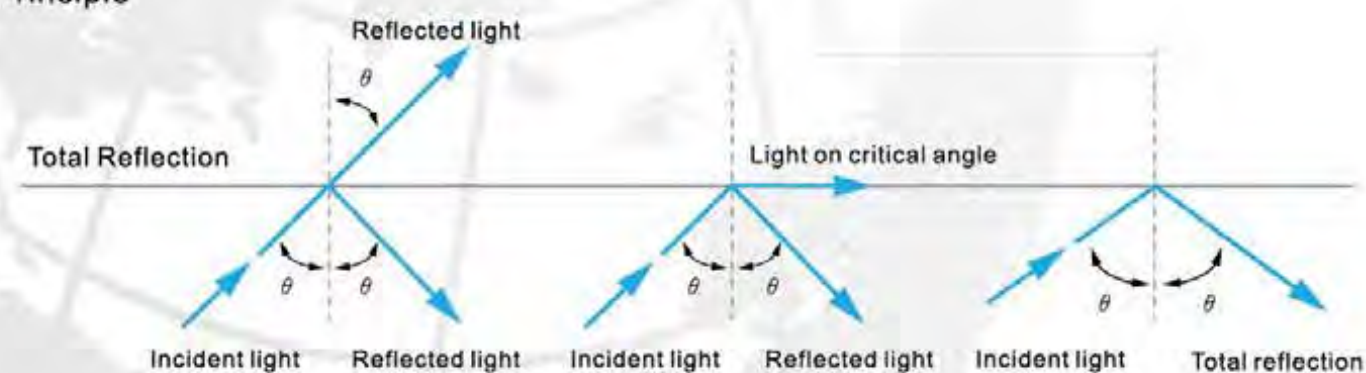
Applications

Measurement Lists: LED diffusion plate reflectance, lens reflectance., glass reflectance., heat-insulation paper reflectance., and every kinds of coating reflectance.

