



IESNA LM -80-08

MEASURING LUMEN MAINTENANCE OF LED LIGHTSOURCES

MEASUREMENT AND TEST REPORT For

HongliZhihui Group Co.,Ltd. Guangzhou Branch
Room 316, Building 2, No.1, Xianke Road, Huadong Town, Huadu District, Guangzhou, China

Model: HL -AS-2835H466W3C-S1-08L-PCT-HR3(R9)

| | |
|--|--|
| Report Type: 10000 HoursTest Report | Product Type: LED Package |
| Reviewed By: | Pote Wang |
| Report Number: | SZ222012403120E10 |
| Test Date: | 201410-04 to201511-24 |
| Report Date: | 202201-24 |
| Approved By: | Blake Zhang / EE Engineer |
| Prepared By: | Bay Area Compliance Laboratories Corp. (Dongguan). No.12, Pulong East st Road, Tangxia Town, Dongguan, Guangdong, China. Tel: +86076986858888 Fax:+86076986858588 |

TABLE OF CONTENTS

| | |
|---|----|
| 1 - GENERAL INFORMATION | 3 |
| 1.1 DESCRIPTION OF LED LIGHT SOURCES..... | 3 |
| 1.2 STANDARDS USED..... | 6 |
| 1.3 TEST FACILITY | 7 |
| 1.4 DESCRIPTION OF AUXILIARY EQUIPMENT..... | 7 |
| 1.5 OPERATING CYCLE..... | 7 |
| 1.6 AMBIENT CONDITIONS..... | 7 |
| 1.7 PHOTOMETRY MEASUREMENT UNCERTAINTY | 7 |
| 1.8 SAMPLE SET | 8 |
| 2 - SUMMARY OF TEST RESULT | 9 |
| 3 - TEST DATA | 10 |
| 3.1 DATA SET 1, 85°C, 100mA (LUMEN MAINTENANCE)..... | 10 |
| 3.2 DATA SET 1, 85°C, 100mA (CHROMATICITY SHIFT) | 11 |
| 3.3 DATA SET 2, 105°C, 100mA (LUMEN MAINTENANCE)..... | 12 |
| 3.4 DATA SET 2, 105°C, 100mA (CHROMATICITY SHIFT) | 13 |
| APPENDIX A EUT PHOTO | 14 |
| A.1 MECHANICAL DIMENSIONS (TA = 25°C)..... | 14 |
| A.2 EUT PHOTO | 14 |
| DIRECTIONS | 15 |

1 - GENERAL INFORMATION

1.1 Description of LED Light Sources

| | |
|--------------------------------------|--------------------------------------|
| Part Number: | HL-AS-2835H466W3C-S1-08L-PCT-HR3(R9) |
| Part Name: | 2835 |
| Part Type: | LED Package |
| #Nominal CCT: | 3000K |
| #Power: | 1W |
| #Average Current Density per LED die | 906.43 mA/mm ² |
| #Average Power Density per LED die | 3.07W/mm ² |
| #CRI: | 80 |
| #Die Spacing | 0.15mm |

Family products covered by this report:

According to ENERGY STAR® Requirements for the Use of L80 Data the following products can be covered by this report based on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements ENERGY STAR® Requirements for the Use of L80 Data (September 28, 2017)

This report covers the following models:

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density W/mm ² | Current density per LED die (mA/mm ²) | Current per die (mA) | Distance between of dies (mm) | Current (mA) |
|--------------|--|-----|-----------|--------|----------|---------------------------------|---|----------------------|-------------------------------|--------------|
| Master model | HL-AS-2835H466W3C-S1-08L-PCT-HR3(R9) | 80 | 3000 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835H***W-3C-S1-08*-PCT-HR3(R9)*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835H***W-3C-S1-08*-PCT-HR3*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 906.43 | 100 | 0.15 | 100 |
| | HL-**-2835D***W-3C-S1-08*-PCT-HR3(R9)*** | 80 | 2700-6500 | 3 | 1 | 0.102041 | 516.668 | 100 | 0.15 | 100 |

