



NVLAP LAB CODE:201045-0



Shenzhen Anbotek Compliance Laboratory Limited

IES LM-79-08 TEST REPORT

For
LED Waves, Inc.

Report Number: R011606136L2

Product Type: PR25 4 INCH

Date of Receipt: 2016-06-03

Date of Test: 2016-06-03 to 2016-06-20

Date of Report: 2016-06-21

Product Model: PR25 4 INCH

Product Description: AC 110-277V 50/60Hz 10W 4000K

Product Criteria: IES LM-79-08: Electrical and Photometric Measurements of Solid-State Lighting Products

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1 – GENERAL

1.1 Product description

General Information

Applicant	LED Waves, Inc.
Applicant Address	4100 1st Ave., 3rd Floor North, Brooklyn, NY 11232, USA
Manufacturer	LED Waves, Inc.
Manufacturer Address	4100 1st Ave., 3rd Floor North, Brooklyn, NY 11232, USA
Brand name	LED Waves, Inc.
Test Model Number	PR25 4 INCH
Burning time before test	0 Hours (For new products)

Rated Values

Rated Inputs	AC 110-277V 50/60Hz
Rated Power	10W
Nominal CCT	4000K

1.2 Standard of method

- ANSI C78.377-2015: Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment
- CIE Publication No.13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources
- IESNA LM-79-08 Approved Method: Electric & Photometric Measurement of Solid-state Lighting Products

1.3 Test Facility

The test facility used by Shenzhen Anbotek Compliance Laboratory Limited is located at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China.

2 – Test Equipment List and Details

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Goniophotometric System	SENSING	GMS-3000	-	-	2016-03-14	2017-03-13
AC Power Source	Ainuo	AN97001W	-	0-300V, 1000VA	2016-04-06	2017-04-05
Digital Power Meter	YOKOGAWA	WT310		0-600V/0-10A/0-10 OHZ	2016-04-06	2017-04-05
Temperature & Humidity meter	XINIXI	CTH-608	-	0°C~50°C, 10% to 90%RH	2016-03-14	2017-03-13
Total Luminous Flux Standard Lamp	SENSING	220V/500W	S135009	220V/500W	2016-03-30	2017-03-29
Total Luminous Flux Standard Lamp	SENSING	220V/500W	S1350014	220V/500W	2016-03-30	2017-03-29
1.5m Integral Sphere	SENSING	SPR-600M	-	380nm-780nm,0.011 m~6.00×10 ⁵ lm	2016-04-06	2017-04-05
Spectrum analyzer	SENSING	SPR-3000	-	380nm-780nm,0.011 m~6.00×10 ⁵ lm	2016-04-06	2017-04-05
AC Power Source	ALL POWER	APW-110N	997079	0-300V, 0-1000VA	2016-04-06	2017-04-05
Digital Power Meter	YOKOGAWA	WT210	-	0-600V/0-10A/0-10 OHZ	2016-04-06	2017-04-05
DC Power Supply	Linkcolor	Linkcolor	-	DC 30V, 5A	2016-03-28	2017-03-27
Total Luminous Flux Standard Lamp	SENSING	110 V / 100 W	S13100190	Refer specification	2016-03-30	2017-03-29
Total Luminous Flux Standard Lamp	SENSING	110 V / 100 W	S1310034	Refer specification	2016-03-30	2017-03-29
Temperature & Humidity meter	XINIXI	CTH-608	-	0°C~50°C, 10% to 90%RH	2016-03-14	2017-03-13

Statement of Traceability:Shenzhen Anbotek Compliance Laboratory Limited attests that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit (SI).

3 – Test Method

3.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, the air flow around the sample(s) being tested did not affect the performance.

3.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within ± 0.2 percent under load.

3.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

3.4 Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards. 4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

3.5 Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The method according to IESNA LM-79-08 following chapter.

