



NVLAP LAB CODE 500080-0

IESNA
SUSTAINING
MEMBER

Ref. No.: LCZP15110010

Version: 1.0

Date of issue: Nov. 14, 2015

Total pages: 11



Test report of
IES LM-79-08

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

For products:
LED corn cob style lamp

Models No.:
CL-EZ2-16W-50K

Test Date: Nov. 7, 2015 to Nov. 10, 2015

Test Lab.: LCTECH (Zhongshan) Testing Service Co.,Ltd

2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan,
Zhongshan, Guangdong, China

Test Note:

Complied by:

Bowen Pang
Test Engineer
Nov. 13, 2015

Reviewed by:

Richard Li
Technical Manager
Nov. 14, 2015

The duplication of this report or parts of it and its use for advertising purposes is only allowed with permission of the testing laboratory. This report contains the result of the examination of the product sample submitted by the applicant. A general statement concerning the quality of the products from the series manufacture cannot be derived therefore. This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.



Table of Contents

| | |
|--|----|
| 1. General | 3 |
| 1.1 Product Information | 3 |
| 1.2 Standards or methods..... | 4 |
| 1.3 Equipment list..... | 4 |
| 2. Test conducted and method | 5 |
| 2.1 Ambient Condition | 5 |
| 2.2 Power Supply Characteristics..... | 5 |
| 2.3 Seasoning and Stabilization..... | 5 |
| 2.4 Electrical Instrumentation | 5 |
| 2.5 Color Measurement Method | 5 |
| 2.6 Total Luminous Flux Measurement Method | 5 |
| 2.7 Luminous Intensity Distribution Measurement Method | 5 |
| 2.8 Spatial Non-uniformity of Chromaticity..... | 5 |
| 3. Test Result Summary | 6 |
| 3.1 Electrical data..... | 6 |
| 3.2 Photometric data..... | 6 |
| 3.3 Color Rendering Details..... | 6 |
| 3.4 Additional test at 277V | 6 |
| 4. Test Data | 7 |
| 4.1 Spectral Distribution | 7 |
| 4.2 ANSI Chromaticity Quadrangles Diagram | 7 |
| 4.3 Goniometry Test Data..... | 8 |
| 4.4 Zonal Lumen Summary | 8 |
| 4.5 Polar Curves..... | 9 |
| 4.6 Candela Tabulation | 10 |
| Appendix 1 Product Photo | 11 |



LCTECH



1. General

1.1 Product Information

| | |
|------------------------------|-------------------------|
| Product Type | LED corn cob style lamp |
| Model Number | CL-EZ2-16W-50K |
| Rated Inputs | 100-300V, 50/60Hz |
| Rated Power | 16W |
| Rated Light output | 1800lm |
| Declared CCT | 5000K |
| Power Supply | Not provided |
| LED Package, Array or Module | Not provided |
| Receipt Samples | 1 unit |
| Date of Receipt Samples | Nov. 5, 2015 |
| 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 | 2015-02-05 | 2016-02-04 |
| AC Power supply | LC-I-987 | APW-110N | 2015-02-05 | 2016-02-04 |
| Power analyzer | LC-I-928 | WT210 | 2015-02-09 | 2016-02-08 |
| Power analyzer | LC-I-954 | WT210 | 2015-03-04 | 2016-03-03 |
| 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 | 2015-10-09 | 2016-10-08 |
| Goniophotometer(with mirror) | LC-I-902 | GMS2000 | 2012-05-10 | 2016-05-09 |
| Wireless temperature transmitter | LC-I-978 | DWRF-B | 2015-02-11 | 2016-02-10 |
| Wireless temperature transmitter | LC-I-979 | DWRF-B | 2015-02-11 | 2016-02-10 |

2. Test conducted and method

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 ± 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 sphere-spectroradiometer system and 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.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these 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 | 120.10V~60Hz | 120.04V~60Hz |
| Input Current(A) | 0.142 | 0.143 |
| Total Power(W) | 16.90 | 17.00 |
| Power Factor | 0.988 | 0.988 |
| THD | 13.8 % | - |
| Off-state Power(W) | - | - |

