



**IESNA
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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Rendered to:

ETI Solid State Lighting (Zhuhai) Ltd
No.1, Zhongzhu Road South, Science & Technology Innovation
Coast, High Tech District, Zhuhai City, Guangdong Prov., China

For products:

Direct Linear Ambient Luminaires

Models No.:

556101###(##=61-70,#=0-9), 545831##-1(##=61-70),
ST-4-49-850-MV-LVD-EM

(Where ## denotes CCT and could be 61-70 which refers 5000K, the 0-9 denotes
different manufacture factory .)

Test Date: May, 25, 2021 to May, 26, 2021

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Template No.: LC-RT-PL-046 Rev.1.3

Test Note:

Complied by:

Fish Tan
Jun. 4, 2021

Fish Tan

Reviewed by:

Lin Qiu
Jun. 4, 2021

Lin Qiu

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1. General

1.1 Product Information

Brand Name	ETI, LEDS
Factory 1	Name: ETI Solid State Lighting (Zhuhai) Ltd Address: No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai City, Guangdong Prov., China
Factory 2	Name: NVC VIETNAM TECHNOLOGY AND LIGHTING COMPANY LIMITED Address: Lot CN23-1, Yen Phong Industrial park, Dong Phong commune, Yen Phong district, Bac Ninh province VIETNAM
Category	Indoor
General Application	Linear Ambient
Primary Use	Direct Linear Ambient Luminaires
Model Number	556101###(##=61-70, #=0-9), 545831##-1(##=61-70), ST-4-49-850-MV-LVD-EM
Rated Inputs	AC120-277V, 50/60Hz
Rated Power	33W
Rated Light output	4900lm
Declared CCT	5000K
Power Supply	ETI-AD03300495060SDA
LED Package, Array or Module	SPMWH1228MD5WAR*RK, Samsung Electronics Co., LTD.
Dimming	Continuous Dimming
Integral Controls	No
Controls Controllability	No
Receipt Samples	1 unit
Sample Code of lab.	210517105014
Date of Receipt Samples	May. 17, 2021
Note	556101###(##=61-70, #=0-9) and 545831##-1(##=61-70) are the same except emergency power. 556101610 was selected for the test.

1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377- 2017	Specifications for the Chromaticity of Solid State Lighting Products
ANSI/IES TM-30-18*	IES Method for Evaluating Light Source Color Rendition
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

Note:

*For reference only and not in the scope of NVLAP.

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2020-12-23	2021-12-22
AC Power supply	LC-I-989	APW-120N	2020-12-23	2021-12-22
Power analyzer	LC-I-928	WT210	2020-12-25	2021-12-24
Power analyzer	LC-I-954	WT210	2020-12-25	2021-12-24
Multimeter	LC-I-972	FLUKE	2020-07-20	2021-07-19
Photometric colorimetric electric system** (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp***	LC-PL-I-011	D204C	2020-07-14	2021-07-13
Luminous Flux Standard Lamp****	LC-PL-I-003	24V/100W	2020-07-14	2021-07-13
Goniophotometer(with mirror)	LC-I-902	GMS-2000	2021-04-22	2022-04-21
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2020-12-24	2021-12-23
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2020-12-24	2021-12-23

Note:

* Bandwidth of spectroradiometer is 1 nm.

** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

*** halogen lamp, 100W, omni-directional type, and its traceability to NIM.

2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

2.1 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.

2.2 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.

2.3 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).

2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval, $k=2$).

2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	119.99 V~60Hz	120.08 V~60Hz
Input Current(A)	0.286	0.288
Total Power(W)	33.46	33.66
Power Factor	0.976	0.975
I-THD	17.7 %	-
Off-state Power(W)	-	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	4918.32
Luminaire Length(ft)	-	4
Lumens per Foot(lm/ft)	-	1229.58
Luminaire Efficacy(lm/W)	-	146.12
Correlated Color Temperature (CCT)(K)	5294	-
Color Rendering Index (CRI)	86.2	-
R ₉	22	-
R _f	86	-
R _g	96	-
R _{cs,h1}	-11%	-
Chromaticity Coordinate (x,y)	x = 0.3375 y = 0.3481	-
Chromaticity Coordinate (u',v')	u' = 0.2076 v' = 0.4818	-
Duv	0.0014	-
Zone Lumens between 0-60 °	-	59.26 %

3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
85	91	94	86	86	87	89	72
R9	R10	R11	R12	R13	R14	R15	-
22	78	86	65	87	97	81	-