4 – Test Result

4.1 Photometric test with Integrating Sphere System

4.1.1 Model: PR25 4 INCH

Electrical data

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.3	60	0.08564	10.17	0.9868

Photometric data

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
672.13	2.0351	66.10	3768	7.97e-04

Chromaticity Coordinate

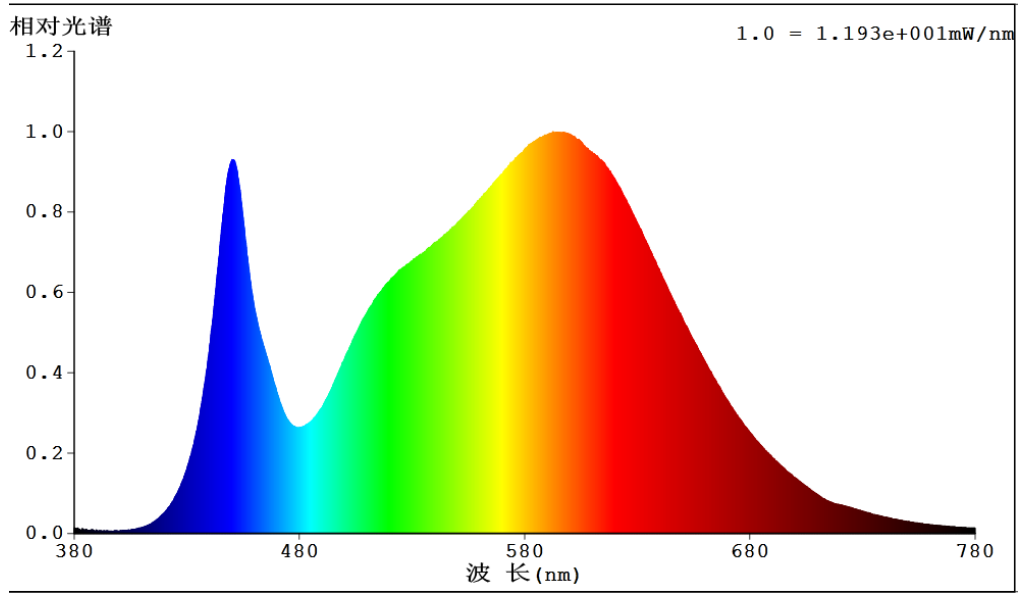
x	y	u	v	u'	v'
0.3919	0.3853	0.2292	0.3380	0.2292	0.5070

Color Rendering Details

Ra
82.7

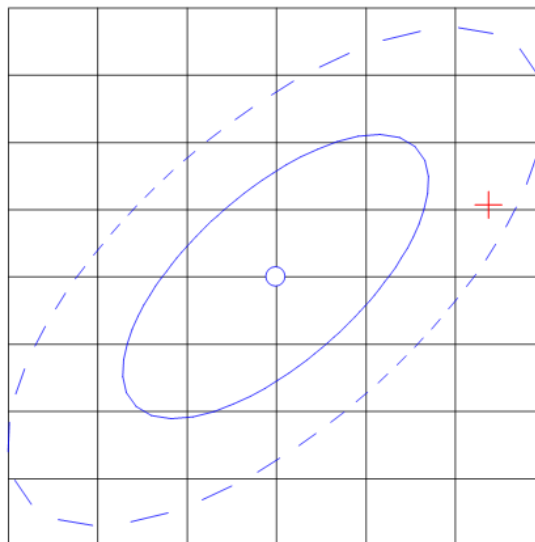
R1	R2	R3	R4	R5
81	89	95	82	81
R6	R7	R8	R9	R10
85	86	64	9	73
R11	R12	R13	R14	R15
80	64	83	97	75