3.2 Photometric data

| Criteria Item | Result(Sphere) | Result(Goniophotometer) |
|---------------------------------------|----------------|-------------------------|
| Total Lumens(lm) | 1858.60 | 1876.24 |
| Luminaire Efficacy(lm/W) | 109.98 | 110.37 |
| Correlated Color Temperature (CCT)(K) | 4942 | - |
| Color Rendering Index (CRI) | 86.5 | - |
| R9 | 28 | - |
| Chromaticity Coordinate (x,y) | 0.3464, 0.3498 | - |
| Chromaticity Coordinate (u,v) | 0.2130, 0.3226 | - |
| Chromaticity Coordinate (u',v') | 0.2130, 0.4840 | - |
| Duv | -0.0015 | - |
| Spacing Criteria(0-180°) | - | 2.10 |
| Spacing Criteria(90-270°) | - | 2.12 |
| Zone Lumens between 0-60 ° | - | 30.77% |

3.3 Color Rendering Details

| | | | | | | | |
|----|-----|-----|-----|-----|-----|-----|----|
| R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 |
| 86 | 92 | 95 | 85 | 85 | 87 | 89 | 73 |
| R9 | R10 | R11 | R12 | R13 | R14 | R15 | - |
| 28 | 79 | 84 | 66 | 87 | 97 | 82 | - |

3.4 Additional test at 277V

| Criteria Item | Result (Sphere) | Result (Goniophotometer) |
|---------------------------|-----------------|--------------------------|
| Input Voltage & Frequency | 276.90V~60Hz | - |
| Input Current(A) | 0.065 | - |
| Total Power(W) | 16.78 | - |
| Power Factor | 0.930 | - |
| THD | 16.8 % | - |
| Off-state Power(W) | - | - |

Note: N.A.

