ENERGY STAR PROGRAM REQUIREMENTS FOR LUMINAIRES (LIGHT FIXTURES) (VERSION 2.0)

MEASUREMENT AND TEST REPORT

For

L-TECH CORPORATION

Shaogangtou District, Qiaotou Town Dongguan City, Guangdong, China

Model: LED200ICA With LT200/203 2700K

Report Type: Original Report	**Product Type:** LED Recessed Downlight
Test Engineer:	Hexy He Hexy He
Report Number:	RSZ171106507-10
Test Date:	2017-11-08 to 2017-11-27
Report Date:	2017-11-28
Reviewed By:	Blake Zhang / EE Engineer Blake Zhang
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). (Rev. 2.0, 2012-10-05 effected)This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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1. GENERAL INFORMATION

1.1. Product Description for Equipment under Test (EUT)

The client submitted 2 samples of model LED200ICA With LT200/203 2700K, Samples were numbered RSZ171106507-S01, RSZ171106507-S02. The samples were received on 2017-11-06, in undamaged condition.

Model Tested:	LED200ICA With LT200/203 2700K
Manufacturer:	L-TECH CORPORATION
Product Designation:	LED Recessed Downlight
Classification:	Directional
Rated Voltage/Frequency:	120V 60Hz
Rated Power:	9W
Nominal CCT:	2700K
Rated Life:	50000 hrs
Dimming:	Yes
Dimming Range:	10%-100%
Indoor and Outdoor:	Indoor use only
Connected Product:	No
Color Tunable:	No
Number of LED Components	1
Type of LED Components:	LED Module
Model of LED Components:	ERC1507Sxxxxx
Light Source Manufacturer:	Lumens Co., Ltd.
LM-80 Report:	Yes
The Number of LED Driver:	1
The Model of LED Driver:	LT-LD12/14-SQ-120/277
Driver Manufacturer:	L-TECH CORP
Rated Maximum TMPc:	90 ℃
Replaceability of Driver:	Separable
Model of Dimmer Used During Test:	Cat.NO.6684
Brand of Dimmer:	LEVITON
Type of Dimmer:	Continuous dimmer

Family Products for ENERGY STAR Certification:

According to ENERGY STAR product certification requirements for family products from ENERGY STAR Program Requirements, Products Specification for Luminaires (Light Fixtures) Version 2.0,section6.1- Product Families, and the declaration from manufacturer, the following model(s) can be covered by this report with or without additional test (additional test would be also included in this report, if any):

Tested Model	Multiple Models	Variations	Details	Additional Test
LED200ICA With LT200/203 2700K	LED200ICA With LT200/203 X	CCT	X is CCT, it can be: 2700K,3000K, 4000K, 5000K	None
	LED200 With LT200/203 X	CCT & housing	X is CCT, it can be: 2700K,3000K, 4000K, 5000K The housing is LED200	See the reports # (RSZ171106507-10-2, RSZ171106507-10-3)
	LED200R With LT200/203 X		X is CCT, it can be: 2700K,3000K, 4000K, 5000K The housing is LED200R	
	LED200 With LT200/200 X	CCT & trim	X is CCT, it can be: 2700K,3000K, 4000K, 5000K 243:trim 240:no trim	Integrating sphere test (RSZ171106507-10-1)
	LED200R With LT200/200 X			

1.2. Statement of Traceability:

Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

2. SUMMARY OF TEST RESULT

Item	Measured	Verdict	Requirement
Efficacy (lm/W)	68.44	PASS	⩾ 55 lm/W
Aperture(inch)	1.89	N/A	N/A
Light Output(lm)	610.47	PASS	For Aperture ⩽4.5”: ⩾345 lm For Aperture ＞4.5”: ⩾575 lm
Zonal Lumen Density	97.78%	PASS	Luminaire shall deliver a minimum of 75% of total initial lumens within the 0°- 60°zone (axially symmetric about the nadir).
CCT (K)	2700	PASS	The luminaire shall fall within the corresponding 7-step chromaticity quadrangles as defined in ANSI/NEMA/ANSLG C78.377-2011.
R_a	94.1	PASS	R_a ⩾80
R_9	66	PASS	R_9 ＞0
Color Angular Uniformity	Complied	PASS	Throughout the beam angle, the variation of chromaticity shall be within a total linear distance of 0.006 from the weighted average point on the CIE 1976(u’,v’) diagram.
Lumen Maintenance Life [ii]	>55000 hours See Attachment A	PASS	⩾25,000 hours (for indoor)
Color Maintenance[iii]	See Attachment A	PASS	⩽ 0.007 (In LM-80 test report)
Start Time(ms)	156.0	PASS	Light source shall remain continuously illuminated within 750 milliseconds of application of electrical power.
Power Factor	0.9906	PASS	For power⩽5W; PF⩾0.5 For Power＞5W,PF⩾ 0.7
Transient Protection	See tables	PASS	Sample shall survive after seven strikes
Standby Power (W)	N/A[iv]	PASS	Luminaires shall not draw power in the off state.
Operating Frequency (Hz) [i]	120.05	PASS	⩾ 120 Hz
Dimming [i]	See tables	PASS	Provide continuous dimming from 100% to 20%
Noise(dBA) [i]	22.2	PASS	⩽ 24 dBA at 1 meter or less at the minimum output
Driver Case Temperature(℃)	39.4	PASS	The measured driver case temperature at thermal equilibrium shall not exceed the driver manufacturer’s maximum recommended temperature 90° C during in situ operation.