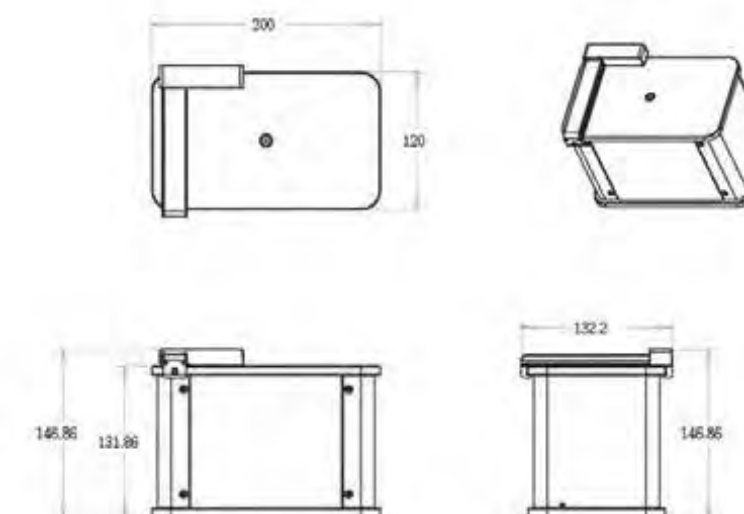
Features

1. Quick, easy, and accurate measurement.
2. Clear report output, easy data saving.

Principle



3 dimension view



Product specification

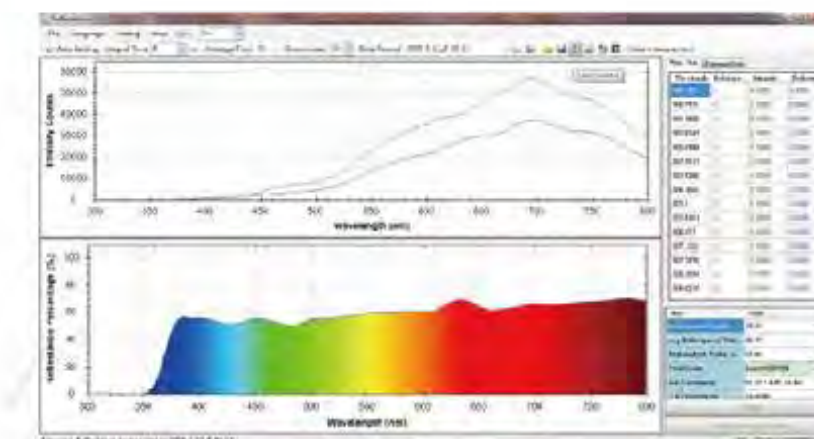
Spectrum spec

	RLT-01	RLT-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm · 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	200(W)x120(D)x145(H) mm	200(W)x120(D)x145(H) mm
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

Xenon lamp Spec

Light source	Xenon lamp
Window material	Quartz window
(V)	3V
(A)	0.8A
(W)	2.4W
Length	15mm
Diameter	5mm

Interface





Color Measurement Instrument

Rainbow Light Technology Co., Ltd develops its own brand Rainbow Light, Color measurement instrument by using MEMS technology as the core and developed by them. By using a grating and a xenon lamp, the same principle with the eye observation of objects, the most close to the actual sense, provide you with the best solution of the relevant color quality.

Function

1. Extensive application, can be measured in various forms of goods.
2. Color accuracy validation and color quality management.
3. For industry color comparison, color process, fixation.

Features

Generally, the color measurement instrument has three different types:

	Portable	Handheld	Desktop
Price	Medium	Low	High
Accuracy	Medium	Low	High
Data	Read directly	Read directly	No data shows

Color measurement instrument is developed by MEMS technology with competitive advantages as following:

1. It can be connected to computer and read the testing data directly.
2. It can do the color measurement fast and easily.
3. It is portable with small size and lower price.

Application

Can be measured in different shape, size, surface structure, or even transparent sample, So it can be widely used in textile, printing, dyeing, electroplating, coating industry for deciding, mixing and examining color. In addition also used for measuring various rice, flour, paint, cement, paper, plastic, porcelain clay, talcum powder, salt, quality control or product approval starch... Etc.. for quality control and product inspection.



Product specification

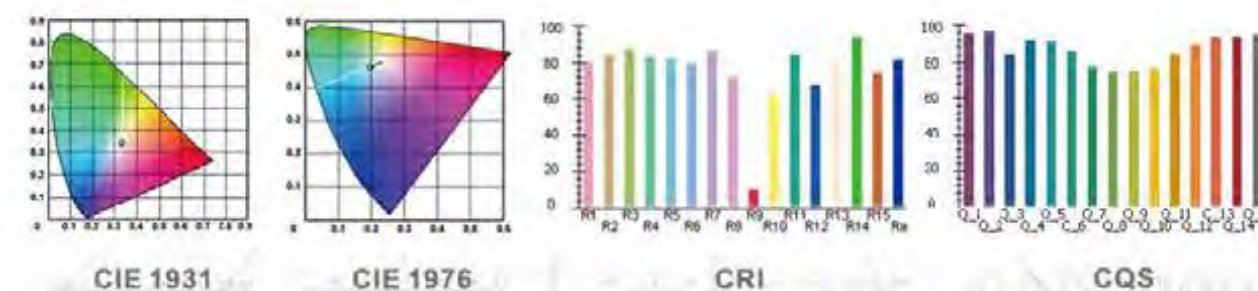
Spectrum spec

	CMM-01	CMM-02
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm · 380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB · GPIO	USB · GPIO
Power	Default USB Power	Default USB Power
Dimensions	200(W)x120(D)x145(H) mm	200(W)x120(D)x145(H) mm
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

Xenon lamp Spec

Light source	Xenon lamp
Window material	Quartz window
(V)	3V
(A)	0.8A
(W)	2.4W
Length	15mm
Diameter	5mm

Interface





Automatic Detection System for LED Strip

Rainbow Light Technology Co., Ltd developed an automatic detection system for all kinds of LED strip. It is not only space-saving equipment but also with high operation speed, which can operate 0.1 million times per hour. It also can test defect-free rate of LED strip, which can reduce material cost and make sure the quality of the products.

