

Light is OSRAM

# DURIS<sup>®</sup> S 8 White (CCT 4000 K – 6500 K)

IES LM-80-15 Test Report

Test Documentation No.: 180258W7 ( Document No.: OSRM020-01-220) – 20<sup>th</sup> Jan 2021





# LM80 17000 Hour Interval Test Report

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

### CSA Group Report: OSRM020-01-220

December 18, 2020

Manufacturer: **OSRAM**

Models tested: **GW P9LT31.PM**

Test conditions: 24 devices @ 55.0 C, 0.065 A  
 24 devices @ 85.0 C, 0.065 A  
 24 devices @ 105.0 C, 0.065 A

<p>Prepared for:          OSRAM Opto Semiconductors (Malaysia) Sdn.          Bayan Lepas Free Industrial Zone Phase 1,          11900 Bayan Lepas, Penang, Malaysia</p> <p>Attn:</p>	<p>Testing performed by:          CSA Group Seattle          14833 NE 87th St          Redmond, WA 98052          425-605-8500  <a href="http://www.csagroupseattle.org">www.csagroupseattle.org</a></p>
<p>Test report prepared by:</p> <p><i>Gabriel Trippel</i></p> <p>Project Engineer,          Test and Measurement Services</p>	<p>Test report approved by:</p> <p><i>KC Fletcher</i></p> <p>Project Manager,          Test and Measurement Services</p>

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

Part number: GW P9LT31.PM					
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	0.065	55	17000	101.2	0.0004
TC2	0.065	85	17000	99.3	0.0011
TC3	0.065	105	17000	95.9	0.0030
LM80-15 Reporting requirements					
1. Number of samples tested:			24 per test condition		
2. Description of LED light sources			LED Package <sup>1</sup>		
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			August 11, 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 P9LT31.PM**

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)
2A0000109518031C	D2	3985±275	4010	270000107E62031C	D4	3985±275	3965	0C0000109714031C	D2	3985±275	3991
	D5	3985±275	4020		D5	3985±275	3977		D3	3985±275	4014
	D6	3985±275	3943		D7	3985±275	3985		D4	3985±275	3999
	D7	3985±275	3995		D8	3985±275	3977		D5	3985±275	3985
							D6		3985±275	3992	
							D7		3985±275	3995	
5F0000109023031C	D1	3985±275	4001	3D0000107F32031C	D1	3985±275	3951	6E00001090FC031C	D1	3985±275	4008
	D2	3985±275	3977		D2	3985±275	3979		D2	3985±275	4016
	D3	3985±275	3997		D3	3985±275	3952		D3	3985±275	4018
	D4	3985±275	3981		D6	3985±275	3969		D4	3985±275	4031
	D5	3985±275	3971		D8	3985±275	3964		D6	3985±275	4002
	D6	3985±275	3955						D7	3985±275	4010
	D7	3985±275	3971				D8		3985±275	4002	
	D8	3985±275	4005								
7200001078CD031C	D1	3985±275	3985	530000108B52031C	D1	3985±275	3984	AC0000109557031C	D1	3985±275	4004
	D2	3985±275	3969		D2	3985±275	4002		D2	3985±275	3951
	D4	3985±275	3975		D3	3985±275	3981		D3	3985±275	4001
	D5	3985±275	3963		D4	3985±275	3971		D4	3985±275	3989
	D6	3985±275	3979		D5	3985±275	3967		D6	3985±275	3963
	D7	3985±275	3995		D6	3985±275	3986		D7	3985±275	3956
	D8	3985±275	3939		D7	3985±275	3947				
					D8	3985±275	3963				

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

Load board ID	Device number	Zero hour measurements	
		ANSI Target* CCT (K)	Initial Calculated CCT (K)
BC0000108EEE031C	D2	3985±275	4014
	D3	3985±275	3975
	D4	3985±275	3967
	D5	3985±275	4003
	D8	3985±275	3896

Load board ID	Device number	Zero hour measurements	
		ANSI Target* CCT (K)	Initial Calculated CCT (K)
7A0000107484031C	D1	3985±275	4021
	D3	3985±275	3999
	D4	3985±275	3997
	D5	3985±275	3978
	D6	3985±275	3971
	D7	3985±275	3979
	D8	3985±275	3992

Load board ID	Device number	Zero hour measurements		
		ANSI Target* CCT (K)	Initial Calculated CCT (K)	
BF00001078CC031C	D4	3985±275	3987	
	D5	3985±275	3972	
	D6	3985±275	3953	
	D7	3985±275	3980	
	D8	3985±275	3984	

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

Test Condition 1      55 °C      0.065 A														
TABLE 2.0 - LUMEN MAINTENANCE RESULTS														GW P9LT31.PM
Test Condition 1      55 °C      0.065 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
2A0000109518031C	D2	304.94	28.50	99.6	100.2	100.3	100.4	100.5	100.4	100.6	100.6	100.6	100.6	100.5
	D5	299.14	28.45	98.9	99.6	99.7	99.8	99.9	99.8	100.0	100.1	100.0	100.0	100.0
	D6	302.75	28.57	99.7	100.2	100.4	100.5	100.6	100.6	100.8	100.9	100.9	100.9	100.9
	D7	301.09	28.48	98.9	99.5	99.7	99.8	99.9	99.8	99.9	100.1	100.0	100.0	100.0
5F0000109023031C	D1	299.49	28.44	100.0	100.6	100.7	100.7	100.9	100.8	100.8	101.0	101.0	100.9	101.0
	D2	302.95	28.49	100.2	100.7	100.8	100.8	100.9	100.9	100.9	101.1	101.1	101.1	101.1
	D3	303.22	28.49	100.0	100.5	100.6	100.7	100.7	100.7	100.7	100.9	100.9	100.9	100.9
	D4	308.82	28.49	99.2	99.9	100.0	100.1	100.2	100.2	100.2	100.4	100.4	100.4	100.4
	D5	300.74	28.48	100.2	100.8	100.9	101.0	101.1	101.0	101.0	101.3	101.3	101.2	101.3
	D6	301.60	28.35	99.9	100.4	100.4	100.5	100.6	100.5	100.5	100.8	100.7	100.7	100.7
	D7	302.80	28.48	100.2	100.8	100.8	100.9	101.0	101.0	101.0	101.2	101.2	101.2	101.2
	D8	310.28	28.48	99.9	100.4	100.4	100.5	100.6	100.5	100.6	100.7	100.7	100.7	100.7
7200001078CD031C	D1	303.46	28.41	99.3	99.9	99.9	100.0	100.0	100.0	100.0	100.2	100.2	100.2	100.2
	D2	310.35	28.51	99.5	100.1	100.2	100.3	100.4	100.4	100.5	100.7	100.6	100.6	100.7
	D4	317.78	28.51	99.7	100.3	100.4	100.5	100.6	100.5	100.5	100.5	100.7	100.7	100.7
	D5	318.20	28.49	99.7	100.3	100.3	100.3	100.4	100.4	100.3	100.5	100.5	100.4	100.4
	D6	309.85	28.49	99.9	100.4	100.4	100.5	100.6	100.5	100.5	100.7	100.7	100.7	100.7
	D7	312.55	28.50	99.9	100.4	100.4	100.5	100.5	100.5	100.5	100.7	100.7	100.6	100.6
	D8	320.20	28.51	99.8	100.2	100.3	100.3	100.4	100.3	100.3	100.5	100.4	100.4	100.4



**Test Condition 1      55 °C      0.065 A**

**TABLE 2.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 1      55 °C      0.065 A**

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		Flux (lm)	Vf (V)	Lumen Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
2A0000109518031C	D2	304.94	28.50	100.8	100.7	100.9	100.8	100.9	101.0								
	D5	299.14	28.45	100.1	100.1	100.3	100.3	100.4	100.4								
	D6	302.75	28.57	101.1	101.1	101.2	101.3	101.4	101.4								
	D7	301.09	28.48	100.2	100.2	100.4	100.3	100.4	100.5								
5F0000109023031C	D1	299.49	28.44	101.1	101.1	101.3	101.3	101.3	101.4								
	D2	302.95	28.49	101.2	101.2	101.4	101.4	101.4	101.5								
	D3	303.22	28.49	101.1	101.1	101.3	101.3	101.4	101.5								
	D4	308.82	28.49	100.5	100.5	100.7	100.7	100.8	100.9								
	D5	300.74	28.48	101.4	101.4	101.6	101.6	101.6	101.8								
	D6	301.60	28.35	100.8	100.8	101.0	101.0	101.1	101.1								
	D7	302.80	28.48	101.4	101.4	101.5	101.5	101.6	101.7								
	D8	310.28	28.48	100.9	100.9	101.0	101.0	101.1	101.2								
7200001078CD031C	D1	303.46	28.41	100.4	100.3	100.5	100.4	100.5	100.6								
	D2	310.35	28.51	100.9	100.9	101.0	101.1	101.2	101.2								
	D4	317.78	28.51	100.9	100.9	101.0	101.0	101.1	101.2								
	D5	318.20	28.49	100.5	100.5	100.6	100.6	100.7	100.7								
	D6	309.85	28.49	100.9	100.9	101.0	101.0	101.1	101.2								
	D7	312.55	28.50	100.8	100.8	100.9	100.9	101.0	101.1								
	D8	320.20	28.51	100.6	100.5	100.7	100.7	100.8	100.8								



