



NVLAP LAB CODE:201045-0



TEST REPORT

IES LM-80-08

For

SHENZHEN LEPOWER OPTO ELECTRONIC CORP., LTD

3-5 Floors, Bldg B, Chuangfu Science Technology Park, Shihuan Rd No.202, Shangwu
Community, Shiyuan St, Bao'an District, Shenzhen

Report No.: R011605419L

Product Name: LED (SMD)

Model No.: LY-SMD2835

Test Initiation Date: 2016-05-16 to 2017-01-21

Revision Date: 2017-02-16

Test Completion Date: 2017-01-24

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant: SHENZHEN LEPOWER OPTO ELECTRONICIS CORP., LTD

Tested Model: LY-SMD2835

Part Type: LED Package

Nominal CCT: 3500K

Number of LED Light Source tested: See tables

Case temperature (test point temperature): See tables

Drive current of the LED light source during lifetime test: See tables

Initial luminous flux and forward voltage at photometric measurement current: See tables

Lumen maintenance data for each individual LED light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the LED Light sources: See tables

Observation of LED light source failure including the failure conditions and time of failure: See tables

LED light source monitoring interval: The LED light source is inspected at regular interval (24 hours) throughout the 6000 hours test.

Photometric measurement uncertainty: 1.5% on flux measurements for LM-80 testing.

Chromaticity shift reported over the Measurement time: See tables

LED Light Source Test interval: At regular intervals (1000 hours) throughout the 6000 hours test.

Date of Receiving Sample: 2016-05-16

Test Duration: 2016-05-16 to 2017-01-21

1.2 Standards Used

IESNA LM-80-08: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources

1.3 Test Facility Description

The test facility used by Shenzhen Anbotek Compliance Laboratory Limited is located at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China.

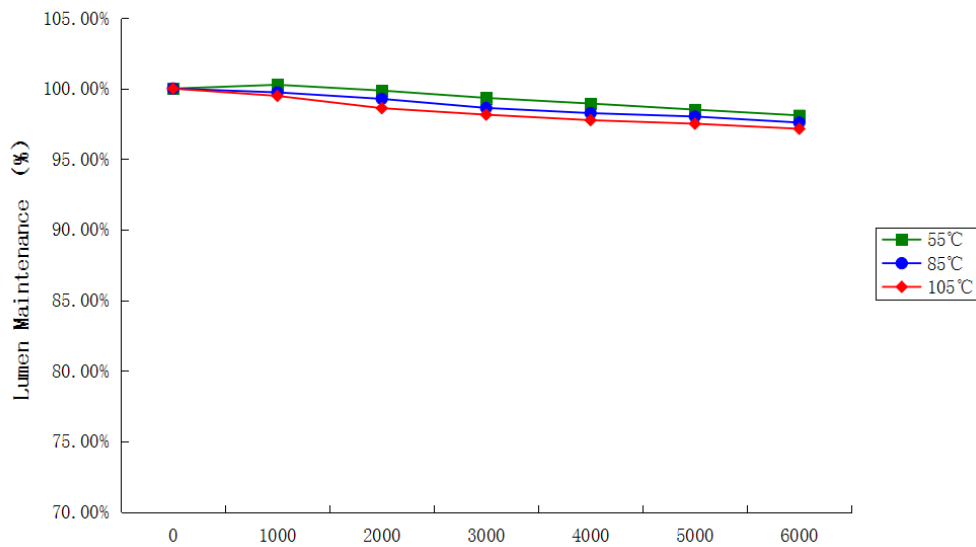
1.4 Test Equipment List

| Device | Manufacture | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---------------------------|-------------|------------|------------|------------------|----------------------|
| Digital Power Meter | YOKOGAWA | WT210 | SE-074 | 2016-04-06 | 2017-04-05 |
| LM-80 Aging Test System | KEYI | KY-3X-LH60 | SE-564 | 2016-04-06 | 2017-04-05 |
| DC Power Supply | ITECH | IT6832 | SE-598 | 2016-06-23 | 2017-06-22 |
| DC Power Supply | EVERFINE | WY605 | SE-605 | 2016-06-23 | 2017-06-22 |
| Standard Lamp | EVERFINE | D062 | SE-606 | 2016-07-02 | 2017-07-01 |
| Spectrum Analyzer | EVERFINE | HAAS-2000 | SE-607 | 2016-06-23 | 2017-06-22 |
| Integrating Sphere (0.5m) | EVERFINE | AIS-2 | SE-608 | 2016-06-23 | 2017-06-22 |

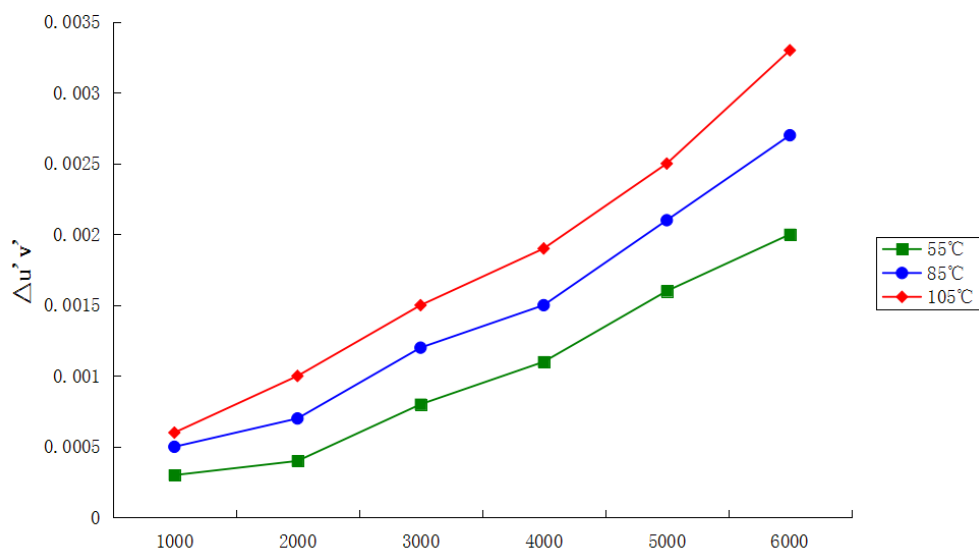
2 Summary of Test Result

| Data Set | Case Temperature (Ts) | Ambient Temperature (Ta) | Drive Current | Average Lumen Maintenance at 6000 hours | Average Chromaticity Shift ($\Delta u'v'$) at 6000 hours |
|----------|-----------------------|--------------------------|---------------|---|--|
| 1 | 54.1°C | 52.9°C | 150 mA | 98.10% | 0.0020 |
| 2 | 84.1°C | 82.7°C | 150 mA | 97.59% | 0.0027 |
| 3 | 104.6°C | 103.2°C | 150 mA | 97.15% | 0.0033 |

Average Lumen Maintenance



Average $\Delta u'v'$



3 Test Method

3.1 Photometric and Electrical Measurement

Total light output (luminous flux) for the $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$ ambient temperature conditions is measured using an integrating sphere. Each LED package is operated at rated drive current (CC Mode).

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed $\pm 1.6\%$ over the wavelength range 380-800nm.

3.2 Season the LED Package from 0 hours to 6000 hours

Three LM-80 aging measurement system Temperature Chambers are used for Seasoning, and the temperature is set to 55°C , 85°C , 105°C (manufacture defined), the airflow is minimum to keep the uniformity to temperature. LED packages are operated steady state (no cycling) for a period of 6000 hours, checked the lumen flux and Chromaticity Shift every 1000 hours. The samples are inspected at regular intervals (24 hours) throughout the 6000 hours. The time and date of failure of each lamp is recorded. The actual elapsed time for each light package is in hour.

4 Data Set 1: 55°C, 150 mA

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 54.1°C |
| Ambient Temperature: | 52.9°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

Lumen Maintenance (%)

| Sample No. | VF(V) | Φ(lm) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------|--------|---------|---------|---------|---------|---------|---------|
| L1 | 3.06 | 57.40 | 100.17% | 99.84% | 99.34% | 98.98% | 98.54% | 98.18% |
| L2 | 3.07 | 58.74 | 100.07% | 99.85% | 99.46% | 99.01% | 98.56% | 98.10% |
| L3 | 3.06 | 57.55 | 99.95% | 99.84% | 99.34% | 99.06% | 98.55% | 98.05% |
| L4 | 3.06 | 58.51 | 99.85% | 99.86% | 99.37% | 98.90% | 98.56% | 98.27% |
| L5 | 3.10 | 57.34 | 100.21% | 99.91% | 99.22% | 99.08% | 98.51% | 98.07% |
| L6 | 3.06 | 58.40 | 99.95% | 99.85% | 99.35% | 98.98% | 98.40% | 98.04% |
| L7 | 3.06 | 59.11 | 100.19% | 99.92% | 99.26% | 98.78% | 98.64% | 97.96% |
| L8 | 3.06 | 58.42 | 100.40% | 99.85% | 99.42% | 99.08% | 98.50% | 98.00% |
| L9 | 3.06 | 58.86 | 100.40% | 99.92% | 99.41% | 98.77% | 98.55% | 98.03% |
| L10 | 3.07 | 59.77 | 100.32% | 99.92% | 99.25% | 98.98% | 98.50% | 98.22% |
| L11 | 3.07 | 58.68 | 100.41% | 99.91% | 99.37% | 99.08% | 98.69% | 98.22% |
| L12 | 3.16 | 58.84 | 100.36% | 99.88% | 99.24% | 98.99% | 98.54% | 98.02% |
| L13 | 3.06 | 58.22 | 100.21% | 99.86% | 99.24% | 98.99% | 98.69% | 98.21% |
| L14 | 3.05 | 58.16 | 100.48% | 99.93% | 99.26% | 98.73% | 98.40% | 98.03% |
| L15 | 3.06 | 58.79 | 100.54% | 99.86% | 99.42% | 99.03% | 98.69% | 98.23% |
| L16 | 3.05 | 57.79 | 100.40% | 99.88% | 99.55% | 99.09% | 98.57% | 97.96% |
| L17 | 3.06 | 57.76 | 100.40% | 99.95% | 99.08% | 99.01% | 98.42% | 98.17% |
| L18 | 3.06 | 58.97 | 100.29% | 99.92% | 99.44% | 99.05% | 98.51% | 97.94% |
| L19 | 3.06 | 58.07 | 100.40% | 99.90% | 99.41% | 98.72% | 98.42% | 98.10% |
| L20 | 3.07 | 59.32 | 100.24% | 99.83% | 99.22% | 99.00% | 98.44% | 98.04% |
| L21 | 3.06 | 58.21 | 100.40% | 99.76% | 99.33% | 98.74% | 98.38% | 98.03% |
| L22 | 3.08 | 57.44 | 100.31% | 99.72% | 99.39% | 98.86% | 98.39% | 98.16% |
| L23 | 3.07 | 57.56 | 100.23% | 99.77% | 99.43% | 99.08% | 98.43% | 98.12% |
| L24 | 3.07 | 58.29 | 100.29% | 99.73% | 99.30% | 98.81% | 98.43% | 98.11% |
| L25 | 3.05 | 57.03 | 100.23% | 99.74% | 99.46% | 98.70% | 98.42% | 98.26% |
| AV | 3.07 | 58.29 | 100.27% | 99.86% | 99.34% | 98.94% | 98.51% | 98.10% |
| MIN | 3.05 | 57.03 | 99.85% | 99.72% | 99.08% | 98.70% | 98.38% | 97.94% |
| MAX | 3.16 | 59.77 | 100.54% | 99.95% | 99.55% | 99.09% | 98.69% | 98.27% |
| STDEV | 0.0209 | 0.6888 | 0.0017 | 0.0007 | 0.0010 | 0.0013 | 0.0010 | 0.0010 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 54.1°C |
| Ambient Temperature: | 52.9°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

Chromaticity Shift ($\Delta u'v'$)

| Sample No. | u' | v' | CCT(K) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| L1 | 0.2295 | 0.5112 | 3701 | 0.0002 | 0.0004 | 0.0007 | 0.0010 | 0.0015 | 0.0020 |
| L2 | 0.2372 | 0.5143 | 3421 | 0.0003 | 0.0004 | 0.0008 | 0.0012 | 0.0017 | 0.0020 |
| L3 | 0.2364 | 0.5103 | 3489 | 0.0004 | 0.0005 | 0.0009 | 0.0010 | 0.0017 | 0.0020 |
| L4 | 0.2357 | 0.5134 | 3476 | 0.0003 | 0.0006 | 0.0007 | 0.0012 | 0.0017 | 0.0022 |
| L5 | 0.2356 | 0.5097 | 3522 | 0.0002 | 0.0005 | 0.0008 | 0.0012 | 0.0016 | 0.0019 |
| L6 | 0.2363 | 0.5112 | 3482 | 0.0002 | 0.0004 | 0.0008 | 0.0009 | 0.0015 | 0.0022 |
| L7 | 0.2322 | 0.5074 | 3658 | 0.0003 | 0.0003 | 0.0009 | 0.0013 | 0.0017 | 0.0019 |
| L8 | 0.2365 | 0.5143 | 3445 | 0.0003 | 0.0003 | 0.0008 | 0.0009 | 0.0017 | 0.0018 |
| L9 | 0.2352 | 0.5141 | 3483 | 0.0004 | 0.0005 | 0.0007 | 0.0009 | 0.0016 | 0.0021 |
| L10 | 0.2352 | 0.5130 | 3499 | 0.0005 | 0.0006 | 0.0008 | 0.0010 | 0.0015 | 0.0021 |
| L11 | 0.2366 | 0.5145 | 3437 | 0.0003 | 0.0005 | 0.0007 | 0.0010 | 0.0014 | 0.0020 |
| L12 | 0.2351 | 0.5131 | 3499 | 0.0004 | 0.0005 | 0.0009 | 0.0011 | 0.0015 | 0.0018 |
| L13 | 0.2358 | 0.5133 | 3476 | 0.0005 | 0.0004 | 0.0006 | 0.0010 | 0.0016 | 0.0022 |
| L14 | 0.2340 | 0.5129 | 3534 | 0.0003 | 0.0002 | 0.0007 | 0.0010 | 0.0016 | 0.0020 |
| L15 | 0.2384 | 0.5149 | 3381 | 0.0003 | 0.0004 | 0.0007 | 0.0012 | 0.0017 | 0.0019 |
| L16 | 0.2375 | 0.5116 | 3441 | 0.0004 | 0.0005 | 0.0008 | 0.0010 | 0.0015 | 0.0020 |
| L17 | 0.2389 | 0.5116 | 3398 | 0.0003 | 0.0005 | 0.0008 | 0.0009 | 0.0017 | 0.0021 |
| L18 | 0.2367 | 0.5138 | 3442 | 0.0004 | 0.0006 | 0.0006 | 0.0012 | 0.0015 | 0.0021 |
| L19 | 0.2352 | 0.5122 | 3506 | 0.0003 | 0.0004 | 0.0009 | 0.0010 | 0.0015 | 0.0019 |
| L20 | 0.2357 | 0.5142 | 3469 | 0.0004 | 0.0003 | 0.0007 | 0.0012 | 0.0015 | 0.0022 |
| L21 | 0.2367 | 0.5151 | 3428 | 0.0005 | 0.0004 | 0.0008 | 0.0011 | 0.0015 | 0.0019 |
| L22 | 0.2380 | 0.5141 | 3401 | 0.0003 | 0.0002 | 0.0009 | 0.0011 | 0.0014 | 0.0019 |
| L23 | 0.2392 | 0.5125 | 3381 | 0.0003 | 0.0004 | 0.0007 | 0.0011 | 0.0016 | 0.0019 |
| L24 | 0.2363 | 0.5138 | 3453 | 0.0004 | 0.0005 | 0.0008 | 0.0009 | 0.0016 | 0.0022 |
| L25 | 0.2384 | 0.5129 | 3401 | 0.0004 | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0019 |
| AV | 0.2361 | 0.5128 | 3473 | 0.0003 | 0.0004 | 0.0008 | 0.0011 | 0.0016 | 0.0020 |
| MIN | 0.2295 | 0.5074 | 3381 | 0.0002 | 0.0002 | 0.0006 | 0.0009 | 0.0014 | 0.0018 |
| MAX | 0.2392 | 0.5151 | 3701 | 0.0005 | 0.0006 | 0.0009 | 0.0013 | 0.0017 | 0.0022 |
| STDEV | 0.0021 | 0.0018 | 76 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

5 Data Set 2: 85°C, 150 mA

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 84.1°C |
| Ambient Temperature: | 82.7°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

Lumen Maintenance (%)

| Sample No. | V _F (V) | Φ(lm) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------------------|--------|---------|---------|---------|---------|---------|---------|
| L26 | 3.06 | 58.48 | 99.73% | 99.38% | 98.53% | 98.13% | 97.89% | 97.45% |
| L27 | 3.06 | 57.50 | 99.93% | 99.37% | 98.50% | 98.37% | 97.97% | 97.80% |
| L28 | 3.06 | 58.26 | 99.76% | 99.18% | 98.61% | 98.27% | 98.03% | 97.69% |
| L29 | 3.07 | 58.80 | 99.71% | 99.35% | 98.66% | 98.39% | 98.07% | 97.58% |
| L30 | 3.07 | 59.43 | 99.90% | 99.33% | 98.55% | 98.18% | 98.18% | 97.63% |
| L31 | 3.05 | 57.79 | 99.81% | 99.13% | 98.68% | 98.13% | 97.88% | 97.79% |
| L32 | 3.11 | 58.39 | 99.78% | 99.14% | 98.56% | 98.31% | 98.06% | 97.62% |
| L33 | 3.06 | 58.51 | 99.76% | 99.18% | 98.60% | 98.14% | 98.11% | 97.41% |
| L34 | 3.06 | 58.65 | 99.73% | 99.20% | 98.58% | 98.14% | 97.90% | 97.70% |
| L35 | 3.06 | 59.81 | 99.63% | 99.35% | 98.70% | 98.35% | 98.19% | 97.42% |
| L36 | 3.06 | 58.95 | 99.66% | 99.34% | 98.76% | 98.14% | 98.19% | 97.65% |
| L37 | 3.07 | 59.51 | 99.75% | 99.21% | 98.50% | 98.22% | 97.91% | 97.48% |
| L38 | 3.06 | 58.74 | 99.88% | 99.35% | 98.42% | 98.25% | 97.90% | 97.71% |
| L39 | 3.06 | 58.64 | 99.61% | 99.28% | 98.81% | 98.36% | 97.93% | 97.76% |
| L40 | 3.06 | 59.14 | 99.64% | 99.17% | 98.68% | 98.38% | 98.17% | 97.65% |
| L41 | 3.06 | 57.40 | 99.77% | 99.32% | 98.52% | 98.22% | 98.08% | 97.47% |
| L42 | 3.06 | 57.83 | 99.67% | 99.22% | 98.75% | 98.44% | 97.91% | 97.60% |
| L43 | 3.06 | 57.52 | 99.90% | 99.36% | 98.70% | 98.18% | 97.98% | 97.80% |
| L44 | 3.07 | 58.01 | 99.79% | 99.36% | 98.83% | 98.13% | 98.16% | 97.44% |
| L45 | 3.06 | 58.09 | 99.86% | 99.31% | 98.61% | 98.45% | 98.02% | 97.69% |
| L46 | 3.07 | 58.52 | 99.47% | 99.33% | 98.51% | 98.12% | 97.91% | 97.46% |
| L47 | 3.06 | 58.36 | 99.40% | 99.16% | 98.49% | 98.43% | 97.95% | 97.41% |
| L48 | 3.17 | 58.05 | 99.70% | 99.26% | 98.76% | 98.35% | 98.04% | 97.52% |
| L49 | 3.07 | 58.68 | 99.66% | 99.32% | 98.70% | 98.27% | 98.02% | 97.51% |
| L50 | 3.07 | 58.28 | 99.67% | 99.14% | 98.78% | 98.16% | 98.12% | 97.46% |
| AV | 3.07 | 58.45 | 99.73% | 99.27% | 98.63% | 98.26% | 98.02% | 97.59% |
| MIN | 3.05 | 57.40 | 99.40% | 99.13% | 98.42% | 98.12% | 97.88% | 97.41% |
| MAX | 3.17 | 59.81 | 99.93% | 99.38% | 98.83% | 98.45% | 98.19% | 97.80% |
| STDEV | 0.0234 | 0.6210 | 0.0013 | 0.0009 | 0.0011 | 0.0011 | 0.0011 | 0.0013 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 84.1°C |
| Ambient Temperature: | 82.7°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

Chromaticity Shift ($\Delta u'v'$)

| Sample No. | u' | v' | CCT(K) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| L26 | 0.2379 | 0.5129 | 3415 | 0.0005 | 0.0007 | 0.0012 | 0.0015 | 0.0022 | 0.0027 |
| L27 | 0.2367 | 0.5130 | 3451 | 0.0004 | 0.0006 | 0.0013 | 0.0016 | 0.0020 | 0.0027 |
| L28 | 0.2367 | 0.5148 | 3432 | 0.0005 | 0.0008 | 0.0010 | 0.0014 | 0.0022 | 0.0026 |
| L29 | 0.2383 | 0.5151 | 3381 | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | 0.0027 |
| L30 | 0.2350 | 0.5123 | 3510 | 0.0005 | 0.0005 | 0.0012 | 0.0015 | 0.0021 | 0.0026 |
| L31 | 0.2367 | 0.5104 | 3480 | 0.0004 | 0.0007 | 0.0012 | 0.0016 | 0.0022 | 0.0028 |
| L32 | 0.2343 | 0.5120 | 3536 | 0.0003 | 0.0006 | 0.0013 | 0.0016 | 0.0020 | 0.0027 |
| L33 | 0.2340 | 0.5125 | 3540 | 0.0005 | 0.0004 | 0.0012 | 0.0015 | 0.0022 | 0.0026 |
| L34 | 0.2353 | 0.5156 | 3465 | 0.0005 | 0.0008 | 0.0014 | 0.0016 | 0.0022 | 0.0026 |
| L35 | 0.2332 | 0.5122 | 3570 | 0.0006 | 0.0007 | 0.0012 | 0.0014 | 0.0022 | 0.0027 |
| L36 | 0.2361 | 0.5134 | 3466 | 0.0007 | 0.0008 | 0.0011 | 0.0015 | 0.0022 | 0.0025 |
| L37 | 0.2368 | 0.5120 | 3459 | 0.0005 | 0.0009 | 0.0010 | 0.0015 | 0.0022 | 0.0025 |
| L38 | 0.2368 | 0.5155 | 3423 | 0.0004 | 0.0006 | 0.0011 | 0.0016 | 0.0020 | 0.0027 |
| L39 | 0.2366 | 0.5127 | 3459 | 0.0004 | 0.0007 | 0.0012 | 0.0016 | 0.0022 | 0.0027 |
| L40 | 0.2362 | 0.5156 | 3438 | 0.0004 | 0.0006 | 0.0013 | 0.0015 | 0.0021 | 0.0026 |
| L41 | 0.2358 | 0.5098 | 3513 | 0.0005 | 0.0007 | 0.0013 | 0.0015 | 0.0020 | 0.0027 |
| L42 | 0.2362 | 0.5113 | 3485 | 0.0005 | 0.0006 | 0.0012 | 0.0016 | 0.0023 | 0.0027 |
| L43 | 0.2377 | 0.5133 | 3417 | 0.0006 | 0.0006 | 0.0011 | 0.0014 | 0.0021 | 0.0027 |
| L44 | 0.2382 | 0.5152 | 3383 | 0.0004 | 0.0006 | 0.0010 | 0.0014 | 0.0020 | 0.0025 |
| L45 | 0.2353 | 0.5133 | 3491 | 0.0003 | 0.0005 | 0.0010 | 0.0015 | 0.0022 | 0.0026 |
| L46 | 0.2353 | 0.5146 | 3477 | 0.0004 | 0.0005 | 0.0012 | 0.0015 | 0.0021 | 0.0027 |
| L47 | 0.2383 | 0.5126 | 3407 | 0.0005 | 0.0008 | 0.0014 | 0.0015 | 0.0022 | 0.0027 |
| L48 | 0.2370 | 0.5137 | 3434 | 0.0004 | 0.0007 | 0.0010 | 0.0017 | 0.0019 | 0.0025 |
| L49 | 0.2369 | 0.5141 | 3434 | 0.0005 | 0.0008 | 0.0012 | 0.0016 | 0.0023 | 0.0027 |
| L50 | 0.2370 | 0.5098 | 3475 | 0.0006 | 0.0009 | 0.0012 | 0.0015 | 0.0022 | 0.0027 |
| AV | 0.2363 | 0.5131 | 3462 | 0.0005 | 0.0007 | 0.0012 | 0.0015 | 0.0021 | 0.0027 |
| MIN | 0.2332 | 0.5098 | 3381 | 0.0003 | 0.0004 | 0.0010 | 0.0014 | 0.0019 | 0.0025 |
| MAX | 0.2383 | 0.5156 | 3570 | 0.0007 | 0.0009 | 0.0014 | 0.0017 | 0.0023 | 0.0028 |
| STDEV | 0.0013 | 0.0017 | 48 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

6 Data Set 3: 105°C, 150 mA

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 104.6°C |
| Ambient Temperature: | 103.2°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

Lumen Maintenance (%)

| Sample No. | V _F (V) | Φ(lm) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------------------|--------|---------|---------|---------|---------|---------|---------|
| L51 | 3.07 | 58.54 | 99.50% | 98.63% | 98.12% | 97.75% | 97.33% | 97.14% |
| L52 | 3.06 | 58.76 | 99.64% | 98.52% | 97.97% | 97.85% | 97.50% | 97.27% |
| L53 | 3.06 | 57.39 | 99.60% | 98.54% | 98.17% | 97.74% | 97.44% | 97.21% |
| L54 | 3.06 | 58.25 | 99.33% | 98.44% | 98.23% | 97.68% | 97.58% | 97.15% |
| L55 | 3.05 | 58.03 | 99.47% | 98.67% | 98.04% | 97.82% | 97.58% | 97.26% |
| L56 | 3.06 | 58.01 | 99.48% | 98.74% | 98.03% | 97.71% | 97.64% | 97.11% |
| L57 | 3.07 | 59.05 | 99.51% | 98.59% | 97.92% | 97.75% | 97.58% | 97.22% |
| L58 | 3.06 | 58.45 | 99.30% | 98.61% | 98.19% | 97.77% | 97.35% | 97.27% |
| L59 | 3.07 | 58.18 | 99.55% | 98.71% | 98.18% | 97.69% | 97.51% | 97.17% |
| L60 | 3.06 | 58.77 | 99.46% | 98.47% | 98.15% | 97.68% | 97.46% | 97.00% |
| L61 | 3.06 | 58.62 | 99.51% | 98.65% | 98.11% | 97.72% | 97.59% | 97.10% |
| L62 | 3.07 | 58.04 | 99.48% | 98.74% | 98.02% | 97.69% | 97.57% | 97.08% |
| L63 | 3.07 | 58.44 | 99.32% | 98.61% | 98.25% | 98.00% | 97.55% | 97.01% |
| L64 | 3.07 | 59.19 | 99.59% | 98.65% | 98.21% | 97.70% | 97.53% | 97.09% |
| L65 | 3.06 | 59.21 | 99.53% | 98.67% | 98.23% | 97.81% | 97.48% | 97.00% |
| L66 | 3.07 | 58.02 | 99.50% | 98.67% | 98.00% | 97.86% | 97.52% | 97.16% |
| L67 | 3.07 | 58.07 | 99.29% | 98.73% | 98.36% | 97.76% | 97.44% | 97.29% |
| L68 | 3.07 | 58.91 | 99.51% | 98.64% | 98.05% | 97.86% | 97.54% | 97.21% |
| L69 | 3.07 | 59.65 | 99.36% | 98.42% | 98.11% | 97.71% | 97.45% | 97.13% |
| L70 | 3.09 | 58.68 | 99.49% | 98.42% | 98.21% | 97.79% | 97.54% | 97.20% |
| L71 | 3.06 | 58.40 | 99.37% | 98.73% | 98.20% | 97.77% | 97.65% | 97.26% |
| L72 | 3.06 | 58.60 | 99.52% | 98.67% | 98.28% | 97.77% | 97.54% | 97.01% |
| L73 | 3.07 | 58.72 | 99.52% | 98.65% | 98.19% | 97.66% | 97.34% | 97.21% |
| L74 | 3.05 | 58.36 | 99.57% | 98.54% | 98.25% | 97.85% | 97.40% | 97.10% |
| L75 | 3.06 | 58.43 | 99.67% | 98.63% | 98.20% | 97.68% | 97.54% | 97.04% |
| AV | 3.06 | 58.51 | 99.48% | 98.61% | 98.15% | 97.76% | 97.51% | 97.15% |
| MIN | 3.05 | 57.39 | 99.29% | 98.42% | 97.92% | 97.66% | 97.33% | 97.00% |
| MAX | 3.09 | 59.65 | 99.67% | 98.74% | 98.36% | 98.00% | 97.65% | 97.29% |
| STDEV | 0.0072 | 0.4806 | 0.0010 | 0.0010 | 0.0011 | 0.0008 | 0.0009 | 0.0009 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

| | |
|--------------------------------------|------------|
| Description of Light Sources Tested: | LY-SMD2835 |
| Case Temperature: | 104.6°C |
| Ambient Temperature: | 103.2°C |
| Drive Current: | 150 mA |
| Measure Current: | 150 mA |
| Failures Observed: | None |

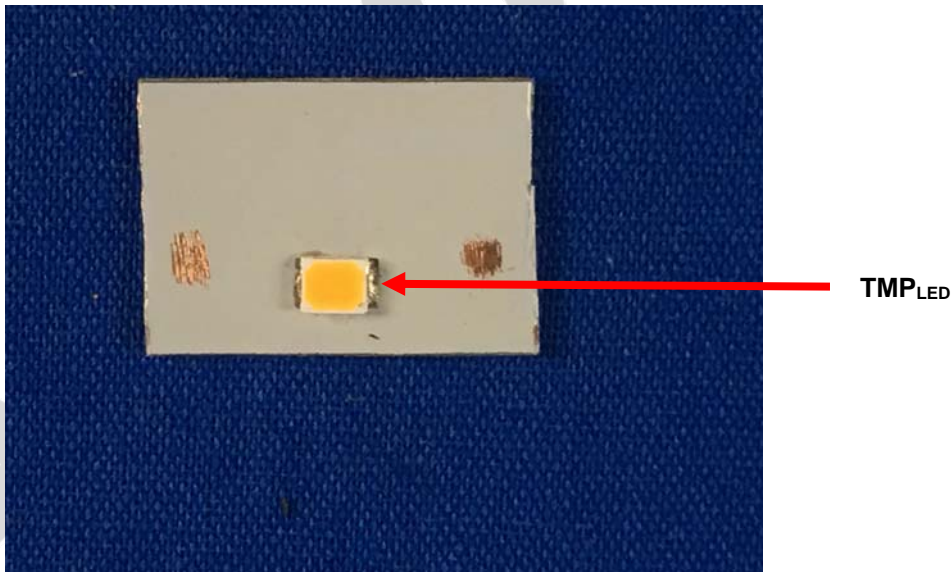
Chromaticity Shift ($\Delta u'v'$)

| Sample No. | u' | v' | CCT(K) | 1000hrs | 2000hrs | 3000hrs | 4000hrs | 5000hrs | 6000hrs |
|------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| L51 | 0.2365 | 0.5138 | 3449 | 0.0007 | 0.0009 | 0.0014 | 0.0018 | 0.0026 | 0.0032 |
| L52 | 0.2325 | 0.5078 | 3644 | 0.0007 | 0.0010 | 0.0015 | 0.0017 | 0.0025 | 0.0033 |
| L53 | 0.2386 | 0.5131 | 3393 | 0.0006 | 0.0009 | 0.0016 | 0.0019 | 0.0027 | 0.0033 |
| L54 | 0.2364 | 0.5141 | 3449 | 0.0006 | 0.0010 | 0.0015 | 0.0018 | 0.0025 | 0.0031 |
| L55 | 0.2341 | 0.5124 | 3537 | 0.0005 | 0.0011 | 0.0013 | 0.0019 | 0.0026 | 0.0033 |
| L56 | 0.2364 | 0.5128 | 3462 | 0.0007 | 0.0012 | 0.0014 | 0.0018 | 0.0024 | 0.0033 |
| L57 | 0.2346 | 0.5127 | 3520 | 0.0006 | 0.0008 | 0.0015 | 0.0019 | 0.0025 | 0.0033 |
| L58 | 0.2383 | 0.5135 | 3399 | 0.0004 | 0.0008 | 0.0016 | 0.0018 | 0.0025 | 0.0034 |
| L59 | 0.2370 | 0.5097 | 3476 | 0.0008 | 0.0009 | 0.0015 | 0.0019 | 0.0025 | 0.0031 |
| L60 | 0.2361 | 0.5134 | 3465 | 0.0007 | 0.0010 | 0.0015 | 0.0020 | 0.0023 | 0.0032 |
| L61 | 0.2341 | 0.5125 | 3538 | 0.0006 | 0.0012 | 0.0016 | 0.0019 | 0.0027 | 0.0033 |
| L62 | 0.2379 | 0.5150 | 3393 | 0.0006 | 0.0011 | 0.0017 | 0.0018 | 0.0025 | 0.0032 |
| L63 | 0.2379 | 0.5129 | 3416 | 0.0006 | 0.0010 | 0.0013 | 0.0021 | 0.0024 | 0.0032 |
| L64 | 0.2346 | 0.5123 | 3522 | 0.0007 | 0.0010 | 0.0014 | 0.0019 | 0.0024 | 0.0034 |
| L65 | 0.2361 | 0.5156 | 3442 | 0.0004 | 0.0010 | 0.0014 | 0.0019 | 0.0023 | 0.0032 |
| L66 | 0.2380 | 0.5152 | 3390 | 0.0007 | 0.0012 | 0.0014 | 0.0019 | 0.0026 | 0.0034 |
| L67 | 0.2383 | 0.5140 | 3392 | 0.0006 | 0.0009 | 0.0013 | 0.0020 | 0.0025 | 0.0033 |
| L68 | 0.2382 | 0.5149 | 3387 | 0.0006 | 0.0008 | 0.0015 | 0.0021 | 0.0026 | 0.0034 |
| L69 | 0.2349 | 0.5129 | 3507 | 0.0006 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0032 |
| L70 | 0.2365 | 0.5138 | 3448 | 0.0005 | 0.0009 | 0.0015 | 0.0019 | 0.0023 | 0.0032 |
| L71 | 0.2357 | 0.5133 | 3478 | 0.0005 | 0.0008 | 0.0016 | 0.0021 | 0.0026 | 0.0031 |
| L72 | 0.2368 | 0.5141 | 3437 | 0.0006 | 0.0009 | 0.0016 | 0.0020 | 0.0024 | 0.0033 |
| L73 | 0.2364 | 0.5145 | 3445 | 0.0007 | 0.0009 | 0.0016 | 0.0020 | 0.0027 | 0.0033 |
| L74 | 0.2342 | 0.5125 | 3534 | 0.0004 | 0.0010 | 0.0015 | 0.0020 | 0.0023 | 0.0032 |
| L75 | 0.2372 | 0.5138 | 3428 | 0.0006 | 0.0009 | 0.0014 | 0.0017 | 0.0025 | 0.0033 |
| AV | 0.2363 | 0.5132 | 3462 | 0.0006 | 0.0010 | 0.0015 | 0.0019 | 0.0025 | 0.0033 |
| MIN | 0.2325 | 0.5078 | 3387 | 0.0004 | 0.0008 | 0.0013 | 0.0017 | 0.0023 | 0.0031 |
| MAX | 0.2386 | 0.5156 | 3644 | 0.0008 | 0.0012 | 0.0017 | 0.0021 | 0.0027 | 0.0034 |
| STDEV | 0.0016 | 0.0017 | 62 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Number | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

7 TM-21 Projection

| Table 1: Report at each LM-80 Test Condition | | | | | |
|--|---------------|--|---------------|--|---------------|
| Description of LED Light Source Tested (manufacturer, model, catalog number) | | SHENZHEN LEPOWER OPTO ELECTRONIC CORP., LTD LY-SMD2835 | | | |
| Test Condition 1 - 55° C Case | | Test Condition 2 - 85° C Case | | Test Condition 3 - 105° C Case | |
| Sample size | 25 | Sample size | 25 | Sample size | 25 |
| Number of failures | 0 | Number of failures | 0 | Number of failures | 0 |
| DUT drive current used in the test (mA) | 150 | DUT drive current used in the test (mA) | 150 | DUT drive current used in the test (mA) | 150 |
| Test duration (hours) | 6,000 | Test duration (hours) | 6,000 | Test duration (hours) | 6,000 |
| Test duration used for projection (hour to hour) | 1,000 - 6,000 | Test duration used for projection (hour to hour) | 1,000 - 6,000 | Test duration used for projection (hour to hour) | 1,000 - 6,000 |
| Tested case temperature (° C) | 55 | Tested case temperature (° C) | 85 | Tested case temperature (° C) | 105 |
| α | 4.408E-06 | α | 4.292E-06 | α | 4.461E-06 |
| B | 1.007 | B | 1.001 | B | 0.997 |
| Calculated L70(6k) (hours) | 83,000 | Calculated L70(6k) (hours) | 83,000 | Calculated L70(6k) (hours) | 79,000 |
| Reported L70(6k) (hours) | >36000 | Reported L70(6k) (hours) | >36000 | Reported L70(6k) (hours) | >36000 |

8 Product Photo



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