Note:

i. Operating frequency, Dimming and noise test are not accredited by the IAS.
ii. TM-21 calculator is used to calculate the L_{70} life. Test data from LM-80 test report of LED light source was used.
iii. Color Maintenance referenced to LM-80 test repot of LED light source.
iv. According to IEC 62301-2011, This *Type A* product has no secondary function load and no power switch.

3. TEST RESULT

3.1. Driver Case Temperature and in Situ TMP_{LED} Temperature Test

Test Method and ENERGY STAR Requirements:

ANSI/UL 1598-2008: Standard for Safety of Luminaires

ENERGY STAR Requirements:

In the sample luminaire, the in situ TMP_{LED} temperature is less than or equal to the temperature specified in the LM-80 test report for the corresponding or higher drive current, within the manufacturer's specified operating current range.

The drive current measured in the luminaire is less than or equal to the drive current specified in the LM-80 test report at the corresponding temperature or higher.

At the temperature measurement point for the hottest location on the driver case (TMPc as detailed by the driver manufacturer), the measured driver case temperature at thermal equilibrium shall not exceed the driver manufacturer's maximum recommended temperature during in situ (installed in the luminaire) operation.

Test Procedure:

One sample was mounted according to ANSI/UL 1598-2008 and operated until constant temperatures were obtained. A temperature was considered constant if the sample was operating for at least three hours and upon three successive readings - taken at 15 minute intervals - were within one degree and were not rising. The sample was connected to a 120V, 60 Hz source of supply.

Thermocouples were attached at locations described in the results by means of a cement made of water glass and Fuller's earth, solder, or epoxy. The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

Test Equipment:

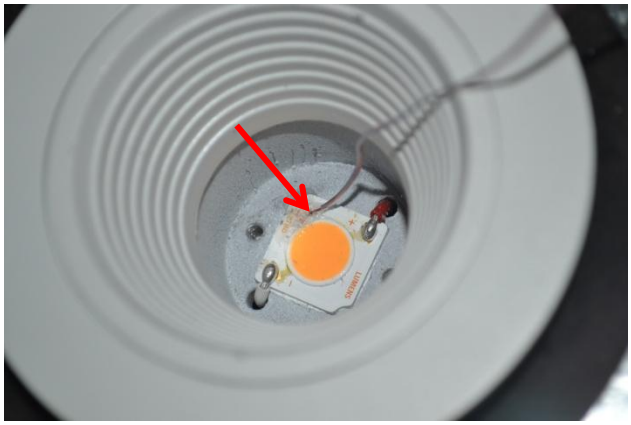
Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Multimeter	FLUKE	17B	1573 1328	400nV~4000nV,4V~1000V	2017-03-03	2018-03-03
Hybrid Recorder	YOKOGAWA	DR240	10#	N/A	2017-07-07	2018-07-07
AC POWER SUPPLY	HengPu	HPA 1103	0003394	3KVA	2017-03-03	2018-03-03

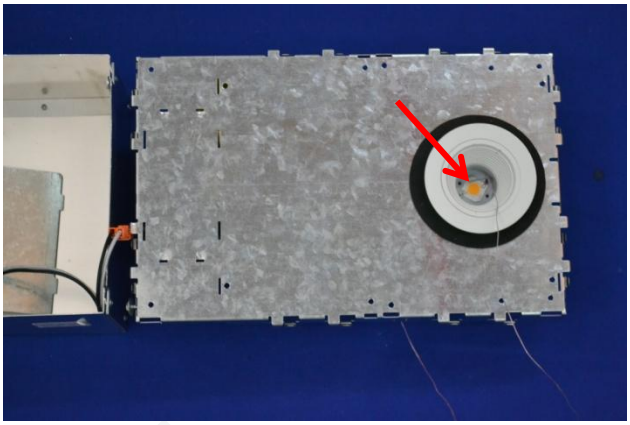
Uncertainty:

The uncertainty of the temperature is U=0.8℃ (K=2) , at the 95% confidence level.