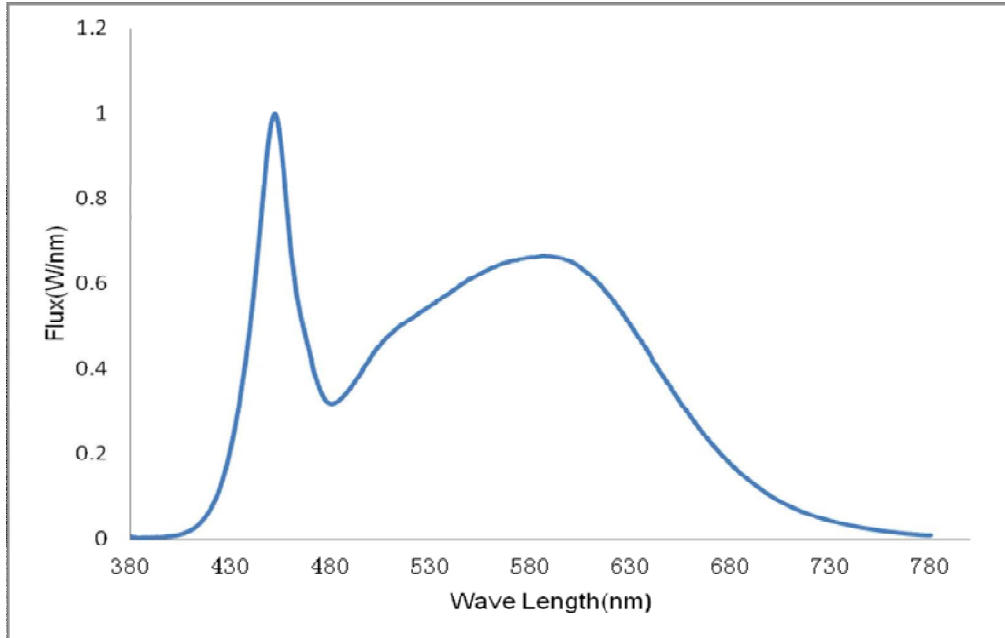


LCTECH

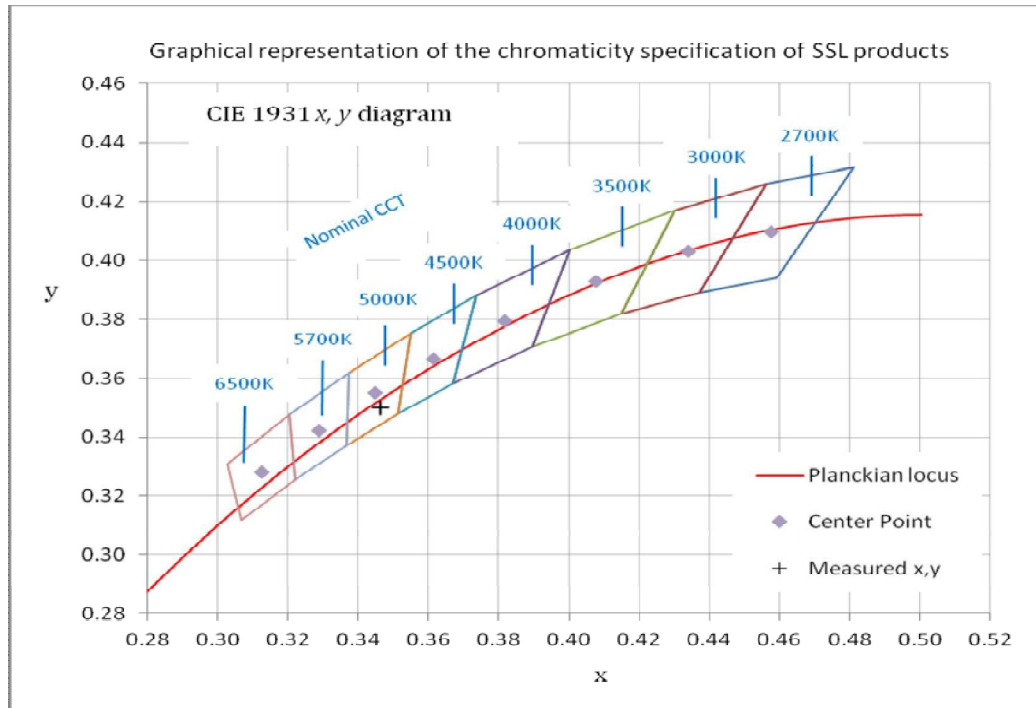


4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





LCTECH



4.3 Goniometry Test Data

| | | | |
|-----------------------------|-------------|----------------------|-------------------|
| CIE Type | Semi-Direct | Basic Luminous Shape | Circular w/ Sides |
| Spacing Criteria (0-180) | 2.12 | Luminous Length | 0.07 m (Diameter) |
| Spacing Criteria (90-270) | 2.08 | Luminous Width | 0.07 m (Diameter) |
| Spacing Criteria (Diagonal) | 2.16 | Luminous Height | 0.09 m |
| Test Distance | 29.86 m | | |

