

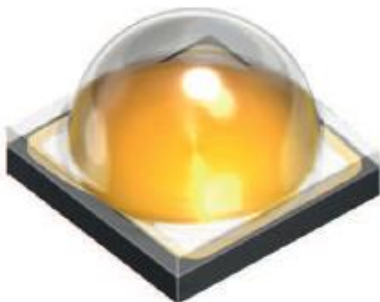
Light is OSRAM

OSRAM
Opto Semiconductors

OSLON® Square White (CCT 2700 K – 6500 K)

IES LM-80-15 Test Report

Test Documentation No.: 190147W6 (Document No.: OSRM027-2-E4-220) – 14th Feb 2020



LM80 17000 Hour Interval Test Report

IES LM-80-15 Approved Method for Measuring Lumen Maintenance of LED Light Sources

CSA Group Report: OSRM027-2-E4-220

January 3, 2020

Manufacturer: **OSRAM**
Models tested: **GW CSSRM2.EM**
OSLON Square
Test conditions: 24 devices @ 55.0 C, 1.200 A
24 devices @ 85.0 C, 1.200 A
24 devices @ 105.0 C, 1.200 A

Prepared for:
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Attn:

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1.0 Statement of test conditions, summary of results, and reporting requirements:

Part number: GW CSSRM2.EM					
Life test conditions				Summary of results	
Test condition	Drive current (A)	Case temperature (°C)	Elapsed life test time (hrs)	Average lumen maintenance (%)	Average chromaticity shift ($\Delta u'v'$)
TC1	1.200	55	17000	100.2	0.0013
TC2	1.200	85	17000	100.1	0.0015
TC3	1.200	105	17000	98.9	0.0021
LM80-15 Reporting requirements					
1. Number of samples tested:			24 per test condition		
2. Description of LED light sources			LED Package ¹		
3. Description of auxiliary equipment			see section 6.1 below		
4. Operating cycle			LED packages are driven at constant current for life test and are pulsed for photometric test.		
5. 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 LM80-15. Case temperature (Ts): controlled to within -2°C, Surrounding air temp: controlled to within -5°C of Ts, Humidity: < 65 RH, No forced air flow		
6. Case temperature (test point temperature)			See summary table above for test conditions. The temperature measurement point is shown in Sec. 6.3.		
7. Drive current during life test			see summary table above		
8. Initial luminous flux and forward voltage			see data tables for individual test conditions		
9. Lumen maintenance data for each individual LED light source			see data tables for individual test conditions		
10. Observation of LED light source failures			see data tables for individual test conditions		
11. LED light source monitoring intervals			see data tables for individual test conditions		
12. Photometric measurement uncertainty			k=2 expanded measurement uncertainty for relative luminous flux measurements is $\pm 2.0\%$		
13. Chromaticity shift reported over the measurement time			see data tables for individual test conditions		
14. Test start date			November 10, 2017		
15. ANSI target and calculated CCT values			see data tables		

Notes:

- per ANSI/IESNA RP-16-05 Addendum b, *Nomenclature and Definitions for Illuminating Engineering*

TABLE 1.1 - Initial ANSI Target & Calculated CCT Results

GW CSSRM2.EM

Load board ID	Device number	Zero hour measurements		Load board ID	Device number	Zero hour measurements		Load board ID	Device number	Zero hour measurements	
		ANSI Target* CCT (K)	Initial Calculated CCT (K)			ANSI Target* CCT (K)	Initial Calculated CCT (K)			ANSI Target* CCT (K)	Initial Calculated CCT (K)
45000010743F031C	D1	3465±245	3462	3B0000107BD7031C	D1	3465±245	3472	3E0000107B9A031C	D1	3465±245	3495
	D2	3465±245	3448		D2	3465±245	3397		D2	3465±245	3450
	D3	3465±245	3420		D3	3465±245	3425		D3	3465±245	3490
	D4	3465±245	3422		D4	3465±245	3464		D4	3465±245	3445
	D5	3465±245	3419		D5	3465±245	3519		D5	3465±245	3521
	D6	3465±245	3510		D6	3465±245	3451		D6	3465±245	3448
	D7	3465±245	3441		D7	3465±245	3450		D7	3465±245	3430
	D8	3465±245	3441		D8	3465±245	3457		D8	3465±245	3462
	D9	3465±245	3477		D9	3465±245	3485		D9	3465±245	3493
	D10	3465±245	3373		D10	3465±245	3446		D10	3465±245	3502
	D11	3465±245	3417		D11	3465±245	3493		D11	3465±245	3447
	D12	3465±245	3511		D12	3465±245	3435		D12	3465±245	3471
DE0000108C7B031C	D1	3465±245	3466	BB0000108270031C	D1	3465±245	3429	E700001083C6031C	D1	3465±245	3493
	D2	3465±245	3460		D2	3465±245	3441		D2	3465±245	3477
	D3	3465±245	3448		D3	3465±245	3465		D3	3465±245	3429
	D4	3465±245	3467		D4	3465±245	3423		D4	3465±245	3487
	D5	3465±245	3473		D5	3465±245	3497		D5	3465±245	3494
	D6	3465±245	3485		D6	3465±245	3418		D6	3465±245	3491
	D7	3465±245	3443		D7	3465±245	3495		D7	3465±245	3422
	D8	3465±245	3463		D8	3465±245	3423		D8	3465±245	3446
	D9	3465±245	3457		D9	3465±245	3463		D9	3465±245	3509
	D10	3465±245	3458		D10	3465±245	3514		D10	3465±245	3476
	D11	3465±245	3461		D11	3465±245	3508		D11	3465±245	3480
	D12	3465±245	3541		D12	3465±245	3439		D12	3465±245	3409

