



High Precision CCD Spectroradiometer & Integrating Sphere Test System LPCE-2(LMS-9000)

Brochure

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Leader in Lighting & Electrical Test Instruments

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Note the following: If you need to test the single LED or LED Chip, you should choose the items which marked by **Blue**

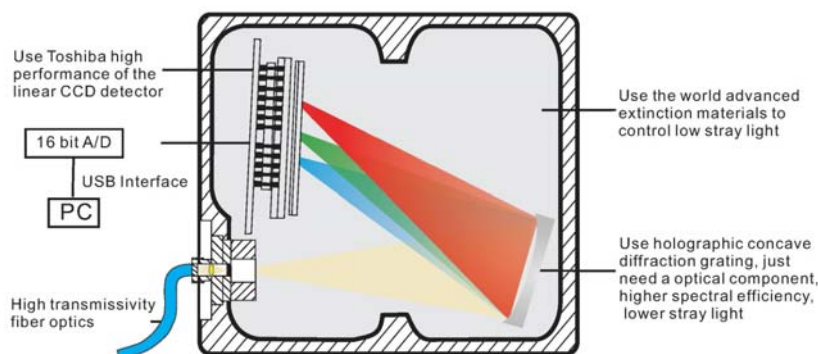
1、 High Precision CCD Spectroradiometer

LMS-9000 is adopting the world advanced Holographic grating with flat-field correction, precision optical system and the electronic shutter control technology. The test speed can be in milliseconds and the test accuracy is in the laboratory level. It has the lowest value of stray light, LMS-9000B has high repeatability and stability testing. It is fully meet CIE127-1997, IES LM-79-08 and IES LM-80-08.



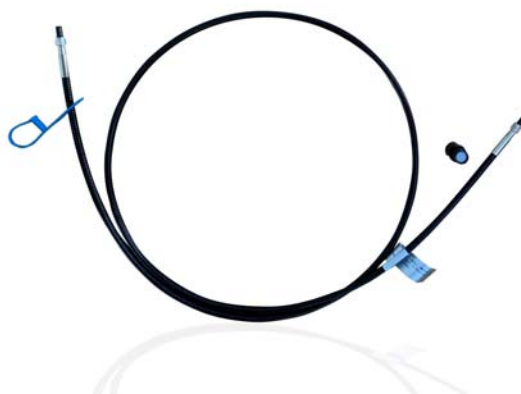
Specifications:

- Spectral Range Wavelength: 380nm~800nm
- Spectral Wavelength Accuracy: $\pm 0.5\text{nm}$ (LMS-9000A), $\pm 0.3\text{nm}$ (LMS-9000B)
- Wavelength Reproducibility: $\pm 0.5\text{nm}$ (LMS-9000A), $\pm 0.1\text{nm}$ (LMS-9000B)
- Accuracy of Chromaticity Coordinate (Δx , Δy): ± 0.003 (LMS-9000A) and ± 0.002 (LMS-9000B)
- Correlated Color Temperature CCT: 1,500K~25,000K(LMS-9000A), 1500K~100,000K(LMS-9000B), CCT Accuracy: $\pm 0.5\%$ (LMS-9000A), $\pm 0.3\%$ (LMS-9000B)
- Color Rendering Index Range: 0~100.0, Accuracy: $\pm(0.3\% \text{rd} \pm 0.3)$
- Photometric linear: $\pm 0.5\%$ (LMS-9000A) and $\pm 0.3\%$ (LMS-9000B)
- Stray light: $< 0.015\%$ (600nm) and $< 0.03\%$ (435nm)
- Time of integration: 0.1ms-20s
- It can measure the temperature inside and outside of integrating sphere



LMS-9000 used the Band pass-filter Wheel Correcting Technique, Spectrometer & Broadband-radiometer & photometer Combined Technique, and modified NIST stray light correction technology, the LMS-9000 spectroradiometer can realize ultra low stray light and super photometry linearity in overall dynamic range.