**TABLE 2.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 1				55 °C	0.065 A										
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
		Flux (lm)	Vf (V)	Lumen Maintenance (%)											
				12000	13000	14000	15000	16000	17000						
BC0000108EEE031C	D2	300.90	28.46	100.9	100.8	101.0	101.0	101.1	101.2						
	D3	300.16	28.48	101.6	101.7	101.8	101.8	101.8	102.0						
	D4	310.44	28.47	100.7	100.7	100.8	100.9	100.9	101.0						
	D5	309.26	28.43	100.8	100.8	101.0	101.0	101.0	101.1						
	D8	299.99	28.50	101.1	101.0	101.1	101.2	101.2	101.4						
				n	24	24	24	24	24	24					
				mean	100.9	100.8	101.0	101.0	101.1	101.2					
				median	100.9	100.9	101.0	101.0	101.1	101.2					
				std. dev.	0.4	0.4	0.4	0.4	0.4	0.4					
				min	100.1	100.1	100.3	100.3	100.4	100.4					
				max	101.6	101.7	101.8	101.8	101.8	102.0					

**Test Condition 1      55 °C      0.065 A**

**TABLE 2.1 - CHROMATICITY SHIFT RESULTS** **GW P9LT31.PM**

**Test Condition 1      55 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
2A0000109518031C	D2	0.2246	0.5020		0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002
	D5	0.2250	0.5007		0.0005	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002
	D6	0.2250	0.5052		0.0003	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	D7	0.2258	0.5004		0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
5F0000109023031C	D1	0.2244	0.5031		0.0005	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	D2	0.2249	0.5035		0.0004	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	D3	0.2247	0.5027		0.0004	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
	D4	0.2247	0.5035		0.0004	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002
	D5	0.2249	0.5036		0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0002
	D6	0.2256	0.5032		0.0005	0.0003	0.0003	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002
	D7	0.2250	0.5034		0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	D8	0.2244	0.5027		0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
7200001078CD031C	D1	0.2241	0.5047		0.0005	0.0003	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003
	D2	0.2243	0.5051		0.0004	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002
	D4	0.2248	0.5038		0.0005	0.0004	0.0003	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003
	D5	0.2250	0.5040		0.0004	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	D6	0.2245	0.5041		0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	D7	0.2246	0.5030		0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003
	D8	0.2255	0.5044		0.0004	0.0003	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002



**TABLE 2.1 - CHROMATICITY SHIFT RESULTS**

**GW P9LT31.PM**

Test Condition 1      55 °C      0.065 A

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
BC0000108EEE031C	D2	0.2240	0.5031		0.0005	0.0003	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
	D3	0.2247	0.5040		0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0002
	D4	0.2247	0.5044		0.0004	0.0002	0.0001	0.0001	0.0001	0.0000	0.0002	0.0001	0.0001	0.0001	0.0002
	D5	0.2243	0.5031		0.0005	0.0003	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
	D8	0.2264	0.5051		0.0005	0.0003	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
				n	24	24	24	24	24	24	24	24	24	24	24
				mean	0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
				median	0.0005	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
				std. dev.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000
				min	0.0003	0.0002	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
				max	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003

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**Test Condition 1      55 °C      0.065 A**

**TABLE 2.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

**Test Condition 1      55 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )													
					12000	13000	14000	15000	16000	17000								
2A0000109518031C	D2	0.2246	0.5020		0.0002	0.0002	0.0003	0.0003	0.0003	0.0004								
	D5	0.2250	0.5007		0.0003	0.0003	0.0003	0.0003	0.0004	0.0004								
	D6	0.2250	0.5052		0.0001	0.0001	0.0002	0.0002	0.0002	0.0002								
	D7	0.2258	0.5004		0.0002	0.0003	0.0003	0.0003	0.0003	0.0003								
5F0000109023031C	D1	0.2244	0.5031		0.0002	0.0002	0.0002	0.0002	0.0003	0.0004								
	D2	0.2249	0.5035		0.0002	0.0003	0.0003	0.0003	0.0003	0.0004								
	D3	0.2247	0.5027		0.0002	0.0002	0.0002	0.0002	0.0003	0.0003								
	D4	0.2247	0.5035		0.0002	0.0002	0.0002	0.0002	0.0003	0.0003								
	D5	0.2249	0.5036		0.0003	0.0003	0.0003	0.0003	0.0003	0.0004								
	D6	0.2256	0.5032		0.0003	0.0003	0.0003	0.0003	0.0004	0.0004								
	D7	0.2250	0.5034		0.0002	0.0002	0.0003	0.0003	0.0003	0.0004								
	D8	0.2244	0.5027		0.0002	0.0002	0.0002	0.0003	0.0003	0.0003								
7200001078CD031C	D1	0.2241	0.5047		0.0003	0.0003	0.0003	0.0003	0.0003	0.0004								
	D2	0.2243	0.5051		0.0002	0.0002	0.0002	0.0002	0.0003	0.0003								
	D4	0.2248	0.5038		0.0003	0.0003	0.0003	0.0003	0.0003	0.0004								
	D5	0.2250	0.5040		0.0002	0.0003	0.0003	0.0003	0.0003	0.0004								
	D6	0.2245	0.5041		0.0002	0.0003	0.0003	0.0003	0.0003	0.0004								
	D7	0.2246	0.5030		0.0003	0.0003	0.0003	0.0003	0.0004	0.0004								
	D8	0.2255	0.5044		0.0002	0.0002	0.0003	0.0003	0.0003	0.0004								

**TABLE 2.1 - CHROMATICITY SHIFT RESULTS**

**GW P9LT31.PM**

Test Condition 1      55 °C      0.065 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'	Chromaticity shift (Δu'v')										
				12000	13000	14000	15000	16000	17000					
BC0000108EEEE031C	D2	0.2240	0.5031	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003					
	D3	0.2247	0.5040	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004					
	D4	0.2247	0.5044	0.0001	0.0002	0.0001	0.0002	0.0002	0.0003					
	D5	0.2243	0.5031	0.0002	0.0003	0.0002	0.0003	0.0003	0.0003					
	D8	0.2264	0.5051	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004					
		<b>n</b>		24	24	24	24	24	24					
		<b>mean</b>		0.0002	0.0002	0.0003	0.0003	0.0003	0.0004					
		<b>median</b>		0.0002	0.0002	0.0003	0.0003	0.0003	0.0004					
		<b>std. dev.</b>		0.0000	0.0001	0.0000	0.0000	0.0000	0.0000					
		<b>min</b>		0.0001	0.0001	0.0001	0.0002	0.0002	0.0002					
		<b>max</b>		0.0003	0.0003	0.0003	0.0003	0.0004	0.0004					

**Test Condition 1      55 °C      0.065 A**

**TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 1      55 °C      0.065 A**

Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
			Vf (V)	Forward Voltage Maintenance (%)										
		1000		2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
		2A0000109518031C		D2	28.50	99.88	99.94	99.92	99.93	99.93	99.93	99.94	99.95	99.95
D5	28.45		100.00	100.03	100.04	100.04	100.05	100.05	100.05	100.06	100.06	100.07	100.06	
D6	28.57		99.93	99.98	99.99	100.00	100.01	100.01	100.01	100.03	100.04	100.04	100.04	
D7	28.48		100.00	100.03	100.03	100.04	100.04	100.04	100.04	100.05	100.05	100.06	100.06	
5F0000109023031C	D1	28.44	100.01	100.05	100.07	100.07	100.08	100.07	100.08	100.09	100.10	100.10	100.11	
	D2	28.49	100.03	100.07	100.09	100.10	100.11	100.12	100.13	100.14	100.15	100.16	100.17	
	D3	28.49	99.92	99.95	99.97	99.98	99.99	100.00	100.01	100.02	100.03	100.04	100.05	
	D4	28.49	99.97	100.01	100.02	100.02	100.03	100.03	100.04	100.05	100.06	100.06	100.06	
	D5	28.48	100.01	100.07	100.09	100.10	100.11	100.12	100.13	100.14	100.15	100.16	100.16	
	D6	28.35	99.98	100.03	100.05	100.06	100.07	100.08	100.09	100.10	100.11	100.12	100.13	
	D7	28.48	100.03	100.09	100.12	100.13	100.14	100.15	100.16	100.18	100.19	100.19	100.20	
	D8	28.48	99.96	100.01	100.03	100.05	100.06	100.07	100.08	100.09	100.10	100.11	100.12	
7200001078CD031C	D1	28.41	100.00	100.05	100.05	100.06	100.05	100.07	100.07	100.07	100.08	100.08	100.09	
	D2	28.51	99.94	100.00	100.02	100.04	100.05	100.06	100.07	100.09	100.10	100.11	100.12	
	D4	28.51	99.92	99.96	99.98	99.99	99.99	99.99	100.00	99.98	100.02	100.02	100.03	
	D5	28.49	99.88	99.92	99.93	99.94	99.95	99.96	99.97	99.97	100.00	100.00	100.01	
	D6	28.49	99.92	99.95	99.97	99.98	99.99	100.00	100.00	100.01	100.02	100.03	100.04	
	D7	28.50	99.91	99.96	99.97	99.98	99.99	100.00	100.01	100.01	100.03	100.03	100.04	
	D8	28.51	99.92	99.98	100.00	100.02	100.03	100.04	100.06	100.07	100.09	100.10	100.11	

**TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 1		55 °C		0.065 A										
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A										
		Vf (V)		Photometric test ambient temperature: 25 ± 2 °C										
				Failures observed: none										
		Forward Voltage Maintenance (%)												
		1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000		
BC000108EEE031C	D2	28.46	100.00	100.05	100.06	100.06	100.07	100.07	100.08	100.09	100.09	100.10	100.10	
	D3	28.48	100.02	100.08	100.10	100.11	100.13	100.13	100.14	100.16	100.17	100.18	100.19	
	D4	28.47	99.98	100.04	100.05	100.06	100.07	100.08	100.08	100.10	100.10	100.11	100.12	
	D5	28.43	99.98	100.03	100.05	100.06	100.07	100.08	100.09	100.10	100.11	100.12	100.12	
	D8	28.50	99.92	99.97	99.98	99.99	100.00	100.01	100.02	100.03	100.04	100.05	100.05	
		<b>n</b>	24	24	24	24	24	24	24	24	24	24	24	
		<b>mean</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1	
		<b>median</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1	
		<b>std. dev.</b>	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
		<b>min</b>	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	100.0	100.0	99.9	
		<b>max</b>	100.0	100.1	100.1	100.1	100.1	100.1	100.2	100.2	100.2	100.2	100.2	