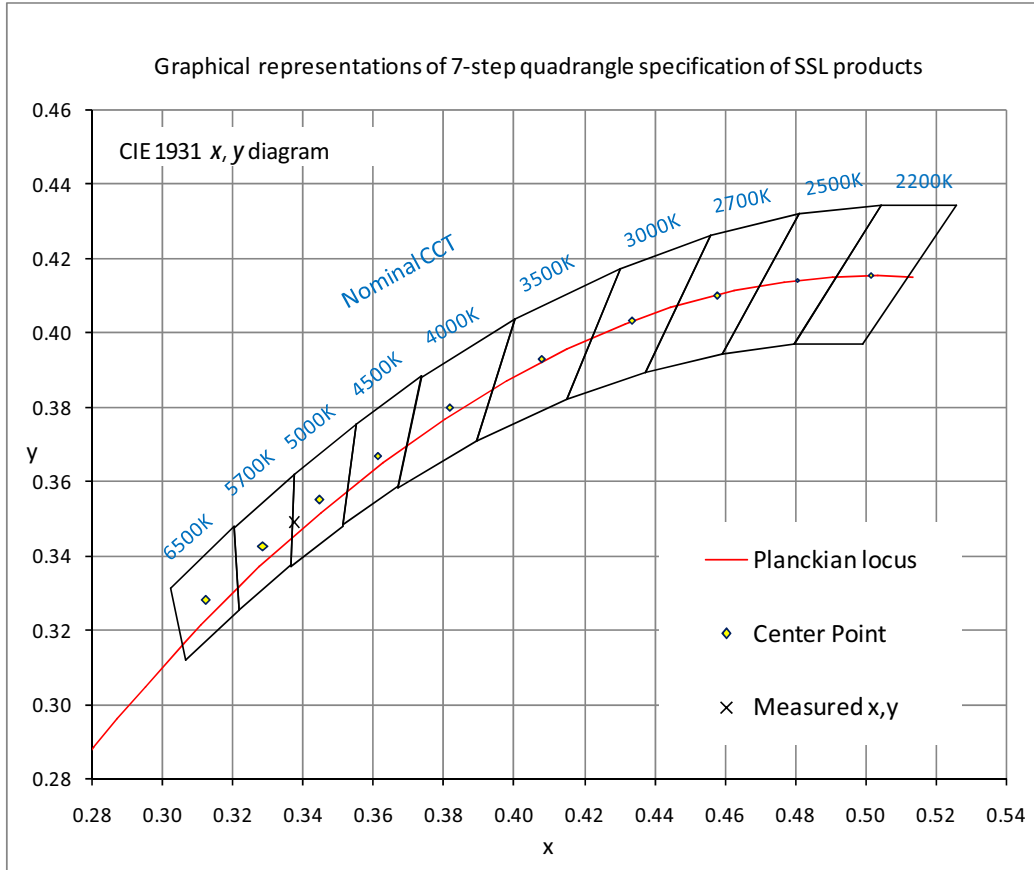
3.4 Electrical data on 277V

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.04 V~60Hz	-
Power Factor	0.880	-
I-THD	19.8 %	-

