



## LM-79-08 Test Report

for

**Philips (China) Investment Co., Ltd.**

Building 9, Lane 888, Tianlin Road  
Shanghai, China

**InstantFit LEDtube**

**Model: 9290002862**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ13080044a

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:

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Sep.11, 2013

Approved by:



*Jim Zhang*

Manager: Jim Zhang  
Sep.11, 2013

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## Test Summary

Sample Tested: 9290002862

### Photometric and Electrical Measurements for two lamps

Voltage (V AC)	Current (A)	Power (W)	Power Factor	Total Luminous Flux (lm)	Luminous Efficacy (lm/W)	Total Harmonic Distortion
120.0	0.145	34.8	0.9970	3083	88.6	6.53

### Photometric and Colorimetric Measurements for each lamp

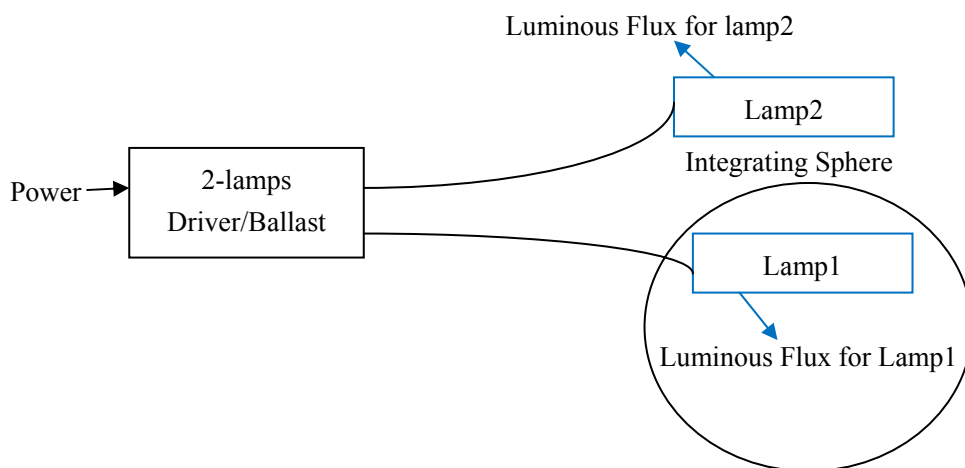
Sample Number	Luminous Flux(lm)	Correlated Color Temperature (K)	Color Rendering Index Ra
S13080044-01	1541	3406	81.3
S13080044-02	1542	3403	81.4
Sample Number	Color Rendering Index R9	Chromaticity Coordinate x	Chromaticity Coordinate y
S13080044-01	14.1	0.4119	0.3967
S13080044-02	14.4	0.4121	0.3968

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Luminous Efficacy=(Luminous Flux for lamp1+ Luminous Flux for lamp2)/Power

Test figure is shown as following:



### Test specifications:

**Date of Receipt** : Sep.3, 2013

**Date of Test** : Sep.3~4, 2013

**Test item** : Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters

**Reference Standard** : IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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## Sample Photos