* target CCT as defined in ANSI C78.377-2008

Test Condition 155 °C1.200 A														
TABLE 2.0 - LUMEN MAINTENANCE RESULTS													GW CSSRM2.EM	
Test Condition 155 °C1.200 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
45000010743F031C	D1	437.54	3.58	99.8	99.9	100.0	100.0	99.9	100.0	100.0	100.0	100.0	99.9	100.0
	D2	435.18	3.61	100.1	100.2	100.2	100.3	100.2	100.3	100.2	100.2	100.3	100.2	100.2
	D3	432.17	3.55	100.5	100.6	100.7	100.8	100.8	100.8	100.8	100.8	100.9	100.8	100.8
	D4	430.01	3.60	100.7	100.7	100.9	101.0	100.9	101.0	101.0	101.0	101.0	100.9	100.9
	D5	431.36	3.63	99.3	99.3	99.3	99.5	99.3	99.3	99.3	99.3	99.3	99.2	99.2
	D6	434.97	3.63	99.9	99.9	100.1	100.2	100.1	100.1	100.1	100.2	100.2	100.1	100.2
	D7	433.19	3.59	100.8	100.9	101.0	101.2	101.1	101.1	101.1	101.1	101.2	101.1	101.2
	D8	431.56	3.70	100.5	100.6	100.7	100.8	100.7	100.7	100.7	100.7	100.8	100.6	100.7
	D9	435.77	3.73	100.6	100.6	100.7	100.8	100.7	100.7	100.7	100.8	100.8	100.7	100.8
	D10	426.91	3.67	100.7	100.7	100.8	101.0	100.9	101.0	100.9	101.0	101.1	100.9	101.0
	D11	433.77	3.62	98.6	98.5	98.7	98.7	98.6	98.6	98.5	98.5	98.5	98.4	98.4
	D12	444.56	3.58	99.6	99.6	99.7	99.8	99.8	99.7	99.8	99.8	99.8	99.7	99.8
DE0000108C7B031C	D1	436.59	3.46	99.9	100.0	100.0	100.2	100.1	100.2	100.1	100.2	100.2	100.1	100.1
	D2	434.61	3.51	99.5	99.6	99.6	99.7	99.6	99.6	99.6	99.6	99.5	99.4	99.5
	D3	431.76	3.57	100.6	100.7	100.9	101.0	100.9	101.0	101.0	101.0	101.0	100.9	101.0
	D4	434.15	3.55	98.7	98.7	98.8	98.9	98.8	98.7	98.7	98.7	98.6	98.5	98.6
	D5	434.71	3.76	100.0	100.1	100.1	100.2	100.1	100.1	100.1	100.2	100.1	100.0	100.1
	D6	437.07	3.61	98.8	98.8	98.8	98.9	98.8	98.8	98.7	98.7	98.6	98.6	98.6
	D7	435.75	3.61	100.8	100.8	100.9	101.0	100.9	101.0	100.9	101.0	100.9	100.9	100.9
	D8	437.57	3.65	100.6	100.7	100.8	100.9	100.9	100.9	100.9	101.0	100.9	100.8	100.9
	D9	437.73	3.74	100.8	100.8	100.9	101.1	100.9	101.0	100.9	101.1	101.0	100.9	101.0
	D10	433.87	3.85	101.4	101.4	101.5	101.6	101.6	101.6	101.6	101.6	101.5	101.6	101.6
	D11	436.03	3.63	98.9	98.9	98.9	99.0	98.9	98.8	98.8	98.9	98.7	98.7	98.7
	D12	441.39	3.65	100.8	100.9	101.0	101.0	101.0	101.0	101.0	101.1	101.0	101.0	101.0
n				24	24	24	24	24	24	24	24	24	24	24
mean				100.1	100.1	100.2	100.3	100.2	100.2	100.2	100.3	100.2	100.2	100.2
median				100.3	100.4	100.4	100.5	100.5	100.5	100.4	100.5	100.5	100.4	100.5
std. dev.				0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
min				98.6	98.5	98.7	98.7	98.6	98.6	98.5	98.5	98.5	98.4	98.4
max				101.4	101.4	101.5	101.6	101.6	101.6	101.6	101.6	101.5	101.6	101.6

Test Condition 1 55 °C 1.200 A															
TABLE 2.1 - CHROMATICITY SHIFT RESULTS															
Test Condition 1 55 °C 1.200 A															
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ($\Delta u'v'$)										
					7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
45000010743F031C	D1	0.2336	0.5208		0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013
	D2	0.2342	0.5203		0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
	D3	0.2350	0.5211		0.0013	0.0013	0.0014	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014
	D4	0.2353	0.5198		0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
	D5	0.2350	0.5209		0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014
	D6	0.2326	0.5190		0.0013	0.0013	0.0015	0.0014	0.0015	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015
	D7	0.2346	0.5199		0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010
	D8	0.2348	0.5193		0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012
	D9	0.2338	0.5188		0.0012	0.0011	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014
	D10	0.2371	0.5196		0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0016	0.0016	0.0016
	D11	0.2353	0.5204		0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
	D12	0.2325	0.5192		0.0012	0.0011	0.0012	0.0012	0.0013	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013
DE0000108C7B031C	D1	0.2336	0.5203		0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014
	D2	0.2336	0.5210		0.0013	0.0014	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
	D3	0.2343	0.5202		0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0014	0.0015	0.0014
	D4	0.2337	0.5200		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0012	0.0012	0.0013	0.0012
	D5	0.2337	0.5195		0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014
	D6	0.2329	0.5206		0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012
	D7	0.2344	0.5204		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
	D8	0.2339	0.5198		0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0012	0.0013	0.0012
	D9	0.2342	0.5197		0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013
	D10	0.2339	0.5203		0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0013	0.0014	0.0014
	D11	0.2338	0.5204		0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012
	D12	0.2318	0.5183		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014
n					24	24	24	24	24	24	24	24	24	24	24
mean					0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
median					0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
std. dev.					0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
min					0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010
max					0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0016	0.0016	0.0016