Note: N/A

4. Test Data

4.1 ANSI Chromaticity Quadrangles Diagram

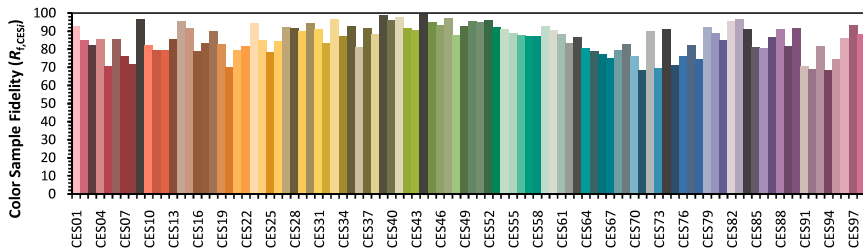
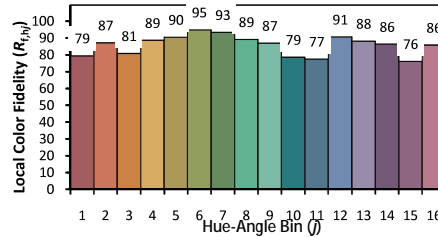
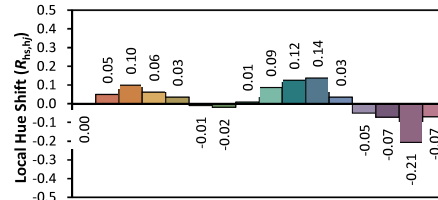
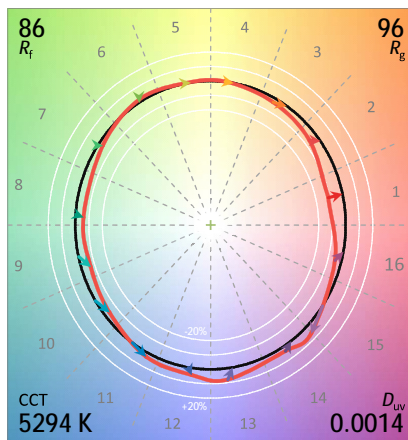
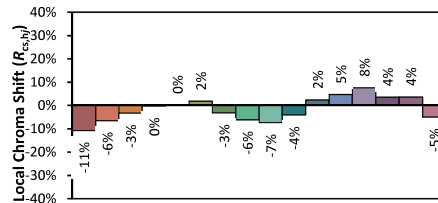
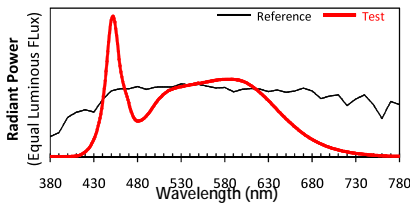


4.2 ANSI/IES TM-30-18 Color Rendition

ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD
Date: 20120/06/04

Manufacturer: ETI Solid State Lighting
Model: 556101###(##=61-70, #=0-9)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3375
y 0.3481
u' 0.2076
v' 0.4818

Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.

4.3 Goniometry Test Data

CIE Type	Semi-Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.24	Luminous Length	1.20 m
Spacing Criteria (90-270)	1.38	Luminous Width	0.04 m
Spacing Criteria (Diagonal)	1.46	Luminous Height	0.02 m
Test Distance	29.83 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	442.71	9.00	9.00
0-30	951.32	19.30	19.30
0-40	1580.62	32.10	32.10
0-60	2914.46	59.30	59.30
0-80	3889.91	79.10	79.10
0-90	4162.25	84.60	84.60
10-90	4048.77	82.30	82.30
20-40	1137.91	23.10	23.10
20-50	1817.18	36.90	36.90
40-70	1894.04	38.50	38.50
60-80	975.45	19.80	19.80
70-80	415.25	8.40	8.40
80-90	272.35	5.50	5.50
90-110	368.18	7.50	7.50
90-120	507.03	10.30	10.30
90-130	612.41	12.50	12.50
90-150	726.46	14.80	14.80
90-180	756.06	15.40	15.40
110-180	387.88	7.90	7.90
0-180	4918.32	100.00	100.00