Product features

- 1.The only professional testing instrument for all kinds of LED strip.
- 2.It can measure spectrum and parameters immediately.
- 3.It can be set on production line for all kinds of LED Strip.
- 4.Significantly reduce personnel and material waste, which improving production efficiency.
- 5.Small size with desktop/portable design.

Application

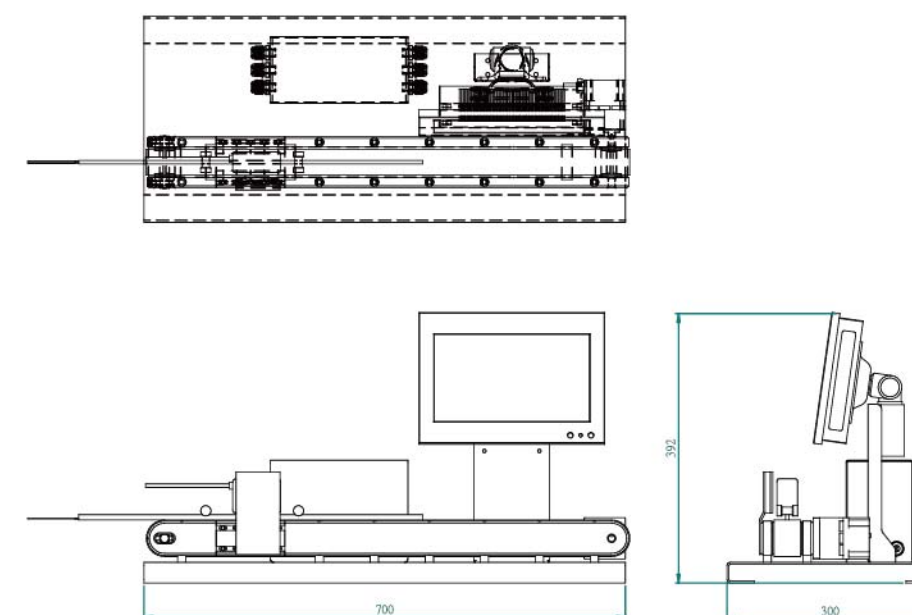
- 1.For measuring all kinds of LED Strip.
- 2.It provides full spectrum for LED strip, CCT, CRI/CQS, CIE 1931/1976...etc.



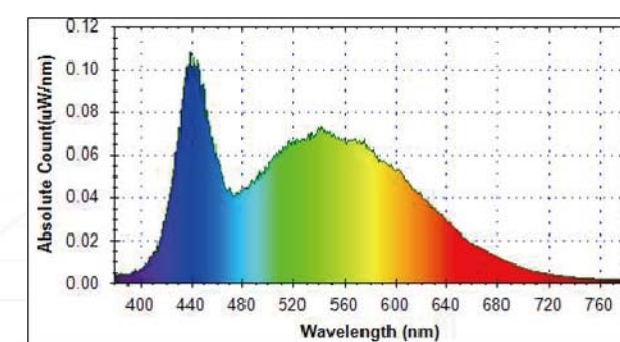
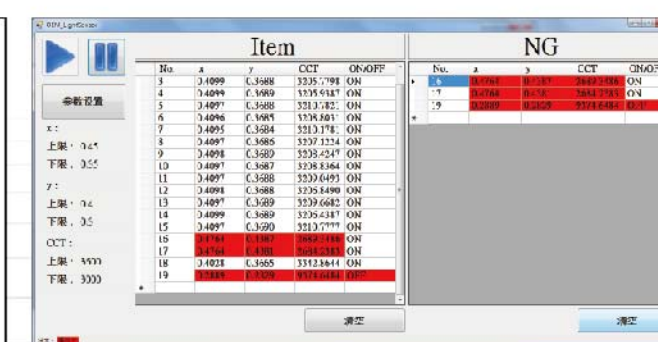
Product specification

