

**Certificate sau alte documente emise de organisme abilitate in
acest sens , care sa ateste conformitatea produselor ,
identifica clar prin referire la specificatii sau standarde
relevante**



DECLARAȚIE DE CONFORMITATE

Nr. 135/ 21.05.2020

Noi, SCHRÉDER ROMANIA S.R.L., cu sediul în Cluj - Napoca, str. Corneliu Coposu, nr. 167A, înregistrată la Registrul Comerțului cu nr. J12/1759/1998, asigurăm, garantăm și declarăm pe propria răspundere, conform prevederilor art. 4 din Hotărârea Guvernului nr. 1022 / 2002 privind regimul produselor care pot pune în pericol viața, sănătatea, securitatea muncii și protecția mediului, că următoarele produse:

- Aparat de iluminat Schreder, tip AXIA 3.3

care vor fi livrate în cadrul contractului: „**Corpuri de iluminat LED**” nu pun în pericol viața, sănătatea, securitatea muncii și nu produc un impact negativ asupra mediului, în situația în care sunt instalate și utilizate conform destinației.

SCHRÉDER ROMANIA S.R.L.

Director Comercial,

Ovidiu GROZA



Schröder

Experts in lightability™

DECLARATIE DE CALITATE

Nr. 135/21.05.2020

Producător/Furnizor: SCHRÉDER ROMANIA S.R.L.
Beneficiar: **ÎM REI „Lumteh”**

În conformitate cu prevederile legale privind calitatea produselor livrate, SCHRÉDER ROMANIA S.R.L. declară pe propria răspundere că produsele care vor fi livrate în cadrul contractului „**Corpuri de iluminat LED**” în concordanță cu Declarația de conformitate nr. 135/ 21.05.2020, îndeplinesc condițiile de calitate prevăzute în documentația tehnică cu care vor fi livrate produsele.

SCHRÉDER ROMANIA S.R.L.
Director Comercial,

Eliberat,
Mai 2020, Cluj-Napoca

Ovidiu GROZA



Schröder România s.r.l.

Str. Corneliu Coposu, nr.167A | 400228 Cluj-Napoca Romania | T +40 364 560 670 | F +40 364 560 671 | www.schroeder.com

TVA RO 11210601 | J12/1759/1998 | IBAN RO77 FTSB 6448 0000 3700 1RON | BIC FTSBROBU



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Declarație în atenția: **ÎM REI „Lumteh”**

Din partea: SCHRÉDER ROMANIA S.R.L. și afiliații săi, în poziția de furnizori

DECLARAȚIA DEEE APARATE DE ILUMINAT

Privind deșeurile de echipamente electrice și electronice - Directiva Europeană 2012/19/UE

Prin prezenta, *furnizorul* garantează că toate produsele și componentele lor, și materialele care intră în componența produselor și a componentelor acestora, furnizate către **COMELEC-LUX S.R.L.**, sunt conforme cerințelor Directivei DEEE.

Mai departe, *furnizorul* confirmă prin prezenta că informația transmisă prin această declarație este corectă și ia la cunoștință faptul că **COMELEC-LUX S.R.L.**, va acorda încredere totală reprezentărilor pe parcursul derulării contractelor cu propriii clienți și va considera furnizorul răspunzător în cazul în care oricare dintre informațiile transmise este neadevărată sau incorectă.

Aprobat:
SCHRÉDER ROMANIA S.R.L.
Director Comercial,

21 Mai 2020,
Cluj-Napoca

Ovidiu GROZA



Schröder România s.r.l.

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Schröder

Experts in lightability™

Declarație în atenția: **ÎM REI „Lumteh”**

Din partea: **SCHRÉDER ROMANIA S.R.L.** și afiliații săi, în poziția de furnizori

DECLARAȚIA RoHS APARATE DE ILUMINAT

„Restricția folosirii anumitor substanțe periculoase în echipamentul electric și electronic” – (RoHS) Directiva Europeană 2002/95/EC

Prin prezenta, *furnizorul* garantează că toate produsele și componentele lor, și materialele care intră în componența produselor și a componentelor acestora, furnizate către **COMELEC-LUX S.R.L.**, sunt conforme cerințelor Directivei RoHS.

Mai departe, *furnizorul* confirmă prin prezenta că informația transmisă prin această declarație este corectă și ia la cunoștință faptul că **COMELEC-LUX S.R.L.**, va acorda încredere totală reprezentărilor pe parcursul derulării contractelor cu propriii clienți și va considera furnizorul răspunzător în cazul în care oricare dintre informațiile transmise este neadevărată sau incorectă.

*Notă: Nivelurile maxime admise conform Directivei RoHS sunt:

- 0.1% din greutate în materiale omogene pentru conductori;
- 0.1% din greutate în materiale omogene pentru crom hexavalent;
- 0.1% din greutate în materiale omogene pentru mercur;
- 0.1% din greutate în materiale omogene pentru difenil polibromurat;
- 0.1% din greutate în materiale omogene pentru eter difenil polibromurat;
- 0.01% din greutate în materiale omogene pentru cadmiu.

Aprobat:
SCHRÉDER ROMANIA S.R.L.
Director Comercial,

21 Mai 2020,
Cluj-Napoca

Ovidiu GROZA



LICENCE

No. 21235 replaces No.21213

Issued to:
Applicant:
R-Tech
Rue de Mons, 3
4000 LIEGE
Belgium



Licensee:
Schreder S.A.
Rue de Lusambo, 67
1190 BRUXELLES
Belgium



- Product : road, square and street lighting
- Trade name(s) : SCHREDER
- Type(s)/model(s) : AXIA GEN 3.1 (AXG3S1), AXIA GEN 3.2 (AXG3S2), AXIA GEN 3.3 (AXG3S3)

The product and any acceptable variation thereto is specified in the annex to this licence and the documents therein referred to.

SGS CEBEC hereby declares that the above-mentioned product has been certified on the basis of:

- a type test according to the standard specified in annex
- an inspection of the production location
- a certification agreement with the number 1173

SGS CEBEC hereby grants the right to use the CEBEC certification mark

The ENEC/CEBEC certification mark may be applied to the product as specified in this licence for the duration of the ENEC/CEBEC certification agreement and under the conditions of the ENEC/CEBEC certification agreement.

This licence is issued on: 25/04/2019

ir. C. Lana,
Certification Manager

© Only integral publication of this certificate, including the annex, is allowed
This certificate is only valid combined with the publication on the following web address: www.sgs.com/ee



SGS Belgium NV-Division SGS CEBEC
Business Riverside Park
Bld Internationelelaan 55 Build. D
B-1070 Brussels
Tel.+32(0)2 556 00 20 Fax.+32(0)2 556 00 36

This certificate is issued by the company under its General Conditions for Certification Services accessible at http://www.sgs.com/terms_and_conditions.htm. Attention is drawn to the limitations of liability defined therein and in the Test Report herein mentioned which findings are reflected in this Certificate. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



SPECIFICATION OF THE CERTIFIED PRODUCT

Product data

Product	:	road, square and street lighting
Trade name(s)	:	SCHREDER
Type(s)/Model(s)	:	AXIA GEN 3.1 (AXG3S1), AXIA GEN 3.2 (AXG3S2), AXIA GEN 3.3 (AXG3S3)
description	:	Street lighting luminaire
rated voltage (Un)	:	220-240 V
nature of supply	:	ac
rated frequency	:	50-60 Hz
class	:	class I
degree of protection	:	IP66
resistance to impact (IK)	:	IK09,IK10,IK10

Product data - type AXIA GEN 3.1 (AXG3S1)

rated ambient temperature (ta)	:	35°C (indoor), 45°C (outdoor use)
rated current (In)	:	max. 870 mA
rated power	:	max. 44 W
lamp(s)	:	8-16 Leds OSLOM

Product data - type AXIA GEN 3.2 (AXG3S2)

rated ambient temperature (ta)	:	35°C (indoor), 45°C (outdoor use)
rated current (In)	:	max. 1000 mA
rated power	:	max. 78 W
lamp(s)	:	24-32 Leds OSLOM

Product data - type AXIA GEN 3.3 (AXG3S3)

rated ambient temperature (ta)	:	30°C (indoor), 40°C (outdoor use)
rated current (In)	:	max. 880 mA
rated power	:	max. 172 W
lamp(s)	:	48-64 Leds OSLOM



TESTS

Test requirements

EN 60598-1:2015
EN 60598-2-3:2003 + A1:2011

Test results

The test results are laid down in certification file ref. 630159/05.

Remarks

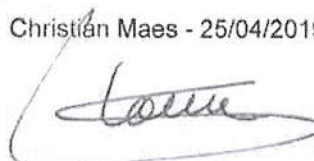
This certificate is based on test report No. P1573-77-lb.

Conclusion

The examination proved that all certification requirements were met.

Reviewed by, project leader : Christian Maes - 25/04/2019

Certification Manager :

 2019-04-25

FACTORY LOCATION(S)

Schreder TOV
 Vul. Mykulynetska 46B
 46000 TERNOPIL
 Ukraine

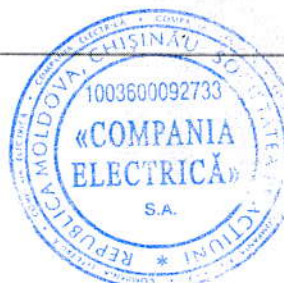
Schreder (China) Lighting Industrial Co., Ltd
 No.40 Xinye 2 Street, Tianjin Economic Technological Development Zone West Zone,
 300462 Tianjin City, P.R.China
 China

Socelec S.A.
 Av. de Roanne, 66
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Schröder Iluminação S.A.
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Comatelec S.A.
 Z.I.
 18400 SAINT FLORENT S/CHER
 France

Schröder Hungary Plc.
 Tópart 2
 2084 PILISSZENTIVAN
 Hungary



LICENȚĂ

Nr. 21235 înlocuit de nr 21213

Eliberat pentru:
Aplicant:
Schreder S.A.
Rue de Lusambo,67
1190 BRUXELLES
Belgia

Posesor licență:
Schreder S.A.
Rue de Lusambo, 67
B-1190 BRUXELLES
Belgia

Produs : aparate de iluminat căi de circulație largi, piețe, stradal

Nume de înregistrare : SCHREDER

Tipul modelului : AXIA GEN 3.1 (AXG3S1), AXIA GEN 3.2 (AXG3S2), AXIA GEN 3.3 (AXG3S3)

Produsul și orice versiune este menționat în Anexa la această licență precum și documentele la care se referă.

SGS CEBEC marcă de calitate înregistrată prin prezenta declară că produsul mai sus menționat a fost certificat în baza:

- testelor tip conforme standardului specificat în anexă
- inspecției la locul de producție
- documentului de certificare cu nr. 1173

SGS CEBEC, marcă de calitate înregistrată, garantează prin prezenta dreptul de a folosi marca de certificare CEBEC

Marca de certificare ENEC/CEBEC poate fi aplicată pe produsul specificat în această licență pe durata valabilității documentului de certificare ENEC/CEBEC, și conform condițiilor documentului de certificare ENEC/CEBEC.