Total Luminaire Efficiency = 100.00%

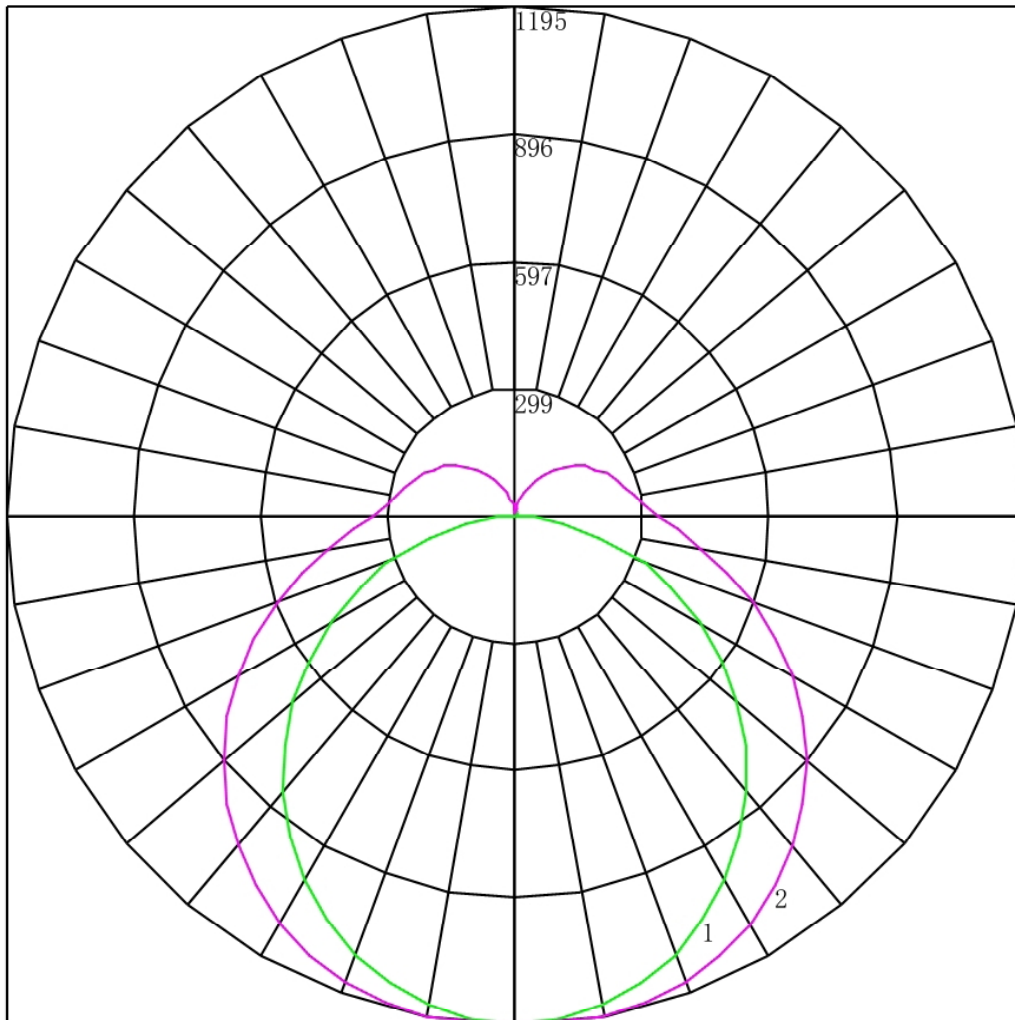
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	113.48
10-20	329.23
20-30	508.61
30-40	629.30
40-50	679.27
50-60	654.57
60-70	560.20
70-80	415.25
80-90	272.35
90-100	199.14
100-110	169.04
110-120	138.85
120-130	105.38
130-140	71.51
140-150	42.53
150-160	21.00
160-170	7.43
170-180	1.17



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4.5 Polar Curves



Maximum Candela = 1194.891 Located At Horizontal Angle = 75, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)