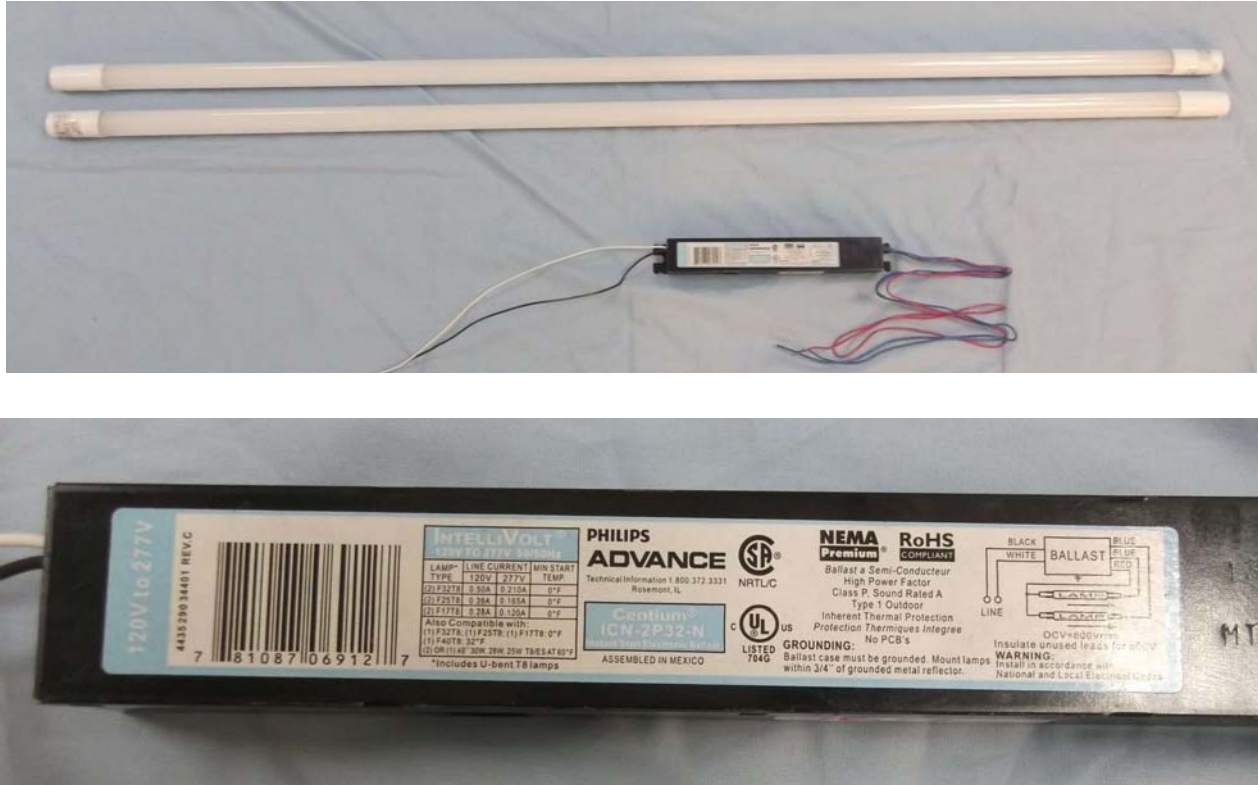


Figure 1- Overview of the sample

## Equipment Under Test (EUT)

<b>Name</b>	: InstantFit LEDtube
<b>Model</b>	: 9290002862
<b>Electrical Ratings</b>	: 120V AC, 60Hz, 18W
<b>Product Description</b>	: G13 base, 3500K
<b>Manufacturer</b>	: Philips (China) Investment Co., Ltd.
<b>Address</b>	: Building 9, Lane 888, Tianlin Road Shanghai, China

## TEST RESULTS

Test ambient temperature was 24.7°C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 105 minutes.

### Sphere-Spectroradiometer Method

Parameter	Result		Special Color Rendering Indices		
	1#	2#		1#	2#
Test Voltage (V)	120.0				
Voltage frequency (Hz)	60		R1	79.2	79.3
Test Current (A)	0.290		R2	87	87.1
Power Factor	0.9970		R3	93	93.2
Test Power (W)	34.8		R4	79.6	79.6
Luminous Efficacy (lm/W)	88.6		R5	78.4	78.5
THD A%	6.42		R6	81.4	81.6
Total Luminous Flux (lm)	1541	1542	R7	86.6	86.7
Color Rendering Index (CRI)	81.3	81.4	R8	65.2	65.3
R9	14.1	14.4	R9	14.1	14.4
Correlated Color Temperature (CCT) (K)	3406	3403	R10	69	69.3
Chromaticity (Chroma x, Chroma y)	(0.4119, 0.3967)	(0.4121, 0.3968)	R11	76.6	76.7
Chromaticity (Chroma u, Chroma v)	(0.2375, 0.3431)	(0.2376, 0.3432)	R12	58.3	58.3
Chromaticity (Chroma u', Chroma v')	(0.2375, 0.5147)	(0.2376, 0.5148)	R13	80.6	80.7
Duv	0.0008	0.0008	R14	95.9	96

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram,  $u' = u = 4x/(-2x+12y+3)$ ,  $v' = 3v/2 = 9y/(-2x+12y+3)$ .