Licența a fost eliberată la 25/04 2019
Semnătură indescifrabilă

ir. C. Lana,
Director Certificare
Este permisă numai publicarea integrală a acestei certificări, inclusiv anexa.
Acest certificat este valid doar împreună cu cu publicarea adresie www.sgs.com/ee

SGS Belgium NV-Division SGS CEBEC

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Traducător și Interpret Autorizat
LIENAS 2019
Am 21.04.2019
Engleză, Italiana

ANEXĂ LA LICENȚA ENEC/CEBEC nr. 21235
pagina 1 din 3

DATELE TEHNICE ALE PRODUSULUI CERTIFICAT

Date produs

Produs	: Căi de circulație largi, piețe, stradal
Nume de marcă	: SCHREDER
Tipul(uri)	: AXIA GEN 3.1 (AXG3S1), AXIA GEN 3.2 (AXG3S2), AXIA
GEN 3.3 (AXG3S3)	
Tensiune nominală	: 220-240 V
Tipul sursei	: a.c.
Frecvența nominală	: 50/60 Hz
Limita de temperatură (t max)	: 55°C
Clasa	: clasa I
Grad de etanșeitate	: IP 66
Rezistența la impact	: IK 09, IK10, IK10

Informatii produs- AXIA GEN 3.1 (AXG3S1)

<u>Temperatura ambientală nominală</u>	: 35° C (interior) , 45° C (exterior)
<u>Putere nominală</u>	: max 44W
<u>Curent secundă nominal (in SEC)</u>	: max 870 mA
<u>Lampă(i)</u>	: 8-16 LED-uri OSLO

Informatii produs- AXIA GEN 3.2 (AXG3S2)

<u>Temperatura ambientală nominală</u>	: 35° C (interior) , 45° C (exterior)
<u>Putere nominală</u>	: max 78 W
<u>Curent secundă nominal (in SEC)</u>	: max 1000 mA
<u>Lampă(i)</u>	: 24-32 LED-uri OSLO

Informatii produs- AXIA GEN 3.3 (AXG3S3)

Temperatura ambientală nominală	: 30° C (interior) , 40° C (exterior)
Putere nominală	: max 172 W
Curent secundă nominal (in SEC)	: max 880 mA
Lampă(i)	: 48-64 LED-uri OSLO

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630159/05

Traducător și Interpret Autorizat
L. G. STANCIU
Arhivă L. M. M. S. S. S.
Engleză, Traducere
L. G. Stanciu



ANEXĂ LA LICENȚA ENEC/CEBEC nr. 21235
pagina 2 din 3

TESTE

Teste solicitate

EN 60598-1:2015
EN 60598-2-3:2003 + A1:2011

Rezultatele testelor

Rezultatele testelor sunt depuse în fișierul 630159/05

Observatii

Acest certificat are la bază raportul testului Nr. P1573-77-lb

Concluzie

Verificarea a demonstrat că toate cerințele au fost îndeplinite.

Verificat de către, coordonator proiect : Christian Maes –25/04/2019

Director Departament, :
Certificare Probus

Director Certificare : semnătură indescifrabilă, data

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Traducător și Interpret Autorizat
LIMBA ROMÂNĂ ÎN
Amplificator de putere
Engleză, Franceză
[Signature]

630159/05



ANEXĂ LA LICENȚA ENEC/CEBEC Nr. 21235
Pagina 3 din 3

SEDIUL (SEDIILE) FABRICII

Schreder TOV
Vul. Mykulynetska 46B
46000 TERNOPIIL
Ukraine

Schreder (China) Lighting Industrial Co., Ltd
No.40 Xinye 2 Street, Tianjin Economic Technological Development Zone West Zone,
300462 Tianjin City, P.R.China
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Traducător de Internet Autorizat
LI...
Am...
Engleza, Franceza
630159/05



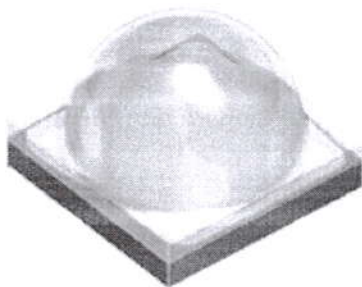
Light is OSRAM

OSRAM
Opto Semiconductors

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

IES LM-80-15 Test Report

Test Documentation No.: 190146W6 (Document No.: OSRM027-2-E3-220) – 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-E3-220

January 3, 2020

Manufacturer:	OSRAM
Models tested:	GW CSSRM2.EM OSLON Square
Test conditions:	24 devices @ 55.0 C, 1.050 A 24 devices @ 85.0 C, 1.050 A 24 devices @ 105.0 C, 1.050 A

Prepared for:
OSRAM Opto Semiconductors (Malaysia) Sdn.
Bayan Lepas Free Industrial Zone Phase 1,
11900 Bayan Lepas, Penang, Malaysia

Attn:

Test report prepared by:

Gabriel Trippel

Project Engineer,
Test and Measurement Services

Testing performed by:
CSA Group Seattle
14833 NE 87th St
Redmond, WA 98052
425-605-8500
www.csagroupseattle.org

Test report approved by:

KE Fletcher

Project Manager,
Test and Measurement Services



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	1.050	55	17000	100.4	0.0014
TC2	1.050	85	17000	100.3	0.0014
TC3	1.050	105	17000	99.2	0.0017
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)
18000010849B031C	D1	3465±245	3388	5B00001073C7031C	D1	3465±245	3461	1300001078A6031C	D1	3465±245	3413
	D2	3465±245	3486		D2	3465±245	3429		D2	3465±245	3459
	D3	3465±245	3475		D3	3465±245	3369		D3	3465±245	3454
	D4	3465±245	3427		D4	3465±245	3400		D4	3465±245	3478
	D5	3465±245	3448		D5	3465±245	3451		D5	3465±245	3430
	D6	3465±245	3425		D6	3465±245	3407		D6	3465±245	3427
	D7	3465±245	3490		D7	3465±245	3495		D7	3465±245	3389
	D8	3465±245	3498		D8	3465±245	3440		D8	3465±245	3479
	D9	3465±245	3416		D9	3465±245	3477		D9	3465±245	3479
	D10	3465±245	3471		D10	3465±245	3458		D10	3465±245	3421
	D11	3465±245	3471		D11	3465±245	3478		D11	3465±245	3392
	D12	3465±245	3415		D12	3465±245	3482		D12	3465±245	3496
5900001077DC031C	D1	3465±245	3467	960000108055031C	D1	3465±245	3504	DE00001081CE031C	D1	3465±245	3604
	D2	3465±245	3446		D2	3465±245	3464		D2	3465±245	3458
	D3	3465±245	3407		D3	3465±245	3379		D3	3465±245	3408
	D4	3465±245	3393		D4	3465±245	3446		D4	3465±245	3400
	D5	3465±245	3450		D5	3465±245	3461		D5	3465±245	3437
	D6	3465±245	3446		D6	3465±245	3513		D6	3465±245	3498
	D7	3465±245	3441		D7	3465±245	3476		D7	3465±245	3408
	D8	3465±245	3428		D8	3465±245	3448		D8	3465±245	3467
	D9	3465±245	3430		D9	3465±245	3452		D9	3465±245	3535
	D10	3465±245	3484		D10	3465±245	3490		D10	3465±245	3528
	D11	3465±245	3458		D11	3465±245	3460		D11	3465±245	3580
	D12	3465±245	3459		D12	3465±245	3403		D12	3465±245	3438

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



Test Condition 1 55 °C 1.050 A

TABLE 2.0 - LUMEN MAINTENANCE RESULTS GW CSSRM2.EM
 Test Condition 1 55 °C 1.050 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.050 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	
18000010849B031C	D1	382.55	3.51	101.3	101.3	101.3	101.4	101.4	101.4	101.4	101.4	101.5	101.5	101.4	101.5
	D2	394.59	3.44	99.5	99.4	99.5	99.6	99.6	99.6	99.6	99.6	99.6	99.7	99.6	99.6
	D3	393.31	3.52	100.0	100.0	100.1	100.2	100.1	100.1	100.1	100.1	100.2	100.2	100.1	100.1
	D4	389.11	3.51	100.8	100.8	101.0	101.0	101.0	101.0	101.1	101.1	101.1	101.1	101.1	101.2
	D5	388.77	3.63	100.6	100.6	100.7	100.8	100.7	100.8	100.8	100.8	100.8	100.8	100.7	100.8
	D6	390.51	3.55	99.1	99.0	99.1	99.2	99.1	99.1	99.1	99.1	99.1	99.1	99.0	99.0
	D7	394.50	3.53	99.6	99.7	99.8	99.9	99.9	99.9	99.9	99.9	100.0	100.0	99.9	99.9
	D8	391.57	3.51	99.0	99.0	99.0	99.1	99.0	99.0	99.0	99.0	99.0	99.0	98.8	98.9
	D9	391.72	3.63	100.8	100.8	100.9	101.0	100.9	101.0	100.9	101.1	101.0	100.9	101.0	101.0
	D10	391.91	3.66	99.9	99.9	100.0	100.1	100.0	100.0	100.1	100.1	100.1	100.0	100.0	100.1
	D11	394.32	3.56	99.4	99.4	99.5	99.6	99.5	99.5	99.6	99.6	99.6	99.6	99.5	99.6
	D12	388.79	3.61	100.9	100.9	101.1	101.2	101.1	101.1	101.2	101.2	101.2	101.2	101.1	101.2
5900001077DC031C	D1	390.00	3.42	100.9	100.9	100.9	101.1	101.0	101.0	101.0	101.1	101.1	101.0	101.1	
	D2	396.48	3.41	99.7	99.8	99.9	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0	
	D3	381.95	3.55	100.9	101.0	101.1	101.2	101.2	101.2	101.2	101.2	101.1	101.1	101.2	
	D4	379.67	3.56	101.2	101.3	101.3	101.5	101.5	101.5	101.5	101.6	101.6	101.5	101.6	
	D5	390.88	3.55	99.9	99.9	100.0	100.1	100.0	100.1	100.1	100.1	100.1	100.1	100.1	
	D6	389.40	3.64	99.9	99.9	100.0	100.1	100.0	100.1	100.0	100.1	100.0	99.9	100.0	
	D7	390.30	3.51	100.1	100.1	100.3	100.4	100.4	100.4	100.3	100.4	100.3	100.3	100.4	
	D8	385.75	3.59	100.8	100.8	100.9	101.1	101.1	101.0	101.1	101.1	101.1	101.0	101.2	
	D9	392.72	3.61	100.3	100.3	100.4	100.5	100.5	100.5	100.5	100.6	100.6	100.5	100.6	
	D10	393.11	3.56	100.5	100.5	100.6	100.7	100.7	100.6	100.6	100.7	100.6	100.5	100.6	
	D11	392.90	3.58	100.2	100.2	100.4	100.5	100.5	100.5	100.4	100.5	100.5	100.4	100.5	
	D12	387.55	3.50	99.8	99.9	100.0	100.1	100.0	100.0	100.0	100.0	100.0	99.9	100.0	
n	24	24	24	24	24	24	24	24	24	24	24	24	24		
	mean	100.2	100.2	100.3	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.3	100.4		
	median	100.2	100.2	100.3	100.4	100.4	100.4	100.4	100.4	100.5	100.4	100.4	100.5		
	std. dev.	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
	min	99.0	99.0	99.0	99.1	99.0	99.0	99.0	99.0	99.0	99.0	98.8	98.9		
	max	101.3	101.3	101.3	101.5	101.5	101.5	101.5	101.5	101.6	101.6	101.5	101.6		