	LSM-11	LSM-12
Resolution	0.8-1.5 nm FWHM	4.2-5 nm FWHM
Wavelength Range	300-1100 nm、380-780 nm	380-780 nm
Signal-to-noise Range	<0.1%	<0.3%
Spectral deviation	0.04%	0.12%
Integration Time	1 ms-24 s	1 ms-24 s
Input Fiber Connector	SMA905	SMA905
Interface	USB、GPIO	USB、GPIO
Power	Default USB Power	Default USB Power
Dimensions	700(W)x300(D)x392(H) mm	700(W)x300(D)x392(H) mm
PC Operating System	Windows XP/Windows7/Vista	Windows XP/Windows7/Vista

3 dimension view



Interface

Item					NG				
No.	λ	γ	CCT	ONOFF	No.	λ	γ	CCT	ONOFF
1	4099	0.3988	3335.799	ON	1	4099	0.3988	3335.799	ON
2	4099	0.3988	3335.799	ON	2	4099	0.3988	3335.799	ON
3	4099	0.3988	3335.799	ON	3	4099	0.3988	3335.799	ON
4	4099	0.3988	3335.799	ON	4	4099	0.3988	3335.799	ON
5	4099	0.3988	3335.799	ON	5	4099	0.3988	3335.799	ON
6	4099	0.3988	3335.799	ON	6	4099	0.3988	3335.799	ON
7	4099	0.3988	3335.799	ON	7	4099	0.3988	3335.799	ON
8	4099	0.3988	3335.799	ON	8	4099	0.3988	3335.799	ON
9	4099	0.3988	3335.799	ON	9	4099	0.3988	3335.799	ON
10	4099	0.3988	3335.799	ON	10	4099	0.3988	3335.799	ON
11	4099	0.3988	3335.799	ON	11	4099	0.3988	3335.799	ON
12	4099	0.3988	3335.799	ON	12	4099	0.3988	3335.799	ON
13	4099	0.3988	3335.799	ON	13	4099	0.3988	3335.799	ON
14	4099	0.3988	3335.799	ON	14	4099	0.3988	3335.799	ON
15	4099	0.3988	3335.799	ON	15	4099	0.3988	3335.799	ON
16	4099	0.3988	3335.799	ON	16	4099	0.3988	3335.799	ON
17	4099	0.3988	3335.799	ON	17	4099	0.3988	3335.799	ON
18	4099	0.3988	3335.799	ON	18	4099	0.3988	3335.799	ON
19	4099	0.3988	3335.799	ON	19	4099	0.3988	3335.799	ON

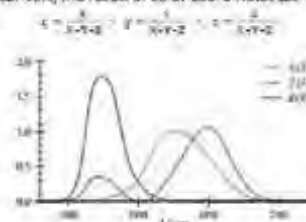
Light Measurement Terms

• CIE1931 Chromaticity Coordinates x, y

The color match function of CIE XYZ is: $\bar{x}(\lambda) = \bar{y}(\lambda) = \bar{z}(\lambda)$
The $\bar{y}(\lambda)$ spectral tristimulus value as below:

$$x = \int_0^\infty \bar{x}(\lambda) S(\lambda) d\lambda, \quad y = \int_0^\infty \bar{y}(\lambda) S(\lambda) d\lambda, \quad z = \int_0^\infty \bar{z}(\lambda) S(\lambda) d\lambda$$

When XYZ convert, the result of color coordinates can read immediately:



• CIE1976 color coordinates u', v'

The u' and v' value on CIE1976LUV.

• CIR 1960 DUV value

The distance between CIE 1960UVW and planckian locus; generally, the value more close to 0 is better.

• Dominant wavelength

On the CIE color coordinate, a straight line drawn between the point for a given color and the point for the color of the illuminant can be inferred out so that two points intersects at the perimeter of the space. The point of intersection nearer to the color in question is the dominant wavelength of the color as the wavelength of the pure spectral color at that intersection point.

• Correlated Color Temperature(CCT)

Color temperature refers to the color of the blackbody radiation generated in a variety of temperatures, by the color coordinates for each color temperature from the connection, known as Planck's trajectory, and relative color temperature, color coordinates with the S & P refers to the light source Frankl trajectory of the connection, the connection from the color temperature for the shortest. In general, for the visual effects, the higher the temperature, the more bluish color, the lower the temperature, the more reddish color.

