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Test report of

## **IES LM-79-08**

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

Rendered to:

LIGHT EFFICIENT DESIGN, DIV OF TADD LLC

188 S. Northwest Highway Cary, IL 60013

For products:

LED Lamp

Models No.:

LED-8088M57, LED-8088M57C, LED-8088E57, LED-8088E57C

**Test Date:** Apr. 25, 2016

**Test Item:** Total luminous flux, Luminous Efficacy, Electrical values, Luminous Intensity Distribution, Chromaticity coordinates, CCT and CRI, Spectral Power Distribution.

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**Template No.:** LC-RT-PL/LM79-08/01

**Test Note:** *LED-8088M57, LED-8088M57C, LED-8088E57 and LED-8088E57C are all the same except for model number and lamp base. Model LED-8088M57 is selected as the representative test sample.*

**Complied by:**

**Bowen Pang**  
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Apr. 27, 2016

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Apr. 27, 2016

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## 1. General

### 1.1 Product Information

Brand Name	Light Efficient Design
Product Type	LED Lamp
Model Number	LED-8088M57, LED-8088M57C, LED-8088E57, LED-8088E57C
Rated Inputs	120-347VAC,50/60Hz
Rated Power	50 W
Rated Light output	6000 lm
Declared CCT	5700K
Power Supply	N/A
LED Package, Array or Module	N/A
Receipt Samples	1 unit
Date of Receipt Samples	Apr. 21, 2016
Note	-

## 1.2 Standards or methods

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

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011	Specifications for the Chromaticity of Solid State Lighting Products
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

## 1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-923	CHP-500	2016-02-04	2017-02-03
AC Power supply	LC-I-987	APW-110N	2016-02-04	2017-02-03
Power analyzer	LC-I-928	WT210	2016-01-24	2017-01-24
Power analyzer	LC-I-954	WT210	2016-02-04	2017-02-03
Multimeter	LC-I-972	Fluke 17B	2015-08-17	2016-08-16
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-I-917	24V100W	2015-10-09	2016-10-08
Luminous Flux Standard Lamp	LC-I-946	110V/200W	2015-10-17	2016-10-16
Goniophotometer(with mirror)	LC-I-902	GMS2000	2015-05-07	2016-05-07
Wireless temperature transmitter	LC-I-978	DWRF-B	2016-02-03	2017-02-02
Wireless temperature transmitter	LC-I-979	DWRF-B	2016-02-03	2017-02-02

## 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  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; 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  $\pm 0.2$  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	277.01V~60Hz	277.06V~60Hz
Input Current(A)	0.197	0.196
Total Power(W)	51.03	50.94
Power Factor	0.937	0.938
I-THD	16.57%	-
Off-state Power(W)	-	-

#### 3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	-	5870.28
Luminaire Efficacy(Lm/W)	-	115.24
Correlated Color Temperature (CCT)(K)	5826	-
Color Rendering Index (CRI)	85.7	-
R9	20	-
Chromaticity Coordinate (x,y)	x=0.3253 y=0.3387	-
Chromaticity Coordinate (u,v)	u=0.2029 v=0.3168	-
Chromaticity Coordinate (u',v')	u'=0.2029 v'=0.4753	-
Duv	0.0021	-
Beam angle	-	114.6
Field angle	-	155.2