Test Condition 1				55 °C	1.200 A									
TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS														GW CSSRM2.EM
Test Condition 1				55 °C	1.200 A									
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)	Forward Voltage Maintainence (%)											
			7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	
45000010743F031C	D1		3.58	94.82	94.71	95.08	95.40	94.68	95.48	94.75	94.74	94.98	94.76	94.78
	D2		3.61	96.41	95.87	95.99	95.70	95.78	96.62	95.76	95.83	95.78	95.86	96.11
	D3		3.55	97.79	97.47	97.30	97.36	97.33	97.40	97.31	97.39	97.65	97.30	97.49
	D4		3.60	96.70	96.61	96.54	96.76	96.56	96.65	96.46	96.48	96.90	96.56	96.49
	D5		3.63	98.08	97.80	97.51	97.80	98.10	97.84	97.84	98.00	97.89	98.00	98.07
	D6		3.63	97.68	97.45	97.11	97.20	97.68	97.58	97.44	97.68	97.41	97.52	97.72
	D7		3.59	96.23	96.34	96.01	95.90	96.18	96.63	96.05	96.34	96.07	95.90	96.17
	D8		3.70	95.40	95.37	95.31	95.16	95.41	95.63	95.28	95.49	95.52	95.16	95.41
	D9		3.73	96.35	96.13	96.23	96.14	96.18	96.27	96.09	96.20	96.54	96.03	96.14
	D10		3.67	97.19	97.11	97.06	97.09	97.08	97.35	97.07	97.40	97.34	97.03	97.01
	D11		3.62	97.85	97.79	97.73	97.73	97.81	98.20	97.84	98.00	98.01	97.72	98.12
	D12		3.58	98.43	98.34	98.25	98.53	98.55	98.81	98.44	98.36	98.53	98.31	98.75
DE0000108C7B031C	D1		3.46	97.63	98.29	98.20	97.27	98.65	97.37	97.93	97.54	98.23	98.10	97.08
	D2		3.51	98.96	99.27	99.23	98.20	99.25	98.20	98.59	98.45	98.78	100.67	97.94
	D3		3.57	98.73	97.74	97.54	97.95	97.61	98.41	98.05	97.92	97.94	99.57	97.22
	D4		3.55	98.63	98.40	97.96	98.45	98.28	99.03	98.73	98.72	98.85	98.36	97.98
	D5		3.76	95.19	95.22	94.86	94.95	95.18	95.06	95.06	96.10	96.24	95.24	95.68
	D6		3.61	98.09	98.10	97.95	97.99	98.24	98.12	97.99	99.95	99.38	99.48	100.98
	D7		3.61	96.53	96.47	96.38	96.33	96.49	96.72	96.29	97.43	96.67	97.49	99.25
	D8		3.65	96.31	96.14	96.01	96.15	96.19	96.47	96.02	96.14	96.20	96.04	96.65
	D9		3.74	95.67	95.56	95.92	95.75	96.39	95.78	95.54	96.48	96.55	95.61	95.55
	D10		3.85	94.52	94.10	94.49	94.70	95.11	94.26	94.08	94.97	95.61	94.21	94.31
	D11		3.63	98.49	97.95	98.07	98.97	98.76	98.09	97.94	98.32	99.39	98.57	98.45
	D12		3.65	96.73	96.53	96.59	97.12	97.28	96.68	96.93	96.95	97.55	97.93	97.56
n				24	24	24	24	24	24	24	24	24	24	
mean				97.0	96.9	96.8	96.9	97.0	97.0	96.8	97.1	97.3	97.1	
median				97.0	96.9	96.8	97.1	97.2	97.0	97.0	97.4	97.4	97.1	
std. dev.				1.3	1.3	1.2	1.2	1.3	1.2	1.3	1.3	1.3	1.6	
min				94.5	94.1	94.5	94.7	94.7	94.3	94.1	94.7	95.0	94.2	
max				99.0	99.3	99.2	99.0	99.2	99.0	98.7	100.0	99.4	100.7	

Test Condition 2 85 °C 1.200 A														
TABLE 3.0 - LUMEN MAINTENANCE RESULTS														GW CSSRM2.EM
Test Condition 2 85 °C 1.200 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
3B0000107BD7031C	D1	434.00	3.43	98.4	98.3	98.3	98.4	98.1	98.1	98.0	98.0	97.9	97.7	97.7
	D2	429.54	3.54	100.5	100.5	100.5	100.8	100.7	100.7	100.7	100.7	100.6	100.5	100.6
	D3	432.51	3.64	100.1	100.1	100.1	100.3	100.2	100.2	100.2	100.3	100.2	100.1	100.2
	D4	435.11	3.62	100.6	100.6	100.7	100.9	100.8	100.9	100.8	100.8	100.8	100.8	100.9
	D5	440.24	3.67	100.5	100.5	100.5	100.7	100.6	100.6	100.5	100.6	100.6	100.4	100.5
	D6	433.78	3.66	100.6	100.6	100.6	100.8	100.7	100.7	100.7	100.7	100.6	100.6	100.6
	D7	433.28	3.67	100.3	100.3	100.4	100.5	100.5	100.4	100.4	100.4	100.4	100.3	100.4
	D8	433.99	3.62	100.4	100.5	100.6	100.7	100.6	100.6	100.6	100.6	100.6	100.5	100.5
	D9	435.85	3.76	99.4	99.3	99.3	99.5	99.4	99.3	99.3	99.3	99.3	99.1	99.2
	D10	437.27	3.80	100.2	100.3	100.3	100.5	100.4	100.4	100.4	100.4	100.4	100.3	100.4
	D11	439.86	3.78	99.5	99.5	99.6	99.8	99.7	99.6	99.7	99.7	99.6	99.5	99.6
	D12	441.60	3.61	98.9	98.9	98.9	99.0	98.9	98.8	98.8	98.8	98.7	98.6	98.6
BB0000108270031C	D1	430.51	3.45	99.9	99.9	100.0	100.1	100.0	100.0	100.0	100.1	100.0	99.8	99.9
	D2	431.09	3.66	100.8	100.8	100.9	101.1	101.0	101.0	101.0	101.0	101.0	100.9	100.9
	D3	435.09	3.53	100.3	100.3	100.4	100.5	100.4	100.4	100.4	100.3	100.4	100.3	100.4
	D4	433.97	3.69	100.2	100.2	100.3	100.5	100.4	100.4	100.4	100.4	100.4	100.3	100.4
	D5	437.71	3.67	100.3	100.3	100.3	100.5	100.4	100.4	100.4	100.3	100.4	100.3	100.3
	D6	427.82	3.68	100.2	100.1	100.2	100.3	100.3	100.2	100.2	100.1	100.0	100.0	100.0
	D7	435.67	3.63	99.9	99.8	99.9	100.0	99.9	99.8	99.8	99.8	99.7	99.6	99.6
	D8	433.73	3.74	100.6	100.6	100.7	100.8	100.8	100.8	100.8	100.7	100.7	100.6	100.7
	D9	432.89	3.70	100.3	100.3	100.4	100.5	100.4	100.3	100.3	100.3	100.2	100.1	100.1
	D10	439.64	3.71	100.7	100.7	100.8	101.0	100.9	100.8	100.9	100.9	100.8	100.7	100.8
	D11	435.56	3.76	99.9	99.9	100.0	100.2	100.1	100.1	100.1	100.0	100.0	100.0	100.0
	D12	440.80	3.69	99.7	99.7	99.7	99.9	99.9	99.8	99.8	99.8	99.8	99.8	99.8
n mean median std. dev. min max				24	24	24	24	24	24	24	24	24	24	24
				100.1	100.1	100.1	100.3	100.2	100.2	100.2	100.2	100.1	100.0	100.1
				100.3	100.3	100.3	100.5	100.4	100.4	100.4	100.3	100.4	100.3	100.3
				0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7
				98.4	98.3	98.3	98.4	98.1	98.1	98.0	98.0	97.9	97.7	97.7
				100.8	100.8	100.9	101.1	101.0	101.0	101.0	101.0	101.0	100.9	100.9