• Color rendering index (CRI)

The color rendering index (CRI), sometimes called color rendition index, is a quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with an ideal or natural light source. From 2000K to 5000K, the reference source is the Black Body Radiator and above 5000K, it is an agreed upon form of daylight. The highest score is 100%. When CRI closer to 100%, the better.

• CQS

CRI prime number is similar to the Color Rendering Index, the only difference is choosing different color patches and the formula is same.

• SDCM (Standard deviation of color matching)

It is used to compare the difference between measurement data and standard, the higher value means the difference is higher. The standard will be different because of the CCT of light sources. Generally, the SDCM of the light source should be less than 5.

• SP-Ratio

The human eyes respond differently between daytime light levels and nighttime light levels. Generally, the SP-Ratio of light source with lower CCT is between 0.2 and 1. And the SP-Ratio of light source with higher CCT is probably between 1 and 3.

• Purity(%)

Purity is also called saturation. The ratio of a single color in color theory. When the purity is closer to 0%, the color is closer to white.

• Peak Wavelength

In the spectrogram, the strongest wavelength is peak wavelength.

• FWHM(nm)

Full width at half maximum (FWHM) is an expression of the extent of a function, given by the difference between the two extreme values of the independent variable at which the dependent variable is equal to half of its maximum value.

• Center wavelength (nm)

The wavelength of central spectrum.

• Centroid wavelength (nm)

The wavelength in the centroid position of the spectrum.

• Luminous flux(Φ_v)(lumen)

The luminous flux represents the total power of light; unit of luminous flux is the lumen (lm). The formula is Radiant flux multiply Luminosity function.

• VIS Radiation Power(Φ_e)(mW)

In radiometry, radiant flux or radiant power is the measure of the total power of electromagnetic radiation (including infrared, ultraviolet, and visible light). The power may be the total emitted from a source, or the total landing on a particular surface.

• Luminous intensity(I)(cd)

The luminous flux of each solid angle which means the luminous flux can be received in the specific angle which value will not change by measuring distance. The Unit is CD.

• Illuminance (E)(lx)

It is a measure of how much the incident light illuminates the surface. Illuminance was formerly often called brightness, but this leads to confusion with other uses of the word. "Brightness" should never be used for quantitative description, but only for nonquantitative references to physiological sensations and perceptions of light.

• PPF (Photosynthetic Photon Flux Density $E_{\mu mol}$)

The PPF means the photon quantities per each square meter.

According to Planck's law, each photons with energy:

$$E = h \frac{c}{\lambda}$$

h=Planck constant
c= Speed of light
 λ = wavelength

For μmol^{-1} the photon energy:

$$E_{\mu mol} = M h \frac{c}{\lambda} \times 10^{-6}$$

6.02×10^{23} M is Avogadro constant

• BIN chart

The BIN code is indicated on the reel label. It is a separate data field from the component part number (PN). Two reels containing the same LED PN do not necessarily feature the same BIN. LEDs with the same PN and BIN appear identical when illuminated.

The Easy Way to Testify the Accuracy of Spectrometer

• The accuracy of optical testing equipment

Today's lighting industry has a huge demand for LED measurement technology because its characterized differently from traditional lighting. To confirm the specification and quality of LED is much more important than to confirm traditional light. However, most of LED manufacturers are less aware of this kind of knowledge and technology. Light measuring technology is not a common facts among LED manufacturers. Therefore, some people are trying to promote inaccurate equipment along with some paradox which is jeopardize to this industry.

• Common situation of LED measurement instrument accuracy

1. Inaccurate about light measuring equipment(LED tester) spec such as resolution, spectral deviation, accuracy,...etc.
2. Inaccurate light measuring instruments (LED quantity measuring instrument) technology, such as claiming that the spectrometer technology is real light sensing technology, that with the world most renown light measuring instruments brand (the IS, Germany, Japan Topcom, Taiwan Rainbow-Light, the United States Ocean) is the same level of technology, the global leader.
3. Unfaithful light measurement qualification such as qualified by Chinese, American, Taiwanese certification and so on.