**Test Condition 1      55 °C      0.065 A**

**TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** GW P9LT31.PM

**Test Condition 1      55 °C      0.065 A**

Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none														
			Vf (V)	Forward Voltage Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
2A0000109518031C	D2	28.50	99.97	99.97	99.98	99.97	99.98	99.99									
	D5	28.45	100.08	100.08	100.08	100.07	100.08	100.09									
	D6	28.57	100.06	100.06	100.07	100.06	100.07	100.08									
	D7	28.48	100.07	100.06	100.07	100.06	100.07	100.07									
5F0000109023031C	D1	28.44	100.12	100.12	100.13	100.11	100.12	100.13									
	D2	28.49	100.18	100.18	100.19	100.19	100.19	100.20									
	D3	28.49	100.06	100.07	100.08	100.07	100.08	100.09									
	D4	28.49	100.07	100.07	100.08	100.07	100.08	100.09									
	D5	28.48	100.18	100.18	100.19	100.18	100.19	100.20									
	D6	28.35	100.14	100.14	100.15	100.15	100.16	100.17									
	D7	28.48	100.22	100.22	100.23	100.22	100.23	100.24									
	D8	28.48	100.13	100.13	100.15	100.15	100.15	100.16									
7200001078CD031C	D1	28.41	100.10	100.10	100.11	100.10	100.10	100.11									
	D2	28.51	100.13	100.14	100.15	100.15	100.15	100.16									
	D4	28.51	100.04	100.04	100.05	100.04	100.05	100.05									
	D5	28.49	100.03	100.03	100.04	100.04	100.05	100.06									
	D6	28.49	100.05	100.05	100.06	100.06	100.07	100.07									
	D7	28.50	100.05	100.05	100.06	100.06	100.06	100.07									
	D8	28.51	100.13	100.13	100.15	100.14	100.16	100.17									



**TABLE 2.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 1		55 °C	0.065 A											
Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
		Vf (V)	Forward Voltage Maintenance (%)											
			12000	13000	14000	15000	16000	17000						
BC000108EEE031C	D2	28.46	100.11	100.10	100.12	100.11	100.12	100.13						
	D3	28.48	100.21	100.20	100.22	100.22	100.22	100.23						
	D4	28.47	100.13	100.12	100.14	100.14	100.14	100.15						
	D5	28.43	100.14	100.13	100.14	100.14	100.15	100.16						
	D8	28.50	100.07	100.06	100.08	100.07	100.09	100.11						
		<b>n</b>	24	24	24	24	24	24						
		<b>mean</b>	100.1	100.1	100.1	100.1	100.1	100.1						
		<b>median</b>	100.1	100.1	100.1	100.1	100.1	100.1						
		<b>std. dev.</b>	0.1	0.1	0.1	0.1	0.1	0.1						
		<b>min</b>	100.0	100.0	100.0	100.0	100.0	100.0						
		<b>max</b>	100.2	100.2	100.2	100.2	100.2	100.2						

Test Condition 2      85 °C      0.065 A														
TABLE 3.0 - LUMEN MAINTENANCE RESULTS														GW P9LT31.PM
Test Condition 2      85 °C      0.065 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
270000107E62031C	D4	318.36	28.42	99.6	99.8	99.8	99.9	99.7	99.5	99.6	99.6	99.4	99.2	99.2
	D5	319.18	28.49	99.5	99.8	99.6	99.7	99.4	99.2	99.1	99.3	99.0	98.8	98.7
	D7	313.41	28.46	99.5	100.0	99.9	100.0	99.8	99.6	99.7	99.8	99.6	99.4	99.4
	D8	313.65	28.50	99.5	100.0	99.8	99.9	99.6	99.5	99.4	99.5	99.4	99.1	99.1
3D0000107F32031C	D1	313.62	28.51	99.6	100.0	100.0	100.0	99.9	99.7	99.7	99.8	99.6	99.4	99.4
	D2	306.07	28.47	99.6	99.8	99.7	99.7	99.6	99.4	99.4	99.4	99.2	99.1	99.1
	D3	318.00	28.44	99.9	100.1	99.9	99.9	99.8	99.5	99.7	99.6	99.4	99.3	99.3
	D6	319.65	28.45	99.6	99.8	99.7	99.7	99.6	99.3	99.3	99.4	99.2	99.0	99.1
	D8	308.90	28.49	99.8	100.1	100.0	100.0	99.9	99.6	99.6	99.7	99.4	99.3	99.4
530000108B52031C	D1	307.04	28.48	99.2	99.5	99.5	99.6	99.5	99.3	99.4	99.3	99.1	99.0	99.0
	D2	296.14	28.46	99.1	99.4	99.3	99.4	99.2	99.0	99.0	99.2	98.9	98.8	98.8
	D3	294.47	28.45	99.6	100.0	99.9	99.9	99.8	99.6	99.6	99.8	99.6	99.5	99.4
	D4	296.79	28.47	99.5	99.7	99.8	99.8	99.6	99.4	99.5	99.6	99.4	99.2	99.2
	D5	308.44	28.47	99.9	100.2	100.1	100.2	100.1	100.0	100.0	100.1	99.8	99.7	99.7
	D6	295.38	28.48	100.1	100.4	100.4	100.4	100.3	100.1	100.1	100.2	100.0	99.8	99.9
	D7	301.87	28.48	99.9	100.2	100.1	100.2	100.0	99.8	99.7	99.9	99.6	99.4	99.5
	D8	305.39	28.38	99.9	100.3	100.3	100.3	100.2	100.0	100.0	100.1	99.9	99.7	99.8



**TABLE 3.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 2      85 °C      0.065 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
7A000107484031C	D1	304.49	28.44	99.1	99.5	99.5	99.5	99.4	99.2	99.3	99.1	99.1	99.0	99.0
	D3	300.40	28.59	98.3	98.7	98.7	98.7	98.6	98.4	98.5	98.4	98.4	98.2	98.3
	D4	306.80	28.52	99.5	100.0	99.9	100.0	99.9	99.7	99.8	99.6	99.6	99.5	99.6
	D5	304.54	28.37	100.0	100.3	100.2	100.2	100.0	99.8	100.0	99.8	99.7	99.5	99.6
	D6	308.99	28.41	99.9	100.2	100.2	100.2	100.0	99.8	100.0	99.8	99.7	99.6	99.7
	D7	307.53	28.44	99.4	99.8	99.7	99.8	99.6	99.4	99.6	99.4	99.3	99.1	99.0
	D8	306.37	28.51	99.4	99.8	99.8	99.9	99.8	99.5	99.9	99.5	99.5	99.4	99.5
			<b>n</b>	24	24	24	24	24	24	24	24	24	24	24
			<b>mean</b>	99.6	99.9	99.8	99.9	99.7	99.5	99.6	99.6	99.4	99.3	99.3
			<b>median</b>	99.6	100.0	99.9	99.9	99.8	99.5	99.6	99.6	99.4	99.3	99.3
			<b>std. dev.</b>	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
			<b>min</b>	98.3	98.7	98.7	98.7	98.6	98.4	98.5	98.4	98.4	98.2	98.3
			<b>max</b>	100.1	100.4	100.4	100.4	100.3	100.1	100.1	100.2	100.0	99.8	99.9

**Test Condition 2      85 °C      0.065 A**

**TABLE 3.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 2      85 °C      0.065 A**

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		Flux (lm)	Vf (V)	Lumen Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
270000107E62031C	D4	318.36	28.42	99.2	99.1	99.3	99.2	99.3	99.3								
	D5	319.18	28.49	98.6	98.6	98.6	98.7	98.7	98.7								
	D7	313.41	28.46	99.4	99.2	99.4	99.3	99.3	99.4								
	D8	313.65	28.50	99.0	98.9	99.1	99.0	99.1	99.1								
3D0000107F32031C	D1	313.62	28.51	99.2	99.3	99.4	99.4	99.4	99.5								
	D2	306.07	28.47	99.0	98.9	99.0	99.0	99.0	99.0								
	D3	318.00	28.44	99.3	99.1	99.3	99.2	99.3	99.3								
	D6	319.65	28.45	98.9	98.8	99.0	98.9	99.0	99.0								
	D8	308.90	28.49	99.2	99.2	99.3	99.3	99.3	99.3								
530000108B52031C	D1	307.04	28.48	99.0	98.6	98.7	98.7	98.7	98.8								
	D2	296.14	28.46	98.7	98.6	98.7	98.7	98.7	98.8								
	D3	294.47	28.45	99.4	99.4	99.6	99.5	99.6	99.6								
	D4	296.79	28.47	99.1	99.1	99.2	99.2	99.2	99.3								
	D5	308.44	28.47	99.7	99.5	99.7	99.6	99.7	99.8								
	D6	295.38	28.48	99.7	99.7	99.8	99.8	99.9	99.9								
	D7	301.87	28.48	99.3	99.2	99.4	99.3	99.4	99.5								
	D8	305.39	28.38	99.6	99.6	99.8	99.7	99.8	99.8								