Spectral Distribution



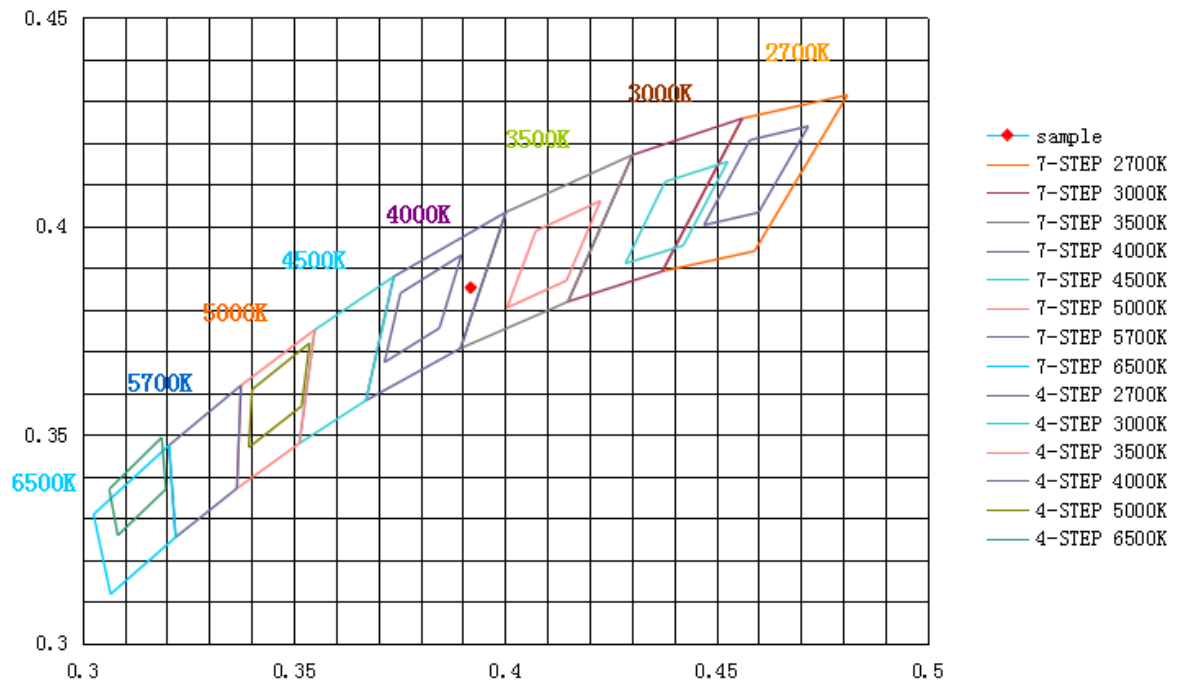
Chromaticity Diagram (CIE 1931)

色容差 6.0 SDCM



x=0.380 y=0.380 F4000

ANSI Chromaticity Quadrangles Diagram



Ambac

4.2 Photometric test with Goniophotometer System

4.2.1 Model: PR25 4 INCH

Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.09	60	0.0850	10.12	0.9868

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	Zonal Lumen Density(0~90°)
691.74	68.35	242.223	99.678%