4.4 Zonal Lumen Summary

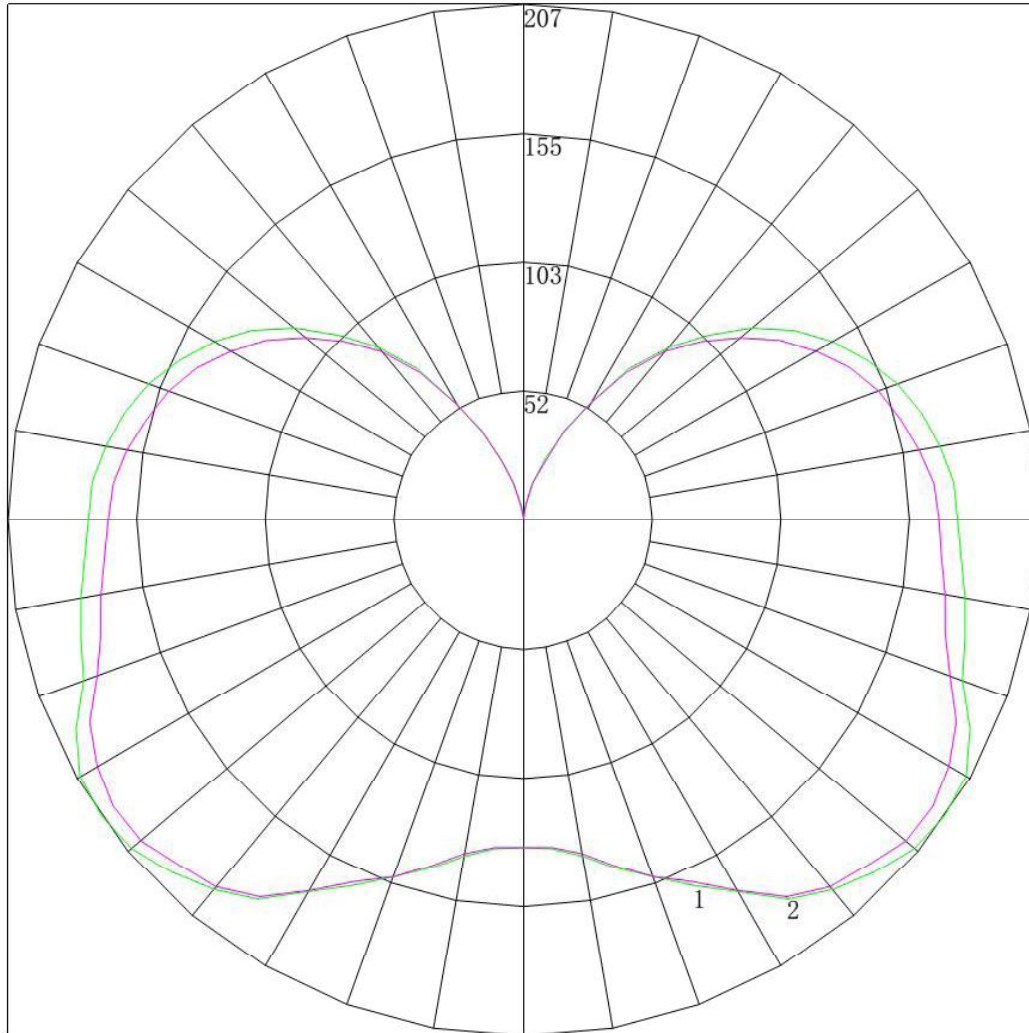
| Zone | Lumens | %Lamp | %Fixt |
|--------|---------|-------|-------|
| 0-30 | 129.8 | 6.9 | 6.9 |
| 0-40 | 245.87 | 13.1 | 13.1 |
| 0-60 | 577.44 | 30.8 | 30.8 |
| 0-90 | 1129.26 | 60.2 | 60.2 |
| 90-120 | 483.86 | 25.8 | 25.8 |
| 90-130 | 597.26 | 31.8 | 31.8 |
| 90-150 | 722.9 | 38.5 | 38.5 |
| 90-180 | 746.99 | 39.8 | 39.8 |
| 0-180 | 1876.25 | 100 | 100 |

| Zone | Lumens |
|---------|--------|
| 0-10 | 12.77 |
| 10-20 | 41.33 |
| 20-30 | 75.7 |
| 30-40 | 116.07 |
| 40-50 | 153.19 |
| 50-60 | 178.37 |
| 60-70 | 186.7 |
| 70-80 | 183.71 |
| 80-90 | 181.4 |
| 90-100 | 176.93 |
| 100-110 | 164.31 |
| 110-120 | 142.63 |
| 120-130 | 113.4 |
| 130-140 | 79.74 |
| 140-150 | 45.89 |
| 150-160 | 19.07 |
| 160-170 | 4.77 |
| 170-180 | .25 |



LCTECH

4.5 Polar Curves



Maximum Candela = 206.68 Located At Horizontal Angle = 0, Vertical Angle = 55

1 - Vertical Plane Through Horizontal Angles (0 - 180)

2 - Vertical Plane Through Horizontal Angles (90 - 270)