## Spectral Power Distribution of 2# tube - Sphere Spectroradiometer Method

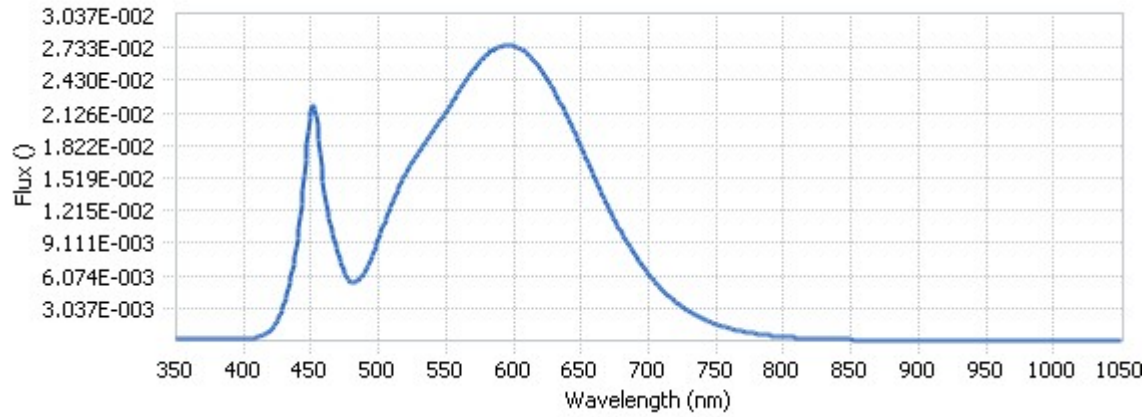
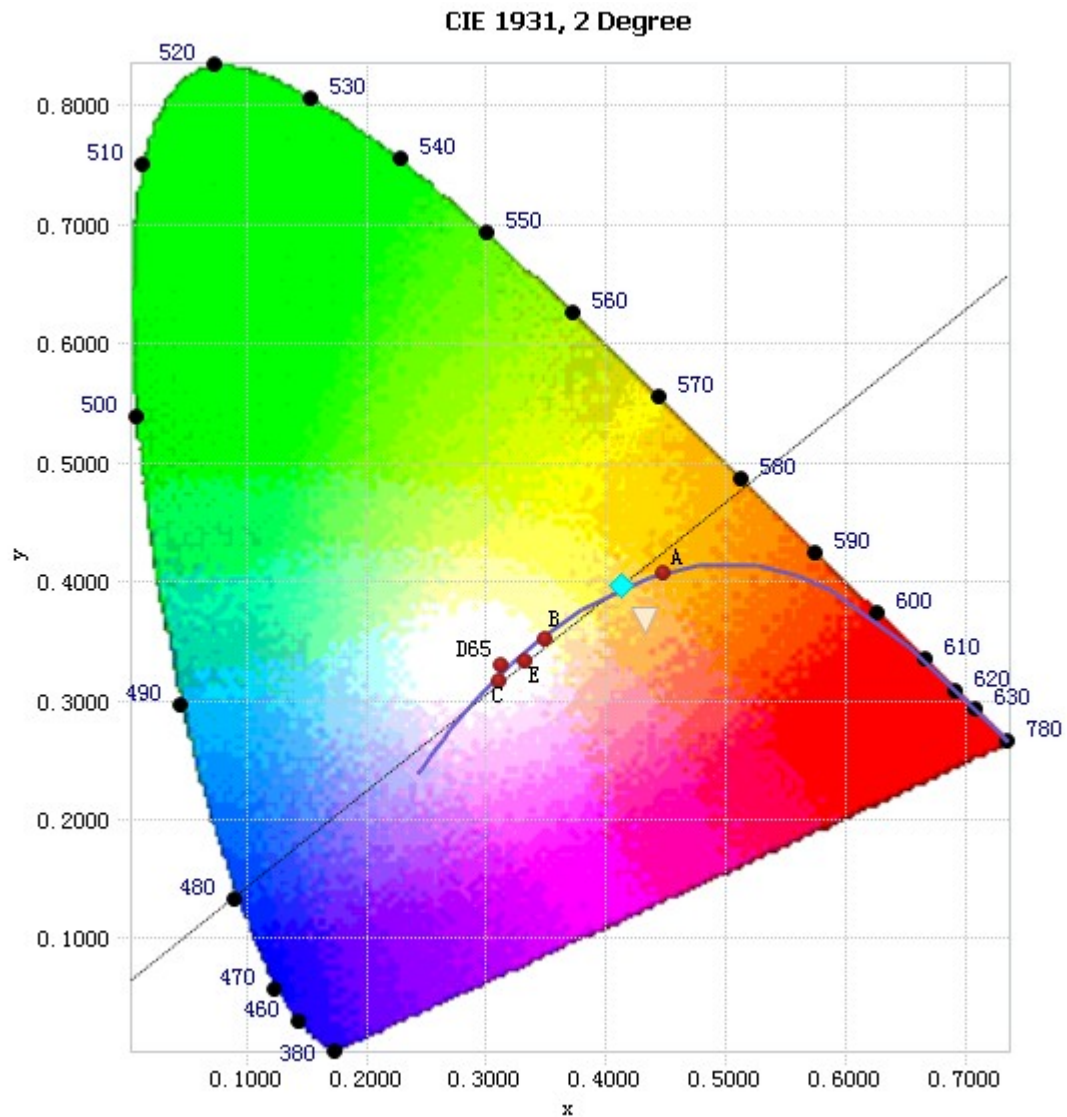