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Test Condition 1 55 °C 1.050 A															
TABLE 2.1 - CHROMATICITY SHIFT RESULTS											GW CSSRM2.EM				
Test Condition 1 55 °C 1.050 A															
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.050 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	
18000010849B031C	D1	0.2363	0.5203	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	
	D2	0.2335	0.5189	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D3	0.2338	0.5188	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	
	D4	0.2352	0.5198	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	
	D5	0.2346	0.5192	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	
	D6	0.2350	0.5206	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D7	0.2331	0.5194	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	
	D8	0.2329	0.5192	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	
	D9	0.2352	0.5208	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D10	0.2337	0.5195	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	
	D11	0.2338	0.5194	0.0011	0.0012	0.0013	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D12	0.2359	0.5190	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	
5900001077DC031C	D1	0.2339	0.5195	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D2	0.2344	0.5199	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0014	0.0014	
	D3	0.2358	0.5199	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	
	D4	0.2359	0.5209	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	
	D5	0.2346	0.5191	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D6	0.2349	0.5185	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
	D7	0.2345	0.5203	0.0014	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0015	
	D8	0.2353	0.5193	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	
	D9	0.2351	0.5196	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	
	D10	0.2334	0.5192	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	
	D11	0.2343	0.5191	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	
	D12	0.2342	0.5192	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	
n				24	24	24	24	24	24	24	24	24	24	24	
mean				0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
median				0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014
std. dev.				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
min				0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012
max				0.0014	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0015

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Test Condition 1 55 °C 1.050 A

TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS
Test Condition 1 55 °C 1.050 A GW CSSRM2.EM

Load board ID	Device number	Zero hour measurements	Vf (V)	Photometric test drive current: 1.050 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
				Forward Voltage Maintenance (%)										
				7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
18000010849B031C	D1	3.51	94.97	94.77	94.79	94.60	95.24	94.92	94.93	95.01	94.95	94.82	95.12	
	D2	3.44	97.94	97.54	97.76	97.55	97.99	97.71	97.70	98.07	98.16	97.83	97.70	
	D3	3.52	97.12	96.87	96.97	96.82	97.02	96.85	96.80	96.74	97.17	96.71	96.78	
	D4	3.51	96.81	96.58	96.56	96.52	96.99	96.41	96.41	96.38	97.55	96.36	96.48	
	D5	3.63	95.64	95.56	95.34	95.39	95.77	95.38	95.35	95.17	96.81	95.53	95.34	
	D6	3.55	97.32	97.49	97.07	97.48	97.24	98.10	97.23	97.12	98.09	97.87	97.32	
	D7	3.53	96.53	96.63	96.40	96.81	96.55	97.28	96.35	96.46	97.92	96.80	96.82	
	D8	3.51	97.46	97.40	97.33	97.39	97.46	97.33	97.22	97.28	98.45	97.27	97.64	
	D9	3.63	96.18	96.10	95.92	95.90	96.05	95.93	95.96	95.88	95.90	95.90	96.28	
	D10	3.66	95.76	95.76	95.53	95.52	95.72	95.57	95.76	95.51	95.55	95.62	96.20	
	D11	3.56	97.63	97.37	97.44	97.28	97.60	97.72	97.57	97.38	98.16	97.45	97.54	
	D12	3.61	95.74	95.34	95.76	95.26	95.46	95.80	95.45	95.30	95.99	95.32	95.14	
5900001077DC031C	D1	3.42	96.22	96.05	96.25	96.39	95.95	96.22	96.39	95.81	96.65	96.20	96.13	
	D2	3.41	98.49	98.25	98.30	98.30	98.13	98.32	98.41	97.92	99.40	98.30	98.33	
	D3	3.55	95.96	96.04	95.83	95.72	95.71	95.81	96.05	95.46	96.66	95.61	95.81	
	D4	3.56	95.81	96.02	95.81	95.68	95.59	95.86	96.00	95.43	96.89	95.52	95.79	
	D5	3.55	97.38	97.38	97.09	97.14	97.13	97.37	97.33	96.97	98.41	97.16	97.24	
	D6	3.64	95.43	95.22	95.11	95.21	95.01	95.47	95.20	94.90	96.37	95.20	95.12	
	D7	3.51	97.02	97.48	96.81	96.86	96.71	97.07	96.80	96.56	98.56	97.02	96.84	
	D8	3.59	95.78	96.34	95.68	95.64	95.56	95.60	95.80	95.40	96.45	95.81	95.71	
	D9	3.61	96.90	96.81	96.83	97.26	96.57	96.74	96.98	96.46	96.63	96.75	97.01	
	D10	3.56	97.71	97.53	97.51	98.04	97.35	97.53	97.45	97.15	97.34	97.37	97.65	
	D11	3.58	97.16	97.07	97.02	97.10	96.83	97.02	96.93	96.72	96.97	96.89	96.94	
	D12	3.50	97.95	98.05	97.90	97.93	97.72	97.93	97.94	97.70	98.09	97.88	97.89	
	n		24	24	24	24	24	24	24	24	24	24	24	
	mean		96.7	96.7	96.5	96.6	96.6	96.7	96.6	96.4	97.2	96.6	96.6	
	median		96.9	96.7	96.7	96.8	96.6	96.8	96.6	96.5	97.1	96.7	96.8	
	std. dev.		0.9	0.9	0.9	1.0	0.9	1.0	0.9	1.0	1.1	1.0	1.0	
	min max		95.0 98.5	94.8 98.3	94.8 98.3	94.6 98.3	95.0 98.1	94.9 98.3	94.9 98.4	94.9 98.1	94.9 99.4	94.8 98.3	95.1 98.3	

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Test Condition 2 85 °C 1.050 A

TABLE 3.0 - LUMEN MAINTENANCE RESULTS
 Test Condition 2 85 °C 1.050 A

GW CSSRM2.EM

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.050 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
5B00001073C7031C	D1	394.55	3.36	99.8	99.8	99.9	100.0	99.9	99.9	99.9	99.9	100.0	99.8	99.9
	D2	389.49	3.49	100.7	100.7	100.7	100.9	100.9	100.8	100.8	100.9	100.8	100.8	100.9
	D3	383.20	3.46	100.7	100.8	100.9	101.1	101.0	101.0	101.0	101.0	101.0	100.9	101.0
	D4	384.37	3.48	100.3	100.3	100.5	100.6	100.5	100.6	100.6	100.6	100.6	100.5	100.6
	D5	392.21	3.68	100.1	100.1	100.2	100.4	100.2	100.3	100.3	100.3	100.3	100.2	100.3
	D6	393.42	3.56	100.2	100.1	100.2	100.4	100.3	100.3	100.3	100.3	100.3	100.3	100.3
	D7	398.50	3.49	99.5	99.5	99.6	99.8	99.7	99.6	99.6	99.6	99.6	99.5	99.6
	D8	392.06	3.58	100.1	100.0	100.2	100.4	100.3	100.3	100.3	100.3	100.3	100.3	100.3
	D9	393.95	3.60	100.2	100.1	100.3	100.4	100.3	100.4	100.3	100.4	100.3	100.3	100.4
	D10	391.62	3.62	100.9	100.9	101.0	101.2	101.1	101.1	101.1	101.1	101.1	101.1	101.1
	D11	389.71	3.61	99.9	99.9	99.9	100.1	100.0	100.0	99.9	99.9	99.9	99.8	99.8
	D12	394.28	3.52	100.0	100.0	100.1	100.3	100.2	100.2	100.2	100.2	100.2	100.1	100.2
960000108055031C	D1	391.45	3.52	100.3	100.3	100.4	100.5	100.4	100.5	100.5	100.5	100.4	100.5	
	D2	392.67	3.45	99.5	99.5	99.6	99.7	99.6	99.7	99.7	99.6	99.7	99.5	
	D3	386.03	3.43	98.6	98.6	98.6	98.6	98.5	98.5	98.4	98.3	98.3	98.2	
	D4	391.67	3.50	100.8	100.8	101.0	101.1	101.0	101.1	101.1	101.0	101.0	100.9	
	D5	391.37	3.53	99.6	99.5	99.6	99.7	99.6	99.6	99.5	99.5	99.5	99.3	
	D6	397.66	3.64	99.5	99.5	99.5	99.7	99.6	99.6	99.6	99.6	99.5	99.5	
	D7	388.74	3.51	100.7	100.7	100.8	100.9	100.9	100.9	100.9	100.9	100.8	100.8	
	D8	389.76	3.53	101.2	101.2	101.4	101.5	101.4	101.5	101.5	101.5	101.5	101.4	
	D9	393.46	3.59	100.6	100.5	100.7	100.8	100.7	100.8	100.7	100.7	100.7	100.6	
	D10	395.24	3.60	100.4	100.4	100.5	100.7	100.6	100.6	100.6	100.6	100.6	100.5	
	D11	394.47	3.58	100.3	100.4	100.5	100.6	100.6	100.5	100.5	100.5	100.5	100.4	
	D12	387.29	3.52	100.1	100.1	100.2	100.3	100.2	100.2	100.1	100.2	100.1	99.9	
	n			24	24	24	24	24	24	24	24	24	24	
	mean			100.2	100.2	100.3	100.4	100.3	100.3	100.3	100.3	100.2	100.3	
	median			100.2	100.1	100.2	100.4	100.3	100.4	100.3	100.4	100.3	100.3	
	std. dev.			0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	
	min			98.6	98.6	98.6	98.6	98.5	98.5	98.4	98.3	98.3	98.2	
	max			101.2	101.2	101.4	101.5	101.4	101.5	101.5	101.5	101.4	101.5	

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Test Condition 2 85 °C 1.050 A

TABLE 3.1 - CHROMATICITY SHIFT RESULTS GW CSSRM2.EM
 Test Condition 2 85 °C 1.050 A

