



# TEST REPORT

## Of IECNA LM-80-15

<b>Kunde:</b> <i>Client:</i>	SHENZHEN REFOND OPTOELECTRONICS UV TECHNOLOGY CO.,LTD
<b>Adresse:</b> <i>Address:</i>	1-8th Floor, Building #1,10th Industrial Zone, Tian Liao Community, Gong Ming Area, Guang Ming District, Shenzhen, China
<b>Hersteller:</b> <i>Manufacturer:</i>	SHENZHEN REFOND OPTOELECTRONICS UV TECHNOLOGY CO.,LTD
<b>Adresse:</b> <i>Address:</i>	1-8th Floor, Building #1,10th Industrial Zone, Tian Liao Community, Gong Ming Area, Guang Ming District, Shenzhen, China
<b>Name der Marke:</b> <i>Brand Name:</i>	N/A
<b>Beschreibung des Produkts:</b> <i>Product Description:</i>	PL 3535 660NM LED package
<b>Modelle:</b> <i>Models:</i>	RF-C35*1-RBD-FR
<b>Bewertung:</b> <i>Rating:</i>	DC1.8-2.4V, 700mA
<b>Verfahren:</b> <i>Method:</i>	Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
<b>Prüfergebnis*:</b> <i>Test result*:</i>	

<b>Datum der Prüfung:</b> <i>Date of Test:</i>	<b>Datum der Emission:</b> <i>Date of Issue:</i>	<b>Klassifizierung:</b> <i>Classification:</i>	<b>Gegenstand der Prüfung:</b> <i>Test item:</i>
2020-01-16-2021-01-25	2021-01-27	Commission Test	LM-80 Test

**Prüflabor (Testlabor) / Testing Laboratory:**  
Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

<b>Test von/Test by:</b>	<b>Check von/Check by:</b>	<b>Genehmigt von/Approved by:</b>
Zero Huang		
Zero Huang/ Project Engineer	Ian Luo/ Director	Jesse Liu/ Manager

**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**  
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Shenzhen Southern LCS Compliance Testing Laboratory Ltd.

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## 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



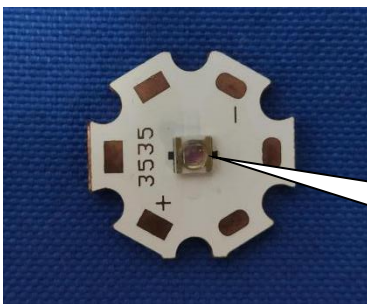
### 5. Ambient conditions including airflow, temperature and relative humidity

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)



**Ts Measurement Point**

### 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



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

No.	T=55°C Chromaticity Shift ( $\Delta u'v'$ )											
	0 h			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
	u'	v'	CCT(K)									
A01	0.5846	0.5114	1016	0.0001	0.0004	0.0007	0.0008	0.0013	0.0016	0.0019	0.0024	0.0026
A02	0.5845	0.5112	1018	0.0004	0.0006	0.0008	0.0008	0.0013	0.0017	0.0020	0.0026	0.0028
A03	0.5842	0.5117	1007	0.0002	0.0006	0.0010	0.0009	0.0014	0.0017	0.0021	0.0027	0.0032
A04	0.5840	0.5116	1017	0.0003	0.0005	0.0008	0.0009	0.0013	0.0016	0.0020	0.0024	0.0026
A05	0.5846	0.5112	1001	0.0002	0.0005	0.0008	0.0010	0.0010	0.0013	0.0018	0.0024	0.0028
A06	0.5845	0.5112	1012	0.0002	0.0005	0.0010	0.0010	0.0013	0.0016	0.0021	0.0025	0.0025
A07	0.5847	0.5114	1014	0.0004	0.0006	0.0008	0.0009	0.0014	0.0017	0.0019	0.0024	0.0027
A08	0.5844	0.5112	1008	0.0001	0.0004	0.0006	0.0010	0.0016	0.0019	0.0023	0.0029	0.0029
A09	0.5841	0.5117	1009	0.0002	0.0003	0.0005	0.0009	0.0014	0.0017	0.0019	0.0023	0.0026
A10	0.5840	0.5116	1003	0.0004	0.0007	0.0008	0.0009	0.0013	0.0017	0.0018	0.0024	0.0026
A11	0.5840	0.5118	1016	0.0002	0.0003	0.0006	0.0007	0.0012	0.0015	0.0022	0.0027	0.0030
A12	0.5842	0.5117	1012	0.0002	0.0006	0.0008	0.0008	0.0013	0.0017	0.0021	0.0025	0.0026
A13	0.5840	0.5113	1014	0.0002	0.0004	0.0006	0.0011	0.0016	0.0019	0.0022	0.0023	0.0024
A14	0.5845	0.5119	1002	0.0002	0.0005	0.0008	0.0011	0.0014	0.0017	0.0019	0.0024	0.0027
A15	0.5844	0.5116	1013	0.0001	0.0003	0.0006	0.0009	0.0013	0.0016	0.0021	0.0025	0.0028
A16	0.5841	0.5114	1011	0.0001	0.0004	0.0007	0.0010	0.0015	0.0017	0.0021	0.0028	0.0031
A17	0.5847	0.5119	1009	0.0003	0.0006	0.0009	0.0011	0.0015	0.0018	0.0023	0.0027	0.0029
A18	0.5845	0.5116	1006	0.0003	0.0006	0.0009	0.0012	0.0017	0.0022	0.0023	0.0027	0.0028
A19	0.5842	0.5113	1013	0.0001	0.0003	0.0005	0.0007	0.0011	0.0015	0.0018	0.0025	0.0029
A20	0.5840	0.5117	1016	0.0002	0.0004	0.0008	0.0010	0.0014	0.0018	0.0021	0.0027	0.0031
A21	0.5845	0.5118	1003	0.0001	0.0003	0.0007	0.0011	0.0013	0.0017	0.0019	0.0023	0.0027
A22	0.5844	0.5114	1005	0.0003	0.0006	0.0008	0.0009	0.0013	0.0016	0.0022	0.0025	0.0028
A23	0.5846	0.5112	1015	0.0001	0.0004	0.0008	0.0012	0.0016	0.0017	0.0021	0.0028	0.0033
A24	0.5844	0.5118	1006	0.0002	0.0004	0.0005	0.0007	0.0014	0.0017	0.0023	0.0024	0.0028
A25	0.5842	0.5117	1011	0.0002	0.0005	0.0007	0.0008	0.0015	0.0018	0.0024	0.0026	0.0031
Avg.	0.5843	0.5115	1010	0.0002	0.0005	0.0007	0.0009	0.0014	0.0017	0.0021	0.0025	0.0028
Med.	0.5844	0.5116	1011	0.0002	0.0005	0.0008	0.0009	0.0014	0.0017	0.0021	0.0025	0.0028
ST dev.	0.0002	0.0002	5.0787	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Max.	0.5847	0.5119	1018	0.0004	0.0007	0.0010	0.0012	0.0017	0.0022	0.0024	0.0029	0.0033
Min.	0.5840	0.5112	1001	0.0001	0.0003	0.0005	0.0007	0.0010	0.0013	0.0018	0.0023	0.0024



**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 ( $\Delta u'v'$ )											
	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 (%)								
				0 h			1000h	2000h	3000h	4000h	5000h	6000h
C01	2.33	3.3889	14.1	99.83	99.43	98.84	98.55	98.25	97.95	97.71	97.42	96.73
C02	2.38	3.4163	14.2	99.87	99.52	98.85	98.60	98.24	98.00	97.71	97.44	96.76
C03	2.32	3.3903	14.8	99.91	99.51	98.78	98.58	98.19	97.93	97.70	97.36	96.87
C04	2.28	3.3876	15.2	99.82	99.39	98.79	98.59	98.19	97.98	97.73	97.43	96.85
C05	2.36	3.3949	15.9	99.84	99.46	98.81	98.55	98.20	97.96	97.61	97.38	96.67
C06	2.36	3.4039	13.0	99.81	99.40	98.85	98.57	98.16	98.02	97.65	97.40	96.65
C07	2.30	3.4185	15.7	99.91	99.48	98.84	98.56	98.15	98.00	97.62	97.44	96.79
C08	2.35	3.4100	15.3	99.86	99.49	98.88	98.55	98.14	98.00	97.63	97.41	96.77
C09	2.32	3.3956	14.3	99.90	99.52	98.86	98.60	99.12	97.98	97.68	97.42	96.81
C10	2.30	3.3944	13.5	99.91	99.48	98.88	98.56	98.16	97.94	97.66	97.39	96.71
C11	2.31	3.3836	15.8	99.82	99.41	98.90	98.59	99.12	97.90	97.64	97.36	96.74
C12	2.36	3.3871	14.3	99.89	99.46	98.89	98.58	98.17	97.93	97.72	97.34	96.75
C13	2.35	3.4113	14.5	99.81	99.53	98.83	98.57	98.13	97.95	97.75	97.38	96.85
C14	2.34	3.3936	14.9	99.79	99.47	98.91	98.55	98.20	97.93	97.64	97.39	96.91
C15	2.33	3.4127	14.5	99.91	99.44	98.87	98.54	99.09	97.91	97.63	97.37	96.83
C16	2.29	3.4192	14.8	99.96	99.53	98.89	98.59	98.18	97.98	97.66	97.45	96.92
C17	2.32	3.3858	15.6	99.88	99.55	98.81	98.61	98.23	97.95	97.71	97.41	96.67
C18	2.39	3.3846	15.0	99.83	99.39	98.90	98.54	98.19	97.96	97.66	97.39	96.85
C19	2.31	3.4104	14.7	99.80	99.37	98.82	98.55	98.20	97.99	97.63	97.43	96.76
C20	2.31	3.4014	14.9	99.81	99.40	98.84	98.54	98.15	97.91	97.69	97.45	96.83
C21	2.31	3.4095	14.3	99.87	99.52	98.89	98.52	98.18	97.93	97.66	97.41	96.63
C22	2.32	3.3871	14.2	99.91	99.41	98.82	98.59	98.20	97.94	97.69	97.46	96.73
C23	2.33	3.3881	15.1	99.88	99.46	98.84	98.57	98.22	97.98	97.74	97.45	96.83
C24	2.34	3.3897	14.3	99.83	99.49	98.88	98.55	98.23	97.92	97.63	97.38	96.70
C25	2.34	3.3903	15.2	99.88	99.53	98.83	98.49	99.22	98.00	97.64	97.40	96.67
Avg.	2.33	3.3982	14.7	99.86	99.47	98.85	98.56	98.34	97.96	97.67	97.41	96.77
Med.	2.33	3.3944	14.8	99.87	99.47	98.85	98.56	98.20	97.95	97.66	97.41	96.76
ST dev.	0.0272	0.0119	0.6942	0.0450	0.0538	0.0361	0.0277	0.3569	0.0337	0.0408	0.0325	0.0820
Max.	2.39	3.4192	15.9	99.96	99.55	98.91	98.61	99.22	98.02	97.75	97.46	96.92
Min.	2.28	3.3836	13.0	99.79	99.37	98.78	98.49	98.13	97.90	97.61	97.34	96.63



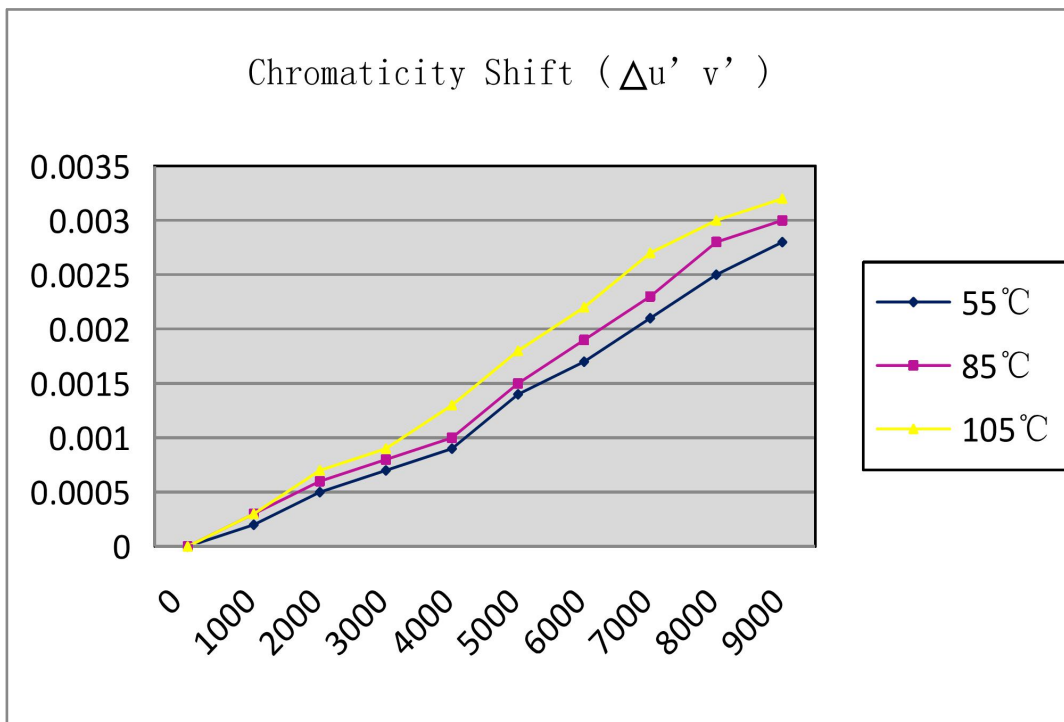
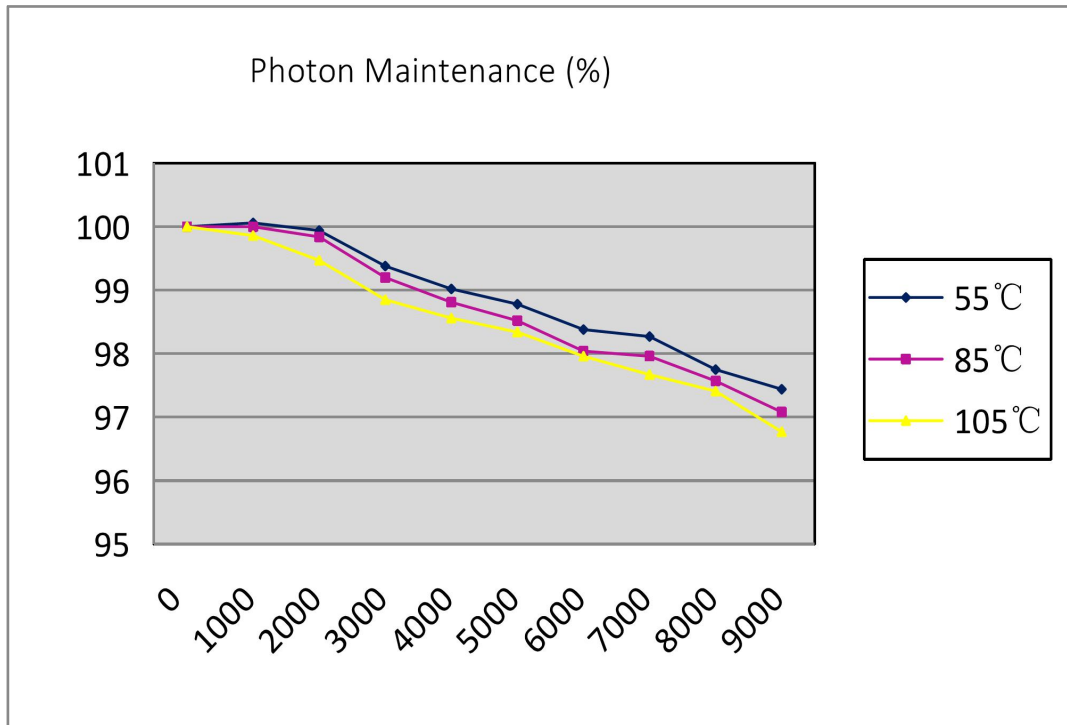


**9.3.1 Test condition 3: 105 °C, Drive Current : 700mA**

No.	T=105°C Chromaticity Shift ( $\Delta u'v'$ )											
	0 h			1000h	2000h	3000h	4000h	5000h	6000h	7000h	8000h	9000h
	u'	v'	CCT(K)									
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	0.0030	0.0032
Med.	0.5844	0.5115	1009	0.0003	0.0007	0.0009	0.0013	0.0018	0.0021	0.0027	0.0030	0.0032
ST dev.	0.0004	0.0017	5.5642	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001
Max.	0.5852	0.5196	1022	0.0005	0.0008	0.0012	0.0015	0.0021	0.0024	0.0030	0.0032	0.0034
Min.	0.5835	0.5109	1001	0.0002	0.0005	0.0007	0.0012	0.0016	0.0020	0.0025	0.0026	0.0030



### 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**

Test Condition 1 - 55° C Case Temp		Test Condition 2 - 85° C Case Temp		Test Condition 3 - 105° C Case Temp	
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)	700	DUT drive current used in the test (mA)	700	DUT drive current used in the test (mA)	700
Test duration (hours)	9,000	Test duration (hours)	9,000	Test duration (hours)	9,000
Test duration used for projection (hour to hour)	4,000 - 9,000	Test duration used for projection (hour to hour)	4,000 - 9,000	Test duration used for projection (hour to hour)	4,000 - 9,000
Tested case temperature (° C)	55	Tested case temperature (° C)	85	Tested case temperature (° C)	105
α	3.228E-06	α	3.377E-06	α	3.518E-06
B	1.004	B	1.002	B	1.000
Reported L70(9k) (hours)	>54000	Reported L70(9k) (hours)	>54000	Reported L70(9k) (hours)	>54000

**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. These manufacturing lots are picked to represent a wide parametric distribution. 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 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

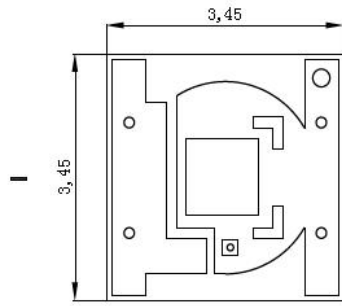


Fig.1-1 Top view 正面视图

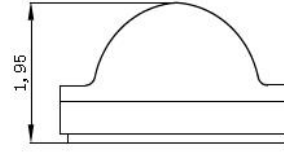


Fig.1-2 Side view 侧面视图

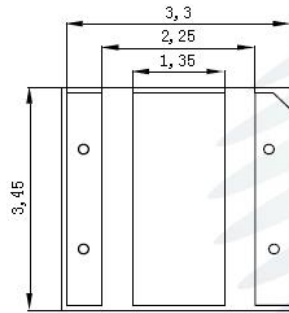


Fig.1-3 Bottom view 背面视图

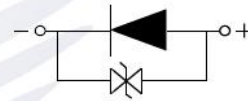
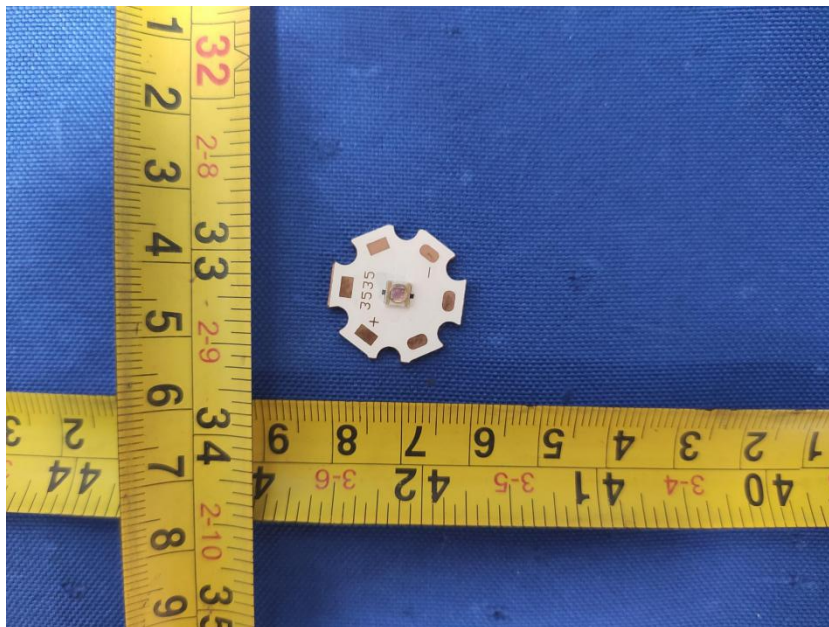


Fig.1-4 Polarity 极性

### 15. Photo of samples:



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