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.16E-04	485	5.66E-03	590	2.74E-02	695	7.02E-03
385	1.26E-04	490	6.44E-03	595	2.76E-02	700	6.18E-03
390	1.31E-04	495	7.79E-03	600	2.75E-02	705	5.44E-03
395	1.37E-04	500	9.48E-03	605	2.72E-02	710	4.75E-03
400	1.52E-04	505	1.13E-02	610	2.68E-02	715	4.16E-03
405	1.88E-04	510	1.29E-02	615	2.61E-02	720	3.65E-03
410	3.06E-04	515	1.44E-02	620	2.54E-02	725	3.17E-03
415	5.43E-04	520	1.56E-02	625	2.45E-02	730	2.75E-03
420	1.02E-03	525	1.67E-02	630	2.34E-02	735	2.38E-03
425	1.94E-03	530	1.76E-02	635	2.21E-02	740	2.06E-03
430	3.54E-03	535	1.86E-02	640	2.08E-02	745	1.78E-03
435	5.97E-03	540	1.95E-02	645	1.95E-02	750	1.54E-03
440	9.51E-03	545	2.04E-02	650	1.81E-02	755	1.33E-03
445	1.54E-02	550	2.14E-02	655	1.66E-02	760	1.15E-03
450	2.14E-02	555	2.24E-02	660	1.52E-02	765	9.98E-04
455	2.00E-02	560	2.34E-02	665	1.39E-02	770	8.60E-04
460	1.37E-02	565	2.43E-02	670	1.25E-02	775	7.50E-04
465	1.04E-02	570	2.52E-02	675	1.13E-02	780	6.44E-04
470	8.10E-03	575	2.60E-02	680	1.01E-02		
475	6.18E-03	580	2.67E-02	685	9.00E-03		
480	5.44E-03	585	2.71E-02	690	7.98E-03		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

## Chromaticity Diagram of 2# tube - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4121, 0.3968)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.