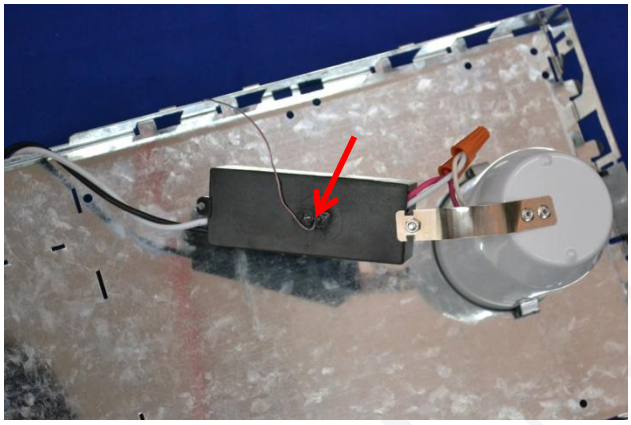
Test Data:

Temperature measurement point of LED light source (TMP_{LED})





Temperature measurement point of driver (TMP_c)



Sample No.	RSZ171106507-S01
Type of Thermocouples:	T
Test Duration	⩾3.5 hours
Maximum Recommended Driver Case Temperature	90° C
Test Location	**Test Result**
TMP_{LED}	67.3 ℃
TMP_c	39.4 ℃
Driver Current of LED	**Test Result**
IF (mA)	211mA

See attachment A: LM-80 test report and TM-21 calculator.

3.2. Photometric and Electrical Measurements at 25 ℃

Test Method and ENERGY STAR Requirements:

IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products

ANSI C82.77:2014: Harmonic Emission Limits - Related Power Quality Requirements for Lighting EquipmentANSI/UL 8750-2009: Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products

CIE Pub. No. 13.3-1995: Method of Measuring and Specifying Color Rendering of Light Sources

CIE Pub. No. 15:2004: Colorimetry

ENERGY STAR Requirement:

Luminaire Efficacy: For LED Recessed Downlight: ⩾55 lm/W;

Luminaire Minimum Light Output: For LED Recessed Downlight: ⩽ 4.5” aperture: 345 lumens; > 4.5” aperture: 575 lumens

CCT Requirements: fall within a 7-step chromaticity quadrangles for CCT: 2700K, 3000K, 3500K, 4000K, 5000K

CRI Requirements: R_a ⩾ 80, R_9＞0

Power Factor Requirements: ⩽5W,PF⩾0.5; ＞5W,PF⩾0.7

Test Procedure:

The photometric tests were performed after the lamps were seasoned. Spectral radiant flux measurements are made using Spectroradiometer attached to the detector port of the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp is allowed to stabilize from 30 min to 2 or more hours before measurements are made. Luminous flux, chromaticity coordinates, correlated color temperature, u’, v’ and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at no more 5 nm intervals over the range 380 to 780 nm. The calibration of the sphere photometer-spectroradiometer system is traceable to The National Metrology Institute of China, NIM. Lamp efficacy (lumens per watts) for each lamp model is computed based on this luminous flux result. Electrical measurements including voltage, current, power, power factor and harmonic analysis are measured using the Digital Power Analyzer.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
1.5m temperature integrating sphere	SENSING	SPR-600	S09008	25～50 ℃	2017-07-11	2018-07-11
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1 361125	380-780nm	2017-07-11	2018-07-11
Digital power meter	YOKOGAWA	WT310	13398	N/A	2016-12-05	2017-12-05
Programmable Precision DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-03
thermometer	SENSING	NA	NA	25、50 ℃	2017-03-09	2018-03-09
Standard Light Source	SENSING	NA	LSD090808	N/A	2016-12-05	2017-12-05

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Precision frequency power supply	ALL Power	APW-105N	970613	220V ±10% 50Hz	2017-03-03	2018-03-03

Uncertainty:

The uncertainty of the light output (luminous flux) measurements is U=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=32K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1 (K=2) , at the 95% confidence level.

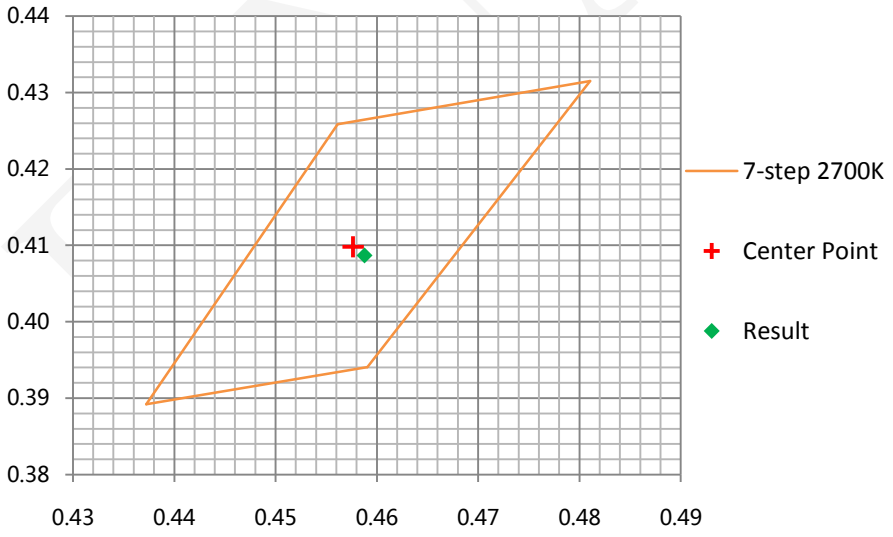
The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.17% of rdg, Power U=0.48%) (K=2), at the 95% confidence level.