Test Condition 2 85 °C 1.200 A															
TABLE 3.1 - CHROMATICITY SHIFT RESULTS															
Test Condition 2 85 °C 1.200 A															
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ($\Delta u'v'$)										
					7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
3B0000107BD7031C	D1	0.2334	0.5202		0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
	D2	0.2360	0.5203		0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
	D3	0.2348	0.5210		0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014
	D4	0.2341	0.5190		0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
	D5	0.2324	0.5188		0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
	D6	0.2345	0.5192		0.0011	0.0012	0.0013	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013
	D7	0.2345	0.5195		0.0013	0.0013	0.0014	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015
	D8	0.2340	0.5203		0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016
	D9	0.2328	0.5207		0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
	D10	0.2341	0.5209		0.0014	0.0014	0.0014	0.0015	0.0014	0.0016	0.0015	0.0015	0.0016	0.0016	0.0016
	D11	0.2329	0.5199		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013
	D12	0.2345	0.5207		0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
BB0000108270031C	D1	0.2354	0.5189		0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0014
	D2	0.2343	0.5210		0.0014	0.0015	0.0016	0.0015	0.0016	0.0016	0.0016	0.0017	0.0016	0.0017	0.0016
	D3	0.2342	0.5188		0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
	D4	0.2351	0.5204		0.0013	0.0013	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015
	D5	0.2331	0.5189		0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
	D6	0.2350	0.5212		0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0015
	D7	0.2329	0.5195		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0016
	D8	0.2354	0.5194		0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
	D9	0.2338	0.5201		0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	0.0020	0.0020	0.0020	0.0021	0.0021
	D10	0.2325	0.5188		0.0012	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014
	D11	0.2328	0.5186		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016
	D12	0.2345	0.5205		0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015
n					24	24	24	24	24	24	24	24	24	24	24
mean					0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
median					0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
std. dev.					0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
min					0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
max					0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	0.0020	0.0020	0.0020	0.0021	0.0021