Zonal Lumen Summary

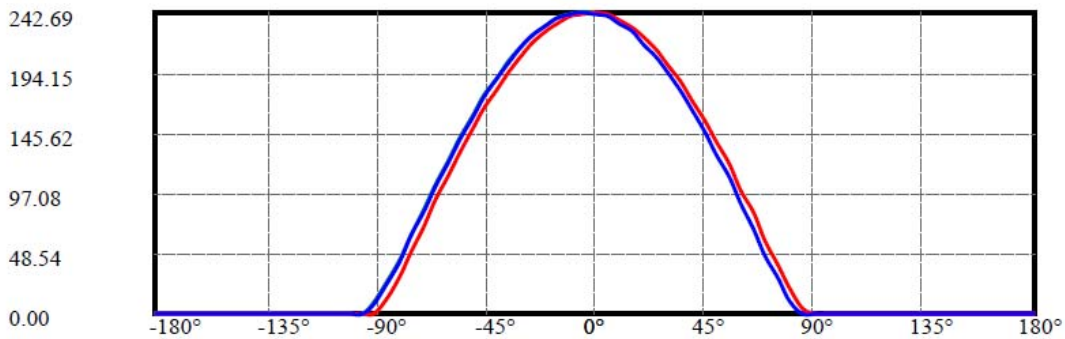
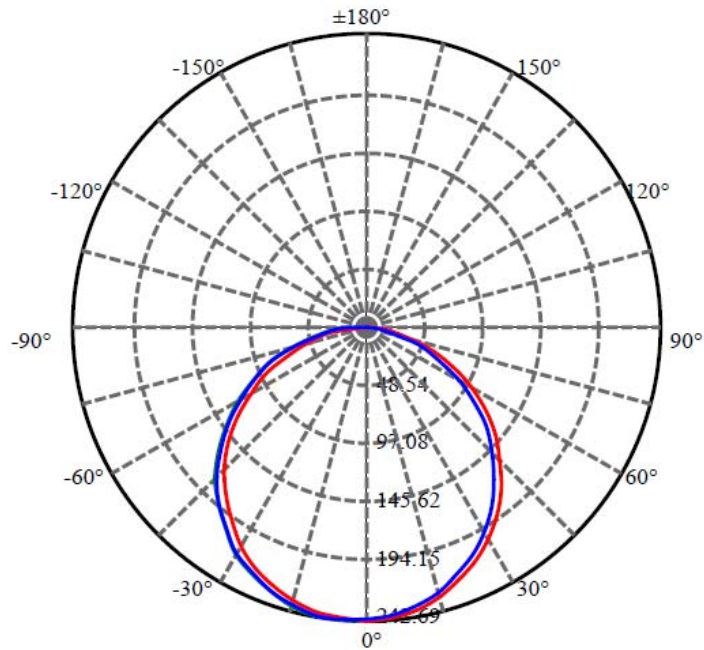
ZONAL LUMEN SUMMARY

Zone	Lumens	%Fixt
0-30	187.89	27.16%
0-40	307.57	44.46%
0-60	543.14	78.52%
0-90	689.51	99.68%
0-120	690.69	99.85%
0-180	691.74	100.00%
60-90	199.69	28.87%
90-120	4.62	0.67%
90-130	4.88	0.71%
90-150	5.35	0.77%
90-180	5.65	0.82%
0-61.10	553.39	80.00%

ZONAL LUMEN SUMMARY

0-10	22.90
10-20	65.59
20-30	99.41
30-40	119.68
40-50	123.89
50-60	111.69
60-70	84.86
70-80	48.08
80-90	13.43
90-100	0.74
100-110	0.22
110-120	0.22
120-130	0.27
130-140	0.24
140-150	0.23
150-160	0.17
160-170	0.11
170-180	0.03

Light Distribution Curve [Unit: cd]