HL

Multiple model

| Model type | Model name | CRI | CCT (K) | Series | Parallel | Power density W/mm ² | Current density per LED die (mA/mm ²) | Current per die (mA) | Distance between of dies(mm) | Current (mA) |
|------------|---|-----|-----------|--------|----------|---------------------------------|---|----------------------|------------------------------|--------------|
| | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 679.825 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3(R9)*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835D***W-2-S1-08*-PCT-HR3*** | 80 | 2700-6500 | 1 | 2 | 0.052 | 387.5 | 75 | 0.15 | 150 |
| | HL-**-2835H***W-2-S1-08*-PCT-HR3(R9)*** | 80 | 2700-6500 | 1 | 2 | 0.0208 | 271.93 | 30 | 0.15 | 60 |

Multiple model

1.3 Test Facility

The testing facility used by Bay Area Compliance Laboratories Corp. (Dongguan) located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

1.4 Description of Auxiliary Equipment

| Device | Manufacture | Model No | Serial No | Calibration date | Calibration due date |
|--|-------------|---------------|-----------------|------------------|----------------------|
| Integral Sphere | EVERFINE | Diameter 0.3m | 1011119 | 201603-10 | 2017-03-09 |
| Programmable Test Power for LEDs | EVERFINE | LED300E | 1008002 | 201603-04 | 2017-03-03 |
| High accuracy array spectroradiometer | EVERFINE | HAAS-2000 | 1012016T | 201603-10 | 2017-03-09 |
| Standard Light Source | EVERFINE | D062 | 1011093 | 201509-17 | 201609-16 |
| Precision digital stabilized DC power supply | EVERFINE | WY605-V110 | G115987CJ732114 | 201603-04 | 2017-03- — |

1.8 Sample Set

Sampling Method:

LED samples for IESNA LM80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on ~~consecutive days~~ TJ ET BT 1 0 0 1 72

2 - SUMMARY OF TEST RESULT

| | |
|---|--|
| Data Set: | Data Set1, 85°C, 100mA |
| Number of Units: | 25 |
| Failures Observed: | 0 |
| Test Interval and Test Duration: | 0h,1000h,2000h,3000h,4000h,5000h,6000h,8000,9000h,10000h |
| Average. Lumen Maintenance at 10000 hours | 96.16% |
| Average Chromaticity Shift at 10000 hours | : 0.0032 |
| Reported TM21 L ₇₀ Lifetime: | >60,000 hours |

| | |
|---|--|
| Data Set: | Data Set2, 105°C , 100mA |
| Number of Units: | 25 |
| Failures Observed: | 0 |
| Test Interval and Test Duration: | 0h,1000h,2000h,3000h,4000h,5000h,6000h,8000,9000h,10000h |
| Average. Lumen Maintenance at 10000 hours | 94.52% |
| Average Chromaticity Shift at 10000 hours | 0.0029 |
| Reported TM21 L ₇₀ Lifetime: | 58,000 hours |