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 1.050 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	
5800001073C7031C	D1	0.2343	0.5188	0.0012	0.0012	0.0013	0.0014	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0014
	D2	0.2351	0.5196	0.0012	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013
	D3	0.2370	0.5202	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0015
	D4	0.2364	0.5188	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015
	D5	0.2340	0.5206	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015
	D6	0.2356	0.5206	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015
	D7	0.2330	0.5192	0.0013	0.0014	0.0014	0.0015	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015
	D8	0.2348	0.5195	0.0015	0.0015	0.0015	0.0016	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0017
	D9	0.2334	0.5200	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0015
	D10	0.2344	0.5189	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016
	D11	0.2336	0.5193	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0013
	D12	0.2335	0.5191	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0015
960000108055031C	D1	0.2327	0.5192	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0013	
	D2	0.2342	0.5190	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D3	0.2367	0.5201	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	
	D4	0.2346	0.5195	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	
	D5	0.2337	0.5206	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	
	D6	0.2324	0.5193	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	
	D7	0.2337	0.5191	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0015	0.0016	0.0016	
	D8	0.2344	0.5199	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	
	D9	0.2339	0.5208	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	
	D10	0.2332	0.5193	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0014	
	D11	0.2343	0.5190	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0012	
	D12	0.2357	0.5205	0.0015	0.0016	0.0017	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	
n				24	24	24	24	24	24	24	24	24	24	24	
mean				0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0014	
median				0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0014	0.0015	0.0014	
std. dev.				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	
min				0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	
max				0.0015	0.0016	0.0017	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0018	0.0018	

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Test Condition 2 85 °C 1.050 A

TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS GW CSSRM2.EM
 Test Condition 2 85 °C 1.050 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.050 A											
		Vf (V)		Photometric test ambient temperature: 25 ± 2 °C											
				Failures observed: none											
				Forward Voltage Maintenance (%)											
		7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000			
5800001073C7031C	D1	3.36	98.76	98.59	99.81	99.57	101.01	100.10	98.77	99.25	105.32	100.01	98.70		
	D2	3.49	97.61	97.25	98.63	98.00	99.46	98.67	97.61	97.97	98.28	98.36	96.88		
	D3	3.46	98.76	98.96	99.01	99.17	100.58	99.65	99.19	98.92	98.69	98.63	98.53		
	D4	3.48	98.29	98.52	100.65	99.01	99.16	98.65	98.33	98.23	98.82	98.26	98.18		
	D5	3.68	97.17	96.26	98.21	96.36	96.49	96.03	95.82	95.76	97.28	95.81	95.62		
	D6	3.56	98.87	97.88	98.13	97.63	98.20	98.87	97.55	98.33	102.01	97.74	96.94		
	D7	3.49	98.27	97.94	99.62	98.60	98.36	99.48	98.02	99.05	101.82	98.03	97.42		
	D8	3.58	97.11	97.73	98.71	98.02	97.44	97.50	97.44	96.95	97.79	97.57	96.84		
	D9	3.60	97.75	98.46	98.14	98.12	97.96	97.71	97.94	97.50	98.38	98.15	97.38		
	D10	3.62	96.53	96.38	96.44	96.66	96.56	98.28	99.37	95.99	96.75	95.96	96.01		
	D11	3.61	96.41	96.38	96.48	96.80	96.58	99.23	99.50	95.70	100.09	96.06	95.79		
	D12	3.52	98.95	99.90	99.75	98.98	99.45	101.33	100.16	99.16	103.90	98.97	98.47		
960000108055031C	D1	3.52	95.16	95.40	95.10	95.73	95.48	95.19	95.59	95.96	95.87	95.22	95.37		
	D2	3.45	98.48	98.18	97.87	98.21	98.52	97.99	98.24	98.63	98.62	97.81	97.93		
	D3	3.43	99.08	98.86	98.40	98.49	99.10	98.55	98.70	98.88	98.55	98.35	99.03		
	D4	3.50	97.32	97.39	97.26	98.56	97.37	97.19	97.55	97.54	97.37	97.35	98.11		
	D5	3.53	97.94	97.28	97.63	99.30	97.47	97.17	98.14	97.29	97.50	97.84	97.73		
	D6	3.64	97.49	96.56	97.02	97.79	97.72	96.51	97.58	98.64	97.09	97.24	96.81		
	D7	3.51	97.77	97.35	97.67	98.03	98.56	97.22	98.05	99.20	97.66	97.37	97.20		
	D8	3.53	97.39	97.31	97.52	97.25	97.64	97.28	97.90	97.21	97.77	97.31	97.25		
	D9	3.59	97.75	97.84	97.47	97.36	97.62	97.42	97.90	97.14	97.70	97.90	97.44		
	D10	3.60	97.42	97.69	97.26	97.48	98.44	97.30	97.78	97.10	97.24	97.76	97.80		
	D11	3.58	97.08	97.63	97.30	98.00	98.97	97.45	98.49	97.35	97.41	97.08	97.62		
	D12	3.52	98.25	98.68	98.29	98.89	99.68	98.35	99.56	98.08	98.28	97.87	98.38		
n	mean	24	24	24	24	24	24	24	24	24	24	24	24		
	median	97.7	97.7	98.0	98.0	98.2	98.0	98.1	97.7	98.8	97.6	97.4	97.4		
	std. dev.	97.8	97.7	98.0	98.0	98.3	97.8	98.0	97.8	98.0	97.8	97.8	97.4		
	min	0.9	1.0	1.2	1.0	1.3	1.4	1.1	1.1	2.3	1.1	1.0	1.0		
	max	95.2	95.4	95.1	95.7	95.5	95.2	95.6	95.7	95.9	95.2	95.4	95.4		
		99.1	99.9	100.7	99.6	101.0	101.3	100.2	99.3	105.3	100.0	99.0	99.0		



Test Condition 3 105 °C 1.050 A

TABLE 4.0 - LUMEN MAINTENANCE RESULTS **GW CSSRM2.EM**
 Test Condition 3 105 °C 1.050 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 1.050 A									
		Flux (lm)	Vf (V)	Photometric test ambient temperature: 25 ± 2 °C									
				Failures observed: none									
		Lumen Maintenance (%)											
		7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	
1300001078A6031C	D1	390.84	3.35	97.7	97.7	97.6	97.5	97.4	97.4	97.2	97.2	97.0	96.9
	D2	391.01	3.41	97.0	96.8	96.7	96.6	96.5	96.4	96.2	96.1	95.9	95.6
	D3	393.08	3.47	99.5	99.5	99.4	99.5	99.4	99.4	99.3	99.2	99.2	99.1
	D4	394.04	3.53	100.4	100.5	100.5	100.6	100.6	100.6	100.6	100.5	100.5	100.4
	D5	390.62	3.53	99.9	99.9	99.9	100.0	99.9	99.9	99.9	99.9	99.8	99.7
	D6	393.15	3.54	98.8	98.8	98.8	98.9	98.9	98.9	98.9	98.8	98.7	98.7
	D7	385.92	3.46	97.0	96.9	96.8	96.7	96.6	96.5	96.3	96.2	96.0	95.8
	D8	395.82	3.60	99.3	99.4	99.4	99.5	99.5	99.5	99.5	99.5	99.4	99.4
	D9	393.70	3.64	100.6	100.6	100.6	100.7	100.7	100.7	100.7	100.7	100.5	100.5
	D10	391.64	3.56	100.1	100.1	100.2	100.3	100.3	100.2	100.2	100.2	100.1	100.0
	D11	388.70	3.62	100.4	100.4	100.4	100.5	100.5	100.5	100.5	100.5	100.4	100.3
	D12	396.11	3.58	100.2	100.2	100.2	100.3	100.3	100.3	100.3	100.3	100.2	100.1
DE0001081CE031C	D1	398.03	3.37	100.1	100.1	100.2	100.2	100.2	100.2	100.2	100.2	100.1	100.0
	D2	392.93	3.46	100.6	100.6	100.6	100.7	100.7	100.7	100.6	100.6	100.6	100.5
	D3	384.56	3.68	101.4	101.4	101.3	101.4	101.3	101.3	101.2	101.2	101.1	101.0
	D4	384.42	3.62	101.2	101.2	101.2	101.3	101.3	101.3	101.3	101.2	101.1	101.1
	D5	388.80	3.53	97.2	97.0	96.9	97.0	96.8	96.7	96.7	96.6	96.5	96.4
	D6	390.23	3.65	100.0	100.0	100.1	100.2	100.2	100.2	100.2	100.2	100.1	100.0
	D7	392.65	3.50	99.4	99.3	99.4	99.5	99.4	99.4	99.4	99.3	99.3	99.2
	D8	393.09	3.56	100.5	100.4	100.5	100.6	100.6	100.6	100.5	100.5	100.4	100.3
	D9	396.21	3.64	99.9	99.9	99.9	100.0	99.9	100.0	99.9	99.9	99.8	99.7
	D10	392.07	3.55	98.3	98.1	98.1	98.1	98.0	97.9	97.8	97.7	97.5	97.5
	D11	401.96	3.58	99.2	99.1	99.2	99.3	99.2	99.2	99.2	99.1	99.0	99.0
	D12	389.83	3.56	99.6	99.5	99.5	99.7	99.6	99.6	99.6	99.5	99.4	99.4
n				24	24	24	24	24	24	24	24	24	
mean				99.5	99.5	99.5	99.6	99.5	99.5	99.4	99.4	99.3	
median				99.9	99.9	99.9	100.0	99.9	100.0	99.9	99.9	99.8	
std. dev.				1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.6	
min				97.0	96.8	96.7	96.6	96.5	96.4	96.2	96.1	95.9	
max				101.4	101.4	101.3	101.4	101.3	101.3	101.3	101.2	101.1	

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Test Condition 3 105 °C 1.050 A