**TABLE 3.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 2      85 °C      0.065 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		Flux (lm)	Vf (V)	Lumen Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
7A000107484031C	D1	304.49	28.44	98.9	98.8	98.9	98.8	98.9	98.9								
	D3	300.40	28.59	98.1	98.1	98.2	98.0	98.3	98.3								
	D4	306.80	28.52	99.5	99.4	99.5	99.5	99.6	99.6								
	D5	304.54	28.37	99.5	99.4	99.5	99.5	99.5	99.6								
	D6	308.99	28.41	99.6	99.5	99.6	99.5	99.6	99.6								
	D7	307.53	28.44	99.1	98.9	99.0	99.0	99.0	99.1								
	D8	306.37	28.51	99.5	99.3	99.5	99.4	99.4	99.5								
<b>n</b>				24	24	24	24	24	24								
<b>mean</b>				99.2	99.1	99.2	99.2	99.2	99.3								
<b>median</b>				99.2	99.1	99.3	99.2	99.3	99.3								
<b>std. dev.</b>				0.4	0.4	0.4	0.4	0.4	0.4								
<b>min</b>				98.1	98.1	98.2	98.0	98.3	98.3								
<b>max</b>				99.7	99.7	99.8	99.8	99.9	99.9								

**Test Condition 2      85 °C      0.065 A**

**TABLE 3.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

**Test Condition 2      85 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
270000107E62031C	D4	0.2249	0.5041		0.0005	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	0.0006	0.0006	0.0007	0.0007
	D5	0.2249	0.5034		0.0005	0.0003	0.0004	0.0005	0.0005	0.0006	0.0006	0.0009	0.0009	0.0009	0.0010
	D7	0.2246	0.5036		0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0007	0.0007
	D8	0.2245	0.5042		0.0005	0.0002	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006	0.0007	0.0007	0.0008
3D0000107F32031C	D1	0.2249	0.5049		0.0004	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0008	0.0008
	D2	0.2248	0.5035		0.0006	0.0004	0.0004	0.0005	0.0006	0.0007	0.0006	0.0008	0.0008	0.0008	0.0010
	D3	0.2252	0.5043		0.0004	0.0004	0.0004	0.0004	0.0005	0.0006	0.0006	0.0007	0.0007	0.0008	0.0008
	D6	0.2245	0.5048		0.0005	0.0003	0.0004	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0008	0.0008
	D8	0.2251	0.5037		0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0008	0.0008
530000108B52031C	D1	0.2247	0.5035		0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0006	0.0007	0.0007	0.0008
	D2	0.2242	0.5036		0.0005	0.0003	0.0004	0.0004	0.0005	0.0005	0.0005	0.0007	0.0007	0.0008	0.0009
	D3	0.2248	0.5034		0.0005	0.0003	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006	0.0006	0.0007	0.0008
	D4	0.2247	0.5041		0.0005	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005	0.0007	0.0007	0.0008	0.0009
	D5	0.2249	0.5040		0.0004	0.0002	0.0003	0.0004	0.0004	0.0005	0.0004	0.0006	0.0006	0.0007	0.0007
	D6	0.2247	0.5032		0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0006	0.0007	0.0008	0.0008
	D7	0.2254	0.5041		0.0005	0.0003	0.0004	0.0005	0.0005	0.0006	0.0006	0.0008	0.0008	0.0009	0.0009
	D8	0.2251	0.5037		0.0004	0.0002	0.0003	0.0003	0.0004	0.0004	0.0004	0.0006	0.0006	0.0007	0.0007



**TABLE 3.1 - CHROMATICITY SHIFT RESULTS** **GW P9LT31.PM**

Test Condition 2		85 °C		0.065 A											
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A										
					Photometric test ambient temperature: 25 ± 2 °C										
		u'	v'		Failures observed: none										
					Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
7A000107484031C	D1	0.2245	0.5017		0.0004	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0007	0.0006	0.0007	0.0007
	D3	0.2255	0.5008		0.0006	0.0004	0.0005	0.0005	0.0005	0.0006	0.0007	0.0008	0.0008	0.0009	0.0009
	D4	0.2254	0.5012		0.0004	0.0002	0.0002	0.0003	0.0003	0.0003	0.0005	0.0006	0.0005	0.0006	0.0006
	D5	0.2253	0.5025		0.0004	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0007	0.0008
	D6	0.2255	0.5025		0.0004	0.0002	0.0002	0.0003	0.0003	0.0004	0.0004	0.0006	0.0005	0.0006	0.0007
	D7	0.2254	0.5022		0.0004	0.0003	0.0003	0.0003	0.0004	0.0004	0.0005	0.0007	0.0007	0.0008	0.0008
	D8	0.2252	0.5018		0.0004	0.0002	0.0002	0.0003	0.0003	0.0004	0.0004	0.0006	0.0006	0.0006	0.0007
				n	24	24	24	24	24	24	24	24	24	24	24
				mean	0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0007	0.0008
				median	0.0005	0.0003	0.0003	0.0004	0.0004	0.0005	0.0005	0.0007	0.0007	0.0008	0.0008
				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	0.0004	0.0002	0.0002	0.0003	0.0003	0.0003	0.0004	0.0006	0.0005	0.0006	0.0006
				max	0.0006	0.0004	0.0005	0.0005	0.0006	0.0007	0.0007	0.0009	0.0009	0.0009	0.0010

**Test Condition 2      85 °C      0.065 A**

**TABLE 3.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

**Test Condition 2      85 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none												
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )												
					12000	13000	14000	15000	16000	17000							
270000107E62031C	D4	0.2249	0.5041		0.0007	0.0008	0.0009	0.0009	0.0009	0.0010							
	D5	0.2249	0.5034		0.0010	0.0011	0.0012	0.0012	0.0013	0.0013							
	D7	0.2246	0.5036		0.0007	0.0009	0.0010	0.0010	0.0011	0.0012							
	D8	0.2245	0.5042		0.0007	0.0009	0.0010	0.0011	0.0011	0.0012							
3D0000107F32031C	D1	0.2249	0.5049		0.0008	0.0009	0.0010	0.0011	0.0012	0.0012							
	D2	0.2248	0.5035		0.0009	0.0010	0.0011	0.0012	0.0012	0.0013							
	D3	0.2252	0.5043		0.0009	0.0010	0.0010	0.0011	0.0011	0.0011							
	D6	0.2245	0.5048		0.0008	0.0009	0.0010	0.0011	0.0011	0.0011							
	D8	0.2251	0.5037		0.0008	0.0009	0.0010	0.0011	0.0011	0.0012							
530000108B52031C	D1	0.2247	0.5035		0.0008	0.0010	0.0010	0.0011	0.0010	0.0011							
	D2	0.2242	0.5036		0.0008	0.0010	0.0010	0.0011	0.0011	0.0012							
	D3	0.2248	0.5034		0.0007	0.0009	0.0009	0.0010	0.0010	0.0010							
	D4	0.2247	0.5041		0.0008	0.0010	0.0011	0.0011	0.0012	0.0012							
	D5	0.2249	0.5040		0.0007	0.0008	0.0009	0.0010	0.0010	0.0010							
	D6	0.2247	0.5032		0.0008	0.0009	0.0010	0.0010	0.0010	0.0011							
	D7	0.2254	0.5041		0.0009	0.0011	0.0012	0.0012	0.0012	0.0013							
	D8	0.2251	0.5037		0.0007	0.0008	0.0009	0.0009	0.0009	0.0010							



TABLE 3.1 - CHROMATICITY SHIFT RESULTS														GW P9LT31.PM			
Test Condition 2														85 °C		0.065 A	
Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A												
		u'	v'		Photometric test ambient temperature: 25 ± 2 °C												
					Failures observed: none												
					Chromaticity shift ( $\Delta u'v'$ )												
					12000	13000	14000	15000	16000	17000							
7A0000107484031C	D1	0.2245	0.5017		0.0008	0.0009	0.0009	0.0010	0.0010	0.0011							
	D3	0.2255	0.5008		0.0009	0.0010	0.0011	0.0012	0.0012	0.0012							
	D4	0.2254	0.5012		0.0007	0.0007	0.0008	0.0008	0.0009	0.0010							
	D5	0.2253	0.5025		0.0008	0.0009	0.0010	0.0010	0.0010	0.0012							
	D6	0.2255	0.5025		0.0006	0.0008	0.0009	0.0009	0.0009	0.0010							
	D7	0.2254	0.5022		0.0007	0.0009	0.0010	0.0011	0.0011	0.0012							
	D8	0.2252	0.5018		0.0006	0.0008	0.0009	0.0009	0.0010	0.0011							
<b>n</b>					24	24	24	24	24	24							
<b>mean</b>					0.0008	0.0009	0.0010	0.0010	0.0011	0.0011							
<b>median</b>					0.0008	0.0009	0.0010	0.0011	0.0011	0.0011							
<b>std. dev.</b>					0.0001	0.0001	0.0001	0.0001	0.0001	0.0001							
<b>min</b>					0.0006	0.0007	0.0008	0.0008	0.0009	0.0010							
<b>max</b>					0.0010	0.0011	0.0012	0.0012	0.0013	0.0013							