• Rainbow Light spectrometer

Rainbow Light is designed and manufactured in Taiwan and proudly owns 15 patents from optical, mechanical, and electrical professionals. It is pretty well-known optical measuring expert in China and Taiwan and has been testified by lots of experts in academic study such as biomedical, chemical, medical, photonical and optoelectrical school of National Taiwan University, and Chin-Hua University, so on and so forth. Also ITRI, Everlight, Wellypower, Chimei have been introducing Rainbow Light spectrometer into their production line.

• Rainbow Light provides an accurate solution

With MEMS technology, Rainbow light micro-spectrometer has high spectral resolution and high accuracy (the deviation is within 3/1000 while mutual coupling calibrating with Instrument System and Topcom). It is applicable to biotechnology, medical, chemistry and optoelectrical fields. As a result of LED is an IT industry right now, therefore we develop a series of LED testing equipment to measure LED quality.

• Accuracy requirements of spectrometer

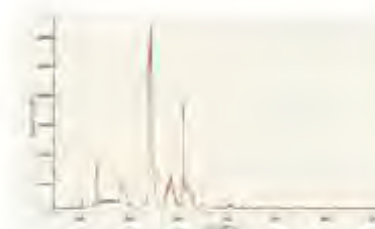
The resolution of qualified spectrometer should be smaller than 5nm and the spectral deviation should be smaller than 1 nm.

• The easy way to testify the accuracy of spectrometer

The picture below is the spectrum of a mercury argon lamp and a candescent lamp. Common candescent lamp consists of mercury argon lamp plus phosphor. Common candescent lamp is a pretty handy object to testify the accuracy of spectrometers.

Process :

Use the spectrometer to test the candescent lamp and make sure if wavelengths at 404.656nm, 435.833nm and 546.074 are accurate. If the wavelengths are not right, that means the spectrum is not accurate which will lead to miscalculation of lumen, color temperature, coordinates, etc..



Common light



Mercury-Argon Lamp Spectrum

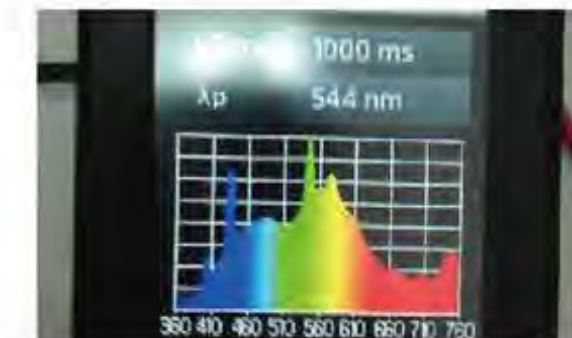
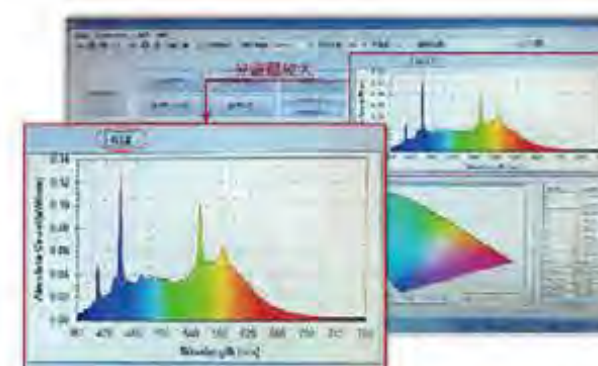
• The accuracy of Rainbow Light Spectrometer

Here we have another LED tester with display from other spectrometer manufacturer and we're doing a quick comparison of its accuracy. Peak wavelength (λ_P) of common candescent lamp is at 435.833nm. A random LED tester that hasn't been spectrum-calibrated will capture the peak wavelength (λ_P) at 546.074. (A spectrometer that hasn't been spectrum-calibrated can't calculate factors such as CRI, CCT, color coordinates, lumen, etc.)