Test Data:

Photometric and Electrical Measurements at 25 ℃

Sample No.	Voltage(V)	Current(A)	Power(W)	Power Factor	Luminous Flux (lm)	Efficacy (lm/W)	CCT(K)
RSZ171106507-S01	120.1	0.075	8.92	0.9906	610.47	68.44	2700

Sample No.	R_a	R_9	x	y	u'	v'	Duv
RSZ171106507-S01	94.1	66	0.4588	0.4087	0.2627	0.5265	-0.00061



3.3. Luminous Intensity Distribution and Color Spatial Uniformity

Test Method and ENERGY STAR Requirements:

IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products

IES LM-58-13: Method for Spectroradiometric Measurement Methods for Light Sources

CIE Pub. No. 15:2004: Colorimetry

ENERGY STAR Requirements:

Luminaire Zonal Lumen Density: For LED Recessed Downlight: Luminaire shall deliver a minimum of 75% of total initial lumens within the 0-60 °zone (axially symmetric about the nadir)

Test Procedure:

Luminous Intensity & Color Distribution was measured by goniophotometer system at 25 ℃±1 ℃. One sample was measured and operated at downward orientation. Sample was operated at rated voltage and was tested after stabilized. System was calibrated by standard light source before measurement.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	0-150V， 0-300V	2017-03-03	2018-03-03
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-03
Digital power meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2017-03-03	2018-03-03
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2017-03-09	2018-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0 ℃~50 ℃;-20 ℃~60 ℃	2017-03-20	2018-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-12-17	2017-12-17

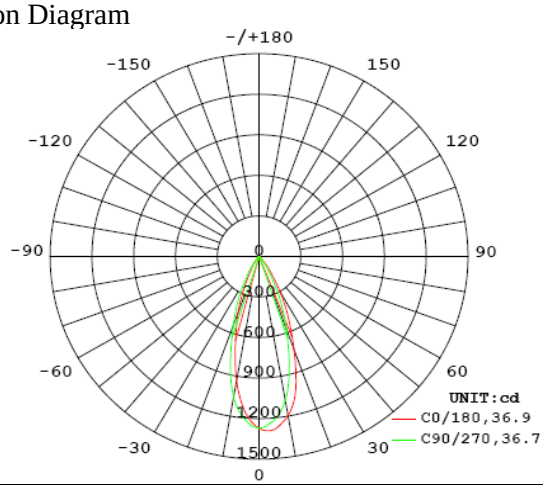
Uncertainty:

The uncertainty of the luminous intensity is U=2.82% (K=2) , at the 95% confidence level.

Test Data:

Sample Number: RSZ171106507-S01

Luminous Intensity Distribution Diagram



Orientation	Beam Angle(°)	I_{max} (cd)
Downward	36.8	1291.0

Zonal Lumen Density

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	29.7	4.86	0-95	611.0	99.88
0-10	111.5	18.22	0-100	611.0	99.88
0-15	223.7	36.57	0-105	611.0	99.88
0-20	337.5	55.18	0-110	611.0	99.88
0-25	434.3	71.01	0-115	611.0	99.88
0-30	503.7	82.35	0-120	611.0	99.88
0-35	546.2	89.29	0-125	611.0	99.88
0-40	569.3	93.07	0-130	611.0	99.89
0-45	579.7	94.76	0-135	611.0	99.89
0-50	586.5	95.89	0-140	611.1	99.90
0-55	592.7	96.90	0-145	611.1	99.91
0-60	598.1	97.78	0-150	611.2	99.93
0-65	602.5	98.50	0-155	611.4	99.95
0-70	605.9	99.06	0-160	611.5	99.97
0-75	608.4	99.46	0-165	611.6	99.98
0-80	610.0	99.72	0-170	611.6	99.99
0-85	610.7	99.85	0-175	611.7	100.00
0-90	611.0	99.88	0-180	611.7	100.00