Test Condition 2      85 °C      0.065 A														
TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS													GW P9LT31.PM	
Test Condition 2      85 °C      0.065 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)	Forward Voltage Maintenance (%)											
			1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
270000107E62031C	D4	28.42	99.95	100.03	100.08	100.10	100.13	100.14	100.20	100.19	100.21	100.23	100.26	
	D5	28.49	99.94	100.01	100.04	100.07	100.09	100.10	100.16	100.15	100.16	100.18	100.21	
	D7	28.46	100.00	100.06	100.08	100.11	100.12	100.13	100.16	100.16	100.18	100.18	100.20	
	D8	28.50	99.92	99.98	100.00	100.02	100.03	100.05	100.08	100.08	100.09	100.10	100.12	
3D0000107F32031C	D1	28.51	100.07	100.16	100.18	100.20	100.22	100.23	100.27	100.26	100.28	100.29	100.28	
	D2	28.47	100.03	100.09	100.11	100.13	100.14	100.15	100.18	100.18	100.19	100.20	100.19	
	D3	28.44	99.95	100.04	100.08	100.12	100.15	100.17	100.23	100.23	100.25	100.27	100.28	
	D6	28.45	99.92	100.00	100.04	100.08	100.10	100.12	100.17	100.16	100.19	100.21	100.22	
	D8	28.49	99.93	99.98	100.00	100.03	100.04	100.04	100.07	100.07	100.09	100.09	100.10	
530000108B52031C	D1	28.48	100.01	100.11	100.07	100.08	100.08	100.08	100.09	100.11	100.12	100.12	100.12	
	D2	28.46	100.00	100.05	100.06	100.07	100.08	100.09	100.10	100.10	100.12	100.12	100.12	
	D3	28.45	100.01	100.07	100.09	100.11	100.12	100.12	100.15	100.15	100.16	100.16	100.19	
	D4	28.47	100.06	100.13	100.16	100.19	100.21	100.21	100.25	100.24	100.27	100.27	100.30	
	D5	28.47	100.00	100.06	100.07	100.10	100.11	100.12	100.15	100.15	100.16	100.18	100.20	
	D6	28.48	100.06	100.15	100.16	100.19	100.21	100.22	100.26	100.26	100.28	100.29	100.31	
	D7	28.48	100.01	100.07	100.10	100.11	100.12	100.13	100.16	100.15	100.17	100.18	100.19	
	D8	28.38	100.00	100.08	100.12	100.13	100.15	100.17	100.21	100.19	100.21	100.22	100.25	

**TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 2			85 °C	0.065 A										
Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
		Vf (V)	Forward Voltage Maintenance (%)											
			1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
7A000107484031C	D1	28.44	100.00	100.04	100.05	100.05	100.05	100.06	100.07	100.07	100.08	100.08	100.10	
	D3	28.59	99.98	100.01	100.02	100.03	100.03	100.03	100.04	100.04	100.05	100.05	100.06	
	D4	28.52	100.01	100.08	100.11	100.14	100.15	100.17	100.19	100.20	100.22	100.23	100.24	
	D5	28.37	100.00	100.08	100.10	100.12	100.14	100.15	100.19	100.18	100.20	100.21	100.23	
	D6	28.41	100.01	100.09	100.11	100.13	100.15	100.17	100.20	100.19	100.22	100.23	100.24	
	D7	28.44	100.01	100.06	100.07	100.08	100.09	100.09	100.12	100.11	100.12	100.12	100.13	
	D8	28.51	100.02	100.06	100.07	100.08	100.09	100.09	100.12	100.11	100.12	100.12	100.13	
		<b>n</b>	24	24	24	24	24	24	24	24	24	24	24	
		<b>mean</b>	100.0	100.1	100.1	100.1	100.1	100.1	100.1	100.2	100.2	100.2	100.2	
		<b>median</b>	100.0	100.1	100.1	100.1	100.1	100.1	100.1	100.2	100.2	100.2	100.2	
		<b>std. dev.</b>	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	
		<b>min</b>	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.1	
		<b>max</b>	100.1	100.2	100.2	100.2	100.2	100.2	100.2	100.3	100.3	100.3	100.3	

**Test Condition 2      85 °C      0.065 A**

**TABLE 3.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 2      85 °C      0.065 A**

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		Vf (V)		Forward Voltage Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
270000107E62031C	D4	28.42	100.28	100.27	100.29	100.31	100.33	100.34									
	D5	28.49	100.23	100.22	100.23	100.25	100.27	100.28									
	D7	28.46	100.23	100.22	100.22	100.23	100.25	100.26									
	D8	28.50	100.15	100.13	100.14	100.15	100.16	100.17									
3D0000107F32031C	D1	28.51	100.32	100.32	100.33	100.33	100.35	100.36									
	D2	28.47	100.21	100.22	100.23	100.23	100.25	100.25									
	D3	28.44	100.32	100.33	100.35	100.36	100.39	100.40									
	D6	28.45	100.26	100.26	100.29	100.29	100.32	100.33									
	D8	28.49	100.12	100.12	100.14	100.14	100.15	100.15									
530000108B52031C	D1	28.48	100.14	100.13	100.14	100.14	100.15	100.15									
	D2	28.46	100.13	100.13	100.14	100.14	100.15	100.15									
	D3	28.45	100.19	100.18	100.19	100.19	100.22	100.21									
	D4	28.47	100.31	100.30	100.31	100.31	100.35	100.34									
	D5	28.47	100.21	100.21	100.22	100.22	100.24	100.25									
	D6	28.48	100.34	100.33	100.35	100.35	100.37	100.38									
	D7	28.48	100.21	100.21	100.22	100.22	100.25	100.24									
	D8	28.38	100.27	100.26	100.28	100.28	100.31	100.31									



Test Condition 3      105 °C      0.065 A														
TABLE 4.0 - LUMEN MAINTENANCE RESULTS														GW P9LT31.PM
Test Condition 3      105 °C      0.065 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Flux (lm)	Vf (V)	Lumen Maintenance (%)										
				1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
0C0000109714031C	D2	307.04	28.47	99.4	99.0	98.5	98.2	97.8	97.5	97.3	97.1	97.0	96.8	96.7
	D3	299.64	28.48	98.8	98.6	97.9	97.7	97.3	97.0	96.8	96.7	96.5	96.3	96.1
	D4	304.38	28.44	98.9	98.5	98.1	97.8	97.4	97.1	96.9	96.7	96.5	96.3	96.2
	D5	306.56	28.48	99.4	99.0	98.5	98.2	97.8	97.5	97.3	97.2	97.0	96.7	96.6
	D6	313.36	28.46	98.6	98.3	97.9	97.7	97.4	97.1	96.9	96.7	96.6	96.4	96.2
	D7	309.27	28.43	99.0	98.6	98.2	97.9	97.6	97.3	97.1	96.9	96.8	96.5	96.4
6E00001090FC031C	D1	300.55	28.53	98.2	97.9	97.4	97.1	96.8	96.5	96.3	96.2	96.0	95.8	95.7
	D2	301.73	28.52	98.3	98.1	97.6	97.3	97.0	96.6	96.5	96.3	96.1	95.9	95.8
	D3	305.20	28.48	98.9	98.7	98.2	97.7	97.6	97.3	97.2	97.0	96.9	96.7	96.6
	D4	302.34	28.51	98.2	97.9	97.5	97.0	96.9	96.6	96.4	96.2	96.1	95.9	95.7
	D6	306.17	28.48	98.5	97.7	97.8	97.4	97.3	96.9	96.7	96.6	96.5	96.3	96.1
	D7	304.10	28.47	98.8	98.1	98.1	97.7	97.6	97.3	97.0	96.9	96.8	96.6	96.4
	D8	302.97	28.45	98.6	97.9	97.8	97.3	97.2	96.8	96.6	96.5	96.2	96.0	95.9
AC0000109557031C	D1	305.56	28.25	99.2	99.0	98.5	98.3	98.0	97.7	97.6	97.4	97.3	97.1	97.0
	D2	301.43	28.49	99.4	99.0	98.3	98.2	97.8	97.5	97.3	97.1	96.9	96.7	96.6
	D3	292.81	28.47	98.7	98.4	97.9	97.7	97.3	97.1	96.9	96.7	96.5	96.4	96.3
	D4	304.99	28.49	99.3	99.0	98.4	98.1	97.7	97.3	97.2	97.0	96.7	96.5	96.4
	D6	304.40	28.37	99.4	99.0	98.4	98.1	97.8	97.5	97.2	97.1	96.9	96.7	96.6
	D7	309.57	28.46	99.5	99.2	98.7	98.5	98.2	97.9	97.7	97.5	97.3	97.2	97.1

**TABLE 4.0 - LUMEN MAINTENANCE RESULTS** GW P9LT31.PM  
 Test Condition 3      105 °C      0.065 A

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
		Flux (lm)	Vf (V)	Lumen Maintenance (%)											
				1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
BF00001078CC031C	D4	319.94	28.41	98.8	98.4	98.0	97.7	97.4	97.0	96.8	96.7	96.5	96.3	96.1	
	D5	309.18	28.46	99.2	98.7	98.1	97.8	97.4	97.0	96.7	96.6	96.4	96.1	96.0	
	D6	308.02	28.50	99.1	98.7	98.3	98.0	97.7	97.3	97.1	97.0	96.8	96.5	96.3	
	D7	310.41	28.53	99.1	98.8	98.2	97.9	97.5	97.1	96.9	96.7	96.5	96.3	96.1	
	D8	313.66	28.41	99.1	98.5	98.0	97.7	97.3	96.9	96.7	96.6	96.4	96.2	96.0	
			n	24	24	24	24	24	24	24	24	24	24	24	
			mean	98.9	98.6	98.1	97.8	97.5	97.2	97.0	96.8	96.6	96.4	96.3	
			median	99.0	98.6	98.1	97.8	97.5	97.1	96.9	96.7	96.6	96.4	96.3	
			std. dev.	0.4	0.4	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.4	
			min	98.2	97.7	97.4	97.0	96.8	96.5	96.3	96.2	96.0	95.8	95.7	
			max	99.5	99.2	98.7	98.5	98.2	97.9	97.7	97.5	97.3	97.2	97.1	