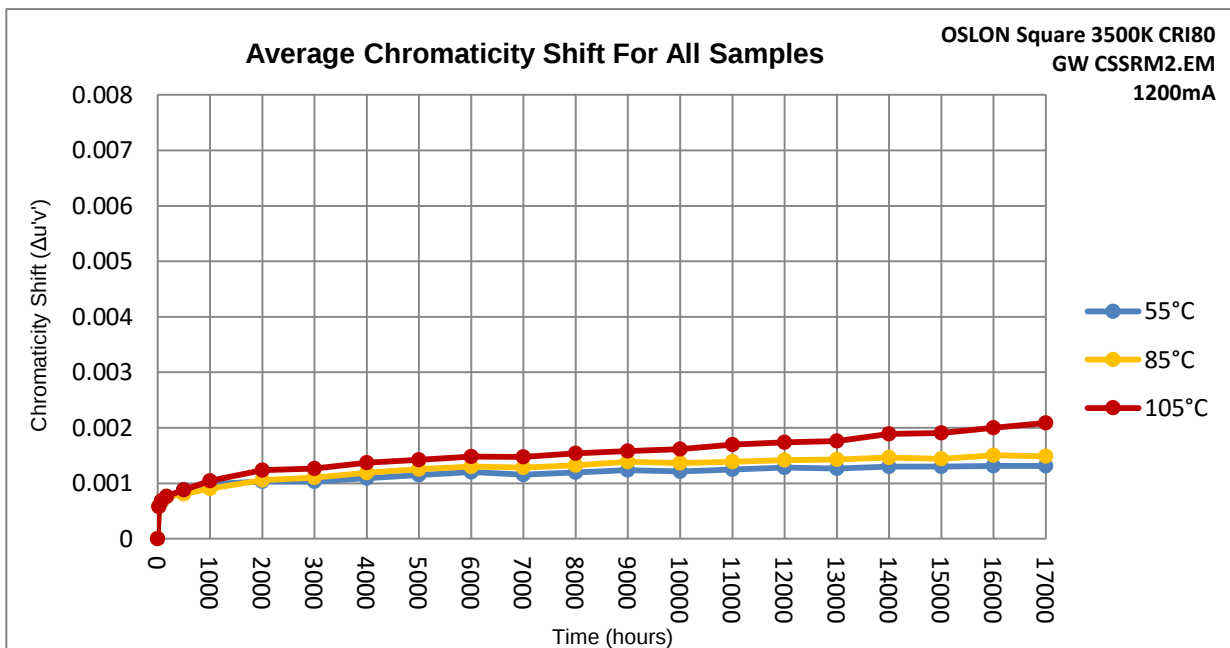
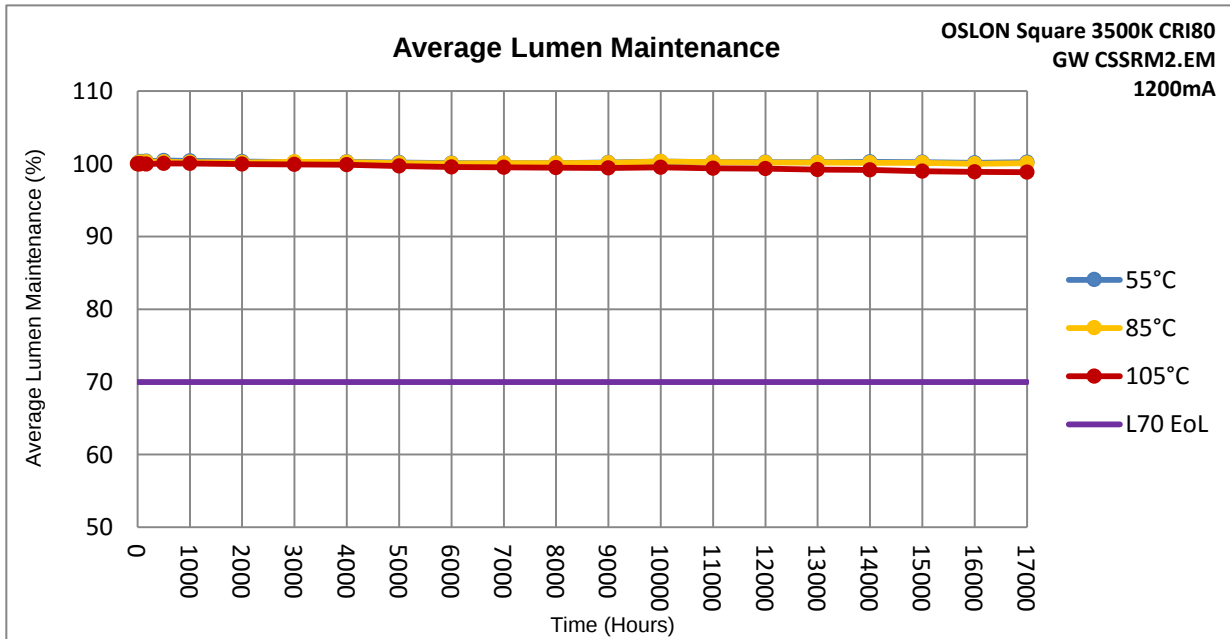
Test Condition 2				85 °C	1.200 A									
TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS														GW CSSRM2.EM
Test Condition 2				85 °C	1.200 A									
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)	Forward Voltage Maintainence (%)											
			7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	
3B0000107BD7031C	D1		3.43	98.63	98.89	98.92	99.24	99.05	99.08	98.76	99.59	99.11	99.26	98.94
	D2		3.54	97.75	98.10	98.06	98.01	98.60	98.46	97.68	98.84	98.71	98.94	98.02
	D3		3.64	96.87	97.05	97.49	97.89	97.36	97.39	96.58	98.77	98.28	97.45	98.23
	D4		3.62	98.72	98.90	99.68	100.20	98.69	98.93	96.86	101.00	100.00	97.89	99.22
	D5		3.67	98.59	99.27	100.13	100.95	98.97	100.29	97.07	99.91	100.77	98.05	98.14
	D6		3.66	98.03	98.00	98.43	101.39	97.70	100.80	97.77	97.99	98.82	97.71	97.79
	D7		3.67	96.90	96.41	96.65	98.47	96.31	98.82	96.50	96.19	96.37	97.31	97.13
	D8		3.62	97.08	97.13	97.45	96.94	96.97	97.86	96.79	97.16	97.95	97.77	97.67
	D9		3.76	97.13	97.76	97.20	96.65	97.04	98.36	96.59	96.82	98.68	96.82	97.99
	D10		3.80	96.38	96.69	96.38	95.99	96.35	97.77	95.94	95.96	97.16	96.28	97.48
	D11		3.78	95.88	95.97	95.93	96.11	96.42	96.28	95.94	96.18	96.71	96.92	96.51
	D12		3.61	98.35	98.52	98.52	98.95	99.52	98.65	99.54	98.95	99.70	99.45	99.73
BB0000108270031C	D1		3.45	97.78	98.54	101.22	99.15	98.96	99.71	98.99	98.39	99.49	98.16	98.56
	D2		3.66	95.83	96.15	98.68	96.54	97.31	97.99	96.35	97.36	96.88	97.01	96.21
	D3		3.53	98.20	98.32	98.39	98.55	99.82	99.50	98.26	99.83	98.28	99.57	98.86
	D4		3.69	95.91	96.06	96.05	96.18	96.70	96.09	95.88	96.01	96.75	96.26	96.45
	D5		3.67	97.00	97.53	97.04	97.19	97.23	97.37	97.11	97.02	97.91	97.49	97.38
	D6		3.68	97.51	98.09	98.16	97.57	97.89	97.87	97.99	97.89	97.73	98.16	98.35
	D7		3.63	95.99	95.97	96.44	95.97	96.19	95.87	96.44	96.20	96.30	95.98	96.64
	D8		3.74	95.20	95.06	95.32	95.15	95.26	95.09	95.29	95.08	95.78	94.90	95.30
	D9		3.70	96.43	96.63	97.03	96.51	96.55	96.62	96.29	96.77	96.95	96.48	96.52
	D10		3.71	96.71	96.73	97.19	96.84	96.96	96.99	97.27	97.34	98.13	97.24	97.38
	D11		3.76	96.12	96.95	96.25	96.40	96.14	96.26	96.59	96.04	97.66	96.28	96.85
	D12		3.69	97.40	98.55	98.13	98.28	97.40	97.91	97.57	97.52	99.63	97.42	97.83
n				24	24	24	24	24	24	24	24	24	24	
mean				97.1	97.4	97.7	97.7	97.5	97.9	97.1	97.6	98.1	97.4	
median				97.0	97.3	97.5	97.4	97.3	97.9	96.8	97.4	98.0	97.4	
std. dev.				1.0	1.1	1.4	1.7	1.2	1.4	1.1	1.5	1.3	1.1	
min				95.2	95.1	95.3	95.2	95.3	95.1	95.3	95.1	95.8	94.9	
max				98.7	99.3	101.2	101.4	99.8	100.8	99.5	101.0	100.8	99.6	