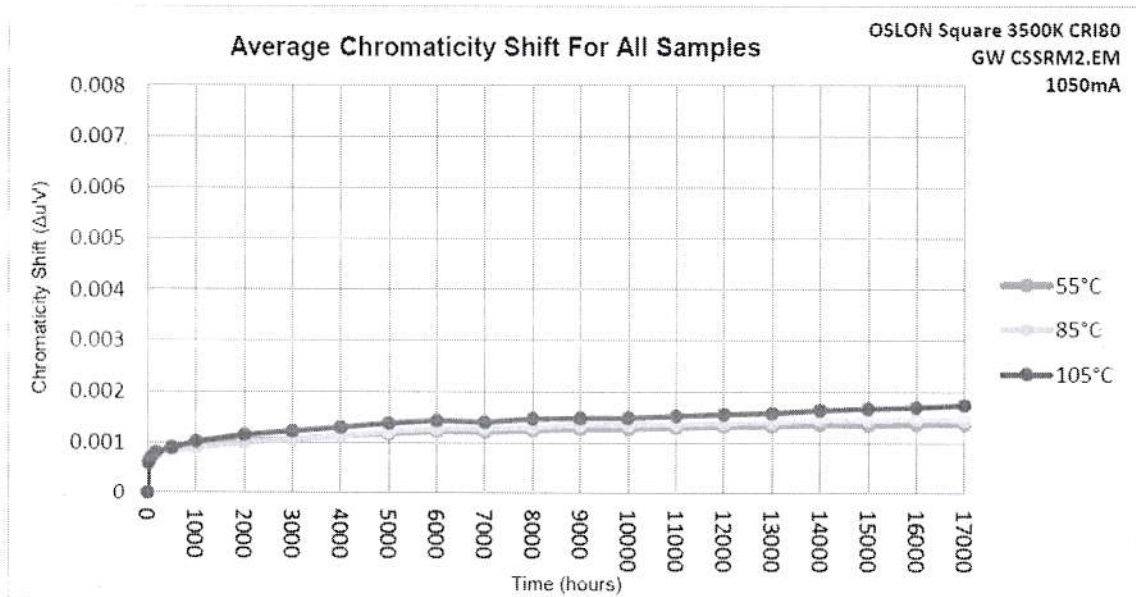
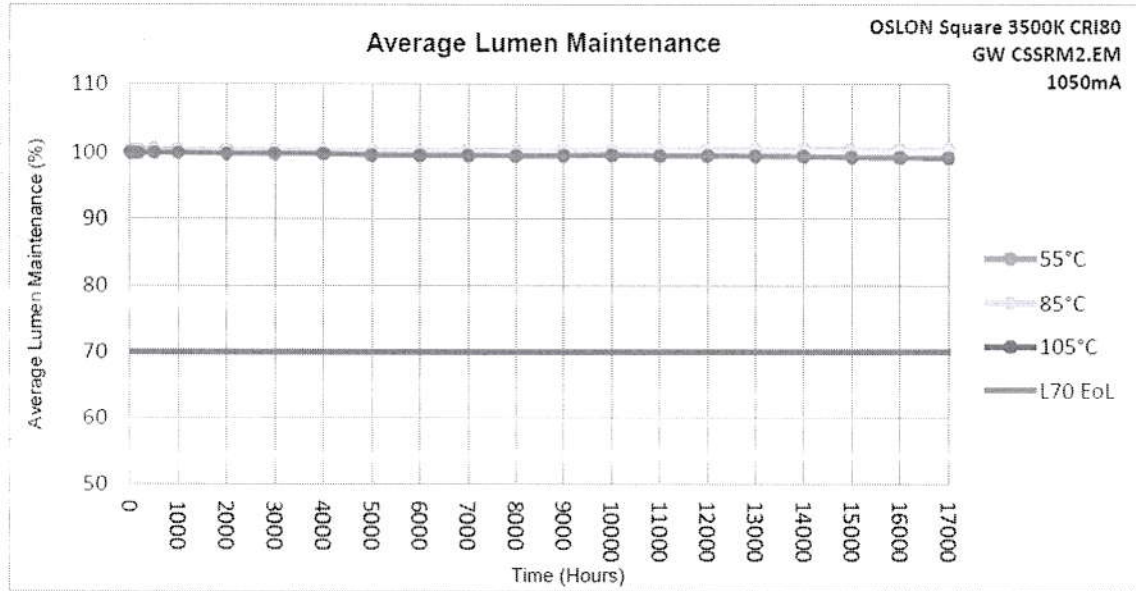
TABLE 4.1 - CHROMATICITY SHIFT RESULTS GW CSSRM2.EM
 Test Condition 3 105 °C 1.050 A

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 1.050 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		
1300001078A6031C	D1	0.2354	0.5205		0.0012	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016		
	D2	0.2339	0.5201		0.0012	0.0013	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015		
	D3	0.2340	0.5204		0.0015	0.0016	0.0016	0.0016	0.0017	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019		
	D4	0.2332	0.5204		0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0017		
	D5	0.2353	0.5191		0.0017	0.0018	0.0018	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	0.0020		
	D6	0.2349	0.5205		0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0018		
	D7	0.2363	0.5201		0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014		
	D8	0.2338	0.5186		0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0015	0.0016	0.0017		
	D9	0.2334	0.5196		0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0018	0.0019		
	D10	0.2354	0.5196		0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017		
	D11	0.2362	0.5203		0.0016	0.0017	0.0016	0.0016	0.0017	0.0018	0.0018	0.0018	0.0018	0.0018	0.0019		
	D12	0.2327	0.5200		0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016		
DE00001081CE031C	D1	0.2306	0.5162		0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016		
	D2	0.2336	0.5211		0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016		
	D3	0.2356	0.5206		0.0016	0.0017	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	0.0020		
	D4	0.2359	0.5204		0.0016	0.0017	0.0017	0.0017	0.0018	0.0018	0.0018	0.0019	0.0020	0.0020	0.0021		
	D5	0.2349	0.5195		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0015	0.0015	0.0015		
	D6	0.2330	0.5191		0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018		
	D7	0.2357	0.5200		0.0015	0.0016	0.0016	0.0016	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019		
	D8	0.2337	0.5200		0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0017	0.0017		
	D9	0.2321	0.5181		0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0017	0.0018	0.0019	0.0019	0.0019		
	D10	0.2321	0.5187		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017		
	D11	0.2311	0.5167		0.0014	0.0014	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017		
	D12	0.2351	0.5188		0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0015		
n					24	24	24	24	24	24	24	24	24	24	24		
mean					0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017		
median					0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0017	0.0017	0.0017		
std. dev.					0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002		
min					0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014		
max					0.0017	0.0018	0.0018	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0020	0.0021		

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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

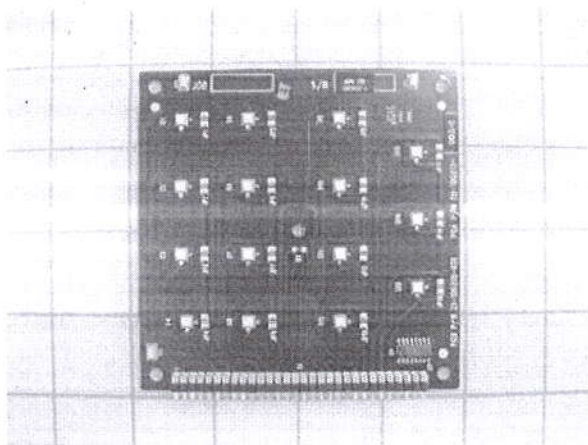


Fig. 1 OSRM027 load board example.

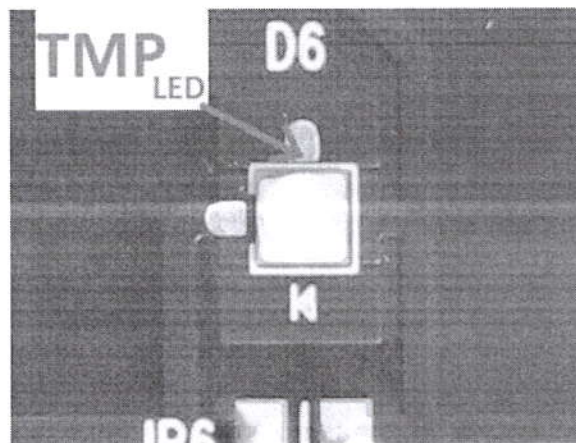


Fig. 2 OSRM027 OSLON Square white LED and temperature measurement point.



6.4 Dimensional Drawing*

* all dimension in millimeters

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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)	3.72
Average current density per LED die (mA/mm ²)	525.00
Average power density per LED Package (W/mm ²)	0.41
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

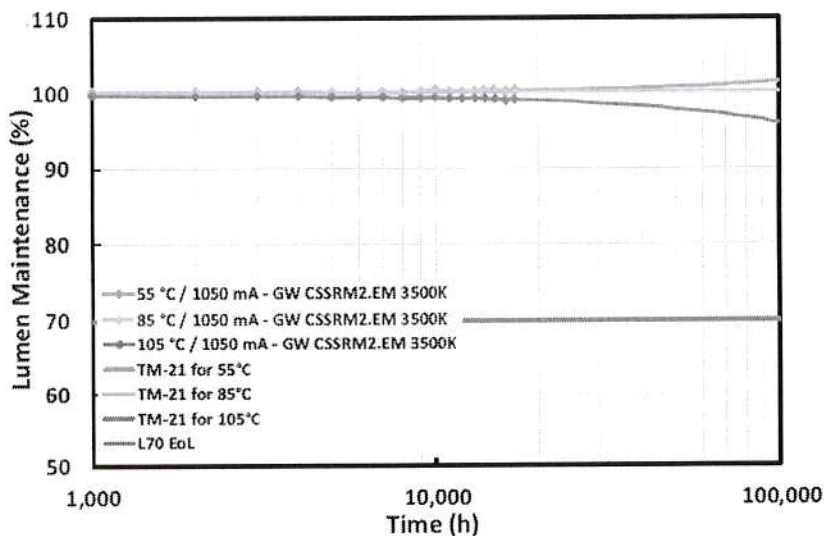
Description of LED light source tested	OSLON® Square GW CSSRM2.EM
Sample size per temperature	24
LED drive current used in the test	1050 mA
Current per die	1050 mA
Test duration	17,000 hours
Test duration used for projection	8,000 hours to 17,000 hours

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	-1.366E-07	-9.007E-09	3.894E-07
B	1.002E+00	1.003E+00	9.988E-01
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.
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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.