2、 Optical Fiber



CFO-1.5M is 1.5m length optical fiber used to connect the spectroradiometer and integrating sphere. CFO-1.5MY is Y type optical fiber which work with LMS-9000A can connect with two integrating spheres at the same time.

3、 Digital CC and CV DC Power Supply

The DC Series Power Supplies are with high stability and high accuracy. The voltage and current can be adjustable and simple operation. They are suitable to supply DC Power for the standard lamps.



Specifications:

- Accuracy of Voltage and Current: $\pm(0.02 \text{ Reading} + 0.01\% \text{ Range} + 1 \text{ Digit})$
- Stability of Output Voltage/Current: $\pm 0.01\% \text{ Reading}/3\text{min}$
- Digital control for Constant Current output or Constant Voltage output
- Communicate with PC via software, the Voltage & Current set by the software and Power Output can be remote controlled.

Model	DC3005	DC3010	DC6005	DC6010	DC12005
U Range	0.0005-30.000V	0.0005-30.000V	0.0005-60.000V	0.0005-60.000V	0.0001-120.00V
I Range	0.0005-5.0000A	0.0005-10.000A	0.0005-5.0000A	0.0005-10.000A	0.0005-5.0000A

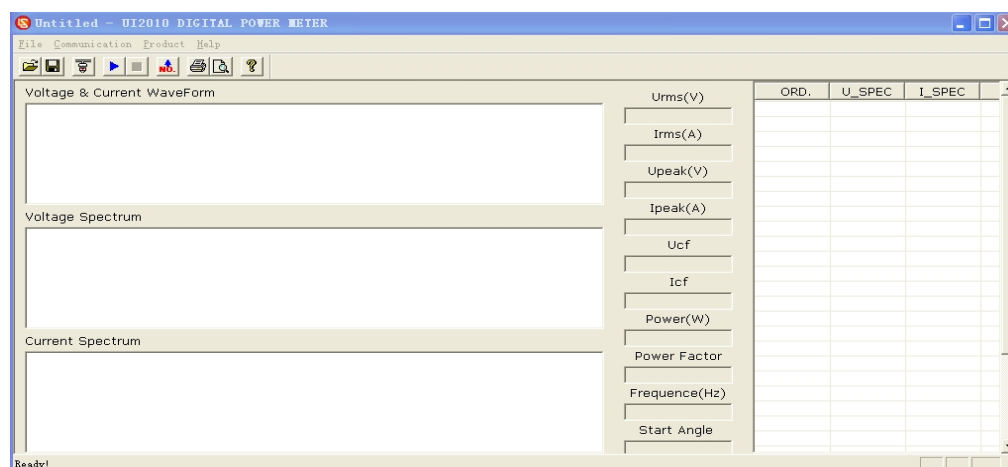
4、 Digital Power Meter



- Measure Voltage, Current, Power and Power Factor.
- Voltage range:10~600V; Current range: 0.005~20A
- Accuracy: ±(0.4%reading + 0.1%range + 1digit)
- Communicate with PC. It can communicate with LISUN spectroradiometer

Model	Measure	Remark
LS2008R	AC Parameters: U, I, P, PF	
LS2010	AC Parameters: U, I, P, PF and harmonic	Special Software can show harmonic in Win7 or Win8
LS2012	AC+DC Parameters: : U, I, P, PF	DC: 1~600v, DC Current Range: 0.005~20A, out of limit alarming
LS2050	AC+DC+Harmonic with high test accuracy	Special Software can show harmonic in Win7, Win8 or Win10

The LS2010 has a separately software can do harmonic analysis as below



5、 AC Power Source



- AC-DC-AC frequency conversion technology, Controlled & tested by 16 bits MCU
- Protection for over hot, thundering voltage and current
- Total voltage distortion: $\leq 0.6\%$; Voltage stability: $\leq 0.1\%/30\text{min}$
- Load adjust rate: $\leq 0.1\%$; Frequency stability: $\leq 0.05\%/30\text{min}$
- Output voltage range: AC 0.0~300.0V, Output Frequency Range: 45~70Hz, 100Hz, 200Hz and 400Hz
- Input Power: 220V and 50/60Hz
- Communicate with PC via software, the Voltage & Current set by the software and Power Output can be remote controlled.