3 - Test Data

3.1 Data Set1, 85°C, 100 mA(Lumen Maintenance)

| No. | V _F (V) | (lm) | Lumen Maintenance (%) | | | | | | | | | |
|--------|--------------------|-------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| | 0hr(Initial) | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 1 | 9.154 | 118.7 | 100.67 | 100.51 | 100.42 | 99.83 | 99.16 | 98.57 | 97.81 | 97.56 | 97.30 | 97.05 |
| 2 | 9.176 | 116.9 | 101.45 | 101.03 | 100.77 | 100.26 | 99.57 | 98.97 | 98.46 | 98.20 | 97.95 | 97.43 |
| 3 | 9.147 | 117.1 | 101.02 | 100.94 | 100.77 | 100.26 | 99.40 | 98.98 | 98.21 | 97.95 | 97.69 | 97.10 |
| 4 | 9.144 | 117.4 | 101.28 | 100.77 | 100.26 | 99.49 | 98.72 | 98.04 | 97.53 | 97.19 | 96.85 | 96.51 |
| 5 | 9.138 | 117.3 | 100.85 | 100.43 | 100.00 | 99.49 | 98.81 | 98.29 | 97.70 | 97.10 | 96.85 | 96.33 |
| 6 | 9.094 | 116.5 | 101.29 | 100.77 | 100.34 | 99.74 | 99.14 | 98.63 | 98.28 | 97.94 | 97.60 | 97.00 |
| 7 | 9.137 | 119.3 | 100.25 | 99.92 | 99.50 | 98.91 | 98.41 | 97.74 | 96.90 | 96.65 | 96.14 | 96.06 |
| 8 | 9.193 | 117.7 | 101.10 | 100.68 | 100.34 | 100.08 | 99.49 | 98.64 | 98.05 | 97.88 | 97.45 | 97.11 |
| 9 | 9.170 | 117.4 | 101.28 | 100.85 | 100.43 | 99.83 | 99.15 | 98.55 | 98.21 | 97.96 | 97.70 | 97.27 |
| 10 | 9.156 | 118.7 | 100.84 | 100.25 | 99.49 | 98.99 | 98.32 | 97.64 | 96.88 | 96.29 | 95.96 | 95.45 |
| 11 | 9.153 | 117.9 | 101.70 | 101.10 | 100.51 | 99.75 | 98.98 | 98.22 | 97.54 | 96.86 | 96.69 | 96.27 |
| 12 | 9.130 | 118.2 | 101.10 | 100.76 | 100.17 | 99.58 | 98.73 | 97.97 | 97.38 | 96.70 | 96.28 | 95.69 |
| 13 | 9.136 | 118.1 | 101.19 | 100.85 | 100.34 | 99.92 | 99.15 | 98.48 | 97.54 | 97.21 | 96.95 | 96.53 |
| 14 | 9.173 | 118.8 | 100.51 | 100.00 | 99.58 | 98.99 | 98.23 | 97.64 | 96.97 | 96.80 | 96.38 | 95.88 |
| 15 | 9.171 | 120.2 | 100.50 | 100.25 | 99.75 | 99.00 | 98.17 | 97.50 | 96.76 | 96.51 | 96.34 | 96.01 |
| 16 | 9.172 | 117.5 | 101.11 | 100.26 | 99.83 | 99.15 | 98.47 | 97.96 | 97.28 | 96.68 | 96.43 | 96.09 |
| 17 | 9.131 | 118.7 | 100.84 | 100.51 | 100.08 | 99.07 | 98.32 | 97.73 | 97.22 | 96.97 | 96.38 | 95.96 |
| 18 | 9.172 | 117.1 | 101.20 | 100.85 | 100.43 | 99.66 | 98.89 | 98.21 | 97.52 | 97.01 | 96.84 | 96.24 |
| 19 | 9.147 | 119.1 | 100.92 | 100.50 | 100.34 | 99.50 | 98.66 | 98.07 | 97.06 | 96.56 | 96.14 | 95.89 |
| 20 | 9.108 | 119.2 | 100.67 | 99.92 | 99.75 | 99.08 | 98.49 | 97.65 | 97.06 | 96.31 | 95.97 | 95.47 |
| 21 | 9.148 | 118.3 | 101.27 | 100.51 | 99.83 | 98.56 | 97.46 | 96.79 | 96.45 | 96.03 | 95.69 | 95.01 |
| 22 | 9.150 | 117.4 | 100.85 | 100.00 | 99.40 | 98.89 | 98.38 | 97.96 | 97.19 | 96.76 | 96.34 | 96.00 |
| 23 | 9.206 | 117.5 | 100.94 | 100.00 | 99.23 | 98.81 | 97.96 | 97.28 | 96.60 | 95.91 | 95.74 | 95.15 |
| 24 | 9.079 | 118.6 | 100.25 | 99.58 | 98.74 | 98.40 | 97.22 | 96.88 | 96.29 | 95.78 | 95.62 | 95.03 |
| 25 | 9.137 | 119.3 | 100.50 | 99.66 | 98.91 | 98.49 | 97.65 | 97.07 | 96.81 | 96.23 | 96.06 | 95.39 |
| Ave. | 9.149 | 118.1 | 100.94 | 100.44 | 99.97 | 99.35 | 98.60 | 97.98 | 97.35 | 96.92 | 96.61 | 96.16 |
| Med. | 9.148 | 118.1 | 100.94 | 100.51 | 100.08 | 99.49 | 98.66 | 97.97 | 97.28 | 96.80 | 96.38 | 96.06 |
| st dev | 0.0285 | 0.9 | 0.3654 | 0.4336 | 0.5446 | 0.5406 | 0.6127 | 0.5992 | 0.5936 | 0.6834 | 0.6820 | 0.7110 |
| Min. | 9.079 | 116.5 | 100.25 | 99.58 | 98.74 | 98.40 | 97.22 | 96.79 | 96.29 | 95.78 | 95.62 | 95.01 |
| Max. | 9.206 | 120.2 | 101.70 | 101.10 | 100.77 | 100.26 | 99.57 | 98.98 | 98.46 | 98.20 | 97.95 | 97.43 |