**Test Condition 3      105 °C      0.065 A**

**TABLE 4.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 3      105 °C      0.065 A**

Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none													
		Flux (lm)	Vf (V)	Lumen Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
0C0000109714031C	D2	307.04	28.47	96.4	96.3	96.3	96.2	96.2	96.1								
	D3	299.64	28.48	96.0	95.9	96.0	95.9	95.9	95.9								
	D4	304.38	28.44	96.0	95.9	95.9	95.9	95.8	95.7								
	D5	306.56	28.48	96.5	96.3	96.4	96.3	96.3	96.3								
	D6	313.36	28.46	96.1	95.9	96.1	95.9	95.9	95.9								
	D7	309.27	28.43	96.5	96.0	96.2	96.0	96.0	95.9								
6E00001090FC031C	D1	300.55	28.53	95.5	95.5	95.5	95.4	95.4	95.4								
	D2	301.73	28.52	95.7	95.5	95.6	95.5	95.4	95.4								
	D3	305.20	28.48	96.5	96.3	96.3	96.2	96.2	96.2								
	D4	302.34	28.51	95.6	95.4	95.5	95.4	95.4	95.3								
	D6	306.17	28.48	96.1	95.8	95.8	95.7	95.7	95.7								
	D7	304.10	28.47	96.5	96.3	96.3	96.2	96.2	96.1								
	D8	302.97	28.45	95.9	95.7	95.7	95.6	95.5	95.5								
AC0000109557031C	D1	305.56	28.25	97.0	96.6	96.7	96.6	96.5	96.5								
	D2	301.43	28.49	96.4	96.3	96.3	96.2	96.2	96.1								
	D3	292.81	28.47	96.1	96.0	96.1	96.0	96.0	96.0								
	D4	304.99	28.49	96.3	96.1	96.2	96.1	96.1	96.0								
	D6	304.40	28.37	96.4	96.3	96.3	96.2	96.2	96.2								
	D7	309.57	28.46	97.2	96.8	96.7	96.6	96.6	96.5								



**TABLE 4.0 - LUMEN MAINTENANCE RESULTS** **GW P9LT31.PM**

Test Condition 3				105 °C		0.065 A								
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A										
		Flux (lm)	Vf (V)	Photometric test ambient temperature: 25 ± 2 °C										
				Failures observed: none										
				Lumen Maintenance (%)										
				12000	13000	14000	15000	16000	17000					
BF00001078CC031C	D4	319.94	28.41	96.1	95.9	95.9	95.8	95.8	95.7					
	D5	309.18	28.46	95.9	95.7	95.7	95.6	95.6	95.6					
	D6	308.02	28.50	96.4	96.0	96.1	95.9	95.9	95.8					
	D7	310.41	28.53	96.0	95.8	95.8	95.8	95.7	95.7					
	D8	313.66	28.41	96.2	95.7	95.8	95.7	95.7	95.6					
			<b>n</b>	24	24	24	24	24	24					
			<b>mean</b>	96.2	96.0	96.1	95.9	95.9	95.9					
			<b>median</b>	96.2	96.0	96.1	95.9	95.9	95.9					
			<b>std. dev.</b>	0.4	0.3	0.3	0.3	0.3	0.3					
			<b>min</b>	95.5	95.4	95.5	95.4	95.4	95.3					
			<b>max</b>	97.2	96.8	96.7	96.6	96.6	96.5					

**Test Condition 3      105 °C      0.065 A**

**TABLE 4.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

**Test Condition 3      105 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
0C0000109714031C	D2	0.2245	0.5035		0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0019	0.0020	0.0021	0.0022	0.0024
	D3	0.2241	0.5030		0.0007	0.0009	0.0011	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022
	D4	0.2243	0.5033		0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0018	0.0019	0.0021	0.0022	0.0023
	D5	0.2250	0.5027		0.0007	0.0009	0.0011	0.0012	0.0014	0.0015	0.0018	0.0019	0.0020	0.0021	0.0022
	D6	0.2244	0.5037		0.0007	0.0009	0.0011	0.0013	0.0015	0.0016	0.0018	0.0019	0.0021	0.0021	0.0023
	D7	0.2247	0.5027		0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0018	0.0020	0.0021	0.0022	0.0023
6E00001090FC031C	D1	0.2253	0.5007		0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026
	D2	0.2253	0.5004		0.0008	0.0010	0.0012	0.0014	0.0017	0.0018	0.0021	0.0022	0.0023	0.0025	0.0026
	D3	0.2250	0.5009		0.0007	0.0009	0.0011	0.0014	0.0015	0.0016	0.0019	0.0020	0.0021	0.0022	0.0023
	D4	0.2252	0.4997		0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0021	0.0022	0.0024	0.0025	0.0026
	D6	0.2254	0.5008		0.0007	0.0006	0.0011	0.0013	0.0014	0.0016	0.0018	0.0019	0.0021	0.0022	0.0023
	D7	0.2252	0.5009		0.0006	0.0006	0.0011	0.0013	0.0014	0.0015	0.0018	0.0019	0.0020	0.0021	0.0022
	D8	0.2252	0.5014		0.0007	0.0007	0.0012	0.0014	0.0016	0.0018	0.0020	0.0021	0.0023	0.0025	0.0025
AC0000109557031C	D1	0.2245	0.5025		0.0007	0.0009	0.0011	0.0012	0.0014	0.0016	0.0018	0.0019	0.0020	0.0021	0.0022
	D2	0.2252	0.5042		0.0008	0.0011	0.0013	0.0014	0.0016	0.0018	0.0019	0.0020	0.0022	0.0023	0.0024
	D3	0.2242	0.5036		0.0006	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	0.0018	0.0019	0.0020	0.0021
	D4	0.2248	0.5029		0.0008	0.0010	0.0013	0.0014	0.0016	0.0017	0.0019	0.0020	0.0022	0.0023	0.0025
	D6	0.2253	0.5032		0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0018	0.0019	0.0021	0.0022	0.0023
	D7	0.2254	0.5034		0.0006	0.0008	0.0011	0.0011	0.0014	0.0015	0.0016	0.0018	0.0019	0.0021	0.0021

**TABLE 4.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

Test Condition 3      105 °C      0.065 A

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )										
					1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
BF00001078CC031C	D4	0.2245	0.5037		0.0007	0.0009	0.0011	0.0013	0.0014	0.0016	0.0018	0.0019	0.0020	0.0021	0.0022
	D5	0.2244	0.5048		0.0005	0.0008	0.0011	0.0013	0.0015	0.0017	0.0018	0.0020	0.0020	0.0022	0.0023
	D6	0.2249	0.5047		0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0020	0.0022	0.0023	0.0024
	D7	0.2247	0.5036		0.0007	0.0009	0.0013	0.0014	0.0017	0.0018	0.0020	0.0022	0.0023	0.0024	0.0025
	D8	0.2247	0.5035		0.0007	0.0011	0.0013	0.0016	0.0017	0.0019	0.0021	0.0023	0.0024	0.0025	0.0026
<b>n</b>				24	24	24	24	24	24	24	24	24	24	24	24
<b>mean</b>				0.0007	0.0009	0.0012	0.0013	0.0015	0.0017	0.0019	0.0020	0.0021	0.0023	0.0024	
<b>median</b>				0.0007	0.0009	0.0012	0.0013	0.0015	0.0016	0.0018	0.0020	0.0021	0.0022	0.0023	
<b>std. dev.</b>				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	
<b>min</b>				0.0005	0.0006	0.0010	0.0011	0.0014	0.0015	0.0016	0.0018	0.0019	0.0020	0.0021	
<b>max</b>				0.0008	0.0011	0.0013	0.0016	0.0017	0.0019	0.0021	0.0023	0.0024	0.0025	0.0026	

**Test Condition 3      105 °C      0.065 A**

**TABLE 4.1 - CHROMATICITY SHIFT RESULTS** GW P9LT31.PM

**Test Condition 3      105 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none												
		u'	v'		Chromaticity shift ( $\Delta u'v'$ )												
					12000	13000	14000	15000	16000	17000							
0C0000109714031C	D2	0.2245	0.5035		0.0024	0.0026	0.0027	0.0027	0.0029	0.0030							
	D3	0.2241	0.5030		0.0022	0.0024	0.0024	0.0025	0.0026	0.0027							
	D4	0.2243	0.5033		0.0024	0.0025	0.0027	0.0027	0.0028	0.0029							
	D5	0.2250	0.5027		0.0023	0.0025	0.0026	0.0026	0.0027	0.0028							
	D6	0.2244	0.5037		0.0023	0.0024	0.0026	0.0027	0.0028	0.0028							
	D7	0.2247	0.5027		0.0024	0.0025	0.0026	0.0027	0.0028	0.0029							
6E00001090FC031C	D1	0.2253	0.5007		0.0027	0.0028	0.0030	0.0031	0.0031	0.0032							
	D2	0.2253	0.5004		0.0027	0.0028	0.0030	0.0030	0.0031	0.0032							
	D3	0.2250	0.5009		0.0024	0.0025	0.0026	0.0027	0.0028	0.0030							
	D4	0.2252	0.4997		0.0027	0.0028	0.0029	0.0030	0.0031	0.0032							
	D6	0.2254	0.5008		0.0023	0.0025	0.0026	0.0027	0.0028	0.0029							
	D7	0.2252	0.5009		0.0023	0.0024	0.0026	0.0026	0.0027	0.0029							
	D8	0.2252	0.5014		0.0026	0.0027	0.0029	0.0030	0.0031	0.0032							
AC0000109557031C	D1	0.2245	0.5025		0.0023	0.0024	0.0026	0.0027	0.0028	0.0029							
	D2	0.2252	0.5042		0.0024	0.0026	0.0027	0.0029	0.0029	0.0030							
	D3	0.2242	0.5036		0.0022	0.0023	0.0025	0.0026	0.0026	0.0028							
	D4	0.2248	0.5029		0.0025	0.0026	0.0028	0.0029	0.0029	0.0030							
	D6	0.2253	0.5032		0.0023	0.0025	0.0027	0.0028	0.0028	0.0029							
	D7	0.2254	0.5034		0.0021	0.0023	0.0025	0.0026	0.0026	0.0028							