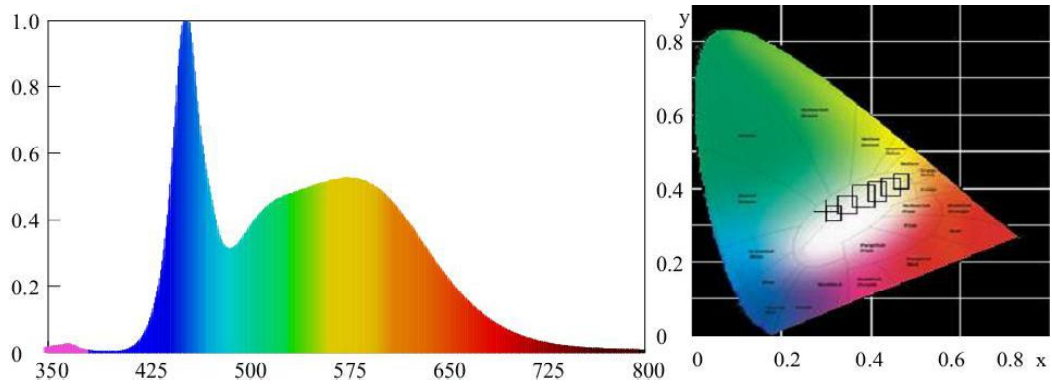
#### 3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
85	94	95	82	84	88	87	71
R9	R10	R11	R12	R13	R14	R15	-
20	83	81	62	89	98	81	-

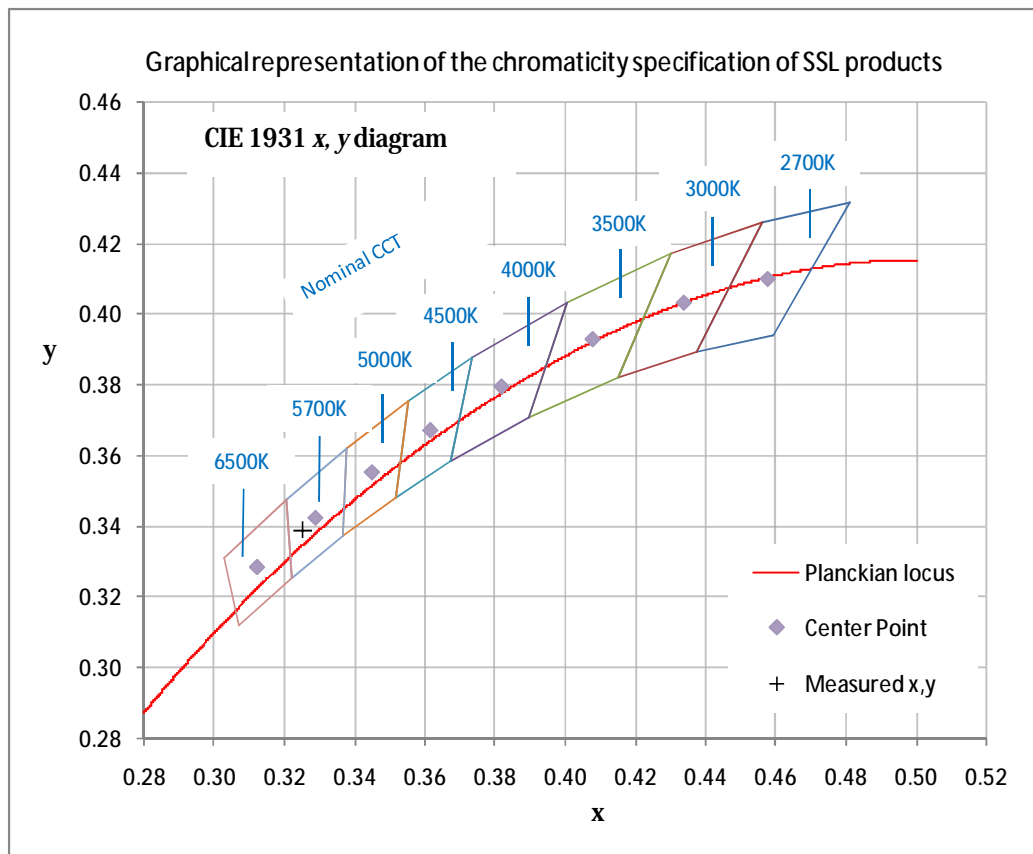
Note: N.A.

## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





**4.3 Goniometry Test Data**

CIE Type	Direct	Basic Luminous Shape	Rectangular w/Sides
Spacing Criteria (0-180)	1.28	Luminous Length	0.12m
Spacing Criteria (90-270)	1.32	Luminous Width	0.08m
Spacing Criteria (Diagonal)	1.40	Luminous Height	0.01m
Test Distance	29.89m		

**4.4 Zonal Lumen Summary**

Zone	Lumens	%Lamp	%Fixt
0-20	752.78	12.80	12.80
0-30	1611.11	27.40	27.40
0-40	2659.43	45.30	45.30
0-60	4736.56	80.70	80.70
0-80	5733.81	97.70	97.70
0-90	5806.84	98.90	98.90
10-90	5612.71	95.60	95.60
20-40	1906.65	32.50	32.50
20-50	3006.73	51.20	51.20
40-70	2764.2	47.10	47.10
60-80	997.25	17.00	17.00
70-80	310.18	5.30	5.30
80-90	73.03	1.20	1.20
90-110	44.61	0.80	0.80
90-120	52.64	0.90	0.90
90-130	56.16	1.00	1.00
90-150	59.37	1.00	1.00
90-180	63.96	1.10	1.10
110-180	19.35	0.30	0.30
0-180	5870.8	100.00	100.00

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

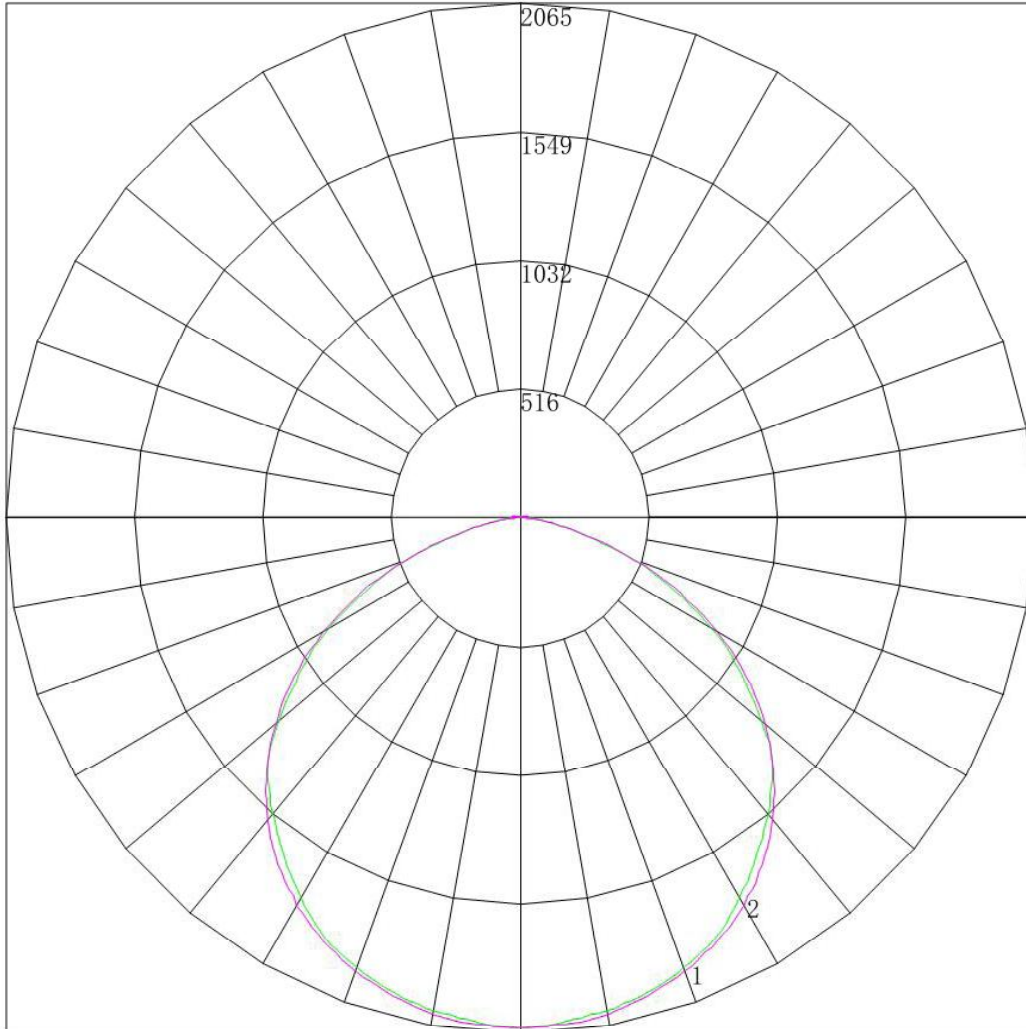
Zone	Lumens
0-10	194.13
10-20	558.65
20-30	858.33
30-40	1048.32
40-50	1100.08
50-60	977.06
60-70	687.07
70-80	310.18
80-90	73.03
90-100	24.68
100-110	19.93
110-120	8.03
120-130	3.52
130-140	1.58
140-150	1.63
150-160	1.97
160-170	1.87
170-180	0.75