Lisun Model	Output Power	Remark
LSP-500VAS LSP-500VAR	500W	0~150V: 4.2A, 150~300V: 2.1A (LSP-500VAR is pure sine wave AC power source with low harmonic and high accuracy)
LSP-1KVAS LSP-1KVAR	1000W	0~150V: 8.4A, 150~300V: 4.2A (LSP-1KVAR is pure sine wave AC power source with low harmonic and high accuracy)

6、 New Design Integrating Sphere

Due to the LED luminaries such as LED street luminaries developed, to do 4 π geometry testing, it is hard to be hold in the traditional integrating sphere design. To solve this problem, LISUN design a new kind of sphere.



A Molding Integrating Sphere VS the traditional Integrating Sphere

LISUN new Integrating sphere has the following advantages:

- The hold base can bear max 20kg, it can test all kinds of luminaires and light source such as E27/E40, all tubes such as T5/T8/T12 and all kinds of luminaries
- The hold base can be installed in the ceiling or down, height can be adjustable
- The test hold base has four power cables connect to the outside Power Supply and max is 5KW
- Build-in Cross laser system which help to install the standard lamp and testing lamp in the center of the integrating sphere



Build-in Cross Laser System

Specification:

- Diameter: 0.3m, 0.5m, 1.0m, 1.5m, 1.75m, 2.0m, 2.5m and 3.0m
- The painting of integrating spheres is according to CIE Pub.No.84(1989)
- BaSO4 coating: $\rho(\lambda) \geq 0.96(450\text{nm} \sim 800\text{nm})$ and $\rho(\lambda) \geq 0.92(380\text{nm} \sim 450\text{nm})$
- Fine diffuse reflection: Reflectance ≈ 0.8 and accuracy of $\rho(\lambda) < 1.5\%$

Order Number:

Sphere Diameter	1.0m	1.5m	1.75m	2m
LISUN Model	IS-1.0MA	IS-1.5MA	IS-1.75MA	IS-2.0MA
Cycle side opening	IS-1.0MA33C	IS-1.5MA55C	IS-1.75MA66C	IS-2.0MA77C

Remark:

The code 55C in IS-1.5MA55C means the side opening is diameter=50cm cycle size

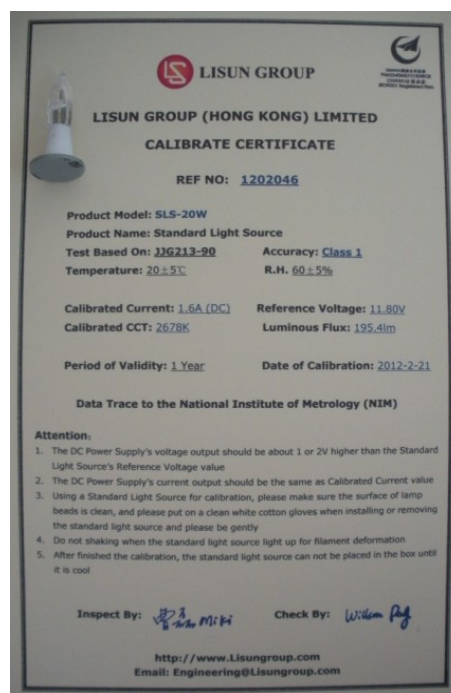
7、 Auxiliary Lamp (RLS-50W)

Due to the luminaires material has self-absorption, the test flux will be a bit difference than the original flux when test the luminaires in the integrating sphere, according to CIE request, it is necessary use an Auxiliary lamp to do flux self-absorption revise.