**TABLE 4.1 - CHROMATICITY SHIFT RESULTS** **GW P9LT31.PM**

**Test Condition 3      105 °C      0.065 A**

Load board ID	Device number	Zero hour measurements			Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		u'	v'		Chromaticity shift (Δu'v')										
					12000	13000	14000	15000	16000	17000					
BF00001078CC031C	D4	0.2245	0.5037		0.0023	0.0024	0.0026	0.0026	0.0027	0.0028					
	D5	0.2244	0.5048		0.0023	0.0025	0.0026	0.0027	0.0027	0.0029					
	D6	0.2249	0.5047		0.0025	0.0027	0.0028	0.0029	0.0030	0.0031					
	D7	0.2247	0.5036		0.0026	0.0028	0.0029	0.0030	0.0031	0.0032					
	D8	0.2247	0.5035		0.0026	0.0029	0.0030	0.0031	0.0031	0.0033					
<b>n</b>					24	24	24	24	24	24					
<b>mean</b>					0.0024	0.0026	0.0027	0.0028	0.0029	0.0030					
<b>median</b>					0.0024	0.0025	0.0027	0.0027	0.0028	0.0029					
<b>std. dev.</b>					0.0002	0.0002	0.0002	0.0002	0.0002	0.0002					
<b>min</b>					0.0021	0.0023	0.0024	0.0025	0.0026	0.0027					
<b>max</b>					0.0027	0.0029	0.0030	0.0031	0.0031	0.0033					

Test Condition 3      105 °C      0.065 A														
TABLE 4.2 - FORWARD VOLTAGE MAINTENANCE RESULTS													GW P9LT31.PM	
Test Condition 3      105 °C      0.065 A														
Load board ID	Device number	Zero hour measurements		Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none										
		Vf (V)		Forward Voltage Maintenance (%)										
		1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000		
0C0000109714031C	D2	28.47	100.13	100.25	100.33	100.41	100.47	100.51	100.56	100.60	100.65	100.69	100.73	
	D3	28.48	100.05	100.08	100.10	100.12	100.13	100.14	100.15	100.17	100.18	100.19	100.20	
	D4	28.44	100.07	100.11	100.15	100.17	100.19	100.20	100.22	100.24	100.25	100.27	100.28	
	D5	28.48	99.96	100.01	100.03	100.06	100.08	100.09	100.10	100.12	100.13	100.14	100.16	
	D6	28.46	100.00	100.05	100.06	100.08	100.09	100.10	100.12	100.12	100.13	100.15	100.16	
	D7	28.43	100.03	100.10	100.13	100.16	100.19	100.20	100.23	100.24	100.25	100.27	100.29	
6E00001090FC031C	D1	28.53	100.00	100.04	100.05	100.06	100.07	100.07	100.08	100.10	100.13	100.11	100.11	
	D2	28.52	99.99	100.03	100.04	100.06	100.07	100.06	100.07	100.09	100.10	100.09	100.09	
	D3	28.48	100.02	100.07	100.08	100.10	100.11	100.12	100.12	100.13	100.14	100.15	100.16	
	D4	28.51	99.99	100.03	100.04	100.05	100.06	100.06	100.07	100.07	100.08	100.08	100.09	
	D6	28.48	100.00	100.06	100.05	100.06	100.07	100.08	100.09	100.10	100.10	100.12	100.12	
	D7	28.47	100.00	100.05	100.05	100.06	100.07	100.07	100.09	100.10	100.11	100.32	100.12	
	D8	28.45	100.01	100.05	100.06	100.08	100.09	100.09	100.11	100.12	100.13	100.33	100.14	
AC0000109557031C	D1	28.25	100.05	100.09	100.12	100.14	100.16	100.17	100.20	100.22	100.23	100.24	100.27	
	D2	28.49	100.05	100.10	100.13	100.16	100.18	100.20	100.23	100.25	100.26	100.28	100.31	
	D3	28.47	100.02	100.07	100.09	100.11	100.13	100.13	100.14	100.15	100.16	100.17	100.18	
	D4	28.49	99.96	100.02	100.05	100.08	100.10	100.12	100.14	100.15	100.17	100.18	100.20	
	D6	28.37	100.04	100.12	100.16	100.19	100.22	100.24	100.26	100.28	100.30	100.32	100.34	
	D7	28.46	100.02	100.09	100.13	100.15	100.17	100.19	100.22	100.24	100.26	100.28	100.30	

**TABLE 4.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** **GW P9LT31.PM**

**Test Condition 3**      **105 °C**      **0.065 A**

Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none											
		Vf (V)	Forward Voltage Maintenance (%)											
			1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
BF00001078CC031C	D4	28.41	100.02	100.12	100.16	100.21	100.25	100.29	100.33	100.36	100.40	100.43	100.47	
	D5	28.46	100.07	100.14	100.17	100.18	100.20	100.22	100.23	100.24	100.25	100.26	100.28	
	D6	28.50	100.03	100.06	100.09	100.10	100.12	100.15	100.15	100.17	100.18	100.20	100.21	
	D7	28.53	100.06	100.14	100.20	100.23	100.26	100.29	100.32	100.33	100.36	100.38	100.40	
	D8	28.41	100.07	100.13	100.18	100.20	100.21	100.24	100.26	100.27	100.28	100.30	100.32	
		<b>n</b>	24	24	24	24	24	24	24	24	24	24	24	
		<b>mean</b>	100.0	100.1	100.1	100.1	100.2	100.2	100.2	100.2	100.2	100.2	100.2	
		<b>median</b>	100.0	100.1	100.1	100.1	100.1	100.1	100.2	100.2	100.2	100.3	100.2	
		<b>std. dev.</b>	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
		<b>min</b>	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1	100.1	100.1	100.1	
		<b>max</b>	100.1	100.3	100.3	100.4	100.5	100.5	100.6	100.6	100.6	100.7	100.7	

**Test Condition 3      105 °C      0.065 A**

**TABLE 4.2 - FORWARD VOLTAGE MAINTENANCE RESULTS** GW P9LT31.PM

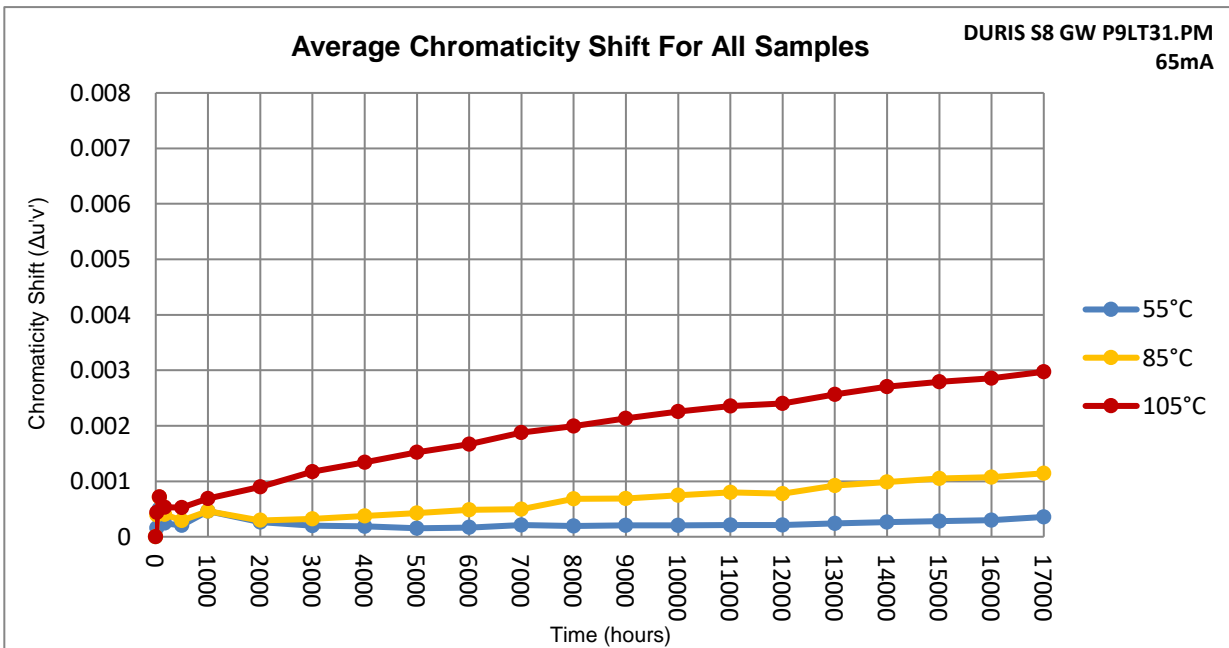
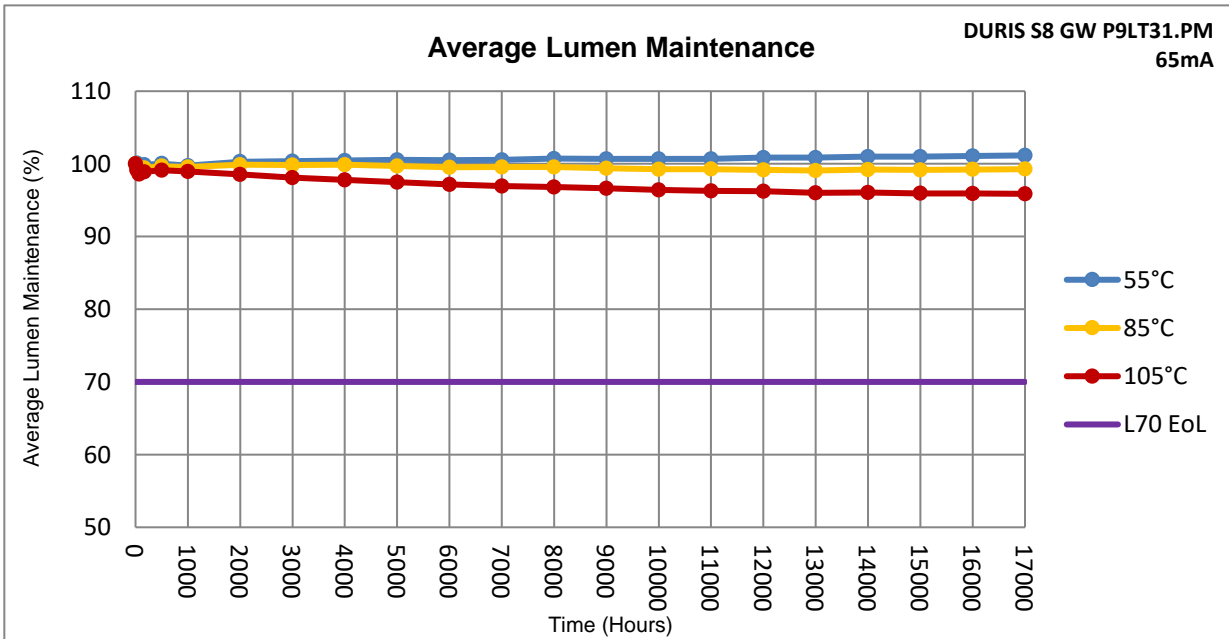
**Test Condition 3      105 °C      0.065 A**