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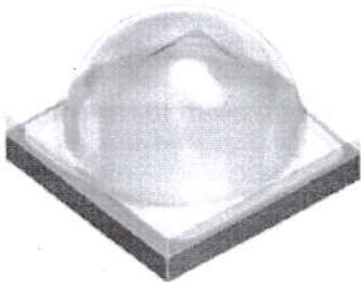
Light is OSRAM

OSRAM
Opto Semiconductors

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

IES LM-80-15 Test Report

Test Documentation No.: 190145W6 (Document No.: OSRM027-2-E2-220) – 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-E2-220

January 3, 2020

Manufacturer:	OSRAM
Models tested:	GW CSSRM2.EM OSLON Square
Test conditions:	24 devices @ 55.0 C, 0.700 A 24 devices @ 85.0 C, 0.700 A 24 devices @ 105.0 C, 0.700 A

Prepared for:
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Attn:

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1.0 Statement of test conditons, 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	0.700	55	17000	100.7	0.0012
TC2	0.700	85	17000	100.8	0.0014
TC3	0.700	105	17000	99.9	0.0014
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 conditons		
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)
05000010819D031C	D1	3465±245	3396	8500010842E031C	D1	3465±245	3431	7200010732E031C	D1	3465±245	3411
	D2	3465±245	3410		D2	3465±245	3351		D2	3465±245	3410
	D3	3465±245	3414		D3	3465±245	3376		D3	3465±245	3373
	D4	3465±245	3345		D4	3465±245	3370		D4	3465±245	3433
	D5	3465±245	3423		D5	3465±245	3418		D5	3465±245	3332
	D6	3465±245	3400		D6	3465±245	3414		D6	3465±245	3366
	D7	3465±245	3383		D7	3465±245	3406		D7	3465±245	3366
	D8	3465±245	3391		D8	3465±245	3415		D8	3465±245	3357
	D9	3465±245	3347		D9	3465±245	3367		D9	3465±245	3383
	D10	3465±245	3368		D10	3465±245	3440		D10	3465±245	3435
	D11	3465±245	3451		D11	3465±245	3443		D11	3465±245	3369
	D12	3465±245	3432		D12	3465±245	3419		D12	3465±245	3364
E600001077A9031C	D1	3465±245	3371	F30000107B9B031C	D1	3465±245	3407	DF0000108A9E031C	D1	3465±245	3362
	D2	3465±245	3366		D2	3465±245	3345		D2	3465±245	3405
	D3	3465±245	3406		D3	3465±245	3395		D3	3465±245	3393
	D4	3465±245	3366		D4	3465±245	3380		D4	3465±245	3324
	D5	3465±245	3412		D5	3465±245	3373		D5	3465±245	3391
	D6	3465±245	3388		D6	3465±245	3346		D6	3465±245	3400
	D7	3465±245	3448		D7	3465±245	3362		D7	3465±245	3417
	D8	3465±245	3389		D8	3465±245	3425		D8	3465±245	3389
	D9	3465±245	3419		D9	3465±245	3398		D9	3465±245	3377
	D10	3465±245	3397		D10	3465±245	3400		D10	3465±245	3365
	D11	3465±245	3397		D11	3465±245	3410		D11	3465±245	3466
	D12	3465±245	3414		D12	3465±245	3382		D12	3465±245	3469

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





Test Condition 1		55 °C		0.700 A											
TABLE 2.0 - LUMEN MAINTENANCE RESULTS														GW CSSRM2.EM	
Test Condition 1		55 °C		0.700 A											
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.700 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	
05000010819D031C	D1	276.46	3.24	100.3	100.3	100.2	100.4	100.3	100.3	100.5	100.5	100.5	100.3	100.4	
	D2	278.69	3.20	99.4	99.4	99.4	99.5	99.5	99.5	99.6	99.6	99.6	99.5	99.6	
	D3	283.81	3.22	100.1	100.1	100.2	100.4	100.3	100.4	100.5	100.6	100.5	100.3	100.5	
	D4	271.46	3.26	100.3	100.2	100.2	100.3	100.3	100.4	100.6	100.7	100.4	100.4	100.5	
	D5	275.72	3.27	99.2	99.2	99.2	99.4	99.3	99.3	99.4	99.5	99.4	99.2	99.3	
	D6	278.30	3.33	100.2	100.2	100.3	100.4	100.4	100.5	100.6	100.6	100.6	100.5	100.6	
	D7	278.48	3.31	100.7	100.7	100.8	101.0	100.9	100.9	101.1	101.1	101.0	101.0	101.1	
	D8	278.28	3.36	101.1	101.2	101.3	101.4	101.4	101.4	101.6	101.6	101.5	101.4	101.5	
	D9	275.61	3.39	100.7	100.6	100.8	100.8	100.9	100.9	101.0	101.1	101.0	100.9	101.0	
	D10	275.12	3.29	99.1	99.1	99.2	99.3	99.3	99.2	99.4	99.4	99.3	99.2	99.3	
	D11	282.73	3.32	100.6	100.6	100.8	100.8	100.9	100.9	101.0	101.1	101.0	101.0	101.1	
	D12	278.12	3.33	100.9	100.9	101.1	101.2	101.2	101.2	101.3	101.4	101.3	101.1	101.2	
E600001077A9031C	D1	274.54	3.23	101.3	101.4	101.4	101.5	101.5	101.5	101.6	101.6	101.6	101.5	101.7	
	D2	276.18	3.33	100.2	100.2	100.3	100.4	100.3	100.4	100.4	100.5	100.4	100.4	100.5	
	D3	271.00	3.36	102.0	102.1	102.2	102.3	102.3	102.3	102.5	102.5	102.5	102.4	102.6	
	D4	277.43	3.23	99.9	99.9	100.0	100.1	100.1	100.1	100.2	100.2	100.2	100.1	100.2	
	D5	277.40	3.29	100.2	100.2	100.3	100.4	100.4	100.4	100.5	100.5	100.5	100.5	100.6	
	D6	277.16	3.33	100.2	100.3	100.4	100.5	100.5	100.5	100.6	100.6	100.6	100.6	100.7	
	D7	276.84	3.34	100.3	100.3	100.4	100.5	100.5	100.5	100.6	100.6	100.6	100.6	100.7	
	D8	277.39	3.29	99.7	99.7	99.8	99.9	99.9	99.9	100.0	100.0	100.0	99.9	100.1	
	D9	276.07	3.34	99.8	99.8	99.8	99.9	99.9	99.9	100.0	100.0	99.9	99.9	99.9	
	D10	276.32	3.42	101.1	101.1	101.2	101.4	101.3	101.4	101.5	101.5	101.5	101.5	101.6	
	D11	280.91	3.31	100.1	100.1	100.2	100.3	100.3	100.2	100.4	100.4	100.4	100.3	100.4	
	D12	276.02	3.30	100.7	100.7	100.9	101.0	101.0	101.0	101.1	101.1	101.1	100.7	100.9	
n				24	24	24	24	24	24	24	24	24	24	24	
mean				100.3	100.3	100.4	100.5	100.5	100.5	100.7	100.7	100.6	100.5	100.7	
median				100.3	100.2	100.3	100.4	100.4	100.5	100.6	100.6	100.6	100.5	100.6	
std. dev.				0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	
min				99.1	99.1	99.2	99.3	99.3	99.2	99.4	99.4	99.3	99.2	99.3	
max				102.0	102.1	102.2	102.3	102.3	102.3	102.5	102.5	102.5	102.4	102.6	



Test Condition 1 55 °C 0.700 A

TABLE 2.1 - CHROMATICITY SHIFT RESULTS GW CSSRM2.EM
 Test Condition 1 55 °C 0.700 A

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.700 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		
05000010819D031C	D1	0.2361	0.5202		0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012		
	D2	0.2356	0.5202		0.0011	0.0012	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013		
	D3	0.2356	0.5198		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0012	0.0013	0.0013		
	D4	0.2379	0.5200		0.0009	0.0008	0.0009	0.0009	0.0009	0.0010	0.0010	0.0011	0.0009	0.0010	0.0010		
	D5	0.2351	0.5202		0.0010	0.0011	0.0011	0.0010	0.0011	0.0011	0.0011	0.0012	0.0011	0.0011	0.0011		
	D6	0.2365	0.5185		0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0011	0.0011	0.0011		
	D7	0.2364	0.5206		0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0012	0.0011	0.0011	0.0011	0.0011		
	D8	0.2363	0.5201		0.0011	0.0012	0.0011	0.0011	0.0012	0.0013	0.0013	0.0013	0.0012	0.0013	0.0013		
	D9	0.2378	0.5201		0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0012		
	D10	0.2372	0.5199		0.0010	0.0010	0.0011	0.0010	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012		
	D11	0.2347	0.5186		0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0012		
	D12	0.2354	0.5187		0.0010	0.0010	0.0011	0.0010	0.0011	0.0012	0.0011	0.0012	0.0011	0.0012	0.0011		
E600001077A9031C	D1	0.2373	0.5193		0.0009	0.0010	0.0009	0.0009	0.0010	0.0010	0.0011	0.0010	0.0010	0.0011	0.0010		
	D2	0.2371	0.5202		0.0010	0.0011	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0011	0.0012	0.0012		
	D3	0.2360	0.5194		0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013		
	D4	0.2370	0.5206		0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0013	0.0013		
	D5	0.2357	0.5196		0.0010	0.0010	0.0010	0.0011	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011		
	D6	0.2364	0.5200		0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012		
	D7	0.2348	0.5188		0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015		
	D8	0.2365	0.5199		0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0014	0.0015		
	D9	0.2356	0.5194		0.0010	0.0010	0.0009	0.0011	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011		
	D10	0.2362	0.5197		0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013		
	D11	0.2364	0.5192		0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013		
	D12	0.2354	0.5202		0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009		
n					24	24	24	24	24	24	24	24	24	24	24		
mean					0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012		
median					0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0012		
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					0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009		
max					0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0014	0.0015		



Test Condition 1		55 °C	0.700 A											
TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS														
Test Condition 1		55 °C	0.700 A	GW CSSRM2.EM										
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.700 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)	Forward Voltage Maintenance (%)											
			7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	
05000010819D031C	D1	3.24	96.64	96.80	96.51	96.70	96.59	96.58	96.54	96.67	96.78	96.91	96.83	
	D2	3.20	98.41	98.52	98.30	98.38	98.28	98.32	98.26	98.31	98.52	98.54	98.50	
	D3	3.22	98.54	98.58	98.38	98.53	98.45	98.45	98.48	98.36	98.57	98.43	98.59	
	D4	3.26	97.80	97.82	97.61	97.86	97.73	97.66	97.75	97.49	97.66	97.65	97.89	
	D5	3.27	98.45	98.40	98.21	98.34	98.25	98.25	98.25	98.07	98.31	98.29	98.45	
	D6	3.33	97.30	97.24	97.12	97.14	97.04	97.39	97.06	96.98	97.26	97.16	97.27	
	D7	3.31	96.54	96.82	96.44	96.49	96.34	96.65	96.52	96.27	96.50	96.39	96.64	
	D8	3.36	96.62	96.97	96.54	96.59	96.47	96.70	96.63	96.35	96.67	96.46	96.70	
	D9	3.39	96.25	96.32	96.33	96.27	96.15	96.32	96.13	96.04	98.13	96.11	96.27	
	D10	3.29	98.30	98.31	98.40	98.36	98.25	98.21	98.26	98.27	100.63	98.35	98.50	
	D11	3.32	97.30	97.25	97.18	97.26	97.13	97.09	97.19	97.17	97.57	97.22	97.33	
	D12	3.33	96.69	96.60	96.55	96.60	96.51	96.58	96.49	96.53	96.52	96.48	96.55	
E60001077A9031C	D1	3.23	96.82	96.48	96.53	96.48	96.63	96.97	96.43	96.54	96.70	96.68	96.58	
	D2	3.33	96.15	95.81	95.90	95.77	95.86	95.84	95.83	95.87	96.08	95.81	95.72	
	D3	3.36	95.50	95.40	95.40	95.31	95.37	95.29	95.29	95.63	96.62	95.22	95.12	
	D4	3.23	98.45	98.42	98.33	98.38	98.40	98.42	98.29	98.76	99.70	98.31	98.27	
	D5	3.29	97.95	97.89	98.20	97.87	97.85	97.93	97.84	97.84	98.28	97.74	97.69	
	D6	3.33	97.34	97.43	97.65	97.29	97.24	97.25	97.16	97.15	97.89	97.09	97.07	
	D7	3.34	96.30	96.30	96.37	96.20	96.31	96.10	96.01	96.15	96.51	96.01	96.04	
	D8	3.29	97.58	97.23	97.48	97.28	97.73	97.21	97.24	97.35	97.31	97.24	97.51	
	D9	3.34	97.49	97.19	97.29	97.16	97.45	97.07	97.10	97.15	97.10	97.07	97.33	
	D10	3.42	95.97	95.86	95.93	95.81	95.81	95.78	95.81	95.91	95.96	95.81	95.71	
	D11	3.31	97.91	97.84	98.04	97.85	97.96	97.94	97.86	98.14	98.11	97.95	97.74	
	D12	3.30	96.95	96.95	97.16	96.86	97.47	96.98	96.81	97.02	97.06	96.82	96.63	
	n		24	24	24	24	24	24	24	24	24	24	24	
	mean		97.2	97.2	97.2	97.1	97.1	97.1	97.1	97.1	97.5	97.1	97.1	
	median		97.3	97.2	97.2	97.2	97.2	97.1	97.1	97.1	97.3	97.1	97.2	
	std. dev.		0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.1	0.9	1.0	
	min		95.5	95.4	95.4	95.3	95.4	95.3	95.3	95.6	96.0	95.2	95.1	
	max		98.5	98.6	98.4	98.5	98.4	98.4	98.5	98.8	100.6	98.5	98.6	