Color Spatial Uniformity

Average Weighted
u': 0.2632, v': 0.5258

γ \ C0-180	u'	v'	Du'v'
-20	0.2631	0.5271	0.0009
-19	0.2630	0.5271	0.0010
-18	0.2630	0.5270	0.0009
-17	0.2631	0.5269	0.0008
-16	0.2630	0.5268	0.0008
-15	0.2632	0.5268	0.0006
-14	0.2632	0.5268	0.0006
-13	0.2634	0.5268	0.0005
-12	0.2634	0.5267	0.0004
-11	0.2635	0.5267	0.0004
-10	0.2635	0.5266	0.0003
-9	0.2634	0.5265	0.0003
-8	0.2633	0.5264	0.0003
-7	0.2635	0.5264	0.0001
-6	0.2635	0.5263	0.0001
-5	0.2634	0.5262	0.0002
-4	0.2634	0.5261	0.0003
-3	0.2634	0.5261	0.0003
-2	0.2635	0.5261	0.0002
-1	0.2635	0.5260	0.0003
0	0.2636	0.5261	0.0002
1	0.2635	0.5259	0.0004
2	0.2634	0.5259	0.0004
3	0.2633	0.5258	0.0006
4	0.2633	0.5258	0.0006
5	0.2634	0.5259	0.0004
6	0.2635	0.5259	0.0004
7	0.2635	0.5259	0.0004
8	0.2635	0.5259	0.0004
9	0.2636	0.5259	0.0004
10	0.2636	0.5260	0.0003
11	0.2636	0.5260	0.0003
12	0.2634	0.5260	0.0004
13	0.2634	0.5259	0.0004
14	0.2634	0.5260	0.0004
15	0.2634	0.5261	0.0003
16	0.2635	0.5261	0.0002
17	0.2636	0.5262	0.0001
18	0.2635	0.5262	0.0001
19	0.2636	0.5263	0.0000
20	0.2634	0.5263	0.0002

γ \ C90-270	u'	v'	Du'v'
-20	0.2646	0.5275	0.0016
-19	0.2646	0.5273	0.0014
-18	0.2644	0.5273	0.0013
-17	0.2644	0.5272	0.0012
-16	0.2645	0.5272	0.0013
-15	0.2645	0.5271	0.0012
-14	0.2645	0.5271	0.0012
-13	0.2647	0.5270	0.0013
-12	0.2647	0.5270	0.0013
-11	0.2647	0.5269	0.0013
-10	0.2646	0.5268	0.0011
-9	0.2645	0.5267	0.0010
-8	0.2644	0.5266	0.0009
-7	0.2642	0.5264	0.0006
-6	0.2640	0.5262	0.0004
-5	0.2638	0.5261	0.0003
-4	0.2637	0.5260	0.0003
-3	0.2637	0.5259	0.0004
-2	0.2637	0.5259	0.0004
-1	0.2637	0.5259	0.0004
0	0.2636	0.5261	0.0002
1	0.2636	0.5258	0.0005
2	0.2636	0.5258	0.0005
3	0.2634	0.5256	0.0007
4	0.2633	0.5256	0.0008
5	0.2633	0.5255	0.0009
6	0.2632	0.5255	0.0009
7	0.2631	0.5255	0.0009
8	0.2631	0.5256	0.0009
9	0.2630	0.5256	0.0009
10	0.2629	0.5255	0.0011
11	0.2629	0.5255	0.0011
12	0.2628	0.5255	0.0011
13	0.2628	0.5255	0.0011
14	0.2629	0.5256	0.0010
15	0.2630	0.5257	0.0008
16	0.2628	0.5257	0.0010
17	0.2629	0.5258	0.0009
18	0.2628	0.5258	0.0009
19	0.2628	0.5259	0.0009
20	0.2627	0.5258	0.0010

3.4. Start Time

Test Method and ENERGY STAR Requirements:

Test Method

ENERGY STAR Test Method: Start Time Test

ENERGY STAR Requirement:

Light source shall remain continuously illuminated within 750 ms (1 second for connected product) of application of electrical power.

Test Procedure:

Integrating sphere, oscilloscope, photocell were used during start time test.

Luminaires were stored at 25℃ ± 5℃ for a minimum of 16 hours prior to the test, after which the temperature range was 25℃ ± 1℃ for at least two hours immediately prior to the test. Luminaires were tested at rated voltage/frequency in an ambient temperature of 25˚C ± 1˚C. The start time is defined as, the time between the application of power to the DUT and the point where the light source is continuously illuminated, and the light output is either constant or increasing.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2017-11-18	2018-11-18
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2017-07-29	2018-07-29
Digital Oscilloscope	Tektronix	TDS 220	C033131	N/A	2017-08-31	2018-08-31
Photometric detector	EVERFINE	V-10111	A8331337	N/A	2017-03-03	2018-03-03
thermometer	Anymetre	JR900A	N/A	N/A	2017-03-20	2018-03-20
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	0-150V，0-300V	2017-03-03	2018-03-03

Uncertainty:

The uncertainty of Start time U=0.6% (K=2), at the 95% confidence level.