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4.5 Polar Curves



Maximum Candela = 2064.704 Located At Horizontal Angle = 15, Vertical Angle = 9  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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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	2043.234	2043.234	2043.234	2043.234	2043.234	2043.234	2043.234
1	2040.551	2040.100	2044.155	2042.783	2043.456	2043.238	2044.124
2	2042.786	2038.534	2042.357	2042.784	2043.232	2043.459	2041.452
3	2036.080	2038.982	2039.443	2042.336	2042.787	2039.899	2042.788
4	2033.397	2033.836	2040.126	2038.091	2041.225	2040.342	2037.444
5	2029.821	2032.494	2036.532	2037.635	2039.665	2037.894	2037.444
6	2023.561	2027.347	2032.509	2032.048	2032.526	2034.557	2036.553
7	2019.537	2022.424	2029.588	2029.145	2032.079	2031.220	2033.881
8	2011.490	2018.620	2028.911	2023.779	2027.172	2027.436	2028.983
9	2010.595	2064.704	2059.294	2058.408	2055.720	2040.567	2027.201
10	2003.889	2009.894	2014.801	2014.830	2014.680	2014.532	2021.857
11	1999.865	2000.944	2008.536	2011.249	2007.543	2008.079	2012.950
12	1989.582	1996.470	2002.252	2000.514	2001.297	2002.515	2006.270
13	1987.793	1990.204	1997.552	1996.491	1993.714	1994.946	1995.582
14	1979.746	1985.731	1989.045	1987.762	1987.244	1989.610	1989.792
15	1970.804	1973.424	1978.069	1981.054	1975.421	1977.591	1984.003
16	1961.862	1968.278	1970.432	1968.087	1971.184	1970.028	1973.315
17	1951.579	1954.853	1958.790	1963.166	1959.585	1960.236	1962.181
18	1942.637	1946.799	1948.036	1950.863	1953.339	1950.218	1953.720
19	1930.565	1937.848	1938.174	1942.143	1941.516	1938.648	1945.258
20	1920.282	1925.769	1927.197	1928.500	1928.802	1927.078	1934.570
21	1909.104	1915.474	1914.425	1916.200	1917.649	1917.061	1923.882
22	1897.033	1904.062	1902.554	1905.917	1905.826	1901.932	1911.857
23	1883.620	1885.940	1892.248	1891.606	1892.889	1891.695	1895.380
24	1872.443	1871.621	1879.475	1877.739	1876.382	1875.677	1886.473
25	1855.453	1853.497	1862.901	1866.109	1862.330	1862.320	1873.558
26	1840.698	1837.609	1848.111	1849.321	1849.392	1849.194	1853.963