Test Condition 2 85 °C 0.700 A															
TABLE 3.1 - CHROMATICITY SHIFT RESULTS														GW CSSRM2.EM	
Test Condition 2 85 °C 0.700 A															
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.700 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
85000010842E031C	D1	0.2349	0.5200		0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015
	D2	0.2379	0.5196		0.0012	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014
	D3	0.2365	0.5211		0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
	D4	0.2368	0.5208		0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
	D5	0.2356	0.5192		0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015
	D6	0.2359	0.5188		0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
	D7	0.2358	0.5199		0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0009	0.0010	0.0009
	D8	0.2359	0.5188		0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014
	D9	0.2370	0.5206		0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
	D10	0.2345	0.5203		0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0013	0.0014	0.0014
	D11	0.2350	0.5185		0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014
	D12	0.2359	0.5185		0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0012	0.0013
F30000107B9B031C	D1	0.2361	0.5190		0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014
	D2	0.2382	0.5193		0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0013	0.0013	0.0014
	D3	0.2366	0.5188		0.0015	0.0015	0.0015	0.0016	0.0015	0.0016	0.0017	0.0016	0.0016	0.0017	0.0017
	D4	0.2364	0.5208		0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013
	D5	0.2369	0.5202		0.0012	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014
	D6	0.2382	0.5192		0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012
	D7	0.2372	0.5204		0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014
	D8	0.2353	0.5197		0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015
	D9	0.2365	0.5189		0.0012	0.0013	0.0013	0.0014	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014
	D10	0.2364	0.5189		0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014
	D11	0.2357	0.5198		0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013
	D12	0.2366	0.5201		0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012
				n	24	24	24	24	24	24	24	24	24	24	
				mean	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	
				median	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	
				std. dev.	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	
				min	0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0009	0.0010	
				max	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0017	0.0017	





Test Condition 2 85 °C 0.700 A

TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS GW CSSRM2.EM
 Test Condition 2 85 °C 0.700 A

Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.700 A										
			Photometric test ambient temperature: 25 ± 2 °C										
			Failures observed: none										
			Forward Voltage Maintenance (%)										
		Vf (V)	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000
E5000010842E031C	D1	3.20	98.71	99.01	98.34	99.03	98.81	98.66	99.10	99.05	100.51	98.89	99.37
	D2	3.30	98.04	98.13	97.65	98.03	98.05	97.38	98.03	97.57	98.84	97.57	97.30
	D3	3.25	98.79	98.81	98.90	98.80	99.11	98.50	98.60	98.62	98.39	98.91	98.37
	D4	3.25	98.65	98.58	99.20	98.84	98.85	99.20	98.67	98.80	98.54	98.67	98.43
	D5	3.29	100.19	98.76	98.95	98.68	98.73	99.86	99.70	99.91	100.03	99.08	98.78
	D6	3.30	99.96	98.49	98.42	98.27	98.35	99.31	99.58	99.61	99.85	99.20	98.61
	D7	3.26	98.18	98.03	98.30	97.94	97.86	98.22	98.02	99.15	98.27	98.21	97.91
	D8	3.31	97.63	97.47	97.88	97.24	97.36	97.33	97.25	98.51	97.64	97.83	97.38
	D9	3.34	97.43	97.17	97.82	97.32	97.22	97.12	97.16	97.08	97.23	97.51	97.02
	D10	3.36	97.40	97.26	97.48	97.43	97.38	97.45	97.25	97.18	97.35	97.22	97.13
	D11	3.42	96.26	96.08	96.51	96.07	96.15	96.23	96.02	96.09	96.16	95.97	95.86
	D12	3.35	97.22	97.14	97.68	97.22	97.20	97.04	97.05	97.19	97.24	97.00	96.95
F30000107898031C	D1	3.20	98.02	98.21	98.34	97.97	98.38	98.18	98.28	98.40	98.26	98.10	97.96
	D2	3.32	96.57	96.79	96.92	96.46	96.83	96.64	96.65	96.75	96.74	96.58	96.46
	D3	3.25	98.43	98.70	99.06	98.39	99.44	98.79	98.60	98.33	98.80	98.50	98.47
	D4	3.27	97.81	97.95	98.30	97.38	98.62	97.78	97.53	97.07	97.48	97.29	97.26
	D5	3.33	98.03	97.93	98.04	97.69	98.02	97.94	97.92	97.65	98.44	97.80	97.79
	D6	3.37	97.08	97.17	97.39	96.90	97.36	97.26	97.12	96.97	97.88	97.23	96.94
	D7	3.33	97.22	97.67	97.79	97.06	97.75	97.27	97.27	97.01	98.12	97.45	97.00
	D8	3.28	98.36	98.62	98.67	98.15	98.84	98.30	98.66	98.21	99.50	98.49	98.12
	D9	3.36	97.76	97.76	97.94	97.58	98.08	97.86	97.91	97.64	98.70	97.81	97.59
	D10	3.33	98.10	98.10	98.43	97.93	98.21	98.21	98.32	97.96	99.29	98.18	97.97
	D11	3.38	97.04	96.96	97.39	97.04	97.29	97.02	97.33	96.97	97.96	97.18	96.76
	D12	3.30	97.89	98.08	97.79	97.73	98.08	97.61	97.79	97.73	97.98	98.65	97.31
		n	24	24	24	24	24	24	24	24	24	24	24
		mean	97.9	97.9	98.0	97.7	98.0	97.9	97.9	97.9	98.3	97.9	97.6
		median	98.0	98.0	98.0	97.7	98.1	97.8	97.9	97.7	98.3	97.8	97.5
		std. dev.	0.9	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	0.8	0.8
		min	96.3	96.1	96.5	96.1	96.2	96.2	96.0	96.1	96.2	96.0	95.9
		max	100.2	99.0	99.2	99.0	99.4	99.9	99.7	99.9	100.5	99.2	99.4

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Test Condition 3	105 °C	0.700 A
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TABLE 4.0 - LUMEN MAINTENANCE RESULTS GW CSSRM2.EM
 Test Condition 3 105 °C 0.700 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.700 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	
72000010732E031C	D1	277.26	3.28	100.7	100.7	100.8	100.9	100.8	100.9	101.0	100.9	100.9	100.9	101.0	
	D2	280.47	3.25	100.8	100.8	100.9	101.0	100.9	100.9	101.0	100.9	101.0	100.9	101.0	
	D3	276.21	3.26	100.4	100.4	100.5	100.6	100.6	100.6	100.6	100.6	100.6	100.6	100.7	
	D4	277.15	3.32	100.2	100.3	100.4	100.5	100.5	100.5	100.6	100.6	100.6	100.5	100.7	
	D5	274.43	3.30	100.3	100.3	100.4	100.4	100.4	100.4	100.5	100.4	100.4	100.3	100.4	
	D6	279.23	3.31	99.6	99.6	99.7	99.8	99.7	99.7	99.7	99.7	99.7	99.6	99.7	
	D7	276.45	3.33	100.7	100.6	100.8	100.9	100.9	100.8	100.9	100.9	100.9	100.9	100.9	
	D8	278.64	3.29	99.2	99.2	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.5	
	D9	275.35	3.34	100.2	100.2	100.3	100.4	100.3	100.3	100.4	100.4	100.3	100.3	100.4	
	D10	277.05	3.30	98.0	97.9	97.9	97.9	97.7	97.6	97.6	97.5	97.4	97.2	97.2	
	D11	277.69	3.35	100.3	100.3	100.4	100.5	100.5	100.5	100.5	100.5	100.5	100.4	100.5	
	D12	274.61	3.31	99.2	99.2	99.3	99.4	99.4	99.4	99.4	99.4	99.3	99.3	99.4	
DF0000108A9E031C	D1	275.86	3.18	100.1	100.2	100.2	100.4	100.3	100.4	100.3	100.3	100.3	100.2	100.4	
	D2	278.66	3.20	100.3	100.4	100.4	100.7	100.6	100.6	100.6	100.6	100.6	100.6	100.7	
	D3	275.97	3.28	101.0	101.1	101.2	101.5	101.4	101.4	101.4	101.4	101.4	101.4	101.5	
	D4	274.98	3.23	98.5	98.5	98.5	98.6	98.5	98.4	98.3	98.3	98.2	98.1	98.2	
	D5	274.32	3.29	98.1	98.0	98.0	98.2	98.0	97.9	97.7	97.7	97.6	97.5	97.5	
	D6	276.44	3.28	98.4	98.3	98.3	98.5	98.3	98.2	98.2	98.1	98.0	97.9	97.9	
	D7	276.93	3.25	97.9	97.8	97.8	97.9	97.8	97.6	97.6	97.5	97.3	97.2	97.3	
	D8	273.99	3.29	100.7	100.7	100.8	101.0	101.0	100.9	100.9	100.9	100.9	100.8	100.9	
	D9	277.05	3.41	100.4	100.4	100.4	100.7	100.6	100.6	100.6	100.7	100.6	100.6	100.7	
	D10	276.34	3.37	100.7	100.8	100.8	101.1	101.0	101.0	100.9	101.0	100.9	101.0	101.0	
	D11	281.88	3.33	100.5	100.5	100.6	100.9	100.8	100.8	100.8	100.8	100.7	100.7	100.8	
	D12	283.65	3.30	100.2	100.2	100.3	100.6	100.5	100.4	100.4	100.5	100.4	100.4	100.4	
n				24	24	24	24	24	24	24	24	24	24		
mean				99.8	99.8	99.9	100.1	100.0	100.0	100.0	100.0	99.9	99.9		
median				100.2	100.3	100.4	100.5	100.5	100.5	100.5	100.5	100.4	100.5		
std. dev.				1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3		
min				97.9	97.8	97.8	97.9	97.7	97.6	97.6	97.5	97.3	97.2		
max				101.0	101.1	101.2	101.5	101.4	101.4	101.4	101.4	101.4	101.5		