The result of the measurement by Rainbow Light portable spectrometer as below:

Peak wavelength (λ_P): 435.8nm ~ 404.656nm ~ 435.833nm ~ 546.074nm are captured 404.852nm ~ 435.805nm ~ 545.673nm We understand that the result is accurate.

Why not take your LED tester at hand and try to testify your spectrometer at hand?
If you need further information about optical testing please feel free to let us know.





Intelligent LED Lighting System

RAINBOW LIGHT TECHNOLOGY CO., LTD provides customers with full automatically lighting control solutions based on years of professional spectrometers' experiences by using micro-spectrometer technology combined with wireless lighting control technology and suitable LED lamps and lanterns. With portable micro-spectrometer as the core of lighting control, it directly monitors light source and calculates its spectrum wavelength to get actual and accurate value such as luminous intensity, luminous decay, CRI, CCT, Illuminance, wavelength...etc.

Applications

1. Constant illumination light control in indoor lighting
2. Plants constant illumination light control
3. Photosynthesis lighting constant and Monitoring
4. Green energy light guide illumination and auto light compensation



Constant illumination light control in indoor lighting

Green energy light guide illumination and auto light compensation

Specification(custom-made spec)

Principle

LED Smart Lighting System uses MEMS micro-spectrometer to monitor light source directly and also see full spectrum. It monitors light source then feedback to the control system to achieve automatic dimming and light constant by calculating visible spectrum (380nm-780nm) to get actual and accurate value such as luminous intensity, luminous decay, CRI, CCT, Illuminance, wavelength...etc.

System

1. Adjustable LED lamps and lanterns: Includes LED wireless lighting control system and LED lamps and lanterns. With R, G, B, W or multi-color LED lighting equipment. / Connects (wireless) LED control system.
2. LED control: Includes LED wireless light control system, LED control system. It's a wireless control device for adjustable LED lamps and lanterns system includes wireless transceiver, computer system. / Connects (wireless) with LED lamps system
3. Luminous monitor and feedback: Micro-spectrometer monitors light source and feedback information to LED control system to let LED control system releases signals and adjusts LED lamps and lanterns actively and automatically in order to achieve adjust light's brightness, color, color temperature, PPF...etc. / Connects with LED control system.



Interface





The Smart Plant Growth System

Indoor planting, without sunshine.

Plant method is safe, easy, according to different vegetation growth, set the most suitable temperature and humidity and the light source of energy-saving design.

Product features:

- LED five bands can be adjusted for proportion.
- Spectrum supervise immediate return.
- Measurement of PPF replaced as Lux.
- Through the spectrum monitoring, with software can automatically adjusting fill light spectrum, in order to reach Optically controlled and Optical feedback.
- Temperature, humidity, liquid flow rate control, wind speed, liquid pH and CO₂ monitoring with control.
- The outdoor climate environmental simulation, 100-STEP climate change condition setting.
- The LED light control with continuous compensation of wisdom, to keep the proportion of colored LED light.
- Connecting the computer with the USB pen drive to store measurement data.
- The remote control collection.
- Completely independent of the ecological system.

LED plant light remote control specification

Interface	1024*600 Color Display
Spectral resolution	4.2-5 nm FWHM
Wavelength range	300-1000 nm
Spectrum error values	0.12%
Integration time	1 ms-24 s

Climate controller specification

Interface	800*600 Color Display
Temperature range	15~30°C ± 1°C
Humidity range	55%~85% R.H. ± 10% R.H.
Display resolution	0.01°C/0.1% R.H.
Program capacity	150 climate group x 100 Period of climate change



Function

- Display and adjust function for illuminance / Display and adjust function for PPF
- PPF displays ratio of UV、B、G、R、IR and adjust function
- Display function: spectrum
- Display function: Correlated Color Temperature
- Display function: Color Rendering Index
- Display function: Wavelength (UV、B、G、R、IR)
- Display function: CIE 1931 chromaticity coordinates x, y
- Display function: CIE 1976 chromaticity coordinates u, v
- Data storage and output functions
- PPF initiative adjustment
- Illuminance initiative adjustment
- Timing control setting
- Setting for save / open