27	1821.920	1823.516	1828.867	1830.779	1833.331	1832.280	1844.165
28	1801.354	1806.510	1814.072	1817.120	1815.488	1813.361	1825.015
29	1780.340	1786.598	1794.123	1801.692	1802.995	1798.233	1810.319
30	1760.668	1770.488	1777.542	1783.802	1783.143	1784.216	1795.623
31	1738.313	1745.429	1754.238	1764.790	1764.854	1762.633	1768.902
32	1720.429	1726.411	1734.980	1744.886	1744.331	1745.941	1757.323
33	1699.416	1706.944	1711.231	1722.529	1727.157	1725.913	1738.174
34	1677.508	1681.886	1690.623	1701.505	1706.633	1707.886	1715.461
35	1651.577	1659.288	1667.538	1679.808	1683.660	1687.635	1698.538
36	1632.798	1639.821	1641.557	1656.325	1662.469	1666.499	1672.263
37	1612.679	1616.775	1621.385	1633.293	1639.716	1641.350	1653.558
38	1591.218	1595.967	1594.942	1607.574	1616.963	1621.326	1629.510
39	1567.969	1568.894	1571.211	1580.959	1592.650	1595.287	1604.571
40	1548.744	1548.757	1548.347	1554.569	1568.113	1574.595	1578.741
41	1529.072	1527.054	1524.142	1529.741	1544.023	1546.109	1549.794
42	1501.352	1502.219	1497.478	1499.323	1515.471	1518.295	1523.073
43	1479.444	1480.068	1472.836	1473.826	1487.812	1491.593	1499.024
44	1457.536	1454.337	1450.196	1442.518	1458.814	1463.334	1465.624
45	1433.840	1429.501	1421.977	1414.560	1430.709	1435.519	1438.458
46	1409.250	1406.903	1396.223	1383.021	1400.595	1405.699	1408.174
47	1379.294	1380.502	1369.999	1355.289	1371.152	1372.988	1380.118
48	1347.998	1343.584	1344.229	1326.213	1338.808	1344.283	1349.835
49	1302.841	1309.798	1316.002	1296.469	1302.449	1311.349	1316.434
50	1263.943	1267.735	1284.197	1266.046	1271.668	1279.527	1279.916
51	1226.387	1226.565	1253.283	1234.743	1234.193	1244.146	1248.742
52	1191.961	1190.767	1214.748	1204.767	1199.841	1211.211	1214.896
53	1149.039	1154.519	1174.424	1169.432	1163.260	1175.605	1180.604
54	1115.060	1119.169	1130.281	1138.568	1129.578	1139.335	1145.867
55	1085.552	1082.249	1091.982	1105.473	1094.110	1105.292	1109.349
56	1043.077	1045.780	1055.681	1066.115	1055.743	1067.458	1069.269
57	1010.886	1009.980	1015.567	1030.107	1018.493	1032.309	1034.977
58	977.354	973.733	973.004	983.820	980.349	992.911	992.669