C247.5(Max): ———

C0/C180: ———

C90/C270: ———

Field angle(10%Imax):C0/180Left:81.7 Right:79.2

:C90/270Left:80.1 Right:81.2

Beam Angle(50%Imax):C0/180Left:57.3 Right:54.7

:C90/270Left:55.3 Right:56.9

Luminous Intensity (cd) Distribution Data

C/γ(°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	242.22	240.66	236.59	230.64	222.82	212.96	201.07	187.46	172.44
22.5	242.22	240.03	235.50	228.77	220.00	209.68	197.63	182.92	167.74
45.0	241.91	239.56	235.03	227.51	218.60	207.64	194.34	179.79	164.30
67.5	242.22	239.25	234.09	226.89	217.97	206.70	193.56	179.01	163.36
90.0	241.75	239.09	234.09	227.05	217.81	207.02	193.87	180.10	164.30
112.5	242.07	239.41	234.71	228.14	219.38	209.05	196.53	182.45	166.18
135.0	241.91	240.19	236.12	229.71	221.88	211.71	200.13	186.05	171.03
157.5	241.91	240.97	237.53	231.90	224.39	215.00	203.89	190.27	175.72
180.0	242.22	241.28	239.09	234.24	227.36	218.91	208.11	195.12	181.35
202.5	242.22	242.54	240.82	236.28	230.49	222.82	212.18	200.13	186.67
225.0	241.91	242.54	241.28	238.00	232.21	224.23	214.37	202.64	189.33
247.5	242.22	242.69	241.44	238.31	232.37	224.70	215.62	203.26	190.43
270.0	241.75	242.38	241.13	237.53	232.37	224.07	215.00	202.48	189.49
292.5	242.07	242.22	240.03	236.12	230.33	222.04	212.02	200.60	186.52
315.0	241.91	241.75	239.25	234.56	227.67	219.22	208.42	196.69	181.67
337.5	241.91	240.82	238.00	232.21	225.17	215.94	204.67	191.68	176.82
360.0	242.22	240.66	236.59	230.64	222.82	212.96	201.07	187.46	172.44
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	155.54	138.32	120.17	100.14	80.74	59.46	39.74	21.12	4.22
22.5	151.15	132.22	113.91	94.04	74.01	52.58	33.49	15.02	0.63
45.0	146.46	128.78	109.85	90.13	68.54	48.82	29.26	12.36	0.47
67.5	145.68	127.53	108.28	87.63	66.81	46.79	27.85	9.86	0.31
90.0	146.15	128.47	109.53	88.41	67.91	47.26	28.48	10.33	0.16
112.5	149.43	131.75	113.44	92.16	71.98	51.17	31.30	13.46	0.31
135.0	154.13	136.60	117.04	97.64	77.61	57.27	36.46	18.78	1.88
157.5	160.07	142.86	123.77	104.99	84.34	63.37	42.87	23.94	6.73
180.0	165.71	148.49	129.56	111.25	91.85	70.41	50.38	30.67	12.21
202.5	170.87	154.60	136.60	117.98	98.58	78.71	57.11	37.71	19.09
225.0	174.78	157.88	140.83	121.58	102.80	83.40	61.81	42.09	24.10
247.5	176.03	159.45	142.24	123.30	104.53	84.97	63.53	43.97	25.35
270.0	174.63	158.04	140.51	122.21	102.80	83.24	63.22	42.40	24.57
292.5	171.50	155.54	137.39	119.23	99.67	79.33	58.83	39.12	21.12
315.0	166.49	149.90	131.60	112.98	94.35	73.07	53.36	33.33	16.59
337.5	161.01	144.27	125.49	106.87	87.16	66.50	46.32	27.54	9.08
360.0	155.54	138.32	120.17	100.14	80.74	59.46	39.74	21.12	4.22
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.31	0.31
22.5	0.16	0.16	0.31	0.16	0.16	0.16	0.31	0.47	0.31
45.0	0.16	0.16	0.31	0.16	0.31	0.16	0.31	0.31	0.31
67.5	0.16	0.16	0.16	0.16	0.31	0.16	0.16	0.16	0.31
90.0	0.16	0.16	0.31	0.31	0.31	0.31	0.31	0.31	0.47
112.5	0.16	0.16	0.31	0.31	0.31	0.31	0.31	0.31	0.31
135.0	0.16	0.16	0.16	0.31	0.16	0.31	0.31	0.31	0.31
157.5	0.16	0.31	0.16	0.16	0.16	0.31	0.31	0.47	0.31
180.0	0.47	0.16	0.16	0.16	0.31	0.16	0.31	0.31	0.31
202.5	2.66	0.31	0.16	0.16	0.16	0.16	0.16	0.31	0.31
225.0	6.57	0.16	0.31	0.31	0.31	0.16	0.16	0.31	0.31
247.5	8.45	0.16	0.16	0.16	0.16	0.31	0.16	0.16	0.31
270.0	7.35	0.16	0.31	0.16	0.16	0.16	0.31	0.31	0.16
292.5	5.48	0.16	0.16	0.16	0.31	0.16	0.31	0.31	0.31
315.0	1.56	0.16	0.16	0.31	0.16	0.16	0.16	0.31	0.31
337.5	0.16	0.16	0.16	0.16	0.16	0.16	0.31	0.31	0.31
360.0	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.31	0.31