Test Condition 3				105 °C		1.200 A								
TABLE 4.0 - LUMEN MAINTENANCE RESULTS													GW CSSRM2.EM	
Test Condition 3				105 °C		1.200 A								
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
3E0000107B9A031C	D1	435.01	3.52	100.2	100.2	100.2	100.3	100.2	100.2	100.1	100.2	100.0	99.9	99.9
	D2	435.34	3.50	96.9	96.8	96.6	96.6	96.4	96.3	96.1	96.0	95.7	95.6	95.5
	D3	439.57	3.57	100.3	100.2	100.2	100.3	100.2	100.2	100.1	100.1	100.0	99.9	99.9
	D4	429.40	3.58	100.3	100.4	100.3	100.5	100.4	100.4	100.3	100.3	100.2	100.0	100.1
	D5	441.59	3.62	99.9	99.9	99.9	99.9	99.9	99.9	99.8	99.8	99.7	99.6	99.6
	D6	435.84	3.71	99.9	99.9	99.9	100.0	99.9	99.8	99.8	99.8	99.6	99.5	99.5
	D7	433.63	3.72	100.4	100.3	100.3	100.3	100.3	100.2	100.1	100.1	100.0	99.8	99.8
	D8	427.31	3.61	97.5	97.3	97.2	97.2	97.0	96.8	96.6	96.5	96.2	96.1	96.0
	D9	435.86	3.80	99.8	99.8	99.8	99.9	99.9	99.8	99.8	99.8	99.6	99.5	99.6
	D10	438.64	3.71	99.7	99.7	99.6	99.8	99.7	99.7	99.6	99.6	99.3	99.3	99.3
	D11	437.20	3.71	99.3	99.2	99.1	99.1	99.0	98.9	98.8	98.7	98.6	98.4	98.3
	D12	432.02	3.69	100.9	100.9	100.8	100.9	100.8	100.7	100.7	100.6	100.4	100.3	100.2
E700001083C6031C	D1	436.89	3.51	99.5	99.5	99.4	99.4	99.3	99.3	99.2	99.1	98.9	98.8	98.8
	D2	432.47	3.64	100.4	100.4	100.4	100.5	100.4	100.4	100.4	100.4	100.2	100.1	100.1
	D3	432.90	3.64	100.2	100.3	100.2	100.4	100.3	100.3	100.2	100.2	100.1	100.0	100.0
	D4	435.92	3.60	100.1	100.0	100.0	100.1	100.0	100.0	99.8	99.8	99.6	99.6	99.5
	D5	434.95	3.61	96.4	96.2	96.0	96.0	95.7	95.7	95.5	95.4	95.1	94.9	94.9
	D6	433.22	3.74	100.5	100.4	100.4	100.5	100.3	100.3	100.2	100.1	100.0	99.9	99.8
	D7	430.34	3.72	100.2	100.1	100.1	100.2	100.0	99.9	99.8	99.8	99.6	99.5	99.5
	D8	435.57	3.60	96.8	96.6	96.4	96.4	96.1	96.0	95.8	95.7	95.4	95.3	95.2
	D9	437.49	3.76	100.4	100.4	100.4	100.5	100.3	100.4	100.3	100.3	100.2	100.1	100.1
	D10	436.96	3.79	100.2	100.1	100.1	100.2	100.0	100.0	99.9	99.9	99.8	99.6	99.6
	D11	441.87	3.64	99.4	99.4	99.3	99.4	99.3	99.3	99.2	99.1	99.0	98.9	98.9
	D12	431.47	3.63	99.6	99.5	99.5	99.6	99.4	99.3	99.3	99.2	99.0	98.9	98.8
n mean median std. dev. min max				24	24	24	24	24	24	24	24	24	24	24
				99.5	99.5	99.4	99.5	99.4	99.3	99.2	99.2	99.0	98.9	98.9
				100.0	100.0	99.9	100.0	99.9	99.9	99.8	99.8	99.6	99.5	99.6
				1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7
				96.4	96.2	96.0	96.0	95.7	95.7	95.5	95.4	95.1	94.9	94.9
				100.9	100.9	100.8	100.9	100.8	100.7	100.7	100.6	100.4	100.3	100.2

Test Condition 3 105 °C 1.200 A															
TABLE 4.1 - CHROMATICITY SHIFT RESULTS															
Test Condition 3 105 °C 1.200 A															
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ($\Delta u'v'$)										
					7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
3E0000107B9A031C	D1	0.2332	0.5189		0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	0.0020
	D2	0.2341	0.5206		0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0016	0.0015	0.0017	0.0017
	D3	0.2334	0.5187		0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0015	0.0017	0.0017	0.0018	0.0018
	D4	0.2346	0.5196		0.0015	0.0016	0.0016	0.0017	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019
	D5	0.2324	0.5185		0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0018	0.0019	0.0019
	D6	0.2342	0.5205		0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018
	D7	0.2346	0.5212		0.0017	0.0017	0.0018	0.0018	0.0019	0.0020	0.0020	0.0021	0.0022	0.0023	0.0023
	D8	0.2342	0.5192		0.0015	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0017	0.0016	0.0016	0.0017
	D9	0.2331	0.5193		0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0021
	D10	0.2329	0.5190		0.0016	0.0017	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0021
	D11	0.2341	0.5209		0.0016	0.0017	0.0018	0.0018	0.0019	0.0019	0.0020	0.0021	0.0022	0.0023	0.0023
	D12	0.2336	0.5199		0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0020	0.0020	0.0021	0.0022
E700001083C6031C	D1	0.2327	0.5203		0.0015	0.0016	0.0016	0.0017	0.0019	0.0020	0.0020	0.0021	0.0023	0.0023	0.0025
	D2	0.2331	0.5207		0.0016	0.0017	0.0018	0.0018	0.0019	0.0020	0.0020	0.0022	0.0022	0.0023	0.0024
	D3	0.2347	0.5207		0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0018	0.0019
	D4	0.2333	0.5193		0.0017	0.0018	0.0018	0.0019	0.0020	0.0020	0.0021	0.0022	0.0022	0.0023	0.0024
	D5	0.2332	0.5188		0.0011	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017
	D6	0.2328	0.5202		0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0021	0.0021	0.0022	0.0023
	D7	0.2350	0.5208		0.0017	0.0017	0.0018	0.0019	0.0020	0.0020	0.0021	0.0023	0.0023	0.0024	0.0026
	D8	0.2341	0.5209		0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016
	D9	0.2328	0.5186		0.0016	0.0017	0.0018	0.0018	0.0019	0.0020	0.0020	0.0021	0.0021	0.0023	0.0024
	D10	0.2334	0.5200		0.0015	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0021	0.0021	0.0022	0.0024
	D11	0.2331	0.5203		0.0014	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0020
	D12	0.2355	0.5207		0.0014	0.0014	0.0015	0.0016	0.0016	0.0017	0.0018	0.0019	0.0019	0.0020	0.0021
n					24	24	24	24	24	24	24	24	24	24	24
mean					0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0020	0.0021
median					0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019	0.0020	0.0021
std. dev.					0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
min					0.0011	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016
max					0.0017	0.0018	0.0018	0.0019	0.0020	0.0020	0.0021	0.0023	0.0023	0.0024	0.0026