59	936.668	937.935	935.582	941.331	943.321	951.083	954.815
60	891.064	896.542	895.255	899.278	903.839	913.253	912.953
61	845.461	850.452	858.506	859.026	865.250	872.748	872.872
62	807.457	808.387	816.387	814.741	826.883	830.918	829.674
63	766.324	768.782	774.273	774.932	786.510	791.081	789.593
64	727.427	731.642	728.334	736.014	750.151	750.585	748.176
65	682.717	689.354	687.108	695.530	704.647	705.634	704.978
66	642.031	646.619	650.811	655.277	666.728	667.580	670.687
67	595.533	597.395	604.435	610.995	622.784	619.290	624.371
68	557.083	553.990	563.663	566.712	577.949	577.675	576.719
69	524.892	520.427	515.060	526.008	536.236	533.398	535.748
70	477.500	483.958	474.950	483.293	490.955	490.228	484.088
71	427.872	433.393	440.891	446.165	450.357	447.956	438.663
72	383.162	386.854	401.933	402.783	412.438	409.015	395.910
73	343.818	345.685	358.471	362.073	372.958	380.520	381.659
74	316.098	320.402	329.351	343.736	338.613	322.882	329.109
75	272.282	274.981	275.338	290.519	288.640	289.058	281.011
76	237.856	238.958	239.487	249.605	256.295	252.573	250.283
77	216.842	213.451	211.929	212.922	223.285	224.970	228.016
78	189.122	188.839	184.817	181.375	196.071	190.703	188.380
79	165.426	162.886	160.640	155.883	166.849	166.226	164.777
80	137.259	137.826	139.809	132.847	140.975	140.633	135.830
81	118.928	118.137	117.624	114.730	117.999	120.830	114.899
82	96.573	98.447	100.817	98.850	99.039	100.135	95.303
83	78.242	77.863	83.350	87.222	83.425	84.339	79.271
84	70.194	69.137	69.678	75.147	71.826	70.541	65.020
85	57.228	58.845	63.403	62.622	63.126	59.636	55.223
86	53.205	50.119	53.101	55.465	53.980	49.622	46.316
87	46.945	45.197	47.047	46.070	43.496	39.830	37.409
88	41.133	39.827	40.328	38.692	34.351	28.706	24.494
89	35.321	34.009	34.058	31.312	26.991	20.920	16.032
90	28.614	27.968	25.543	23.038	18.960	14.465	9.352
91	19.672	19.466	19.943	19.236	15.168	11.795	8.907
92	18.331	18.347	19.495	20.129	18.068	14.689	10.688
93	15.648	16.557	18.822	20.129	21.191	20.472	19.150
94	16.543	17.005	20.389	22.363	23.644	25.143	26.275
95	16.543	18.571	21.733	25.495	28.106	29.371	30.729
96	17.437	19.466	23.300	27.061	29.890	32.488	32.955
97	18.331	19.242	23.527	27.063	29.890	32.267	33.401
98	19.225	19.466	22.185	27.286	29.444	31.599	31.619
99	17.884	17.676	21.739	26.614	29.445	31.375	32.510
100	17.437	17.900	22.408	24.602	29.221	30.042	30.729
101	18.331	19.018	19.272	23.709	28.328	28.707	28.057
102	17.884	16.781	16.806	23.711	26.098	26.925	27.611
103	15.201	14.991	15.685	23.039	24.537	24.477	27.166
104	14.307	15.215	15.012	22.145	23.422	22.474	25.830
105	15.201	15.662	14.564	20.801	22.753	21.140	22.712
106	14.754	14.767	14.787	17.444	21.192	20.028	20.931
107	14.307	14.543	15.235	14.313	20.076	18.917	19.595
108	14.307	14.991	14.114	13.197	17.399	17.360	16.923
109	14.754	14.767	12.995	12.302	14.275	15.579	15.142
110	14.754	14.320	12.098	10.735	11.599	13.351	14.251
111	13.413	12.530	10.979	9.840	9.592	11.124	14.251
112	12.072	11.635	10.531	8.946	8.031	9.345	12.024
113	11.625	11.187	10.306	8.723	6.692	7.789	9.352
114	10.730	10.740	9.635	8.051	5.130	6.677	6.680
115	10.730	10.069	9.410	7.604	4.238	6.009	5.344
116	10.283	9.621	8.962	7.157	3.346	4.896	4.899
117	9.836	9.397	8.739	6.485	3.123	4.005	4.453
118	9.389	8.950	8.291	5.815	3.123	3.338	4.008
119	8.942	8.726	8.066	4.920	3.123	2.893	3.563