System

LED plant light remote control

1. Adjustable LED lamps and lanterns: Includes LED wireless lighting control system and LED lamps and lanterns. With R, G, B, W or multi-color LED lighting equipment. / Connects (wireless) LED control system.
2. LED control: Includes LED wireless light control system, LED control system. It's a wireless control device for adjustable LED lamps and lanterns system includes wireless transceiver, computer system. / Connects (wireless) with LED lamps system
3. Luminous monitor and feedback: Micro-spectrometer monitors light source and feedback information to LED control system to let LED control system releases signals and adjusts LED lamps and lanterns actively and automatically in order to achieve adjust light's brightness, color, color temperature, PPF...etc. / Connects with LED control system.

Climate controller

1. The air temperature and humidity sensor & surrounding temperature detection: internal temperature and humidity measure, record and cultivation area, and make sure the machine around the environment temperature is maintained at 5 ~ 35 °C.
2. Controller, with full color touch human-machine interface under industrial computer monitoring state, set the internal temperature and humidity control and growth mechanism, light sources. Growth parameters, such as editing machine simulation conditions needed for growth.

Interface



RAINBOW
LIGHT

Mini-Luxmeter (Brightness Test)

The first Rainbow Light product dedicated to consumer markets- mini lux meter. You can protect your eyes anytime, anywhere. Its minimalism, portable and instant result makes this mini lux meter a necessary household commodity

- Ultra-small
- Easy and quick testing
- Easy to carry
- Energy-saving mode stand by 2 min will automatically shut down
- Taiwan patent # M432828
- Machine size : 61 x 42 x 9 mm
- Weight : 25 g

Instruction

- Designed for indoor illuminance from 0-2000 lux
- Different CNS lux standard :

Place	Area	Reference standard(Lux)
Company	Office, studio	1500-750
	Meeting room	750-300
	Rest area, Hallway, Staircase, Power room	300-100
School	Library, Laboratory, Graphics room	1500-300
	Classroom, reading Lab, Gym	750-200
	Auditorium, Hallway, Staircase	300-75
Factory	Assembly and precision operation	1500-750
	Daily operation	750-300
	Packing and garage	300-150
House	Study	1000-750
	Bedroom	750-500
	Living room	300-50

※Monthly measure recommended

Principle

This product uses micro-controller to calculate directional lux capturing technique. Brightness sensor microcontroller operates through voltage conversion.

Study : 1000-750 Lux



Living room : 300-50 Lux



Bedroom : 750-500 Lux



Light Measuring Expert | Light Source Reflectance Absorbance Transmittance



Events

2015

- 03/25-03/28 Taiwan Int'l Lighting Show
- 06/09-06/12 Guangzhou International Lighting Exhibition
- 06/16-06/18 Photonics Festival in Taiwan
- 10/22-10/26 China (Guzhen) International Lighting Fair
- 10/27-10/30 Hong Kong International Lighting Fair
- 11/10-11/13 Interlight Moscow powered by light+building

2014

- 02/23-02/26 LED China 2014
- 03/13-03/16 Eco-Products International Fair
- 03/20-03/23 Taiwan Int'l Lighting Show
- 03/30-04/04 Light + Building Frankfurt
- 04/14-04/16 China Lighting Expo
- 06/09-06/12 Guangzhou International Lighting Exhibition
- 06/17-06/19 Photonics Festival in Taiwan
- 09/18-09/21 Taipei Int'l Invention Show & Technomart
- 10/27-10/30 Hong Kong International Lighting Fair



Optical Testing and Measuring Equipment

Measuring equipment for LED manufacturers, wholesalers, and retailers, gamut examination equipment, etc.



Environmental monitoring system

Water quality, gas, chemical industry, and ultra-violet, etc.



Color detecting management

Color fixation, mixing, and verifying for textile, printing, coloring, electroplating, coating, etc.



Biomedical application

Blood test, preventive medicine, and personal health-care management etc.

- Other applications about spectrometer- anything related to specifications listed above are welcome.