8、 Standard Lamp Source

OSRAM Standard Lamp to calibrate the spectrum and luminous flux with Lisun Lab certification. The data can be traced NIM. The Standard Lamp Source is used to calibrate the integrating sphere system. The different size of Integrating Sphere should choose the right power of standard lamp source

Integrating Sphere Size	Standard Lamp Source
0.3m/0.5m	SLS-10W
1m/1.5m/1.75m	SLS-50W
2m/2.5m/3m	SLS-100W



9、 19Inch Cabinet (CASE-19IN)

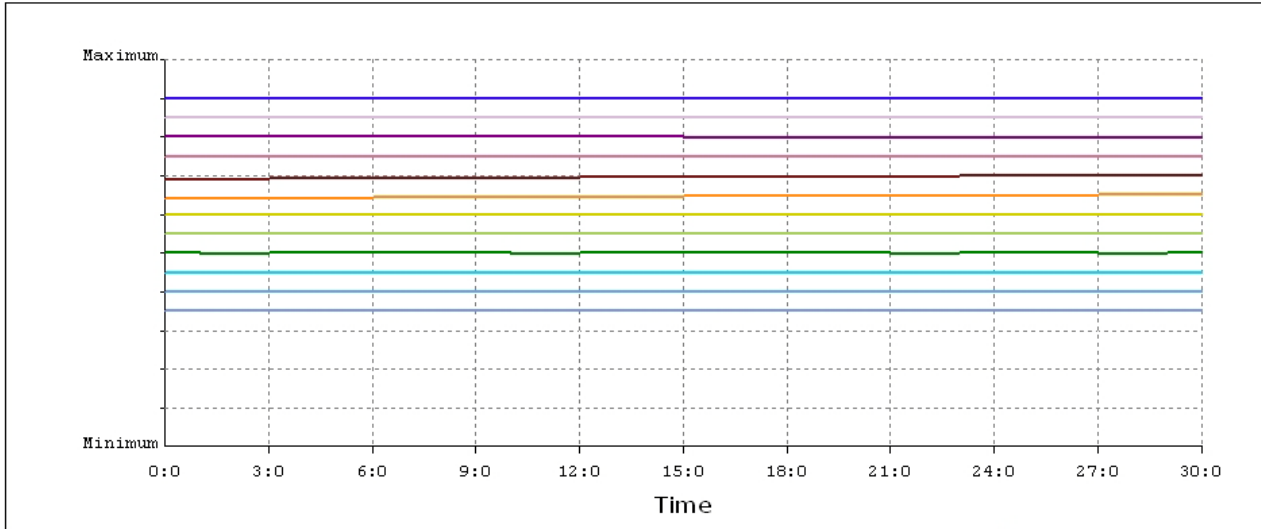
Combine all of the test instruments in a 19 inch standard Cabinet, makes the whole systems looks nice and is simple to use



The next pages are LPCE-2 (LMS-9000) Test Report.

Appendix 1: LM-80 LED Optical Maintenance Test Report

LED Optical Maintenance Curve



	Voltage(V)	Current(A)	Power(W)	Power Factor	Luminous Flux(lm)	Efficiency(lm/W)	CCT(K)	Dominant Wavelength(nm)
Maximum of Scale	27.16	2.491	64.69	1.333	1187.38	24.7	4807	1062.4
Minimum of Scale	0.00	0.000	0.00	0.000	0.00	0.0	0	0.0
Maximum	24.44	2.117	51.75	1.000	819.17	16.1	2884	584.3
Minimum	24.41	2.117	51.68	1.000	819.22	15.8	2881	584.3

Product Category: Hallogen Lamp
Product Number: SLS-50W

Product Spec: 24V/50W
Manufacturer: OSRAM

Condition: 20C/65%
Test Lab: Lisun Group
Operator: Jacky

Remark:
Test Time: 2013-02-18 16:38:24
Inspector:

The testing results can be exported Excel files to do detail analyse:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Product Category	Hallogen Lamp											
2	Product Type												
3	Product Spec	24V/50W											
4	Product Number	SLS-50W											
5	Manufacturer	OSRAM											
6	Buyer												
7	Submitted Unit												
8	Test Lab	Lisun Group											
9	Operator	Jacky											
10	Test Time	2013-2-18 16:38											
11	Condition	20C/65%											
12	Remark												
13	Time	Voltage(V)	Current(A)	Power(W)	Power Factor	Luminous Flux(lm)	Efficiency (lm/W)	CCT(K)	Dominant Wavelength (nm)	Peak Wavelength (nm)	CRI: Ra	Chromaticity Coordinate: x	Chromaticity Coordinate: y
14	0:00:00	24.44	2.117	51.75	1	819.22	15.8	2884	584.3	799	99.9	0.4455	0.407
15	0:01:00	24.44	2.117	51.74	1	819.49	15.8	2883	584.3	799	99.9	0.4455	0.4069
16	0:02:00	24.43	2.117	51.72	1	820.08	15.9	2883	584.3	798	99.9	0.4456	0.4069
17	0:03:00	24.43	2.117	51.72	1	820.69	15.9	2883	584.3	800	99.9	0.4456	0.4069
18	0:04:00	24.43	2.117	51.72	1	821.41	15.9	2883	584.3	799	100	0.4455	0.4069
19	0:05:00	24.43	2.117	51.72	1	821.61	15.9	2883	584.3	800	99.9	0.4456	0.407
20	0:06:00	24.43	2.117	51.72	1	822.38	15.9	2882	584.3	800	100	0.4456	0.407
21	0:07:00	24.43	2.117	51.71	1	822.18	15.9	2883	584.3	799	99.9	0.4455	0.4069
22	0:08:00	24.43	2.117	51.71	1	823.08	15.9	2883	584.3	800	99.9	0.4456	0.407
23	0:09:00	24.42	2.117	51.71	1	823.63	15.9	2883	584.3	799	99.9	0.4456	0.407
24	0:10:00	24.42	2.117	51.71	1	824.06	15.9	2883	584.3	800	100	0.4455	0.4069
25	0:11:00	24.42	2.117	51.7	1	824.48	15.9	2883	584.3	798	100	0.4456	0.407
26	0:12:00	24.42	2.117	51.7	1	824.9	16	2882	584.3	799	99.9	0.4457	0.407
27	0:13:00	24.42	2.117	51.7	1	825.18	16	2881	584.3	799	99.9	0.4457	0.407
24	0:10:00	24.42	2.117	51.71	1	824.06	15.9	2883	584.3	800	100	0.4455	0.4069
25	0:11:00	24.42	2.117	51.7	1	824.48	15.9	2883	584.3	798	100	0.4456	0.407
26	0:12:00	24.42	2.117	51.7	1	824.9	16	2882	584.3	799	99.9	0.4457	0.407
27	0:13:00	24.42	2.117	51.7	1	825.18	16	2881	584.3	799	99.9	0.4457	0.407

Lightsource Test Report (1/2)