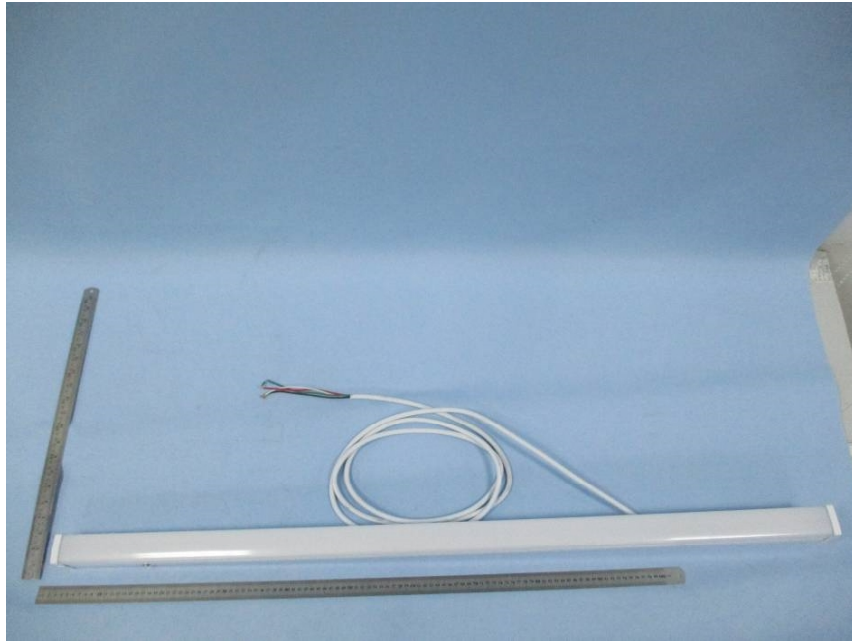
LCTECH



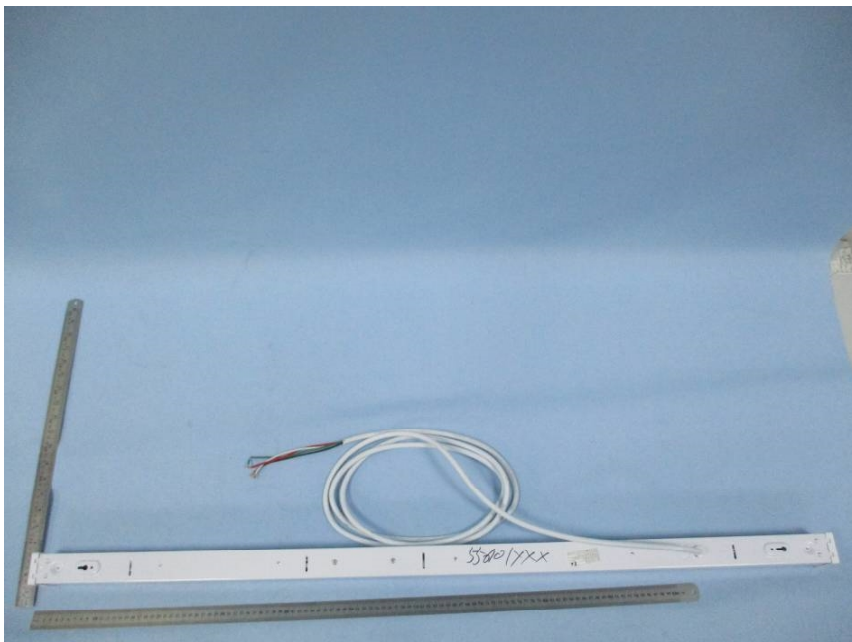
4.6 Candela Tabulation

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	1193.802	1193.802	1193.802	1193.802	1193.802	1193.802	1193.802
5	1188.168	1188.099	1190.435	1192.141	1193.848	1194.891	1194.331
10	1169.300	1171.350	1177.569	1185.869	1190.250	1193.492	1193.052
15	1138.672	1144.335	1155.647	1168.533	1178.472	1184.697	1184.494
20	1098.298	1106.832	1124.114	1143.672	1158.088	1166.242	1167.466
25	1047.013	1059.780	1087.927	1110.087	1127.880	1139.969	1140.866
30	988.173	1004.765	1033.294	1067.453	1089.468	1104.457	1105.839
35	920.345	940.651	976.305	1016.859	1042.630	1060.440	1062.520
40	846.392	881.578	912.327	958.409	988.637	1010.249	1012.142
45	766.984	796.762	842.798	894.076	928.483	954.616	956.736
50	681.853	716.993	767.524	824.283	862.439	890.189	893.565
55	593.861	631.858	688.445	748.940	792.302	822.808	825.498
60	498.759	540.882	602.934	668.373	716.099	748.055	752.843
65	402.629	447.447	515.000	584.038	635.342	671.101	676.879
70	327.424	353.454	424.909	496.554	552.696	589.440	594.828
75	207.462	259.840	335.618	410.884	469.693	508.910	516.482
80	115.982	171.818	252.113	330.130	392.527	434.000	443.342
85	42.342	106.307	184.926	264.764	328.213	369.551	381.362
90	7.467	62.594	143.762	220.997	281.977	321.580	334.337
95	3.979	53.359	128.410	199.015	255.105	292.199	302.928
100	3.935	49.893	120.825	187.547	239.481	273.655	283.077
105	3.711	45.420	114.168	177.482	226.790	259.153	267.858
110	3.443	40.746	106.976	167.280	213.719	244.273	252.550
115	3.353	36.855	98.208	156.231	199.761	228.328	236.449
120	3.264	33.567	89.187	144.156	185.243	211.604	219.377
125	3.309	30.146	78.965	129.542	169.372	194.393	201.952
130	3.353	26.835	69.734	114.347	151.165	174.761	181.924
135	3.443	24.107	61.009	101.639	131.601	152.507	159.559
140	3.800	21.222	52.975	85.834	113.596	131.031	137.326
145	4.203	18.092	44.943	72.889	95.924	111.266	116.019
150	4.918	15.364	37.157	60.349	80.575	91.256	94.712
155	5.634	13.239	29.385	47.363	63.532	73.311	76.449
160	6.528	11.763	22.658	35.531	48.041	56.010	58.627
165	7.333	10.488	17.443	25.213	32.766	41.684	42.084
170	8.003	9.348	12.893	17.194	20.291	23.896	26.380
175	8.451	8.654	9.719	11.023	12.112	12.725	14.205
180	4.282	4.282	4.282	4.282	4.282	4.282	4.282

Appendix A Product Photo



Picture 1



Picture 2

****End of test report****