Test Condition 3				105 °C		1.200 A								
TABLE 4.2 - FORWARD VOLTAGE MAINTENANCE RESULTS														GW CSSRM2.EM
Test Condition 3				105 °C		1.200 A								
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.200 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)	Forward Voltage Maintainence (%)											
			7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	
3E0000107B9A031C	D1		3.52	98.49	99.16	103.71	101.25	98.91	98.34	97.65	98.09	102.34	99.69	99.30
	D2		3.50	100.29	99.51	100.57	101.35	100.15	100.28	100.23	99.54	100.33	100.09	100.71
	D3		3.57	98.87	98.40	98.60	98.86	99.30	99.38	99.07	98.81	99.30	101.55	104.07
	D4		3.58	100.22	98.99	101.38	99.13	100.56	100.03	99.28	99.26	99.22	101.69	102.95
	D5		3.62	99.41	100.06	101.32	99.05	105.09	100.35	101.55	99.62	100.73	106.41	100.28
	D6		3.71	98.39	98.77	98.26	99.47	105.13	98.38	99.77	98.38	100.32	105.48	99.53
	D7		3.72	98.23	96.78	97.73	98.49	99.23	96.90	97.07	97.27	98.61	98.11	97.27
	D8		3.61	99.36	98.48	99.18	98.86	99.17	98.27	98.77	98.80	99.33	99.22	100.31
	D9		3.80	97.01	97.70	97.20	97.59	97.86	97.17	97.48	97.11	97.66	97.75	98.93
	D10		3.71	103.87	99.42	97.85	98.34	98.70	99.36	99.17	100.09	98.17	102.05	97.79
	D11		3.71	102.33	97.82	96.40	99.18	96.92	97.92	98.02	98.56	95.97	101.87	96.97
	D12		3.69	97.66	97.93	97.25	99.76	97.49	98.30	97.87	98.57	97.46	99.99	99.00
E700001083C6031C	D1		3.51	98.09	100.73	100.17	101.22	101.37	99.69	102.04	102.86	101.03	103.30	97.84
	D2		3.64	98.19	98.61	99.82	99.77	99.54	98.39	99.45	98.00	98.36	99.05	97.63
	D3		3.64	97.89	98.06	100.71	97.39	97.72	97.44	97.45	97.75	98.11	98.73	100.04
	D4		3.60	98.59	98.33	101.35	98.14	98.21	99.75	98.14	98.59	98.72	98.32	101.52
	D5		3.61	100.16	98.94	99.66	99.41	99.57	101.04	99.44	99.72	99.74	99.90	100.85
	D6		3.74	97.69	97.02	97.42	97.26	97.15	97.53	100.14	97.67	97.58	98.50	98.29
	D7		3.72	97.73	96.30	96.94	96.49	96.83	96.84	99.55	98.76	96.68	99.49	100.52
	D8		3.60	100.53	98.67	98.81	98.48	98.97	99.03	98.80	100.86	98.51	101.22	102.48
	D9		3.76	98.42	97.36	99.11	98.18	97.70	98.26	99.97	97.62	97.55	100.74	101.50
	D10		3.79	98.34	96.91	99.42	97.62	97.20	97.37	99.54	96.88	97.82	99.97	101.58
	D11		3.64	102.05	99.11	100.46	98.48	98.39	98.41	99.27	98.48	105.82	98.59	99.75
	D12		3.63	100.24	98.92	98.84	97.60	97.42	97.60	98.33	97.36	103.56	97.20	97.44
n				24	24	24	24	24	24	24	24	24	24	24
mean				99.3	98.4	99.3	98.8	99.1	98.6	99.1	98.7	99.3	100.4	99.9
median				98.5	98.5	99.1	98.7	98.8	98.4	99.2	98.6	98.7	99.9	99.9
std. dev.				1.7	1.1	1.8	1.3	2.2	1.2	1.2	1.3	2.2	2.3	1.9
min				97.0	96.3	96.4	96.5	96.8	96.8	97.1	96.9	96.0	97.2	97.0
max				103.9	100.7	103.7	101.4	105.1	101.0	102.0	102.9	105.8	106.4	104.1

5.0 Charts:



6.0 Additional Information

6.1 Auxilliary Equipment

Lifetest thermal chamber:	Orb Optronix Thermal Platform - resistive heating, liquid cooling, no forced air flow
Lifetest current source:	Orb Optronix 12-Channel Driver
Photometric test current source:	Keithley 2425
Photometric test thermal control:	Orb Optronix TEC-100
Spectrometer:	Instrument Systems, CAS 140CT
Integrating Sphere:	Gamma Scientific 20"
Photometric reference standards:	LabSphere SCL-50

6.2 Additional Test Information

6.3 Photographs

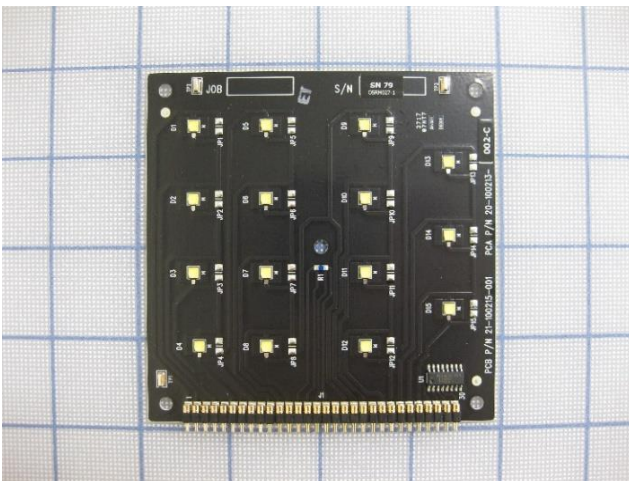


Fig. 1 OSRM027 load board example.