120	8.495	8.279	7.169	4.473	3.123	2.670	3.117
121	8.495	8.055	6.721	4.026	2.900	2.670	2.672
122	8.048	7.607	6.273	3.355	2.677	2.670	2.672
123	7.601	7.160	5.600	2.907	2.900	2.670	2.672
124	7.154	6.712	4.929	2.684	3.123	2.670	2.672
125	6.706	6.265	4.481	2.684	2.900	2.670	2.672
126	6.259	5.594	4.033	2.460	2.454	2.670	2.672
127	5.812	4.923	3.585	2.684	2.454	2.448	2.672
128	4.918	4.475	2.689	2.684	2.677	2.225	2.672
129	4.471	3.804	2.689	2.012	2.677	2.225	2.227
130	4.024	3.356	2.240	1.789	2.454	2.225	2.227
131	3.577	3.132	2.240	1.789	2.677	2.225	2.227
132	3.130	2.685	2.240	1.789	2.231	2.225	2.227
133	2.683	2.461	2.240	1.789	1.784	2.225	2.227
134	2.683	2.237	1.792	1.789	1.784	1.780	2.227
135	2.235	2.237	1.792	1.789	1.784	1.780	2.227
136	2.235	2.237	1.792	1.789	1.784	1.780	2.227
137	1.788	1.790	1.792	1.789	1.784	1.780	1.781
138	1.788	1.790	1.792	1.789	1.338	2.003	1.781
139	1.788	1.790	1.792	1.789	1.561	1.557	1.781
140	2.235	2.237	2.240	2.236	1.784	1.780	1.781
141	2.235	2.237	2.240	2.236	2.231	1.780	1.781
142	2.683	2.237	2.240	2.236	2.231	2.225	1.781
143	2.683	2.237	2.240	2.236	2.231	2.225	2.227
144	2.683	2.685	2.240	2.236	2.231	2.225	2.227
145	2.683	2.685	2.689	2.236	2.231	2.225	2.227
146	2.683	3.132	3.137	2.907	2.677	2.670	2.672
147	3.130	3.132	3.137	3.131	2.677	2.670	2.672
148	3.130	3.132	3.137	3.131	3.123	3.115	2.672
149	3.577	3.580	3.137	3.131	3.123	3.115	3.117
150	3.577	3.580	3.585	3.131	3.123	3.115	3.117
151	3.577	3.580	3.585	3.578	3.346	3.115	3.117
152	3.577	3.580	3.585	3.578	3.569	3.560	3.563
153	3.577	4.251	4.033	3.802	3.792	4.005	3.563
154	4.471	4.475	4.256	4.026	4.015	4.005	4.008
155	4.471	4.475	4.481	4.473	4.015	4.005	4.008
156	4.471	4.475	4.481	4.473	4.461	4.451	4.453
157	4.918	4.922	4.706	4.473	4.461	4.451	4.453
158	5.365	5.370	5.377	5.368	5.130	4.673	5.344
159	5.365	5.370	5.377	5.368	5.353	5.341	5.344
160	5.812	5.370	5.377	5.368	5.353	5.341	5.344
161	5.812	6.265	6.050	5.591	5.800	5.341	5.344
162	6.259	6.265	6.273	6.262	6.246	6.231	6.235
163	6.259	6.265	6.273	6.262	6.246	6.231	6.235
164	6.706	6.489	6.273	6.262	6.246	6.231	6.235
165	7.154	7.160	7.169	6.933	6.692	6.898	6.680
166	7.154	7.160	7.169	7.157	7.138	7.121	7.125
167	7.154	7.160	7.169	7.157	7.138	7.121	7.125
168	7.154	7.160	7.169	7.157	7.138	7.121	7.125
169	7.601	7.607	7.617	7.604	7.584	7.566	7.571
170	7.601	7.607	7.617	7.604	7.584	7.566	7.571
171	8.048	7.607	7.617	7.604	7.584	7.566	7.571
172	8.048	7.607	7.841	7.604	7.584	7.566	7.571
173	7.601	7.607	7.841	7.827	7.807	7.788	7.571
174	8.495	7.831	7.841	7.604	7.807	7.566	7.571
175	7.601	8.502	8.514	8.275	8.253	7.566	7.571
176	8.495	8.278	8.289	8.274	8.253	8.011	8.016
177	8.048	8.279	8.291	8.275	8.253	8.234	8.016
178	8.495	8.502	8.289	8.051	8.030	8.011	8.016
179	8.048	8.055	8.066	8.051	8.253	8.011	8.016
180	8.103	8.103	8.103	8.103	8.103	8.103	8.103

### Appendix 1 Product Photo



Picture 1



Picture 2

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