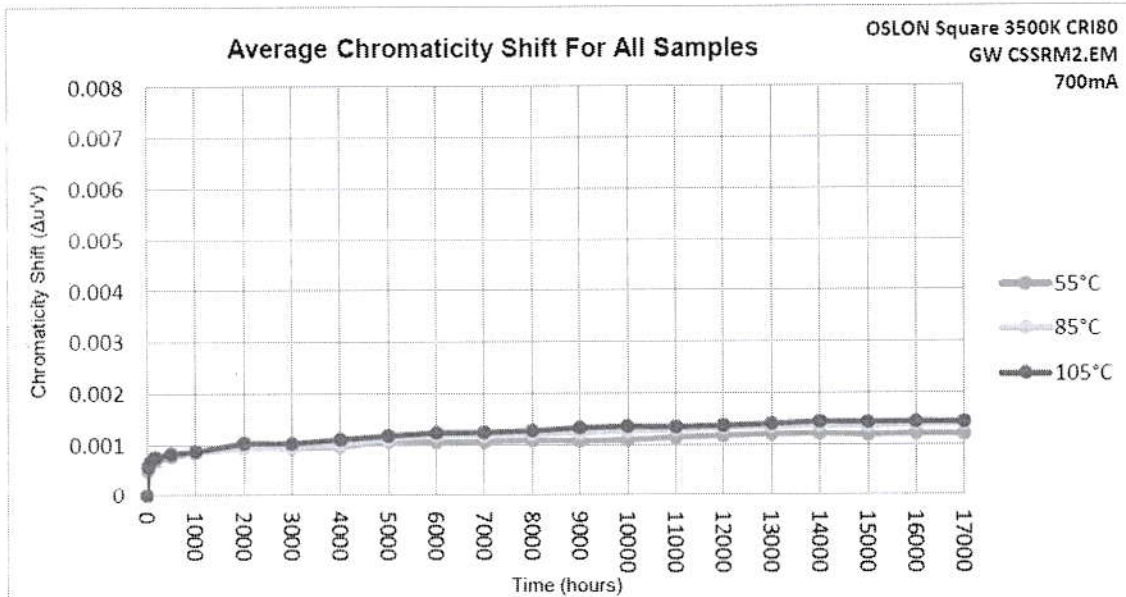
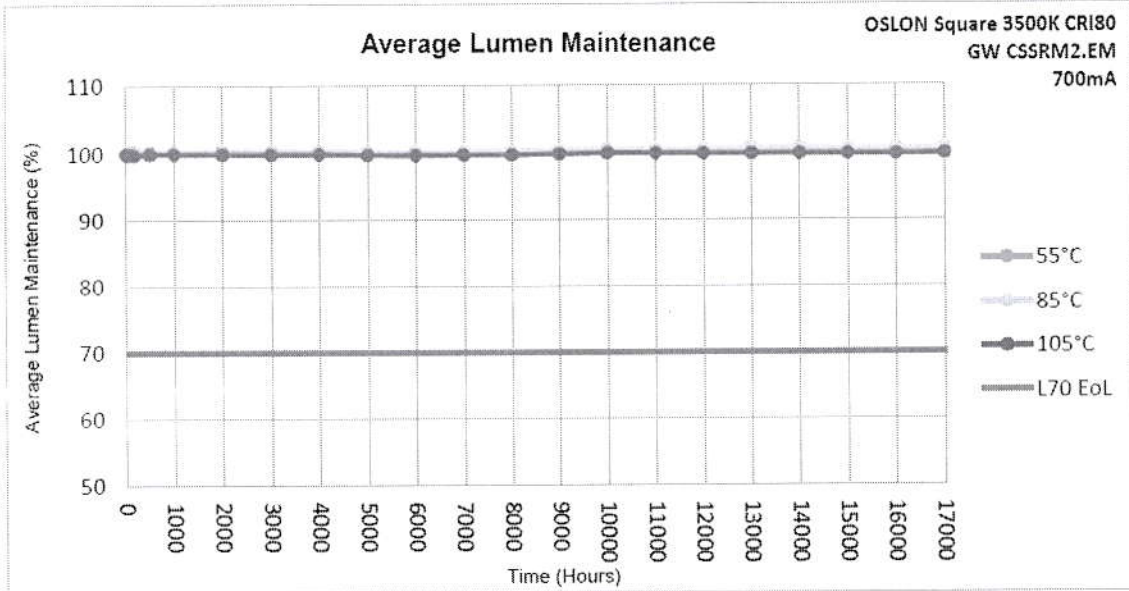
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Test Condition 3 105 °C 0.700 A															
TABLE 4.1 - CHROMATICITY SHIFT RESULTS														GW CSSRM2.EM	
Test Condition 3 105 °C 0.700 A															
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.700 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	
72000010732E031C	D1	0.2359	0.5192		0.0013	0.0013	0.0014	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0014
	D2	0.2358	0.5197		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0017	0.0016	0.0017	0.0016
	D3	0.2370	0.5198		0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0016
	D4	0.2354	0.5185		0.0013	0.0014	0.0014	0.0015	0.0014	0.0014	0.0015	0.0016	0.0016	0.0016	0.0016
	D5	0.2384	0.5200		0.0013	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0015	0.0014	0.0014	0.0014
	D6	0.2376	0.5187		0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015
	D7	0.2372	0.5200		0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013
	D8	0.2375	0.5200		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016
	D9	0.2372	0.5182		0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017
	D10	0.2351	0.5190		0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0013
	D11	0.2375	0.5188		0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015
	D12	0.2372	0.5202		0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0015	0.0016	0.0015	0.0016	0.0015
DF0000108A9E031C	D1	0.2379	0.5182		0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	
	D2	0.2360	0.5197		0.0013	0.0013	0.0014	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	
	D3	0.2362	0.5200		0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	
	D4	0.2388	0.5195		0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	
	D5	0.2362	0.5203		0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
	D6	0.2360	0.5201		0.0012	0.0012	0.0012	0.0013	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	
	D7	0.2352	0.5207		0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0013	0.0014	0.0013	0.0013	
	D8	0.2368	0.5189		0.0008	0.0008	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0011	0.0010	
	D9	0.2369	0.5198		0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	
	D10	0.2374	0.5195		0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	
	D11	0.2341	0.5189		0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	
	D12	0.2340	0.5188		0.0012	0.0013	0.0013	0.0014	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	
				n	24	24	24	24	24	24	24	24	24	24	
				mean	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	
				median	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	
				std. dev.	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	
				min	0.0008	0.0008	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0011	0.0010	
				max	0.0014	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0017	0.0016	0.0017	



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

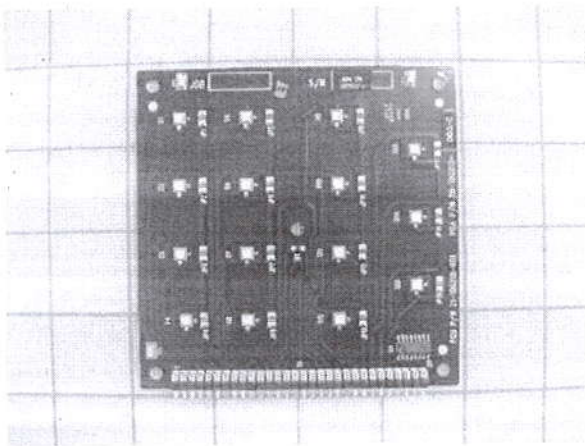


Fig. 1 OSRM027 load board example.

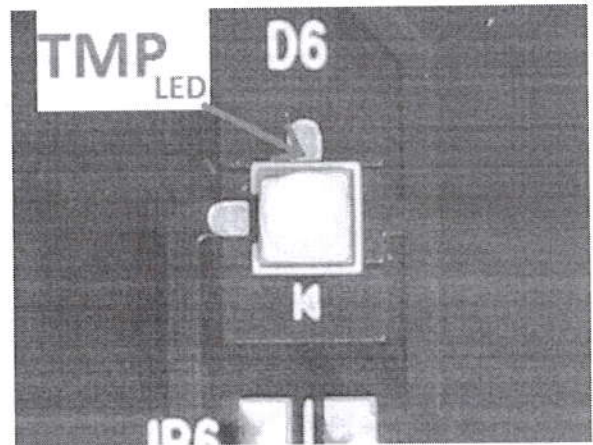


Fig. 2 OSRM027 OSLON Square white LED and temperature measurement point.

6.4 Dimensional Drawing*

* all dimension in millimeters

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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)	2.31
Average current density per LED die (mA/mm ²)	350.00
Average power density per LED Package (W/mm ²)	0.26
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

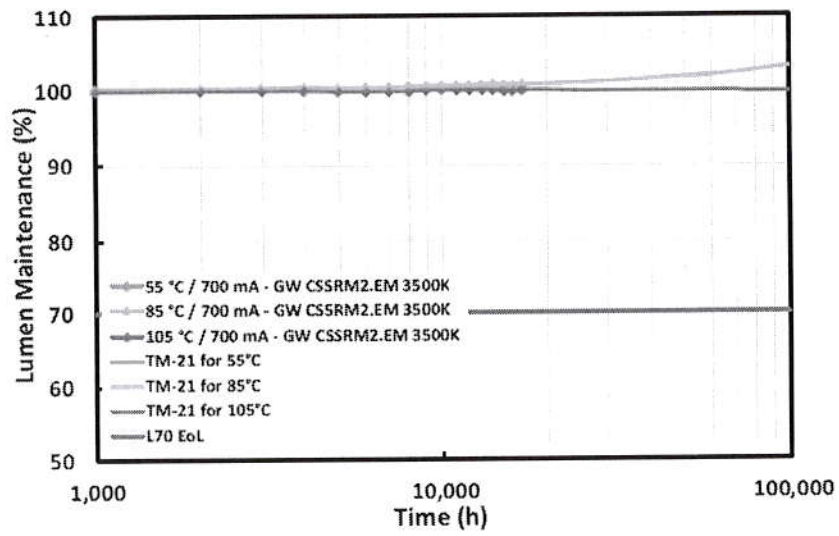
Description of LED light source tested	OSLON® Square GW CSSRM2.EM
Sample size per temperature	24
LED drive current used in the test	700 mA
Current per die	700 mA
Test duration	17,000 hours
Test duration used for projection	8,000 hours to 17,000 hours

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	-2.782E-07	-2.693E-07	3.138E-08
B	1.002E+00	1.003E+00	9.999E-01
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.



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