### Nominal CCT Quadrangles of 2# tube – Sphere Spectroradiometer Method

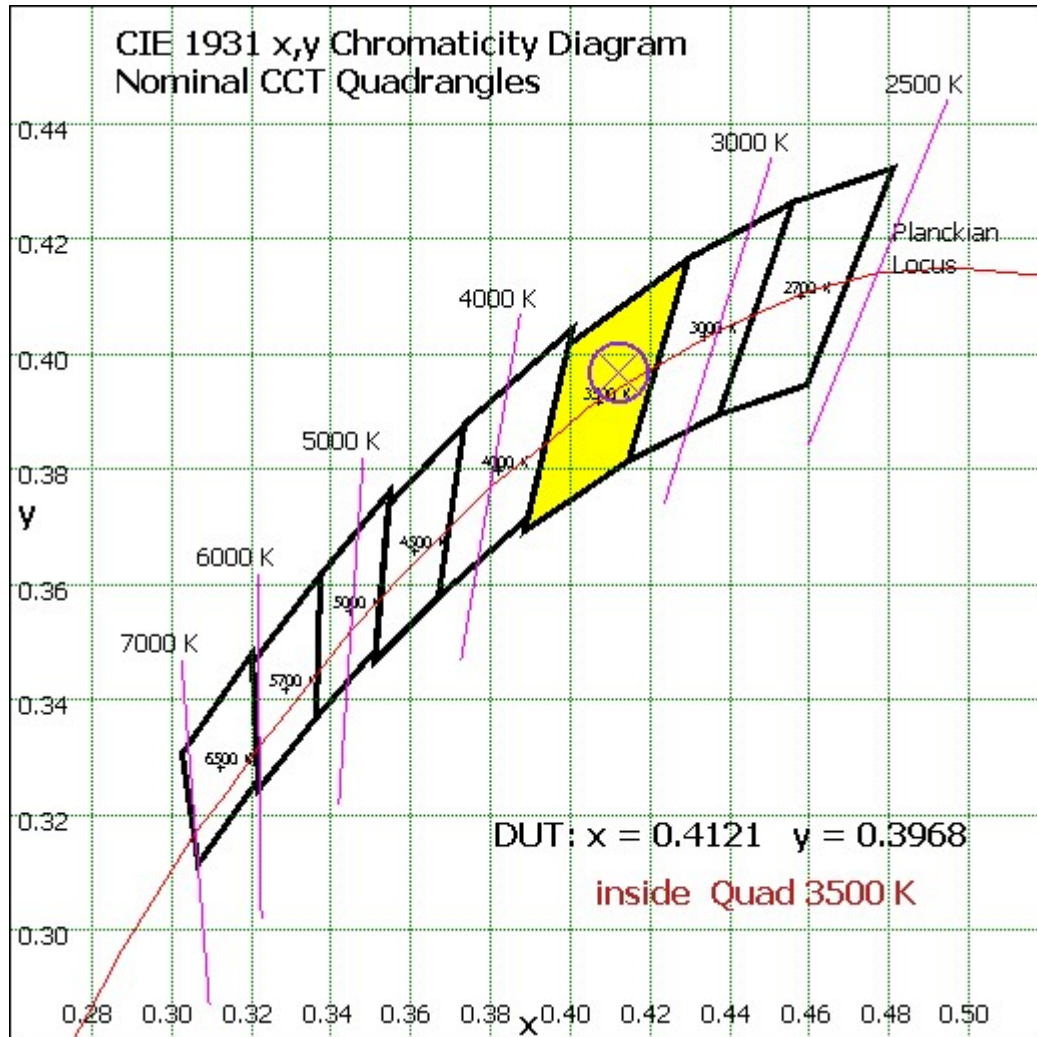


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram



## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2012	Sep. 17, 2013
Digital Power Meter	PF2010A	HZTE028-01	Sep. 19, 2012	Sep. 18, 2013
AC Power Supply	PCR 500L	HZTE001-08	Sep. 19, 2012	Sep. 18, 2013
DC Power Supply	WY12010	HZTE004-03	Sep. 19, 2012	Sep. 18, 2013
Temperature Meter	TES1310	HZTE017-01	Sep. 19, 2012	Sep. 18, 2013
Standard source	D908	HZTE012-01	Sep. 19, 2012	Sep. 18, 2013
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2012	Sep. 17, 2013
Digital Power Meter	WT210	HZTE008-01	Sep. 19, 2012	Sep. 18, 2013
AC Power Supply	PCR 500L	HZTE001-07	Sep. 19, 2012	Sep. 18, 2013
DC Power Supply	6154	HZTE004-04	Sep. 19, 2012	Sep. 18, 2013
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 19, 2012	Sep. 18, 2013
Standard source	SCL-1400	HZTE012-02	Sep. 19, 2012	Sep. 18, 2013

Table 4: Test Equipment List

## TEST METHODS

### Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

### Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is  $4\pi$ . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution

type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.06% with a coverage factor  $k=2$ .

## **Goniophotometer Method**

### **Photometric and Electrical Measurements**

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 1.94% with a coverage factor  $k=2$ .

### **Color Characteristics Measurements**

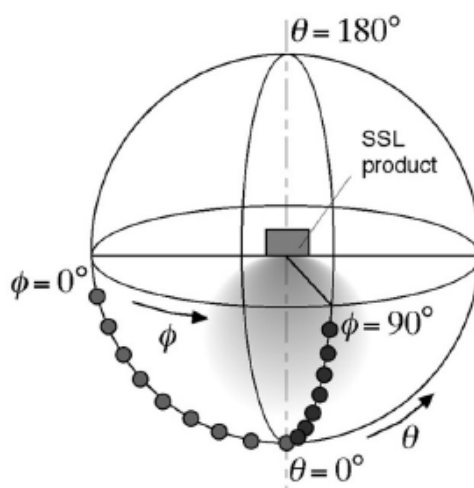
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

### **Color Spatial Uniformity**

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ( $C=0^\circ/180^\circ$  and  $C=90^\circ/270^\circ$ ) and at  $10^\circ$  or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate

was calculated from these points. The data was then analyzed to check for delta color differences of the  $u'$ ,  $v'$  chromaticity coordinates. The spatial non-uniformity of chromaticity,  $\Delta u'v'$ , is determined as the maximum deviation (distance on the CIE ( $u'$ ,  $v'$ ) diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



\*\*\* End of Report \*\*\*

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