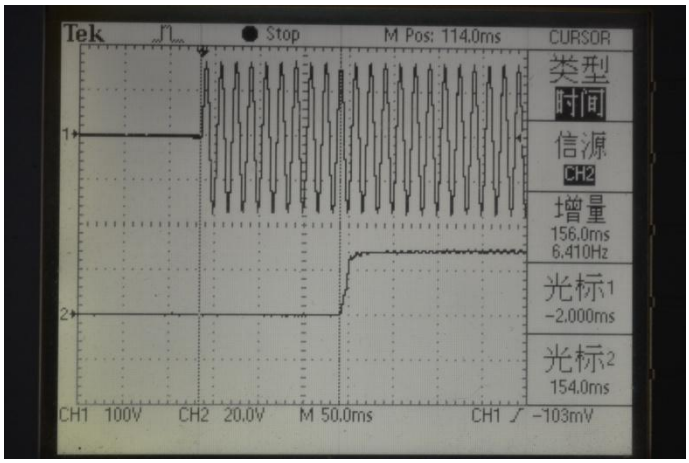
Test Data:

Test date: 2017-11-08; Test voltage AC 120 V 60 Hz.

Sample No.	Time base (ms/div)	Start Time(ms)
RSZ171106507-S01	50.0	156.0

Figure of Input voltage and light output waveforms

RSZ171106507-S01



3.5. Transient Protection

Test Method and ENERGY STAR Requirements:

ANSI/IEEE C62.41.1-2002: IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits

ANSI/IEEE C62.41.2-2002: IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits

ENERGY STAR Requirement:

Ballast or driver shall comply with ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, Category A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.

Test Procedure:

Seven strikes were performed on lamp base in accordance with ANSI/IEEE C62.41 (Category A). The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode. Samples should be fully operational after seven strikes.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
AC Power source	HengPu	HPA 1103	0003394	3KVA	2017-03-03	2018-03-03
MODULAR IMPULSE GENERATOR	EMC-PARTNER	MIG0603IN1 IEC-ANSI	593	N/A	2017-03-03	2018-03-03

Uncertainty:

The uncertainty of voltage U=1.07% (K=2), at the 95% confidence level.

The uncertainty of time U=0.6% (K=2), at the 95% confidence level.

Test Data:

Sample No.	Transient Protection Test
RSZ171106507-S01	PASS

3.6. Operating Frequency

These test method was not accredited by the IAS

Test Method and ENERGY STAR Requirements:

ENERGY STAR Requirements:

⩾ 120 Hz

Test Procedure:

The sample was operated at rated voltage in its designated orientation during the test. Lamp was measured by a photodetector, integrating sphere and rapid recording photometer. For dimmable lamps, test was performed with dimmer at three levels: full light output level, medium light output level and minimum light output level. The final result would be the minimum of the three test results.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Rapid Recording Photometer	EVERFINE	PHOTO-2000F	1007010	0.1lm—200klm	2017-11-18	2018-11-18
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2017-11-18	2018-11-18
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2017-07-29	2018-07-29
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	0-150V， 0-300V	2017-03-03	2018-03-03
thermometer	Anymetre	JR900A	N/A	N/A	2017-03-20	2018-03-20

Uncertainty:

The uncertainty of Operating Frequency U=0.6% (K=2), at the 95% confidence level.

Test Data:

Sample No.	Operating Frequency (Hz)
RSZ171106507-S01	120.05

3.7. Dimming and noise Test

This test method was not accredited by the IAS

Test Method and ENERGY STAR Requirements:

IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products

ENERGY STAR Requirements:

The luminaire and its components shall provide continuous dimming from 100% to 20% of light output. Luminaire shall not emit noise above 24dBA at 1 meter or less at the minimum output.

Test Procedure:

The photometric measurement test was performed with dimmer specified by manufacturer and detailed as below. For continuous dimmer, the dimmer was set maximum level and minimum level output for photometric measurement.
Sample was transferred to sound insulation chamber to measure the noise level at the lowest dimmable level.

Test Equipment:

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
spectroradiometer	EVERFINE	HAAS-2000	20140912	380-780nm	2017-11-18	2018-11-18
Rapid Recording Photometer	EVERFINE	PHOTO-2000F	1007010	0.1lm—200klm	2017-11-18	2018-11-18
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2017-11-18	2018-11-18
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2017-07-29	2018-07-29
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	0-150V， 0-300V	2017-03-03	2018-03-03
thermometer	Anymetre	JR900A	N/A	N/A	2017-03-20	2018-03-20
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-12-05	2017-12-05
Precision frequency power supply	ALL Power	APW-105N	970613	220V ±10% 50Hz	2017-03-03	2018-03-03
Sound Insulation Box	N/A	N/A	01#	N/A	2017-11-25	2018-11-25
Sound Level Meter	Hangzhou Aihua	AWA5661	88071	12~112dB	2017-09-27	2018-09-27

Uncertainty:

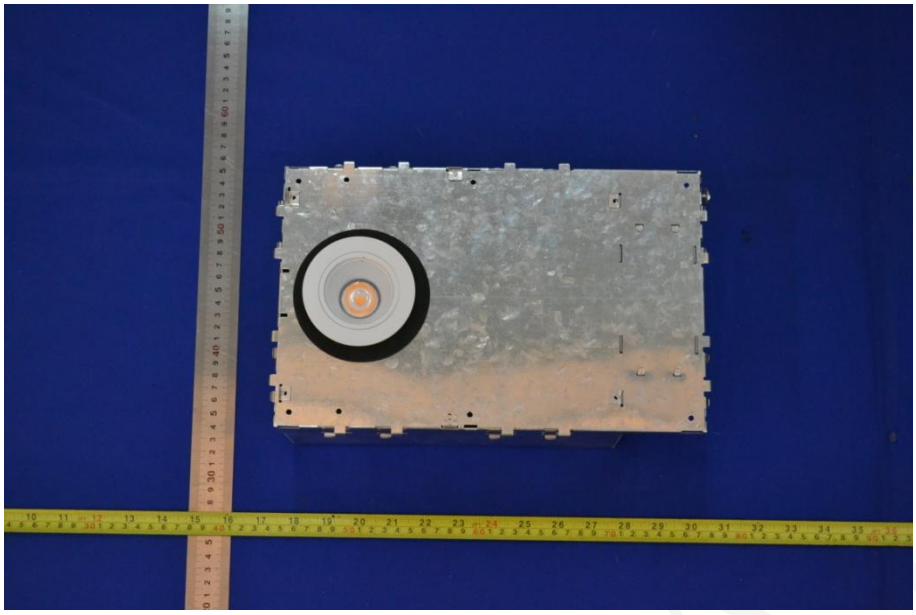
The uncertainty of the light output (luminous flux) measurements is U=2.1% (K=2), at the 95% confidence level.
The uncertainty of noise U=0.5 dB (K=2), at the 95% confidence level.

Test Data:

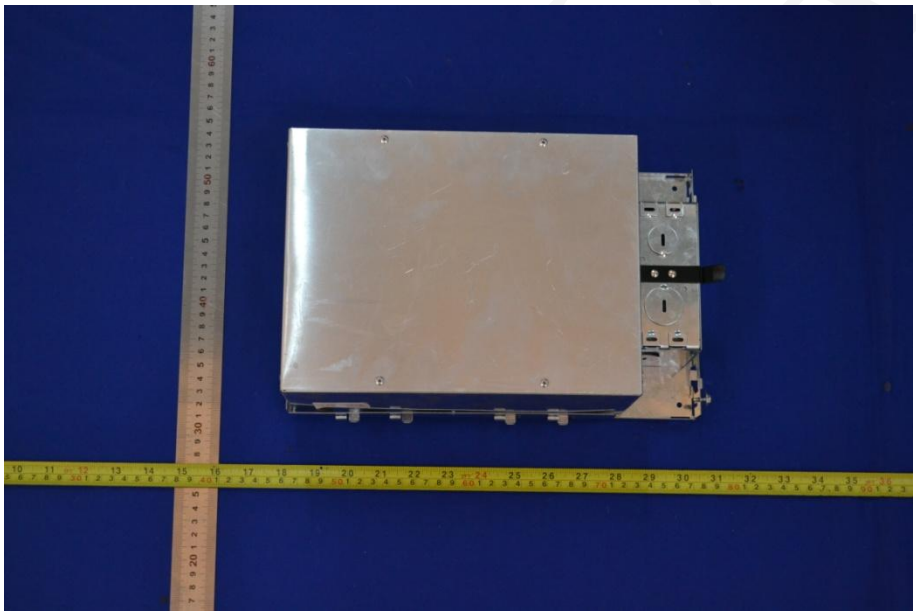
Sample No.		Maximum Level	Minimun Level
RSZ171106507-S01	Light output (Lumen)	603.05	41.405
	Percentage	100%	6.9%
	Noise(dBA)	/	22.2