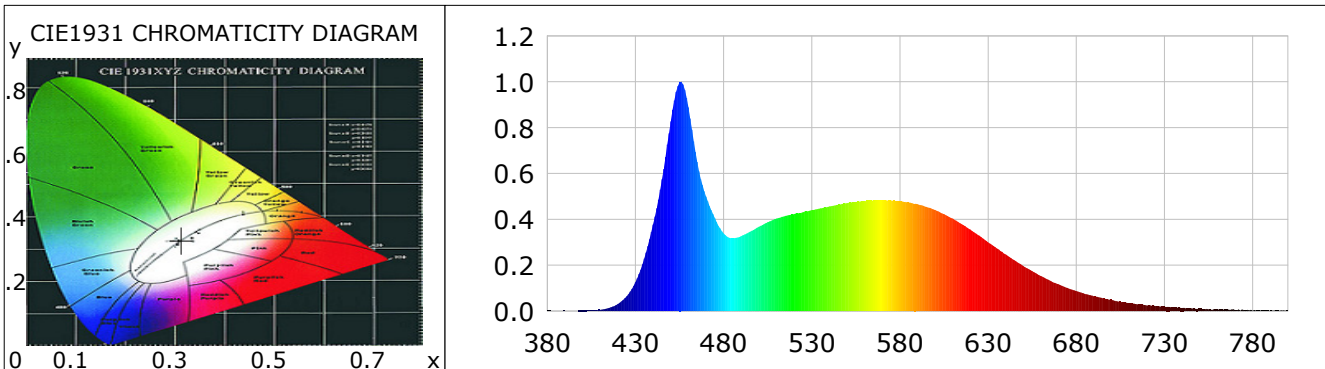
Product Infomation

 Product Spec: 220V/13W
 Manufacturer: OSRAM

 Product Number: DR-001
 Buyer: LISUN

CIE Colorimetric Parameters

Chromaticity coordinates: $x=0.3126$ $y=0.3270$ $u(u')=0.1985$ $v=0.3115$ $v'=0.4672$
 CCT: $T_c=6526K$ ($duv=0.00223$) Color Ratio: $R=0.139$ $G=0.796$ $B=0.065$
 Peak Wavelength: 455.6nm Half Bandwidth: 26.7nm
 Dominant Wavelength: 487.7nm Color Purity: 0.075
 CRI: $R_a=85.8$, $avgR(1\sim14)=79.8$, $avgR(1\sim15)=79.9$ TM30: $R_f=84$, $R_g=93$
 R1 =85 R2 =93 R3 =95 R4 =82 R5 =85 R6 =88 R7 =87 R8 =71
 R9 =18 R10=83 R11=82 R12=63 R13=88 R14=98 R15=81
 Color Quality Scale: $Q_a=82.8$, $Q_f=83.1$, $Q_p=82.1$, $Q_g=90.9$
 Q1 =82 Q2 =98 Q3 =83 Q4 =74 Q5 =78 Q6 =81 Q7 =86 Q8 =90
 Q9 =98 Q10=91 Q11=86 Q12=84 Q13=83 Q14=74 Q15=78



Photometric Parameters

Luminous Flux: 1112.62 lm Efficiency: 88.94 lm/W Radiant Power: 3.656 W
 EEI: 0.15 Energy Efficiency Class: A+ (EU 874-2012)
 Pupil Flux: 2152.01 Plm Pupil Lumens Per Watt: 172.02 Plm/W Pupil Factor (Kp): 1.934
 PAR: 3.608 W PPF: 16.209 umol/s R/B: 0.6
 Photons1: 4.909 umol/s(400~500nm) Photons2: 3.987 umol/s(600~700nm)
 Circopic Flux: 5073.88 lm
 Mesopic Flux (CIE R.): 1558.01 lm ($L_p=0.100$ cd/m², $S/P=2.33$)
 Mesopic Flux (USP): 1864.61 lm ($L_p=0.100$ cd/m², $S/P=2.33$)
 Mesopic Flux (MOVE): 1632.82 lm ($L_p=0.100$ cd/m², $S/P=2.33$)

Electric Parameters

Voltage: 220.70V Current: 0.0660A Power: 12.51W
 Power Factor: 0.8530 Frequency: 49.99Hz

Test Infomation

Scan Range: 380~800:1nm Photometric Method: sphere-photometer (spec_rev)
 Stabilization Time: 0 Min Photometric Condition: Sphere diameter: 1.00m, 4T
 Max of Signal: 46090 (2408) CCD Integration Time: 87.05 ms