$C/\gamma(^{\circ})$	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	0.31	0.31	0.31	0.47	0.47	0.31	0.31	0.31	0.31
22.5	0.31	0.47	0.47	0.47	0.47	0.47	0.31	0.47	0.47
45.0	0.31	0.31	0.47	0.31	0.47	0.47	0.47	0.31	0.31
67.5	0.31	0.47	0.47	0.47	0.31	0.31	0.31	0.31	0.31
90.0	0.31	0.31	0.47	0.31	0.31	0.31	0.47	0.47	0.47
112.5	0.31	0.47	0.31	0.31	0.47	0.31	0.47	0.47	0.47
135.0	0.31	0.47	0.47	0.31	0.31	0.47	0.47	0.31	0.31
157.5	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.47	0.31
180.0	0.31	0.31	0.31	0.31	0.31	0.47	0.31	0.31	0.47
202.5	0.16	0.31	0.31	0.47	0.31	0.31	0.31	0.47	0.31
225.0	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
247.5	0.16	0.47	0.31	0.31	0.47	0.47	0.47	0.31	0.47
270.0	0.31	0.31	0.31	0.31	0.31	0.31	0.47	0.47	0.31
292.5	0.31	0.16	0.31	0.31	0.31	0.31	0.31	0.47	0.47
315.0	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.47
337.5	0.31	0.31	0.31	0.47	0.31	0.31	0.31	0.31	0.31
360.0	0.31	0.31	0.31	0.47	0.47	0.31	0.31	0.31	0.31

$C/\gamma(^{\circ})$	180.0
0.0	0.47
22.5	0.47
45.0	0.47
67.5	0.31
90.0	0.47
112.5	0.47
135.0	0.31
157.5	0.31
180.0	0.47
202.5	0.47
225.0	0.47
247.5	0.31
270.0	0.47
292.5	0.47
315.0	0.31
337.5	0.31
360.0	0.47

Attachment A – Product PHOTO

FRONT PHOTO



PHOTO 1

REVERSE PHOTO

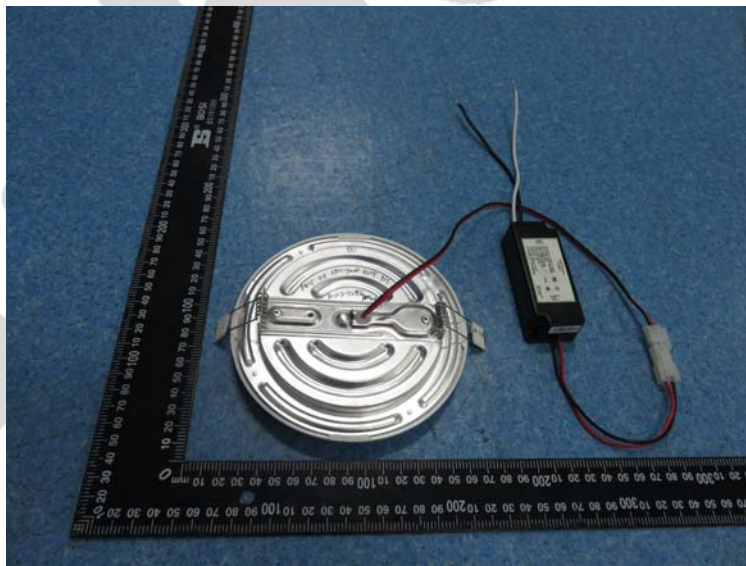


PHOTO 2

-----End of Report-----