(R9)

| |
|----------|
| |
| 10000hrs |
| 0.0031 |
| 0.0027 |
| 0.0034 |
| 0.0034 |
| 0.0034 |
| 0.0035 |
| 0.0032 |
| 0.0031 |
| 0.0031 |

report

3.3 Data Set2, 105C, 100 mA (Lumen Maintenance)

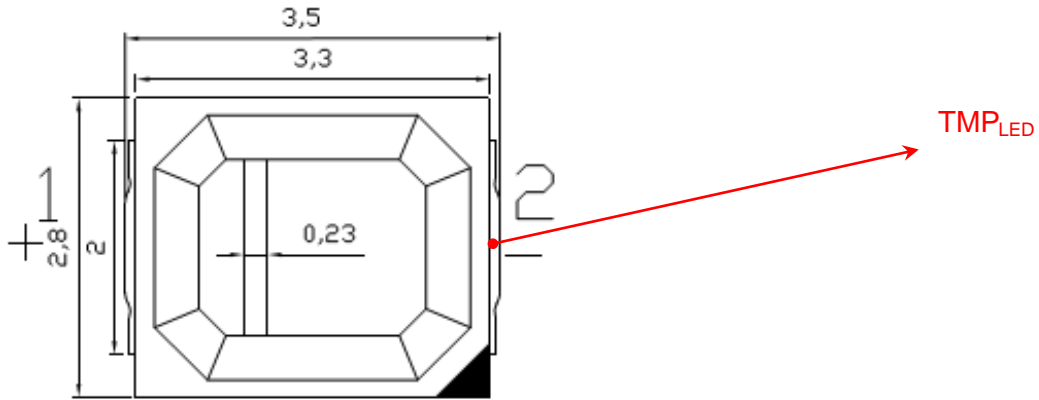
| No. | V _F (V) | (lm) | Lumen Maintenance (%) | | | | | | | | | |
|------|--------------------|-------|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| | 0hr(Initial) | | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs | 10000hrs |
| 26 | 9.172 | 117.3 | 100.85 | 99.91 | 99.15 | 98.29 | 97.44 | 96.59 | 95.57 | 94.80 | 94.54 | 94.29 |
| 27 | 9.174 | 117.2 | 100.85 | 99.91 | 99.32 | 98.98 | 98.21 | 97.61 | 95.56 | 94.88 | 94.37 | 93.77 |
| 28 | 9.130 | 117.0 | 100.34 | 99.83 | 99.32 | 98.55 | 97.62 | 96.85 | 96.09 | 95.92 | 95.49 | 94.90 |
| 29 | 9.157 | 117.5 | 100.60 | 100.00 | 99.32 | 98.81 | 97.79 | 96.85 | 96.17 | 95.32 | 94.89 | 94.47 |
| 30 | 9.194 | 117.2 | 100.77 | 99.91 | 99.23 | 98.81 | 97.95 | 97.18 | 96.33 | 96.16 | 95.90 | 95.56 |
| 31 | 9.138 | 117.7 | 101.19 | 100.17 | 99.07 | 98.13 | 97.28 | 96.35 | 95.33 | 94.73 | 94.14 | 93.71 |
| 32 | 9.196 | 117.3 | 100.94 | 99.74 | 98.64 | 97.70 | 96.76 | 96.08 | 95.57 | 94.97 | 94.54 | 94.12 |
| 33 | 9.112 | 119.0 | 100.92 | 99.83 | 98.91 | 97.82 | 96.72 | 95.88 | 95.04 | 94.54 | 94.12 | 93.78 |
| 34 | 9.173 | 118.1 | 101.52 | 100.68 | 99.58 | 98.81 | 97.97 | 97.29 | 96.53 | 95.85 | 95.34 | 94.83 |
| 35 | 9.155 | 119.9 | 100.50 | 99.83 | 99.17 | 97.83 | 96.83 | 96.08 | 95.33 | 94.75 | 94.33 | 93.83 |
| 36 | 9.095 | 119.2 | 100.92 | 100.25 | 99.50 | 98.91 | 98.15 | 97.57 | 96.81 | 96.39 | 95.97 | 95.39 |