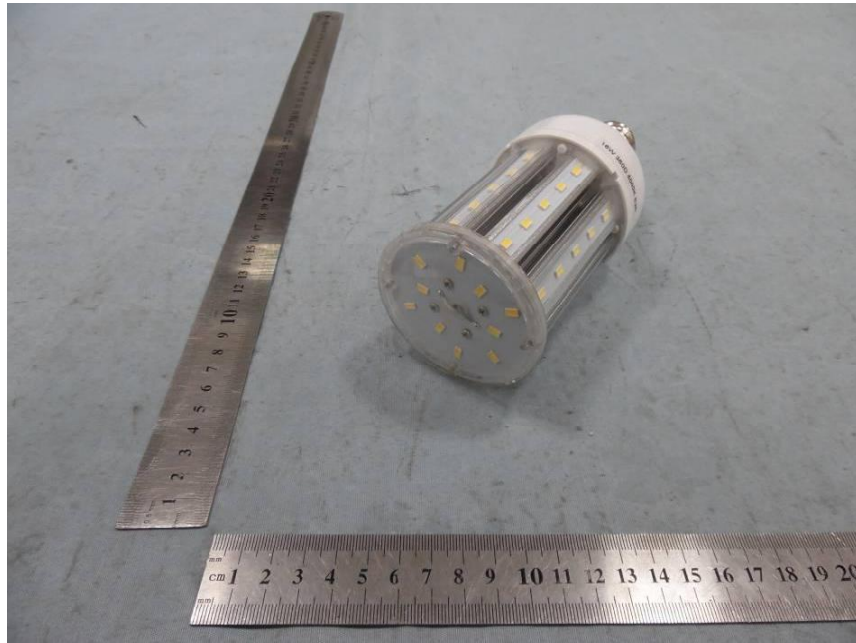
LCTECH



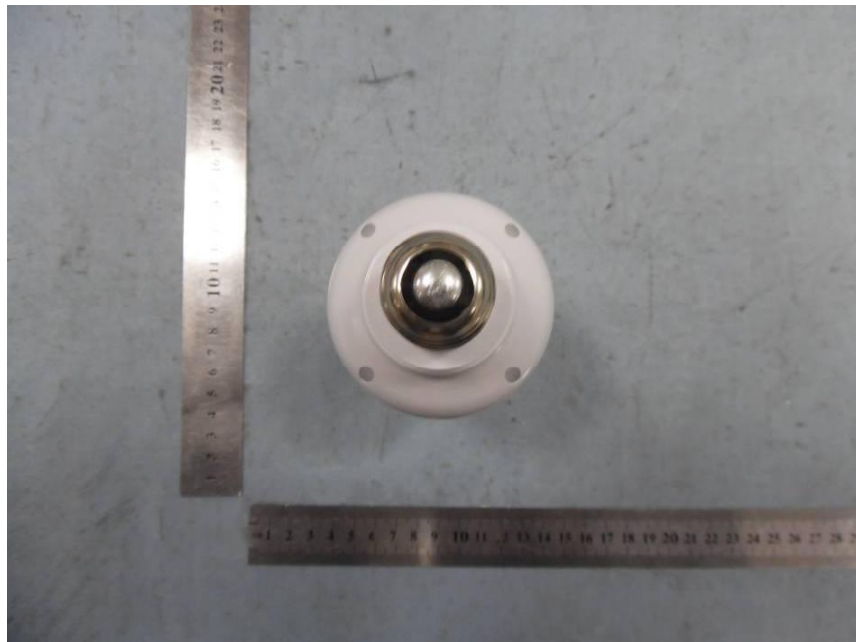
4.6 Candela Tabulation

| | <u>0</u> | <u>15</u> | <u>30</u> | <u>45</u> | <u>60</u> | <u>75</u> | <u>90</u> |
|------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0 | 131.21 | 131.21 | 131.21 | 131.21 | 131.21 | 131.21 | 131.21 |
| 5 | 132.25 | 132.99 | 133.22 | 132.57 | 131.73 | 132.57 | 131.84 |
| 10 | 136.88 | 136.63 | 136.82 | 137.05 | 135.93 | 135.66 | 135.73 |
| 15 | 144.63 | 144.85 | 146.15 | 145.53 | 144.86 | 144.85 | 143.41 |
| 20 | 152.46 | 154.31 | 155.94 | 153.44 | 153.71 | 153.54 | 152.13 |
| 25 | 161.74 | 162.35 | 164.83 | 162.10 | 163.03 | 162.49 | 160.08 |
| 30 | 171.96 | 173.03 | 175.45 | 171.96 | 174.22 | 173.11 | 171.51 |
| 35 | 185.74 | 184.35 | 188.43 | 184.92 | 185.60 | 184.45 | 184.25 |
| 40 | 193.71 | 192.88 | 197.50 | 190.58 | 194.86 | 193.18 | 191.80 |
| 45 | 199.47 | 197.72 | 201.70 | 194.22 | 200.49 | 198.93 | 195.73 |
| 50 | 204.78 | 198.80 | 203.10 | 197.21 | 200.88 | 200.21 | 200.07 |
| 55 | 206.68 | 197.27 | 201.27 | 197.06 | 199.15 | 198.18 | 200.61 |
| 60 | 205.41 | 194.10 | 198.52 | 193.83 | 194.97 | 193.96 | 197.18 |
| 65 | 197.90 | 185.36 | 190.04 | 187.87 | 187.38 | 185.84 | 191.71 |
| 70 | 187.49 | 174.70 | 181.06 | 178.69 | 178.71 | 179.01 | 182.18 |
| 75 | 183.53 | 168.65 | 173.71 | 172.20 | 172.29 | 169.52 | 175.40 |
| 80 | 179.97 | 165.74 | 170.68 | 169.53 | 169.91 | 167.93 | 171.96 |