 Condition: Tx:18.9'C, Ti:16.8'C, R.H.:60%
 Test Lab: LISUN Lab
 Operator:

 Test Device: Lisun LMS-9000B
 Test Time: 2019-01-17 14:43:41
 Inspector:

Lightsource Test Report (2/2)

Product Information

Product Spec: 220V/13W
Manufacturer: OSRAMProduct Number: DR-001
Buyer: LISUN

WL(nm)	PL	PE(mW/nm)	WL(nm)	PL	PE(mW/nm)	WL(nm)	PL	PE(mW/nm)
380	0.0011	0.0383	525	0.4309	15.1312	670	0.1168	4.1023
385	0.0002	0.0076	530	0.4403	15.4610	675	0.1006	3.5328
390	0.0007	0.0258	535	0.4479	15.7283	680	0.0874	3.0697
395	0.0007	0.0230	540	0.4563	16.0242	685	0.0745	2.6166
400	0.0013	0.0463	545	0.4642	16.2986	690	0.0636	2.2333
405	0.0026	0.0924	550	0.4712	16.5451	695	0.0557	1.9576
410	0.0053	0.1876	555	0.4758	16.7093	700	0.0489	1.7167
415	0.0139	0.4877	560	0.4791	16.8243	705	0.0401	1.4098
420	0.0310	1.0895	565	0.4824	16.9398	710	0.0347	1.2198
425	0.0641	2.2494	570	0.4825	16.9414	715	0.0288	1.0103
430	0.1261	4.4297	575	0.4820	16.9265	720	0.0243	0.8520
435	0.2286	8.0267	580	0.4793	16.8290	725	0.0223	0.7818
440	0.3771	13.2404	585	0.4736	16.6308	730	0.0190	0.6677
445	0.5747	20.1818	590	0.4659	16.3583	735	0.0159	0.5593
450	0.8275	29.0567	595	0.4543	15.9516	740	0.0135	0.4755
455	0.9991	35.0833	600	0.4408	15.4790	745	0.0124	0.4365
460	0.8884	31.1952	605	0.4227	14.8426	750	0.0101	0.3529
465	0.6511	22.8632	610	0.4031	14.1531	755	0.0073	0.2552
470	0.4995	17.5383	615	0.3791	13.3109	760	0.0079	0.2781
475	0.4057	14.2462	620	0.3552	12.4742	765	0.0058	0.2053
480	0.3383	11.8782	625	0.3284	11.5333	770	0.0047	0.1655
485	0.3174	11.1443	630	0.2990	10.4998	775	0.0045	0.1593
490	0.3273	11.4925	635	0.2727	9.5747	780	0.0026	0.0902
495	0.3458	12.1420	640	0.2464	8.6538	785	0.0036	0.1259
500	0.3676	12.9074	645	0.2206	7.7464	790	0.0012	0.0435
505	0.3875	13.6082	650	0.1959	6.8801	795	0.0008	0.0267
510	0.4035	14.1675	655	0.1739	6.1057	800	0.0018	0.0649
515	0.4152	14.5786	660	0.1522	5.3441			
520	0.4237	14.8790	665	0.1330	4.6711			