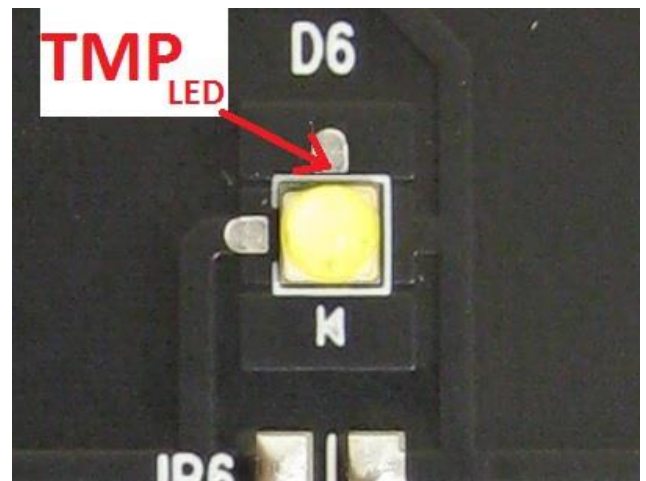


Fig. 2 OSRM027 OSLON Square white LED and temperature measurement point.

6.4 Dimensional Drawing*

* all dimension in millimeters

This report alone may not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- END OF REPORT -

Appendix A:

Energy Star® LM-80 Application

ENERGY STAR® LM-80 Cover Page

Administrative Information

Tested subcomponent series	OSLON® Square
Tested subcomponent model number	GW CSSRM2.EM
Report issue date	3 rd Jan 2020
Report revision date (if applicable)	Not Applicable
Testing start date	10 th Nov 2017
Testing completion date	3 rd Jan 2020
DUT sampling method	According to ANSI/IES LM-80 Test Method

DUT Identification

DUT manufacturer's name	OSRAM Opto Semiconductors (Malaysia) Sdn Bhd
DUT identification	GW CSSRM2.EM
Description of DUT	LED Package

DUT Characteristics

Total input power (W)	4.37
Average current density per LED die (mA/mm ²)	600.00
Average power density per LED Package (W/mm ²)	0.49
Representative CRI (Ra) of the tested sample set	80
Minimum die edge to die edge spacing	Not Applicable

Appendix B:

Lumen Maintenance Projection (IES TM-21-11)

For Information Only!

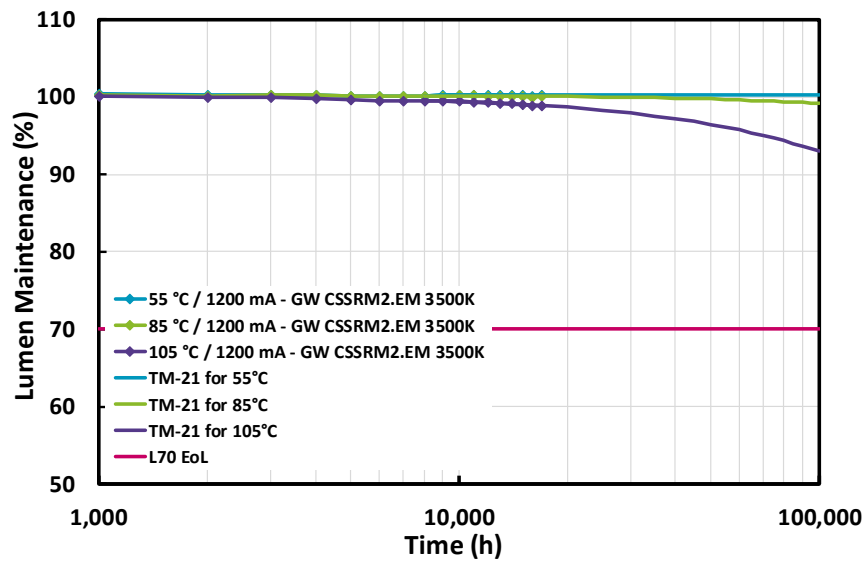
1. General Information

Description of LED light source tested	OSLON® Square GW CSSRM2.EM
Sample size per temperature	24
LED drive current used in the test	1200 mA
Current per die	1200 mA
Test duration	17,000 hours
Test duration used for projection	8,000 hours to 17,000 hours

2. Projection Data

	I	II	III
Case temperature (solder point)	$T_s = 55\text{ °C}$	$T_s = 85\text{ °C}$	$T_s = 105\text{ °C}$
α	-1.463E-08	1.082E-07	7.465E-07
B	1.002E+00	1.003E+00	1.002E+00
Reported L70	> 102,000 hours	> 102,000 hours	> 102,000 hours
Reported L80	> 102,000 hours	> 102,000 hours	> 102,000 hours
Reported L90	> 102,000 hours	> 102,000 hours	> 102,000 hours

3. Graphic chart



Appendix C: Additional Models Covered By Testing

The 28 September 2017 *ENERGY STAR® Requirements for the Use of LM-80 Data* defines conditions for which a LM-80 report is applied to cover models that have not been directly tested.

The test results in this report applies to the following list of models:

- OSOLON® Square GW CSSRM2.EM with CCT 2700 K – 6500 K
- OSOLON® Square GW CSSRM2.PM with CCT 2700 K – 6500 K
- OSOLON® Square GW CSSRM3.PM with CCT 2700 K – 6500 K
- OSOLON® Square GW CSSRM2.CM with CCT 2700 K – 6500 K
- OSOLON® Square GW CSSRM3.EM with CCT 2700 K – 6500 K

Disclaimer

Please carefully read the below terms and conditions before using the Information.
If you do not agree with any of these terms and conditions, do not use the Information.

The Information contained in this document does not constitute an independent warranty. The committed behavior is described in the Product data sheet.

Further explanations:

Data: The Data used in this Document consider the reliability test results under the mentioned driving conditions only. For Product information on the maximum operating conditions please refer to the Product data sheet or contact your local sales partner.

Conditions: The conditions for the generation of the data are as follows:

1. The Data and curves shown in this Document are based on experiments carried out under laboratory conditions on a random sample size of LED with readouts at discrete readout times (where applicable). Thus, the Data above represent a limited number of production lots only and may differ between different assembly lots over time (including chip or package changes). Thus, the behavior of the LED in the final application may differ from the Data. The behavior of the LED at conditions or readout times deviating from those stated above may not be deduced from the Data.
2. For long term operation additional failure modes of the chip or package can occur which are not shown in this Document.
3. Possible differences in the thermal management of OSRAM OS and customer's setup may lead to a different aging behavior.
4. The lifetime projection data presented in this Document has been evaluated in accordance with the lifetime extrapolation method described and defined in IES TM-21-11. The lifetime projection is based on the Data shown in this Document. The Data had been collected and assembled according to IES LM-80-15.

END OF DOCUMENT

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