| 37 | 9.118 | 119.1 | 100.67 | 99.92 | 99.33 | 98.66 | 97.65 | 96.81 | 96.73 | 96.22 | 95.72 | 95.21 |
| 38 | 9.127 | 119.7 | 100.58 | 99.67 | 99.08 | 98.50 | 97.66 | 96.74 | 95.99 | 95.57 | 95.15 | 94.65 |
| 39 | 9.172 | 117.7 | 101.70 | 100.85 | 99.92 | 99.07 | 97.96 | 97.11 | 96.52 | 96.18 | 95.75 | 95.07 |
| 40 | 9.165 | 117.6 | 101.36 | 100.26 | 99.23 | 98.38 | 97.28 | 96.68 | 95.92 | 95.83 | 95.58 | 94.90 |
| 41 | 9.150 | 117.9 | 101.78 | 100.93 | 99.92 | 98.98 | 97.79 | 97.03 | 96.18 | 95.50 | 95.17 | 94.66 |
| 42 | 9.104 | 117.7 | 100.08 | 99.15 | 98.73 | 98.05 | 97.20 | 96.69 | 96.01 | 95.33 | 95.16 | 94.65 |
| 43 | 9.131 | 118.9 | 100.93 | 99.16 | 98.82 | 97.98 | 96.80 | 96.13 | 95.29 | 94.70 | 94.37 | 93.78 |
| 44 | 9.163 | 118.6 | 101.35 | 100.51 | 99.83 | 98.65 | 97.22 | 96.63 | 95.70 | 95.19 | 94.77 | 94.10 |
| 45 | 9.177 | 118.2 | 101.02 | 100.08 | 98.98 | 97.97 | 97.12 | 96.36 | 95.52 | 94.75 | 94.59 | 93.91 |
| 46 | 9.166 | 118.2 | 100.51 | 99.83 | 99.15 | 97.80 | 97.04 | 96.19 | 95.18 | 94.59 | 94.25 | 93.74 |
| 47 | 9.155 | 118.7 | 101.52 | 100.51 | 99.92 | 99.24 | 97.47 | 96.71 | 95.53 | 94.95 | 94.44 | 93.93 |
| 48 | 9.121 | 117.9 | 100.76 | 100.08 | 99.32 | 98.73 | 97.88 | 97.20 | 96.27 | 95.76 | 95.42 | 94.83 |
| 49 | 9.142 | 119.1 | 100.42 | 99.41 | 98.66 | 98.24 | 97.48 | 96.47 | 95.89 | 95.38 | 95.21 | 94.63 |
| 50 | 9.158 | 117.4 | 101.87 | 101.11 | 100.43 | 99.91 | 98.98 | 98.21 | 97.27 | 96.59 | 96.42 | 96.25 |
| Ave. | 9.150 | 118.2 | 100.96 | 100.06 | 99.30 | 98.51 | 97.53 | 96.77 | 95.93 | 95.39 | 95.03 | 94.52 |
| Med. | 9.155 | 117.9 | 100.92 | 99.92 | 99.23 | | | | | | | |

3.4 Data Set2, 105℃, 100 mA (Chromaticity Shift)

| No. | u' | v' | CCT(K) | Chromaticity Shift (u'v') | | | | | | | | | |
|-----|--------|--------|--------|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | | | 0hr(Initial) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs | 7000hrs | 8000hrs | 9000hrs |
| 26 | 0.2532 | 0.5202 | 2942 | 0.0006 | 0.0009 | 0.0006 | 0.0008 | 0.0014 | 0.0019 | 0.0020 | 0.0023 | 0.0028 | 0.0031 |
| 27 | 0.2534 | 0.5216 | 2931 | 0.0006 | 0.0008 | 0.0004 | 0.0006 | 0.0012 | 0.0020 | 0.0022 | 0.0025 | 0.0029 | 0.0032 |
| 28 | 0.2540 | 0.5208 | 2921 | 0.0008 | 0.0009 | 0.0006 | 0.0007 | 0.0013 | 0.0021 | 0.0024 | 0.0026 | 0.0029 | 0.0032 |
| 29 | 0.2533 | 0.5225 | 2927 | 0.0006 | 0.0008 | 0.0004 | 0.0006 | 0.0010 | 0.0018 | 0.0021 | 0.0023 | 0.0026 | 0.0030 |
| 30 | 0.2529 | 0.5202 | 2949 | 0.0006 | 0.0009 | 0.0006 | 0.0006 | 0.0014 | 0.0020 | 0.0022 | 0.0026 | 0.0028 | 0.0031 |
| 31 | 0.2536 | 0.5215 | 2925 | 0.0006 | 0.0010 | 0.0007 | 0.0006 | 0.0010 | 0.0017 | 0.0020 | 0.0023 | 0.0025 | 0.0028 |
| 32 | 0.2536 | 0.5211 | 2928 | 0.0006 | 0.0008 | 0.0006 | 0.0008 | 0.0015 | 0.0022 | 0.0026 | 0.0028 | 0.0031 | 0.0034 |
| 33 | 0.2526 | 0.5211 | 2952 | 0.0007 | 0.0011 | 0.0006 | 0.0006 | 0.0011 | 0.0018 | 0.0022 | 0.0024 | 0.0026 | 0.0029 |
| 34 | 0.2527 | 0.5224 | 2942 | 0.0007 | 0.0011 | 0.0007 | 0.0006 | 0.0010 | 0.0016 | 0.0019 | 0.0021 | 0.0024 | 0.0026 |
| 35 | 0.2521 | 0.5212 | 2965 | 0.0008 | 0.0011 | 0.0008 | 0.0006 | 0.0011 | 0.0018 | 0.0020 | 0.0022 | 0.0026 | 0.0027 |
| 36 | 0.2527 | 0.5223 | 2943 | 0.0010 | 0.0015 | 0.0010 | 0.0009 | 0.0011 | 0.0017 | 0.0019 | 0.0021 | 0.0024 | 0.0027 |

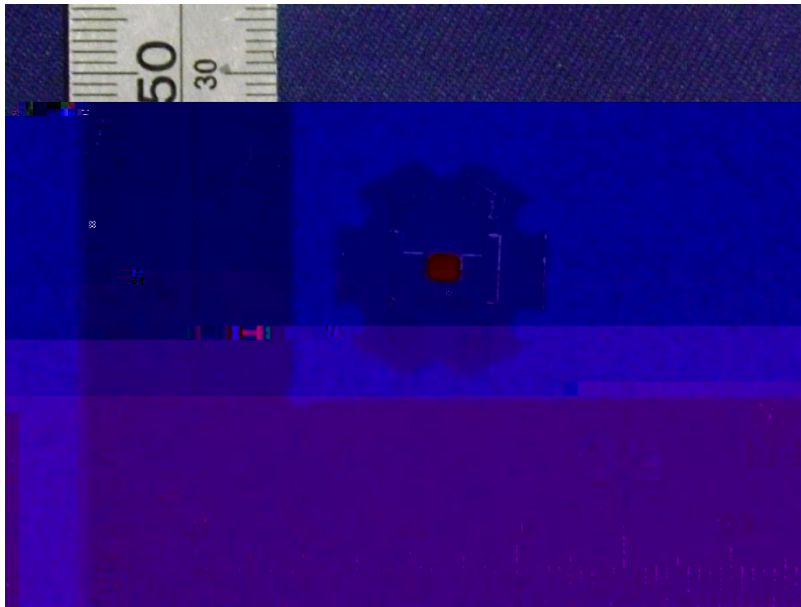
Appendix A EUT PHOTO

A.1 Mechanical Dimensions (Ta =25°C)



All dimensions are in millimeter

A.2 EUT Photo



Directions

 K K M K MK K K
K M K K MK K M K
 K K
1 9 K MK M K . M M
 M K
 M K K M K K M K
M K KM 5 # M M K
 MK M M K K K
 K K K K K K K K K K
 K K

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