





## Test Summary

| Life test condition |              |                       | Summary of result |                                |  |  |   |
|---------------------|--------------|-----------------------|-------------------|--------------------------------|--|--|---|
| Test condition      | Current (mA) | Case temperature (°C) | Test duration (h) | Average Photon maintenance (%) | Maximum chromaticity shift ( $\Delta u'v'$ ) | Average Power Density (W/mm <sup>2</sup> ) | Average Current Density (mA/mm <sup>2</sup> ) |
| 1                   | 700          | 55                    | 9000              | 97.44%                         | 0.0028                                       | 0.1680                                     | 58.8112                                       |
| 2                   | 700          | 85                    | 9000              | 97.08%                         | 0.0030                                       |  |   |
| 3                   | 700          | 105                   | 9000              | 96.77%                         | 0.0032                                       |  |   |

### 1. Number of LED Light Sources tested

- 25 Packages tested at actual case temperature 55.9°C
- 25 Packages tested at actual case temperature 85.7°C
- 25 Packages tested at actual case temperature 105.5°C

### 2. Description of LED Light Sources

- Part Number: RF—C35\*1—RBD—FR
- Part Type: PL 3535 660NM LED package
- IF =700mA, CCT(Nominal) = 1000-1500K

### 3. Description of auxiliary equipment

- 1) EVERFINE LT-200A Accelerated Aging-Life Test System for LEDs
- 2) Instrument Integrating sphere 0.5m
- 3) SENSING SPR-3000 Photometric, Colorimetric& Electric System for Light Sources

### 4. Operating time

LED packages are driven with a constant direct current.

- Number of units : 25 at 55°C, 85°C and 105°C
- Drive current : 700mA
- Typical voltage : 1.8-2.4V



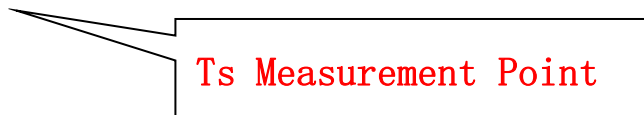
### 5. Ambient conditions including airflow, temperature and relative humidity

The minimal airflow is maintained in chamber.

The ambient temperature around the LED packages inside chamber is controlled by air flowing and the thermocouple readings are monitored.

- Case temperature : Contorlled to -2°C
- Surrounding air temperature : Contorlled to -5°C
- Relative humidity : 65%RH

### 6. Case temperature (Test point temperature)



### 7. Drive current of the LED Light Sources during lifetime test

See Sub-clause 9.1, 9.2 and 9.3

### 8. Initial luminous flux and forward voltage

See the table

### 9. Lumen maintenance data for each individual LED Light Sources

See the table

| Quantity | Model           | Serial Number   |
|----------|-----------------|-----------------|
| 25       | RF-C35*1-RBD-FR | A01-A25 (55°C)  |
| 25       | RF-C35*1-RBD-FR | B01-B25 (85°C)  |
| 25       | RF-C35*1-RBD-FR | C01-C25 (105°C) |



**9.1 Test condition 1: 55 °C, Drive Current : 700mA**

| Item    | V <sub>F</sub> (V) | PPF    | Ra     | T=55°C Photon Maintenance (%) |        |        |        |        |        |        |        |        |
|---------|--------------------|--------|--------|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|         |                    |        |        | 0 h                           |        |        | 1000h  | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  |
| A01     | 2.30               | 3.4210 | 14.3   | 100.14                        | 99.94  | 99.38  | 99.03  | 98.88  | 98.50  | 98.27  | 97.83  | 97.49  |
| A02     | 2.34               | 3.3876 | 14.2   | 100.09                        | 99.89  | 99.33  | 99.05  | 98.81  | 98.38  | 98.13  | 97.78  | 97.44  |
| A03     | 2.29               | 3.3864 | 14.8   | 100.02                        | 99.84  | 99.32  | 98.99  | 98.92  | 98.42  | 98.28  | 97.79  | 97.58  |
| A04     | 2.28               | 3.3907 | 14.6   | 100.05                        | 99.92  | 99.27  | 98.95  | 98.84  | 98.38  | 98.24  | 97.69  | 97.43  |
| A05     | 2.34               | 3.4181 | 14.9   | 99.91                         | 99.89  | 99.25  | 99.03  | 98.90  | 98.30  | 98.54  | 97.77  | 97.48  |
| A06     | 2.33               | 3.3921 | 14.0   | 99.99                         | 99.87  | 99.35  | 98.98  | 98.82  | 98.38  | 98.26  | 97.80  | 97.49  |
| A07     | 2.27               | 3.4122 | 15.1   | 100.09                        | 99.95  | 99.39  | 99.06  | 98.87  | 98.44  | 98.38  | 97.73  | 97.57  |
| A08     | 2.31               | 3.4032 | 14.8   | 99.98                         | 99.91  | 99.33  | 99.05  | 98.80  | 98.35  | 98.53  | 97.71  | 97.52  |
| A09     | 2.33               | 3.4113 | 14.1   | 100.25                        | 100.15 | 99.51  | 99.09  | 98.79  | 98.32  | 98.46  | 97.77  | 97.48  |
| A10     | 2.30               | 3.3889 | 14.3   | 99.99                         | 99.99  | 99.45  | 98.97  | 98.80  | 98.45  | 98.38  | 97.73  | 97.35  |
| A11     | 2.29               | 3.3899 | 14.8   | 100.08                        | 99.94  | 99.39  | 99.03  | 98.74  | 98.36  | 98.24  | 97.78  | 97.33  |
| A12     | 2.31               | 3.3915 | 14.6   | 100.09                        | 100.01 | 99.44  | 99.00  | 98.79  | 98.41  | 98.28  | 97.69  | 97.51  |
| A13     | 2.33               | 3.3921 | 14.4   | 99.97                         | 99.99  | 99.42  | 99.05  | 98.71  | 98.32  | 98.16  | 97.71  | 97.36  |
| A14     | 2.35               | 3.4131 | 14.7   | 99.92                         | 99.87  | 99.34  | 98.99  | 98.77  | 98.28  | 98.30  | 97.80  | 97.42  |
| A15     | 2.32               | 3.3954 | 14.1   | 100.04                        | 99.99  | 99.45  | 99.03  | 98.70  | 98.42  | 98.13  | 97.69  | 97.35  |
| A16     | 2.30               | 3.4145 | 14.9   | 100.09                        | 99.88  | 99.33  | 98.99  | 98.77  | 98.43  | 98.24  | 97.71  | 97.35  |
| A17     | 2.33               | 3.3894 | 15.0   | 100.17                        | 99.99  | 99.42  | 99.05  | 98.69  | 98.39  | 98.14  | 97.76  | 97.52  |
| A18     | 2.36               | 3.3967 | 13.9   | 99.99                         | 99.90  | 99.35  | 99.00  | 98.74  | 98.38  | 98.16  | 97.79  | 97.47  |
| A19     | 2.32               | 3.4057 | 14.8   | 100.12                        | 99.93  | 99.38  | 99.02  | 98.80  | 98.45  | 98.27  | 97.73  | 97.45  |
| A20     | 2.35               | 3.4203 | 14.6   | 100.17                        | 99.99  | 99.45  | 99.05  | 98.71  | 98.43  | 98.17  | 97.79  | 97.38  |
| A21     | 2.30               | 3.4118 | 14.1   | 99.91                         | 99.92  | 99.41  | 98.99  | 98.76  | 98.29  | 98.17  | 97.71  | 97.40  |
| A22     | 2.30               | 3.3974 | 14.2   | 99.99                         | 99.90  | 99.32  | 99.03  | 98.69  | 98.34  | 98.23  | 97.72  | 97.36  |
| A23     | 2.33               | 3.3962 | 15.1   | 100.07                        | 99.97  | 99.44  | 99.01  | 98.75  | 98.45  | 98.39  | 97.76  | 97.51  |
| A24     | 2.35               | 3.3854 | 14.0   | 100.11                        | 99.96  | 99.40  | 99.05  | 98.71  | 98.31  | 98.14  | 97.73  | 97.42  |
| A25     | 2.33               | 3.3889 | 14.9   | 100.17                        | 99.97  | 99.39  | 99.05  | 98.66  | 98.40  | 98.38  | 97.74  | 97.45  |
| Avg.    | 2.32               | 3.4000 | 14.5   | 100.06                        | 99.94  | 99.38  | 99.02  | 98.78  | 98.38  | 98.27  | 97.75  | 97.44  |
| Med.    | 2.32               | 3.3962 | 14.6   | 100.07                        | 99.94  | 99.39  | 99.03  | 98.77  | 98.38  | 98.26  | 97.74  | 97.45  |
| ST dev. | 0.0239             | 0.0119 | 0.3803 | 0.0888                        | 0.0636 | 0.0615 | 0.0334 | 0.0694 | 0.0583 | 0.1207 | 0.0402 | 0.0717 |
| Max.    | 2.36               | 3.4210 | 15.1   | 100.25                        | 100.15 | 99.51  | 99.09  | 98.92  | 98.50  | 98.54  | 97.83  | 97.58  |
| Min.    | 2.27               | 3.3854 | 13.9   | 99.91                         | 99.84  | 99.25  | 98.95  | 98.66  | 98.28  | 98.13  | 97.69  | 97.33  |





**9.2 Test condition 2: 85 °C, Drive Current : 700mA**

| Item    | V <sub>F</sub> (V) | PPF    | Ra     | T=85°C Photon Maintenance (%) |        |        |        |        |        |        |        |        |
|---------|--------------------|--------|--------|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|         |                    |        |        | 0 h                           | 1000h  | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  |
| B01     | 2.31               | 3.4104 | 14.3   | 99.98                         | 99.82  | 99.20  | 98.87  | 98.56  | 98.02  | 97.88  | 97.55  | 97.16  |
| B02     | 2.37               | 3.3880 | 14.5   | 100.16                        | 99.88  | 99.22  | 98.81  | 98.54  | 98.09  | 97.93  | 97.60  | 97.13  |
| B03     | 2.30               | 3.3890 | 14.5   | 100.08                        | 99.86  | 99.20  | 98.83  | 98.53  | 98.03  | 97.92  | 97.57  | 97.13  |
| B04     | 2.26               | 3.3906 | 15.1   | 99.97                         | 99.79  | 99.19  | 98.82  | 98.56  | 98.09  | 97.89  | 97.54  | 97.07  |
| B05     | 2.35               | 3.3912 | 15.5   | 99.93                         | 99.81  | 99.21  | 98.76  | 98.52  | 97.92  | 97.96  | 97.58  | 97.04  |
| B06     | 2.37               | 3.4122 | 13.5   | 100.08                        | 99.87  | 99.20  | 98.77  | 98.53  | 98.07  | 97.91  | 97.62  | 97.08  |
| B07     | 2.27               | 3.3945 | 15.5   | 100.05                        | 99.89  | 99.19  | 98.81  | 98.52  | 98.03  | 97.87  | 97.51  | 97.05  |
| B08     | 2.34               | 3.4136 | 15.0   | 99.98                         | 99.81  | 99.24  | 98.83  | 98.53  | 98.01  | 97.93  | 97.54  | 97.04  |
| B09     | 2.31               | 3.4201 | 13.8   | 99.97                         | 99.82  | 99.18  | 98.79  | 98.54  | 97.90  | 97.84  | 97.58  | 97.12  |
| B10     | 2.28               | 3.3867 | 14.1   | 100.02                        | 99.92  | 99.20  | 98.87  | 98.59  | 98.05  | 97.88  | 97.53  | 97.07  |
| B11     | 2.30               | 3.3855 | 15.5   | 99.98                         | 99.81  | 99.14  | 98.80  | 98.52  | 97.99  | 97.93  | 97.54  | 96.99  |
| B12     | 2.34               | 3.3898 | 14.2   | 100.00                        | 99.87  | 99.22  | 98.81  | 98.53  | 98.02  | 97.96  | 97.58  | 96.98  |
| B13     | 2.34               | 3.4172 | 14.9   | 99.90                         | 99.80  | 99.19  | 98.76  | 98.54  | 97.93  | 97.92  | 97.63  | 97.11  |
| B14     | 2.33               | 3.3912 | 15.2   | 99.96                         | 99.85  | 99.21  | 98.77  | 98.55  | 97.91  | 97.95  | 97.51  | 97.12  |
| B15     | 2.34               | 3.3885 | 13.9   | 99.97                         | 99.89  | 99.20  | 98.75  | 98.46  | 97.92  | 97.97  | 97.53  | 97.06  |
| B16     | 2.27               | 3.3958 | 15.3   | 99.95                         | 99.90  | 99.25  | 98.81  | 98.55  | 98.00  | 97.96  | 97.54  | 97.11  |
| B17     | 2.29               | 3.4048 | 15.2   | 99.98                         | 99.88  | 99.24  | 98.80  | 98.51  | 98.03  | 97.91  | 97.57  | 97.07  |
| B18     | 2.38               | 3.4194 | 14.4   | 99.99                         | 99.81  | 99.19  | 98.84  | 98.52  | 98.05  | 97.84  | 97.55  | 97.09  |
| B19     | 2.33               | 3.4109 | 14.4   | 100.02                        | 99.82  | 99.17  | 98.86  | 98.50  | 97.96  | 97.88  | 97.58  | 97.11  |
| B20     | 2.30               | 3.3965 | 15.3   | 100.04                        | 99.78  | 99.21  | 98.76  | 98.46  | 98.04  | 97.93  | 97.63  | 97.05  |
| B21     | 2.29               | 3.3953 | 14.5   | 100.00                        | 99.83  | 99.20  | 98.85  | 98.44  | 97.92  | 97.94  | 97.51  | 97.07  |
| B22     | 2.31               | 3.3845 | 13.9   | 100.01                        | 99.78  | 99.19  | 98.80  | 98.52  | 98.03  | 97.87  | 97.57  | 97.09  |
| B23     | 2.31               | 3.3880 | 15.0   | 99.99                         | 99.76  | 99.17  | 98.81  | 98.45  | 98.09  | 97.92  | 97.55  | 97.13  |
| B24     | 2.32               | 3.4113 | 14.4   | 100.05                        | 99.85  | 99.15  | 98.84  | 98.53  | 97.91  | 97.91  | 97.54  | 97.06  |
| B25     | 2.32               | 3.4023 | 15.1   | 100.00                        | 99.93  | 99.28  | 98.83  | 98.59  | 99.00  | 99.08  | 97.77  | 97.13  |
| Avg.    | 2.32               | 3.3991 | 14.7   | 100.00                        | 99.84  | 99.20  | 98.81  | 98.52  | 98.04  | 97.96  | 97.57  | 97.08  |
| Med.    | 2.31               | 3.3953 | 14.5   | 99.99                         | 99.83  | 99.20  | 98.81  | 98.53  | 98.02  | 97.92  | 97.55  | 97.08  |
| ST dev. | 0.0321             | 0.0119 | 0.5902 | 0.0537                        | 0.0462 | 0.0302 | 0.0350 | 0.0383 | 0.2093 | 0.2363 | 0.0543 | 0.0441 |
| Max.    | 2.38               | 3.4201 | 15.5   | 100.16                        | 99.93  | 99.28  | 98.87  | 98.59  | 99.00  | 99.08  | 97.77  | 97.16  |
| Min.    | 2.26               | 3.3845 | 13.5   | 99.90                         | 99.76  | 99.14  | 98.75  | 98.44  | 97.90  | 97.84  | 97.51  | 96.98  |



**9.2.1 Test condition 2: 85 °C, Drive Current : 700mA**

| No.     | T=85°C Chromaticity Shift ( u'v') |        |        |        |        |        |        |        |        |        |        |        |
|---------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|         | 0 h                               |        |        | 1000h  | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  | 9000h  |
|         | u'                                | v'     | CCT(K) |        |        |        |        |        |        |        |        |        |
| B01     | 0.5848                            | 0.5111 | 1010   | 0.0003 | 0.0007 | 0.0009 | 0.0011 | 0.0013 | 0.0018 | 0.0023 | 0.0026 | 0.0028 |
| B02     | 0.5840                            | 0.5111 | 1010   | 0.0003 | 0.0005 | 0.0006 | 0.0008 | 0.0012 | 0.0016 | 0.0022 | 0.0027 | 0.003  |
| B03     | 0.5843                            | 0.5114 | 1004   | 0.0002 | 0.0004 | 0.0005 | 0.0008 | 0.0012 | 0.0016 | 0.0023 | 0.0027 | 0.0029 |
| B04     | 0.5838                            | 0.5118 | 1010   | 0.0003 | 0.0007 | 0.0008 | 0.0011 | 0.0016 | 0.0019 | 0.0021 | 0.0025 | 0.0027 |
| B05     | 0.5843                            | 0.5112 | 1001   | 0.0002 | 0.0005 | 0.0007 | 0.0012 | 0.0015 | 0.0021 | 0.0022 | 0.0026 | 0.0029 |
| B06     | 0.5842                            | 0.5115 | 1007   | 0.0004 | 0.0008 | 0.0008 | 0.0011 | 0.0017 | 0.0021 | 0.0023 | 0.0028 | 0.003  |
| B07     | 0.5849                            | 0.5116 | 1011   | 0.0002 | 0.0006 | 0.0008 | 0.0009 | 0.0014 | 0.0018 | 0.0021 | 0.0027 | 0.0028 |
| B08     | 0.5845                            | 0.5110 | 1002   | 0.0004 | 0.0008 | 0.0009 | 0.001  | 0.0016 | 0.0018 | 0.0023 | 0.0026 | 0.0029 |
| B09     | 0.5838                            | 0.5116 | 1009   | 0.0003 | 0.0007 | 0.0008 | 0.0011 | 0.0017 | 0.0021 | 0.0025 | 0.003  | 0.0032 |
| B10     | 0.5839                            | 0.5118 | 1006   | 0.0002 | 0.0006 | 0.0007 | 0.0012 | 0.0016 | 0.0019 | 0.0025 | 0.0031 | 0.0032 |
| B11     | 0.5843                            | 0.5120 | 1009   | 0.0003 | 0.0005 | 0.0005 | 0.0007 | 0.0013 | 0.0018 | 0.0022 | 0.0026 | 0.0028 |
| B12     | 0.5842                            | 0.5119 | 1005   | 0.0002 | 0.0006 | 0.0008 | 0.0011 | 0.0015 | 0.0018 | 0.0023 | 0.0027 | 0.003  |
| B13     | 0.5838                            | 0.5116 | 1012   | 0.0003 | 0.0005 | 0.0007 | 0.0012 | 0.0014 | 0.0019 | 0.0025 | 0.0029 | 0.003  |
| B14     | 0.5849                            | 0.5116 | 1002   | 0.0002 | 0.0006 | 0.0008 | 0.0011 | 0.0016 | 0.0021 | 0.0024 | 0.0028 | 0.003  |
| B15     | 0.5841                            | 0.5118 | 1005   | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0016 | 0.002  | 0.0023 | 0.0029 | 0.0031 |
| B16     | 0.5843                            | 0.5113 | 1008   | 0.0003 | 0.0005 | 0.0007 | 0.0012 | 0.0015 | 0.002  | 0.0024 | 0.0027 | 0.0028 |
| B17     | 0.5845                            | 0.5116 | 1004   | 0.0004 | 0.0007 | 0.0009 | 0.0009 | 0.0016 | 0.0019 | 0.0023 | 0.0027 | 0.0031 |
| B18     | 0.5848                            | 0.5116 | 1004   | 0.0002 | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0019 | 0.0025 | 0.0029 | 0.003  |
| B19     | 0.5844                            | 0.5112 | 1013   | 0.0003 | 0.0005 | 0.0006 | 0.001  | 0.0014 | 0.002  | 0.0023 | 0.0028 | 0.0031 |
| B20     | 0.5843                            | 0.5113 | 1018   | 0.0002 | 0.0006 | 0.0007 | 0.0009 | 0.0013 | 0.0018 | 0.0025 | 0.003  | 0.0032 |
| B21     | 0.5849                            | 0.5119 | 1001   | 0.0003 | 0.0007 | 0.0008 | 0.001  | 0.0017 | 0.0022 | 0.0026 | 0.0027 | 0.003  |
| B22     | 0.5842                            | 0.5113 | 1000   | 0.0004 | 0.0008 | 0.0009 | 0.0011 | 0.0015 | 0.002  | 0.0024 | 0.0027 | 0.003  |
| B23     | 0.5846                            | 0.5113 | 1011   | 0.0002 | 0.0004 | 0.0008 | 0.0012 | 0.0015 | 0.002  | 0.0023 | 0.0027 | 0.003  |
| B24     | 0.5846                            | 0.5121 | 1004   | 0.0004 | 0.0006 | 0.0008 | 0.001  | 0.0017 | 0.0021 | 0.0025 | 0.0028 | 0.0029 |
| B25     | 0.5841                            | 0.5115 | 1003   | 0.0002 | 0.0007 | 0.0007 | 0.0011 | 0.0014 | 0.002  | 0.0024 | 0.0027 | 0.0029 |
| Avg.    | 0.5843                            | 0.5115 | 1007   | 0.0003 | 0.0006 | 0.0008 | 0.0010 | 0.0015 | 0.0019 | 0.0023 | 0.0028 | 0.0030 |
| Med.    | 0.5843                            | 0.5116 | 1006   | 0.0003 | 0.0006 | 0.0008 | 0.0011 | 0.0015 | 0.0019 | 0.0023 | 0.0027 | 0.0030 |
| ST dev. | 0.0003                            | 0.0003 | 4.4747 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 |
| Max.    | 0.5849                            | 0.5121 | 1018   | 0.0004 | 0.0008 | 0.0009 | 0.0013 | 0.0017 | 0.0022 | 0.0026 | 0.0031 | 0.0032 |
| Min.    | 0.5838                            | 0.5110 | 1000   | 0.0002 | 0.0004 | 0.0005 | 0.0007 | 0.0012 | 0.0016 | 0.0021 | 0.0025 | 0.0027 |



**9.3 Test condition 3: 105 °C, Drive Current : 700mA**

| Item | V <sub>F</sub> (V) | PPF | Ra | T=105°C Photon Maintenance (%) |       |       |       |          |
|------|--------------------|-----|----|--------------------------------|-------|-------|-------|----------|
| No.  |                    | 0 h |    | 1000h                          | 2000h | 3000h | 4000h | -0Mriv N |





9.3.1 Test condition 3: 105 °C, Drive Current : 700mA

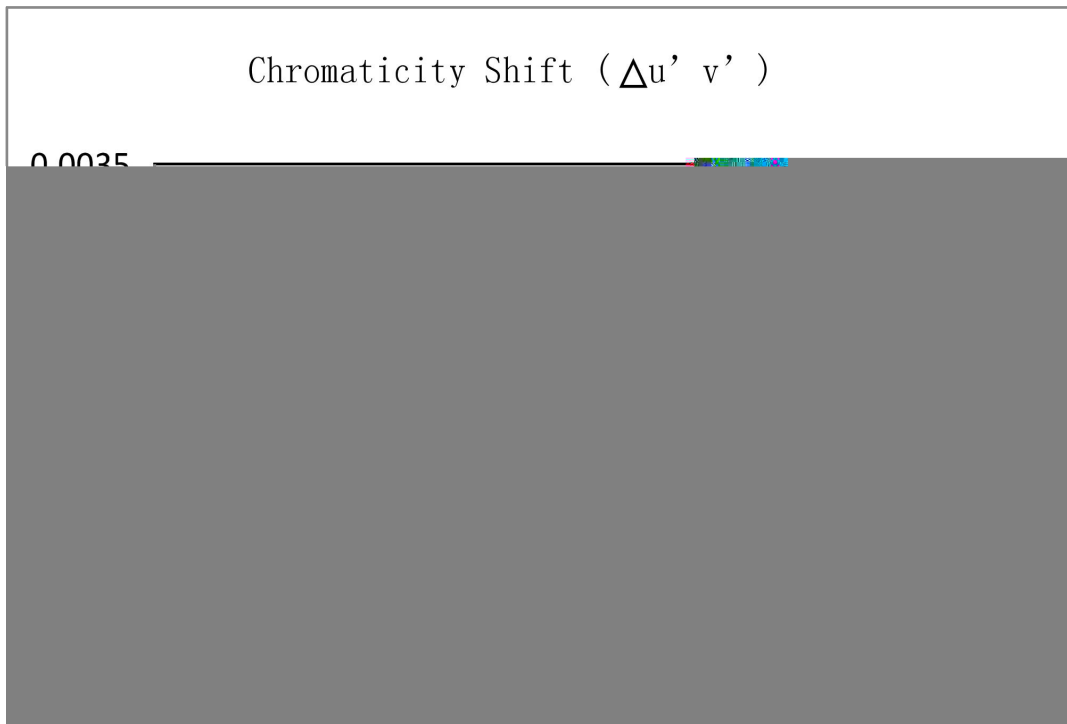
T=105°C Chromaticity Shift ( u'v')

| No.  | 0 h    |        | CCT(K) | 1000h  | 2000h  | 3000h  | 4000h  | 5000h  | 6000h  | 7000h  | 8000h  | 9000h  |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|      | u'     | v'     |        |        |        |        |        |        |        |        |        |        |
| C01  | 0.5846 | 0.5196 | 1006   | 0.0003 | 0.0007 | 0.0009 | 0.0013 | 0.0019 | 0.0021 | 0.0026 | 0.0026 | 0.003  |
| C02  | 0.5841 | 0.5109 | 1011   | 0.0003 | 0.0006 | 0.001  | 0.0012 | 0.0017 | 0.002  | 0.0027 | 0.0029 | 0.0031 |
| C03  | 0.5845 | 0.5113 | 1003   | 0.0004 | 0.0007 | 0.0011 | 0.0013 | 0.0017 | 0.0021 | 0.0026 | 0.003  | 0.0032 |
| C04  | 0.5841 | 0.5114 | 1012   | 0.0003 | 0.0008 | 0.0011 | 0.0014 | 0.0019 | 0.0023 | 0.003  | 0.0032 | 0.0034 |
| C05  | 0.5843 | 0.5114 | 1003   | 0.0002 | 0.0007 | 0.0008 | 0.0013 | 0.0017 | 0.002  | 0.0025 | 0.0027 | 0.0031 |
| C06  | 0.5839 | 0.5114 | 1013   | 0.0004 | 0.0005 | 0.0008 | 0.0013 | 0.0016 | 0.0021 | 0.0026 | 0.0029 | 0.003  |
| C07  | 0.5851 | 0.5113 | 1011   | 0.0003 | 0.0007 | 0.001  | 0.0015 | 0.0019 | 0.0022 | 0.0028 | 0.003  | 0.0031 |
| C08  | 0.5847 | 0.5111 | 1009   | 0.0004 | 0.0006 | 0.0009 | 0.0012 | 0.0017 | 0.0021 | 0.0026 | 0.0029 | 0.0032 |
| C09  | 0.5836 | 0.5116 | 1014   | 0.0002 | 0.0007 | 0.0008 | 0.0013 | 0.002  | 0.0023 | 0.0027 | 0.0029 | 0.0031 |
| C10  | 0.5840 | 0.5121 | 1009   | 0.0003 | 0.0008 | 0.0011 | 0.0014 | 0.0021 | 0.0024 | 0.0028 | 0.0031 | 0.0033 |
| C11  | 0.5841 | 0.5119 | 1010   | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0021 | 0.0027 | 0.003  | 0.0032 |
| C12  | 0.5844 | 0.5121 | 1007   | 0.0003 | 0.0006 | 0.0008 | 0.0015 | 0.002  | 0.002  | 0.0026 | 0.0028 | 0.0031 |
| C13  | 0.5835 | 0.5117 | 1013   | 0.0004 | 0.0005 | 0.0007 | 0.0012 | 0.0017 | 0.0021 | 0.0028 | 0.003  | 0.0032 |
| C14  | 0.5852 | 0.5115 | 1001   | 0.0002 | 0.0007 | 0.0008 | 0.0013 | 0.0017 | 0.0022 | 0.0026 | 0.0029 | 0.0031 |
| C15  | 0.5843 | 0.5118 | 1001   | 0.0005 | 0.0006 | 0.0007 | 0.0014 | 0.0019 | 0.0021 | 0.0026 | 0.003  | 0.0033 |
| C16  | 0.5844 | 0.5111 | 1013   | 0.0003 | 0.0008 | 0.0011 | 0.0013 | 0.002  | 0.0022 | 0.003  | 0.0032 | 0.0033 |
| C17  | 0.5847 | 0.5119 | 1007   | 0.0003 | 0.0007 | 0.001  | 0.0013 | 0.0017 | 0.0021 | 0.0028 | 0.0028 | 0.0032 |
| C18  | 0.5850 | 0.5118 | 1006   | 0.0004 | 0.0006 | 0.0009 | 0.0013 | 0.0018 | 0.0023 | 0.003  | 0.0031 | 0.0034 |
| C19  | 0.5842 | 0.5115 | 1014   | 0.0002 | 0.0007 | 0.0012 | 0.0015 | 0.002  | 0.0022 | 0.0026 | 0.0029 | 0.0033 |
| C20  | 0.5845 | 0.5110 | 1022   | 0.0003 | 0.0005 | 0.0007 | 0.0013 | 0.0017 | 0.0021 | 0.0027 | 0.003  | 0.0032 |
| C21  | 0.5846 | 0.5118 | 1001   | 0.0002 | 0.0007 | 0.0011 | 0.0014 | 0.0019 | 0.0022 | 0.0028 | 0.0031 | 0.0033 |
| C22  | 0.5842 | 0.5112 | 1001   | 0.0004 | 0.0008 | 0.001  | 0.0013 | 0.0018 | 0.0021 | 0.0029 | 0.0032 | 0.0034 |
| C23  | 0.5845 | 0.5111 | 1018   | 0.0004 | 0.0007 | 0.0008 | 0.0014 | 0.0019 | 0.0023 | 0.003  | 0.0031 | 0.0033 |
| C24  | 0.5845 | 0.5123 | 1009   | 0.0003 | 0.0006 | 0.0009 | 0.0013 | 0.0018 | 0.0022 | 0.0028 | 0.003  | 0.0032 |
| C25  | 0.5843 | 0.5114 | 1004   | 0.0002 | 0.0007 | 0.001  | 0.0015 | 0.002  | 0.0021 | 0.0026 | 0.0028 | 0.0031 |
| Avg. | 0.5844 | 0.5118 | 1009   | 0.0003 | 0.0007 | 0.0009 | 0.0013 | 0.0018 | 0.0022 | 0.0027 | 0.0028 | 0.0031 |

0.0006" Ar @ Da \$ à à ñ Ñ Z d



#### 9.4 Chart





### 10. Observation of failures

No optical, Electrical or mechanical failure of any LED Package was seen during the lifetime testing.

### 11. Photometric measurement uncertainty

2%

### 12. TM-21-11 report: Projecting long term lumen maintenance of LED Light Sources

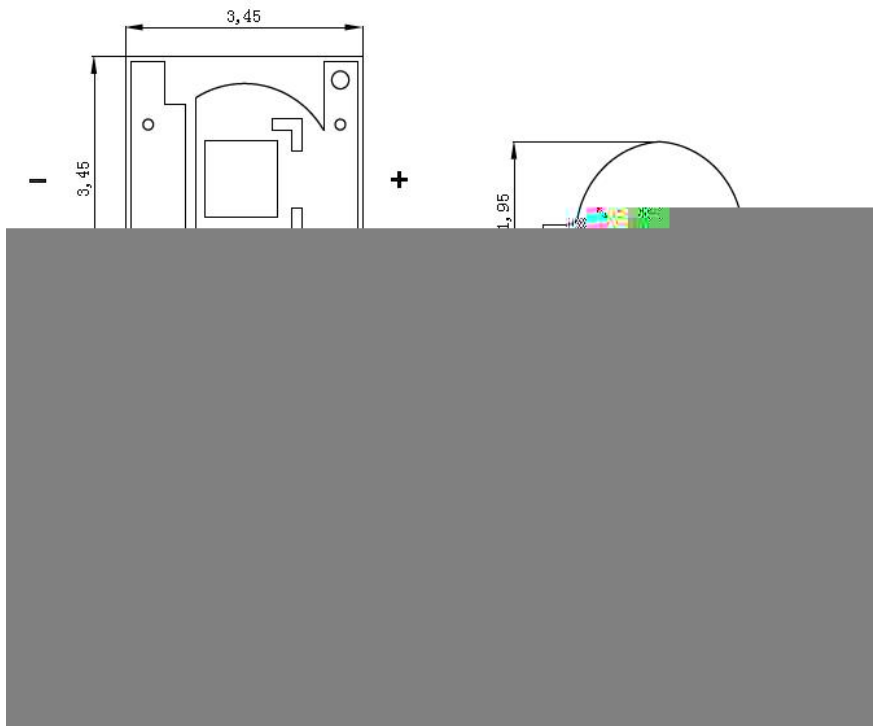
| Item               | Manufacturer | Model | Power (W) | Color Temp (K) | Beam Angle (°) | Notes |
|--------------------|--------------|-------|-----------|----------------|----------------|-------|
| [Redacted content] |              |       |           |                |                |       |

**13. ENERGY STAR® LM-80 Cover Sheet**

| <b>Administrative Information</b>                                     |   |
|---|---|
| Tested subcomponent series:   | -   |
| Tested subcomponent model number:                                     | RF—C35*1—RBD—FR   |
| Report issue date:  | January 27, 2021  |
| Report revision date (if applicable):                                 | -   |
| Testing start date:   | January 16, 2020  |
| Testing completion date:  | January 25, 2021  |
| DUT sampling method:  | LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.<br>These manufacturing lots are picked to represent a wide parametric distribution.<br>Each Sample is soldered to all of the reliability stress boards for a given set of IESNA LM-80 tests. |
| <b>DUT Identification</b>   |   |
| DUT manufacturer's name:  | SHENZHEN REFOND OPTOELECTRONICS UV<br>TECHNOLOGY CO.,LTD  |
| DUT identification, e.g., model number:                               | RF—C35*1—RBD—FR   |
| Description of DUT, including if the DUT is an LED package or module: | PL 3535 660NM LED package   |
| <b>DUT Characteristics</b>  |   |
| Total input power (W):  | 2   |
| Average current density per LED die (mA/mm <sup>2</sup> ):            | 58.8112   |
| Average power density per LED die (W/mm <sup>2</sup> ):               | 0.1680  |
| Representative CRI (Ra) of the tested sample set:                     | 13-16   |
| Minimum die edge to die edge spacing:                                 | -   |



14.Mechanical Dimensions



15. Photo of samples:



\*\*\*\*\*END OF THIS REPORT\*\*\*\*\*