| 85 | 176.46 | 160.84 | 166.93 | 165.28 | 165.23 | 163.18 | 168.53 |
| 90 | 174.48 | 158.94 | 165.25 | 163.22 | 163.37 | 161.42 | 166.63 |
| 95 | 173.49 | 157.63 | 163.90 | 162.02 | 162.22 | 160.25 | 165.32 |
| 100 | 169.98 | 155.17 | 161.46 | 158.67 | 159.51 | 157.59 | 161.57 |
| 105 | 165.52 | 151.31 | 157.25 | 154.49 | 155.35 | 153.51 | 156.69 |
| 110 | 159.58 | 146.56 | 152.26 | 149.35 | 150.50 | 148.48 | 151.50 |
| 115 | 152.19 | 140.53 | 146.13 | 142.91 | 144.21 | 141.83 | 144.54 |
| 120 | 143.28 | 133.13 | 138.15 | 134.50 | 136.42 | 134.43 | 135.68 |
| 125 | 132.88 | 124.27 | 129.17 | 124.39 | 127.55 | 125.48 | 125.83 |
| 130 | 119.64 | 114.07 | 118.66 | 112.02 | 116.99 | 114.84 | 113.77 |
| 135 | 104.42 | 102.14 | 106.23 | 99.64 | 104.64 | 102.84 | 101.30 |
| 140 | 90.37 | 88.30 | 91.19 | 87.20 | 90.13 | 88.00 | 88.56 |
| 145 | 74.11 | 71.79 | 74.87 | 72.66 | 73.78 | 72.45 | 72.16 |
| 150 | 53.99 | 54.22 | 56.49 | 53.80 | 55.63 | 54.44 | 54.31 |
| 155 | 38.99 | 40.24 | 41.71 | 39.65 | 40.79 | 39.25 | 39.49 |
| 160 | 26.48 | 27.91 | 28.98 | 27.70 | 27.67 | 24.72 | 24.62 |
| 165 | 15.85 | 16.01 | 16.96 | 16.76 | 15.14 | 12.54 | 14.96 |
| 170 | 6.03 | 6.37 | 6.46 | 6.29 | 5.86 | 4.51 | 5.15 |
| 175 | 0.77 | 0.70 | 0.68 | 0.72 | 0.70 | 0.77 | 0.86 |
| 180 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |

Appendix 1 Product Photo



Picture 1



Picture 2

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