4. EUT Photo

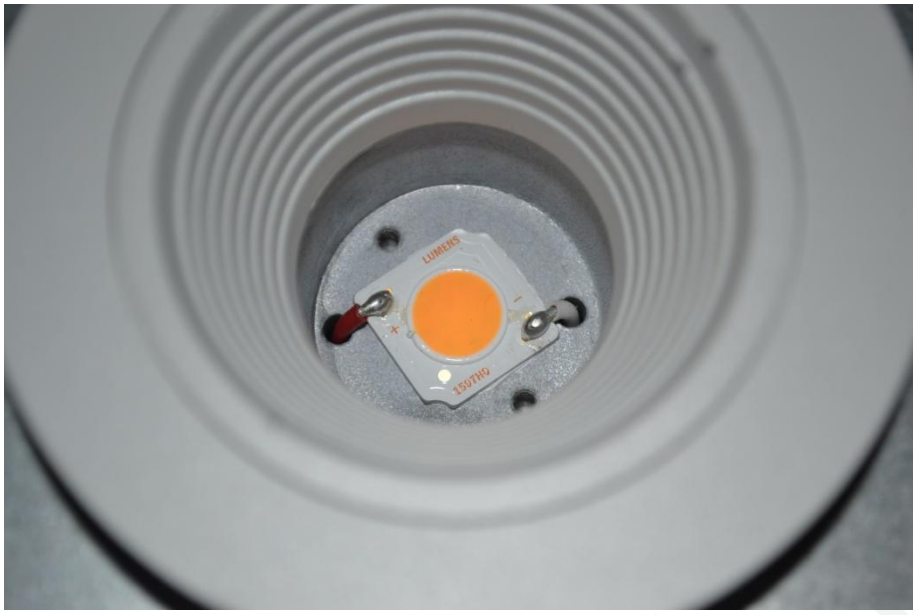
4.1. EUT Photo



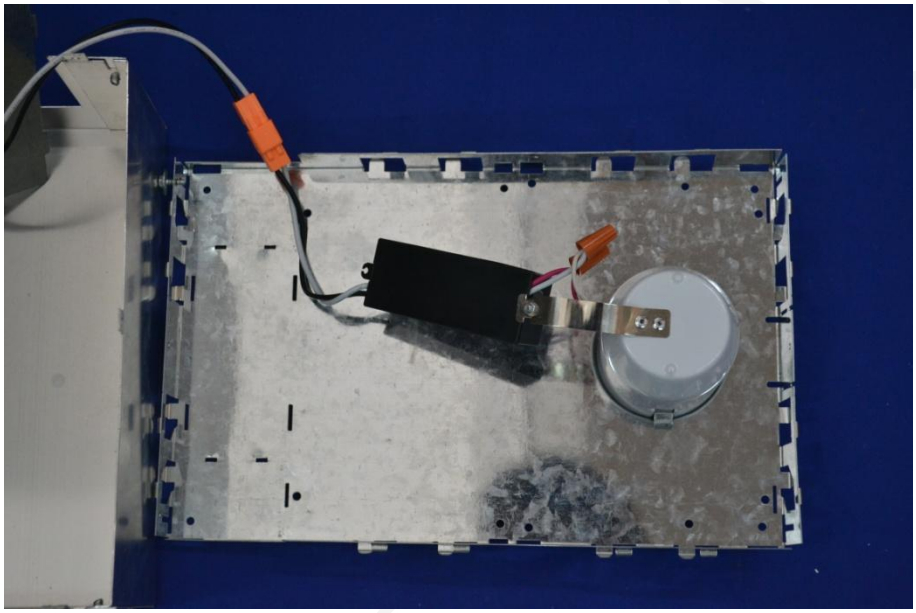
4.2. EUT Photo



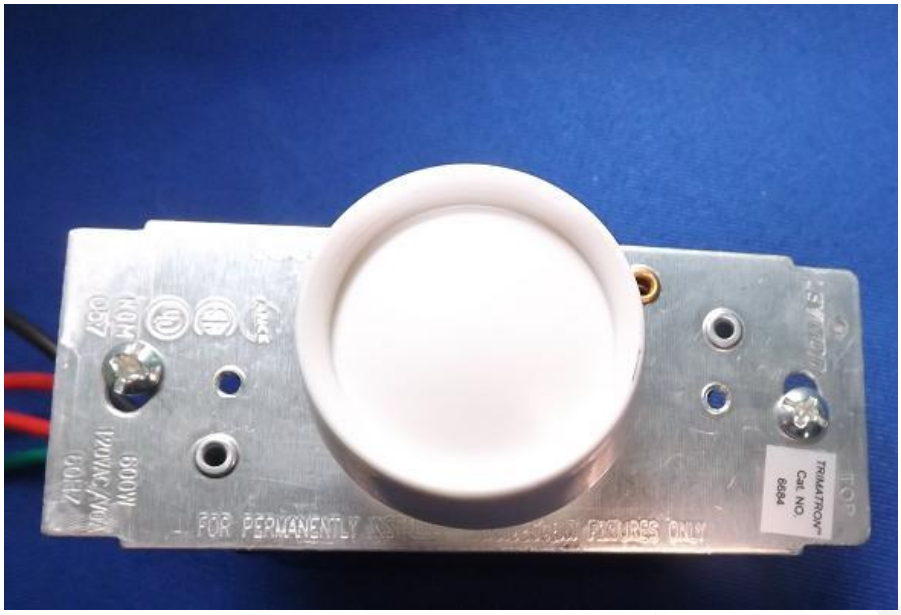
4.3. LED Source Photo



4.4. LED Driver Photo



4.5. Dimmer Photo



Attachment A –LM-80-08 test report and TM-21 Calculator

**********END OF REPORT**********