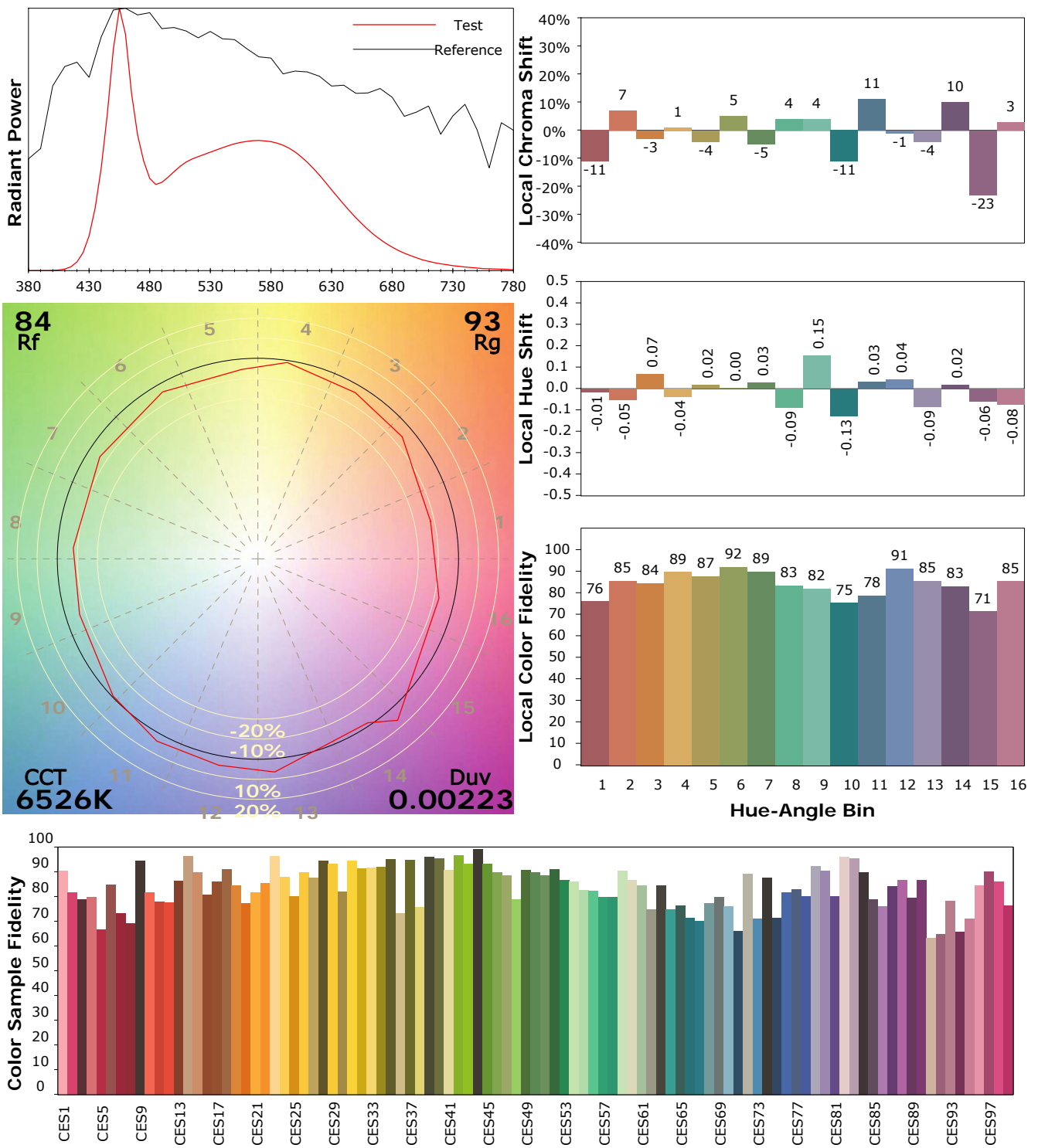
Condition: Tx:18.9'C, Ti:16.8'C, R.H.:60%
Test Lab: LISUN Lab
Operator:Test Device: Lisun LMS-9000B
Test Time: 2019-01-17 14:43:41
Inspector:

IES TM-30-18 Color Rendition Report

Product Information

Product Spec: 220V/13W
 Manufacturer: OSRAM

Product Number: DR-001
 Buyer: LISUN



Condition: Tx:18.9'C, Ti:16.8'C, R.H.:60%
 Test Lab: LISUN Lab
 Operator:

Test Device: Lisun LMS-9000B
 Test Time: 2019-01-17 14:43:41
 Inspector: