

Test Location:	<input checked="" type="checkbox"/>	1. Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China			
	<input type="checkbox"/>	3. Other:			
Project No.:	GZE150901-C			Test by:	Johnson Sun
Applicant:	[REDACTED]			Model:	5050
Case Temp.:	55°C	85°C	105°C	Rated Current:	60mA
Test Date:	2015-10-08 TO 2016-06-15				
Standard	IESNA LM-80-2015 (Refer to QD31)				

Test & Report By:	<i>Johnson Sun</i>	Review By:	<i>Tommy Liang</i>
Date:	July.12, 2016	Date	July.12, 2016



1. Standards used: IES LM-80-08 Approved Method for Measuring Lumen Maintenance of LED Light Sources.

2. LED packages are driven at constant current for both life test and photometric test.

3. Ambient conditions, airflow, relative humidity

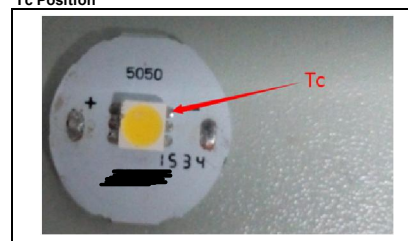
LED's are operated on controlled thermal plates in an environment that complies with the requirements given in Section 4.4 of IES LM80-2008. Case temperature (Ts): controlled within -2°C, Surrounding air temp: controlled to within -5°C of Ts, Humidity: < 65 RH. Airflow shall be minimized.

4. The input current shall be monitored and regulated to within +/-3% of the rated rms value during life testing.

5. Test Results Summary

Items	Case Temperature of LM-80-2008		
	55°C	85°C	105°C
Total Test Time (hours)	6000h	6000h	6000h
Average Luminous Flux (lm)	22.20	22.18	22.23
Average Voltage (V)	2.87	2.87	2.86
Average Color Temperature (K)	3000	3000	3000
Test Current (mA)	60	60	60
Case Temperature [Ts] (°C)	55.7	85.4	105.9
Surrounding Air Temperature (°C)	55.3	85.1	105.2
Average Lumen Maintenance at 6000 h (%)	99.08%	98.23%	96.92%
Average Chromaticity Shift at 6000 h	0.0010	0.0016	0.0024

Tc Position



6. Equipment List

Equipment ID	Equipment Name	Calibration date	Next Calibration date
ST-R-328	0.5m Integrating sphere	2015-7-1	2016-7-1
ST-R-333	Power Meter	2015-7-1	2016-7-1
ST-R-335	DC power source	2015-7-1	2016-7-1

7. Uncertainty of Measurement

Uncertainty of Photometric Measurement:

Uncertainty of Life Test: 0.28%, k=2

Data set 1, 55°C, 60mA

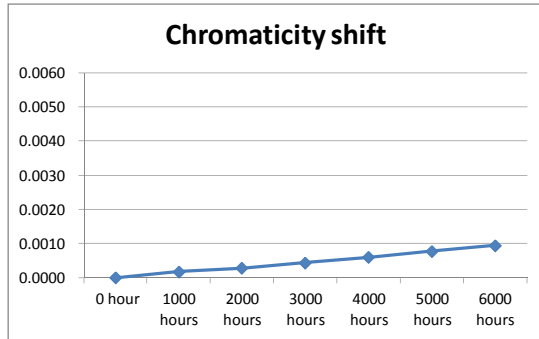
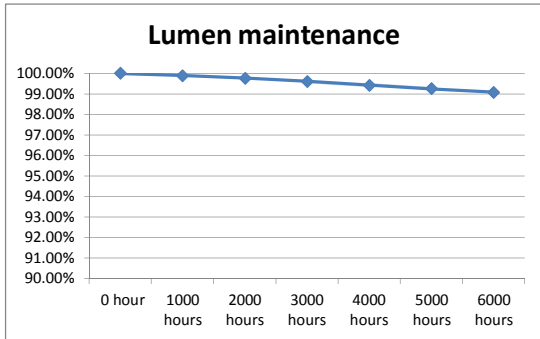
Model 5050
Actual Case Temperature(TS): 55.7 °C
Actual Oven Temperature(TA): 55.3 °C
Life Test Drive Current: 60 mA
Measurement Current: 60.33 mA
Ambien: 30 °C
Humidity: 60%RH

Lumen maintenance

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#	Avg.	Min.	Max.	Med	
0 hour	Vf (V)	2.859	2.858	2.861	2.918	2.862	2.849	2.871	2.857	2.869	2.872	2.875	2.866	2.859	2.864	2.869	2.872	2.881	2.894	2.872	2.868					
	Im	22.15	22.14	22.17	22.31	22.21	22.08	22.25	22.13	22.19	22.25	22.26	22.19	22.15	22.18	22.19	22.25	22.26	22.28	22.25	22.20					
1000 hours	Im	22.14	22.12	22.16	22.29	22.19	22.06	22.21	22.11	22.16	22.23	22.24	22.15	22.13	22.15	22.16	22.23	22.23	22.26	22.21	22.18	99.89%	99.82%	99.95%	99.91%	
	Maintenance	99.95%	99.91%	99.95%	99.91%	99.91%	99.91%	99.82%	99.91%	99.86%	99.91%	99.91%	99.91%	99.82%	99.91%	99.86%	99.86%	99.91%	99.87%	99.91%	99.82%	99.91%				
2000 hours	Im	22.11	22.09	22.14	22.26	22.17	22.04	22.18	22.08	22.11	22.21	22.11	22.11	22.11	22.12	22.21	22.21	22.21	22.24	22.18	22.16	99.76%	99.64%	99.86%	99.78%	
	Maintenance	99.82%	99.77%	99.86%	99.78%	99.82%	99.82%	99.69%	99.77%	99.64%	99.82%	99.78%	99.64%	99.77%	99.68%	99.68%	99.82%	99.78%	99.82%	99.78%	99.82%	99.69%	99.82%			
3000 hours	Im	22.06	22.03	22.10	22.21	22.15	22.01	22.15	22.06	22.05	22.18	22.18	22.06	22.06	22.06	22.08	22.18	22.19	22.21	22.15	22.13	99.60%	99.37%	99.73%	99.62%	
	Maintenance	99.59%	99.50%	99.68%	99.55%	99.73%	99.68%	99.55%	99.68%	99.37%	99.69%	99.64%	99.41%	99.59%	99.46%	99.50%	99.69%	99.69%	99.69%	99.69%	99.55%	99.68%				
4000 hours	Im	22.01	21.99	22.06	22.16	22.09	21.96	22.09	22.03	22.13	22.16	22.02	22.02	22.02	22.02	22.05	22.15	22.15	22.18	22.11	22.09	99.42%	99.23%	99.55%	99.43%	
	Maintenance	99.37%	99.32%	99.50%	99.33%	99.46%	99.46%	99.28%	99.55%	99.28%	99.46%	99.55%	99.23%	99.41%	99.28%	99.37%	99.55%	99.51%	99.55%	99.37%	99.50%					
5000 hours	Im	21.99	21.97	22.02	22.12	22.06	21.92	22.06	22.00	22.09	22.11	21.96	21.96	21.99	22.01	22.11	22.11	22.15	22.06	22.06		99.25%	98.96%	99.42%	99.28%	
	Maintenance	99.28%	99.23%	99.32%	99.15%	99.32%	99.28%	99.15%	99.41%	99.19%	99.28%	99.33%	98.96%	99.14%	99.14%	99.19%	99.37%	99.33%	99.42%	99.15%	99.37%					
6000 hours	Im	21.93	21.95	21.99	22.08	22.02	21.88	22.02	21.95	21.96	22.06	22.08	21.95	21.94	21.96	21.95	22.06	22.08	22.11	22.03	22.01	99.08%	98.92%	99.24%	99.12%	
	Maintenance	99.01%	99.14%	99.19%	98.97%	99.14%	99.09%	98.97%	99.19%	98.96%	99.15%	99.19%	98.92%	99.05%	99.01%	98.92%	99.15%	99.19%	99.24%	99.01%	99.14%					

Chromaticity shift

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#	Avg.	Min.	Max.	Med	
0 hour	U'	0.2513	0.2509	0.2514	0.2511	0.2510	0.2515	0.2508	0.2506	0.2512	0.2515	0.2511	0.2506	0.2511	0.2507	0.2509	0.2517	0.2513	0.2511	0.2512	0.2519	0.2511	0.2506	0.2519	0.2511	
	V'	0.5233	0.5227	0.5238	0.5235	0.5230	0.5236	0.5240	0.5239	0.5237	0.5231	0.5232	0.5237	0.5230	0.5235	0.5237	0.5229	0.5238	0.5230	0.5233	0.5236	0.5234	0.5227	0.5240	0.5235	
	Chromaticity shift	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1000 hours	Chromaticity shift	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0001	0.0002	0.0002
2000 hours	Chromaticity shift	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0004	0.0003	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0004	0.0002	0.0004	0.0003	0.0002	0.0004	0.0003
3000 hours	Chromaticity shift	0.0004	0.0004	0.0004	0.0003	0.0004	0.0005	0.0005	0.0004	0.0004	0.0004	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0004	0.0006	0.0004	0.0003	0.0006	0.0004	
4000 hours	Chromaticity shift	0.0006	0.0005	0.0005	0.0004	0.0006	0.0009	0.0006	0.0005	0.0006	0.0005	0.0007	0.0006	0.0006	0.0005	0.0006	0.0006	0.0006	0.0007	0.0005	0.0007	0.0006	0.0004	0.0009	0.0006	
5000 hours	Chromaticity shift	0.0009	0.0007	0.0006	0.0007	0.0007	0.0010	0.0009	0.0007	0.0008	0.0007	0.0009	0.0008	0.0008	0.0006	0.0007	0.0007	0.0008	0.0010	0.0006	0.0008	0.0008	0.0006	0.0010	0.0008	
6000 hours	Chromaticity shift	0.0011	0.0008	0.0007	0.0008	0.0009	0.0011	0.0010	0.0010	0.0011	0.0009	0.0011	0.0010	0.0009	0.0007	0.0009	0.0009	0.0010	0.0011	0.0009	0.0010	0.0010	0.0007	0.0011	0.0010	



Data set 2, 85°C, 60mA
Model 5050
Actual Case Temperature(TS): 85.4 °C
Actual Oven Temperature(TA): 85.1 °C

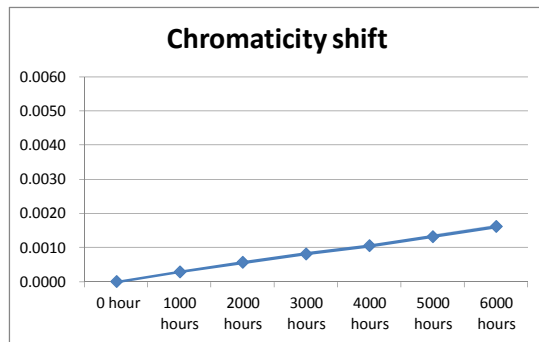
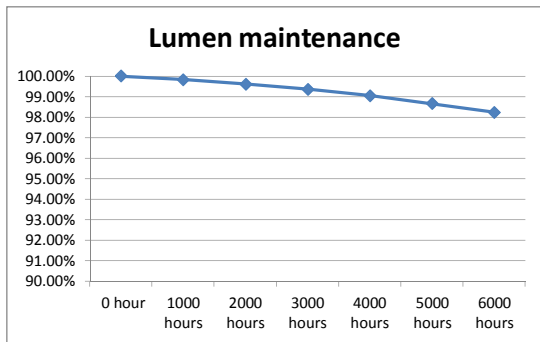
Life Test Drive Current: 60 mA
 Measurement Current: 60.28 mA
 Ambient: 30 °C
 Humidity: 60%RH

Lumen maintenance

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#	Avg.	Min.	Max.	Med
0 hour	Vf (V)	2.863	2.871	2.862	2.857	2.864	2.876	2.882	2.874	2.871	2.863	2.855	2.875	2.871	2.865	2.869	2.857	2.864	2.861	2.876	2.882				
	Im	22.16	22.18	22.16	22.14	22.16	22.19	22.21	22.19	22.18	22.16	22.14	22.19	22.18	22.16	22.17	22.14	22.17	22.16	22.16	22.20	22.30			
1000 hours	Im	22.14	22.15	22.12	22.11	22.11	22.16	22.19	22.16	22.15	22.14	22.11	22.13	22.12	22.10	22.14	22.11	22.14	22.12	22.16	22.24	99.83%	99.73%	99.91%	99.86%
	Maintenance	99.91%	99.86%	99.82%	99.86%	99.77%	99.86%	99.91%	99.86%	99.86%	99.91%	99.86%	99.73%	99.73%	99.73%	99.86%	99.86%	99.86%	99.82%	99.82%	99.73%				
2000 hours	Im	22.09	22.12	22.09	22.04	22.07	22.09	22.12	22.09	22.09	22.08	22.07	22.08	22.08	22.07	22.08	22.07	22.07	22.08	22.11	22.21	99.61%	99.50%	99.73%	99.59%
	Maintenance	99.68%	99.73%	99.68%	99.55%	99.59%	99.55%	99.59%	99.55%	99.59%	99.64%	99.68%	99.50%	99.55%	99.59%	99.59%	99.68%	99.55%	99.64%	99.59%	99.60%				
3000 hours	Im	22.01	22.04	22.04	21.97	21.98	21.96	22.06	22.03	22.02	22.06	22.01	22.03	22.04	22.03	22.05	22.04	22.01	22.03	22.05	22.18	99.35%	98.96%	99.55%	99.35%
	Maintenance	99.32%	99.37%	99.46%	99.23%	99.19%	98.96%	99.32%	99.28%	99.28%	99.55%	99.41%	99.28%	99.37%	99.41%	99.46%	99.55%	99.28%	99.41%	99.32%	99.46%				
4000 hours	Im	21.92	21.97	21.96	21.92	21.92	21.91	21.98	21.97	21.97	21.96	21.93	22.01	21.97	21.96	21.98	21.99	21.93	21.94	21.94	22.13	99.04%	98.74%	99.32%	99.05%
	Maintenance	98.92%	99.05%	99.10%	99.01%	98.92%	98.74%	98.96%	99.01%	99.05%	99.10%	99.05%	99.19%	99.05%	99.10%	99.14%	99.32%	98.92%	99.01%	98.83%	99.24%				
5000 hours	Im	21.81	21.89	21.91	21.87	21.86	21.85	21.92	21.86	21.92	21.91	21.86	21.82	21.84	21.87	21.91	21.83	21.86	21.88	21.87	22.02	98.65%	98.33%	98.87%	98.69%
	Maintenance	98.42%	98.69%	98.87%	98.78%	98.65%	98.47%	98.69%	98.51%	98.83%	98.87%	98.74%	98.33%	98.47%	98.69%	98.83%	98.60%	98.60%	98.74%	98.51%	98.74%				
6000 hours	Im	21.75	21.82	21.82	21.76	21.74	21.75	21.84	21.79	21.81	21.82	21.72	21.76	21.77	21.72	21.78	21.74	21.73	21.77	21.82	21.97	98.23%	98.01%	98.52%	98.22%
	Maintenance	98.15%	98.38%	98.47%	98.28%	98.10%	98.02%	98.33%	98.20%	98.33%	98.47%	98.10%	98.06%	98.15%	98.01%	98.24%	98.19%	98.02%	98.24%	98.29%	98.52%				

Chromaticity shift

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#	Avg.	Min.	Max.	Med	
0 hour	U'	0.2506	0.2511	0.2498	0.2503	0.2512	0.2500	0.2503	0.2509	0.2506	0.2502	0.2498	0.2501	0.2500	0.2513	0.2508	0.2502	0.2512	0.2511	0.2518	0.2504	0.2506	0.2498	0.2518	0.2505	
	V'	0.5235	0.5232	0.5229	0.5234	0.5241	0.5226	0.5219	0.5233	0.5232	0.5231	0.5226	0.5229	0.5234	0.5231	0.5229	0.5227	0.5234	0.5229	0.5235	0.5227	0.5230	0.5219	0.5241	0.5230	
	Chromaticity shift	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1000 hours	Chromaticity shift	0.0003	0.0004	0.0005	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0004	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0004	0.0003	0.0002	0.0005	0.0003	
2000 hours	Chromaticity shift	0.0006	0.0006	0.0007	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.0006	0.0006	0.0005	0.0006	0.0006	0.0006	0.0004	0.0005	0.0006	0.0006	0.0004	0.0007	0.0006
3000 hours	Chromaticity shift	0.0008	0.0009	0.0008	0.0007	0.0007	0.0009	0.0008	0.0008	0.0009	0.0008	0.0009	0.0009	0.0007	0.0008	0.0009	0.0008	0.0008	0.0006	0.0009	0.0009	0.0008	0.0006	0.0009	0.0008	
4000 hours	Chromaticity shift	0.0011	0.0012	0.0009	0.0008	0.0009	0.0011	0.0010	0.0009	0.0012	0.0011	0.0011	0.0012	0.0009	0.0011	0.0012	0.0010	0.0009	0.0010	0.0011	0.0011	0.0011	0.0008	0.0012	0.0011	
5000 hours	Chromaticity shift	0.0013	0.0016	0.0011	0.0011	0.0012	0.0014	0.0013	0.0011	0.0015	0.0014	0.0015	0.0016	0.0011	0.0015	0.0016	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0011	0.0016	0.0013
6000 hours	Chromaticity shift	0.0015	0.0018	0.0016	0.0014	0.0015	0.0016	0.0015	0.0013	0.0018	0.0016	0.0016	0.0018	0.0014	0.0017	0.0018	0.0016	0.0014	0.0016	0.0016	0.0018	0.0016	0.0013	0.0018	0.0016	



Data set 3, 105°C, 60mA
 Model: 5050
 Actual Case Temperature(TS): 105.9 °C
 Actual Oven Temperature(TA): 105.2 °C
 Life Test Drive Current: 60 mA
 Measurement Current: 60.45 mA
 Ambient: 30 °C

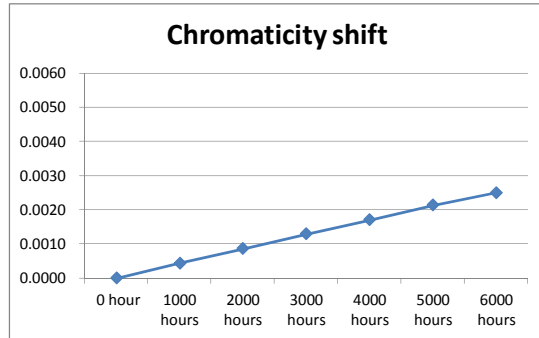
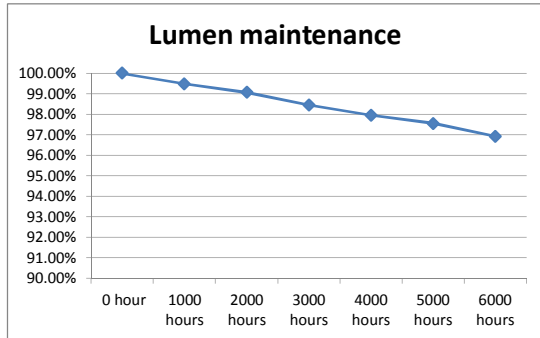
Humidity: 60%RH

Lumen maintenance

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#				
0 hour	Vf (V)	2.879	2.871	2.864	2.855	2.859	2.876	2.864	2.857	2.866	2.875	2.858	2.863	2.858	2.879	2.862	2.861	2.859	2.854	2.872	2.863	Avg.	Min.	Max.	Med
	Im	22.31	22.29	22.25	22.14	22.16	22.30	22.25	22.15	22.26	22.30	22.15	22.25	22.15	22.31	22.24	22.23	22.16	22.13	22.29	22.25				
1000 hours	Im	22.18	22.21	22.16	22.01	22.05	22.20	22.14	22.06	22.13	22.16	22.06	22.14	22.05	22.17	22.12	22.11	22.03	22.02	22.14	22.13	99.48%	99.33%	99.64%	99.48%
	Maintenance	99.42%	99.64%	99.60%	99.41%	99.50%	99.55%	99.51%	99.59%	99.42%	99.37%	99.59%	99.51%	99.55%	99.37%	99.46%	99.46%	99.41%	99.50%	99.33%	99.46%				
2000 hours	Im	22.01	21.98	22.02	21.89	21.97	22.08	22.04	21.95	22.04	22.09	21.96	22.07	21.95	22.12	22.06	22.07	21.99	21.95	22.07	22.09	99.06%	98.61%	99.28%	99.10%
	Maintenance	98.66%	98.61%	98.97%	98.87%	99.14%	99.01%	99.06%	99.10%	99.01%	99.06%	99.14%	99.19%	99.10%	99.15%	99.19%	99.28%	99.23%	99.19%	99.01%	99.28%				
3000 hours	Im	21.88	21.76	21.88	21.75	21.93	21.98	21.94	21.86	21.87	22.01	21.85	21.94	21.83	21.94	21.91	21.89	21.84	21.76	21.94	21.92	98.45%	97.62%	98.96%	98.52%
	Maintenance	98.07%	97.62%	98.34%	98.24%	98.96%	98.57%	98.61%	98.69%	98.25%	98.70%	98.65%	98.61%	98.56%	98.34%	98.52%	98.47%	98.56%	98.33%	98.43%	98.52%				
4000 hours	Im	21.71	21.68	21.74	21.63	21.74	21.86	21.82	21.74	21.71	21.88	21.73	21.81	21.76	21.88	21.82	21.78	21.76	21.71	21.86	21.83	97.95%	97.26%	98.24%	98.07%
	Maintenance	97.31%	97.26%	97.71%	97.70%	98.10%	98.03%	98.07%	98.15%	97.53%	98.12%	98.10%	98.02%	98.24%	98.07%	98.11%	97.98%	98.19%	98.10%	98.07%	98.11%				
5000 hours	Im	21.55	21.72	21.68	21.54	21.63	21.69	21.74	21.58	21.62	21.79	21.64	21.72	21.66	21.77	21.74	21.71	21.69	21.64	21.76	21.77	97.54%	96.59%	97.88%	97.62%
	Maintenance	96.59%	97.44%	97.44%	97.29%	97.61%	97.26%	97.71%	97.43%	97.12%	97.71%	97.70%	97.62%	97.79%	97.58%	97.75%	97.66%	97.88%	97.79%	97.62%	97.84%				
6000 hours	Im	21.48	21.59	21.58	21.42	21.52	21.54	21.54	21.41	21.54	21.61	21.58	21.54	21.54	21.65	21.65	21.58	21.53	21.48	21.68	21.43	96.92%	96.28%	97.43%	96.95%
	Maintenance	96.28%	96.86%	96.99%	96.75%	97.11%	96.59%	96.81%	96.66%	96.77%	96.91%	97.43%	96.81%	97.25%	97.04%	97.35%	97.08%	97.16%	97.06%	97.26%	96.31%				

Chromaticity shift

	Sample no.	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#	19#	20#	Avg.	Min.	Max.	Med	
0 hour	U'	0.2513	0.2511	0.2503	0.2508	0.2510	0.2516	0.2507	0.2502	0.2515	0.2500	0.2519	0.2511	0.2502	0.2506	0.2501	0.2498	0.2512	0.2517	0.2512	0.2506	0.2508	0.2498	0.2519	0.2509	
	V'	0.5239	0.5227	0.5235	0.5231	0.5226	0.5234	0.5229	0.5234	0.5227	0.5221	0.5217	0.5215	0.5234	0.5227	0.5226	0.5231	0.5234	0.5231	0.5225	0.5218	0.5228	0.5215	0.5239	0.5227	
	Chromaticity shift	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1000 hours	Chromaticity shift	0.0006	0.0004	0.0004	0.0006	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006	0.0004	0.0004	0.0004	0.0004	0.0004	0.0006	0.0004
2000 hours	Chromaticity shift	0.0009	0.0009	0.0008	0.0010	0.0007	0.0009	0.0008	0.0008	0.0008	0.0009	0.0008	0.0008	0.0008	0.0009	0.0008	0.0011	0.0010	0.0009	0.0007	0.0008	0.0009	0.0007	0.0011	0.0008	
3000 hours	Chromaticity shift	0.0014	0.0015	0.0012	0.0014	0.0011	0.0012	0.0015	0.0013	0.0012	0.0014	0.0013	0.0013	0.0011	0.0013	0.0012	0.0013	0.0014	0.0012	0.0011	0.0013	0.0013	0.0011	0.0015	0.0013	
4000 hours	Chromaticity shift	0.0018	0.0018	0.0016	0.0018	0.0016	0.0014	0.0018	0.0018	0.0015	0.0017	0.0018	0.0017	0.0016	0.0018	0.0017	0.0017	0.0020	0.0016	0.0016	0.0017	0.0017	0.0014	0.0020	0.0017	
5000 hours	Chromaticity shift	0.0021	0.0023	0.0021	0.0021	0.0022	0.0018	0.0021	0.0021	0.0018	0.0022	0.0024	0.0021	0.0020	0.0022	0.0023	0.0021	0.0024	0.0021	0.0021	0.0023	0.0021	0.0018	0.0024	0.0021	
6000 hours	Chromaticity shift	0.0024	0.0025	0.0025	0.0028	0.0025	0.0023	0.0024	0.0023	0.0021	0.0026	0.0028	0.0024	0.0025	0.0026	0.0025	0.0026	0.0027	0.0024	0.0023	0.0026	0.0025	0.0021	0.0028	0.0025	



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