Load board ID	Device number	Zero hour measurements	Photometric test drive current: 0.065 A Photometric test ambient temperature: 25 ± 2 °C Failures observed: none														
			Vf (V)	Forward Voltage Maintenance (%)													
				12000	13000	14000	15000	16000	17000								
0C0000109714031C	D2	28.47	100.76	100.82	100.88	100.91	100.95	100.99									
	D3	28.48	100.20	100.22	100.24	100.24	100.25	100.26									
	D4	28.44	100.29	100.30	100.33	100.33	100.34	100.36									
	D5	28.48	100.19	100.18	100.20	100.21	100.22	100.23									
	D6	28.46	100.18	100.18	100.19	100.20	100.21	100.23									
	D7	28.43	100.32	100.33	100.34	100.35	100.37	100.39									
6E00001090FC031C	D1	28.53	100.12	100.14	100.14	100.15	100.16	100.20									
	D2	28.52	100.11	100.11	100.12	100.12	100.14	100.16									
	D3	28.48	100.18	100.19	100.20	100.22	100.22	100.22									
	D4	28.51	100.09	100.10	100.10	100.13	100.12	100.12									
	D6	28.48	100.13	100.14	100.15	100.14	100.15	100.16									
	D7	28.47	100.77	100.14	100.15	100.14	100.15	100.16									
	D8	28.45	100.77	100.17	100.18	100.17	100.19	100.18									
AC0000109557031C	D1	28.25	100.29	100.30	100.31	100.32	100.34	100.35									
	D2	28.49	100.33	100.34	100.35	100.36	100.38	100.39									
	D3	28.47	100.20	100.22	100.22	100.22	100.24	100.24									
	D4	28.49	100.23	100.25	100.26	100.26	100.29	100.29									
	D6	28.37	100.38	100.38	100.39	100.41	100.43	100.46									
	D7	28.46	100.33	100.34	100.40	100.37	100.39	100.41									





**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 DURIS S8 load board example.

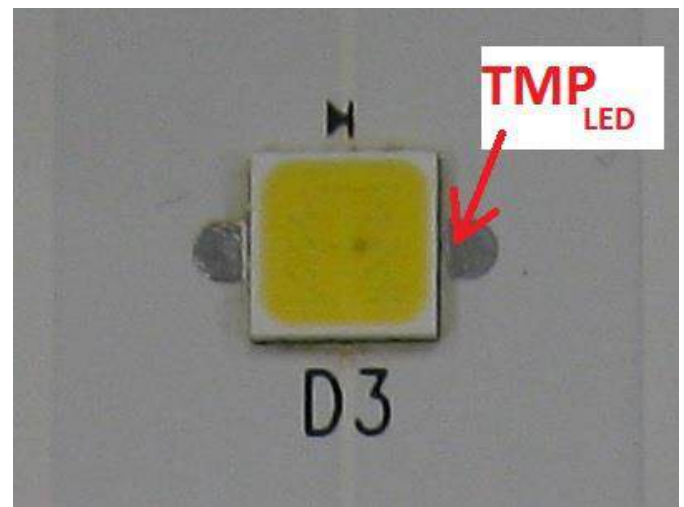


Fig. 2 DURIS S8 type LED model GW P9LT31.PM and temperature measurement point.

**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	DURIS® S 8
Tested subcomponent model number	GW P9LT31.PM
Report issue date	18 <sup>th</sup> Dec 2020
Report revision date (if applicable)	Not Applicable
Testing start date	11 <sup>th</sup> August 2017
Testing completion date	18 <sup>th</sup> Dec 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 P9LT31.PM
Description of DUT	LED Package

### DUT Characteristics

Total input power (W)	1.85
Average current density per LED die (mA/mm <sup>2</sup> )	130
Average power density per LED Package (W/mm <sup>2</sup> )	0.07
Representative CRI (Ra) of the tested sample set	70
Minimum die edge to die edge spacing (mm)	0.2

# Appendix B: Lumen Maintenance Projection (IES TM-21-11)

For Information Only!

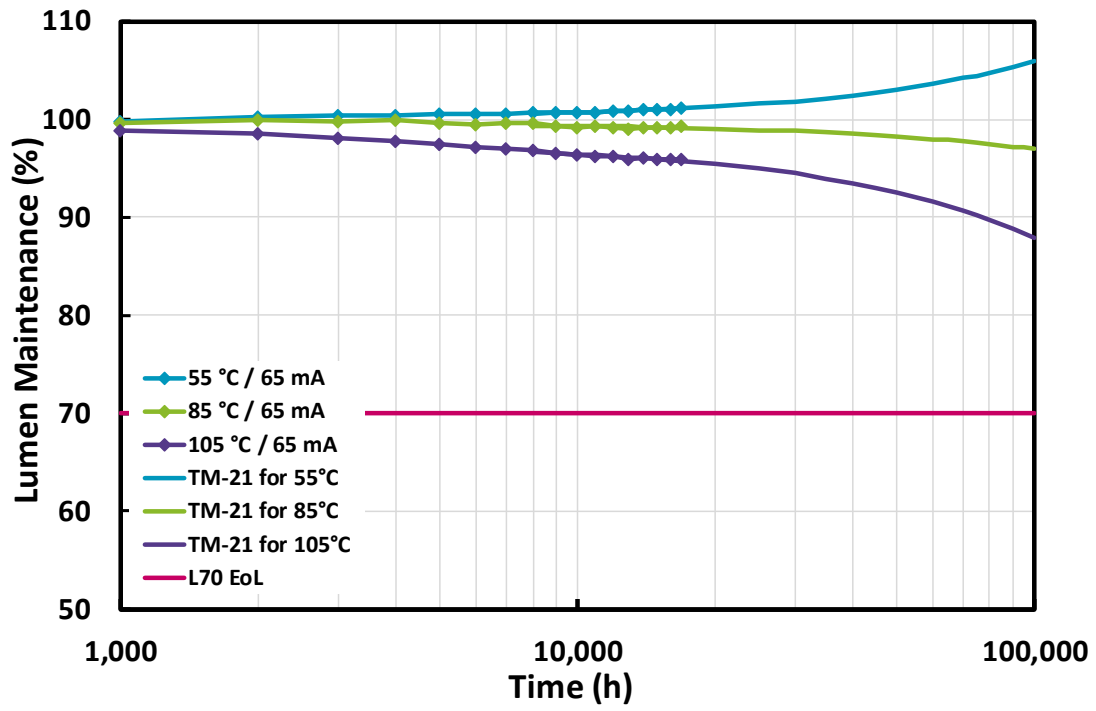
## 1. General Information

Description of LED light source tested	DURIS® S 8 GW P9LT31.PM
Sample size per temperature	24
LED drive current used in the test	65 mA
Current per die	65 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)	$T_s = 55\text{ °C}$	$T_s = 85\text{ °C}$	$T_s = 105\text{ °C}$
$\alpha$	-5.632E-07	2.670E-07	1.034E-06
B	1.002E+00	9.960E-01	9.747E-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	77,107 hours

### 3. Graphic chart



## Appendix C: Additional Models Covered By Testing

The 28 September 2017 *ENERGY STAR*<sup>®</sup> 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:

- DURIS<sup>®</sup> S 8 GW P9LT31.PM with CCT 4000 K – 6500 K up to 65mA
- DURIS<sup>®</sup> S 8 GW P9LR31.PM with CCT 4000 K – 6500 K up to 65mA
- DURIS<sup>®</sup> S 8 GW P9LT32.PM with CCT 4000 K – 6500 K up to 325mA
- DURIS<sup>®</sup> S 8 GW P9LR34.PM with CCT 4000 K – 6500 K up to 74mA
- DURIS<sup>®</sup> S 8 GW P9LR34.PM Gen5 with CCT 4000 K – 6500 K up to 74mA
- DURIS<sup>®</sup> S 8 GW P9LR35.PM with CCT 4000 K – 6500 K up to 296mA
- DURIS<sup>®</sup> S 8 GW P9LR35.PM Gen5 with CCT 4000 K – 6500 K up to 296mA

*Note: The devices are stressed and tested at average current density per LED die of 130mA/mm<sup>2</sup>. This report can be referenced when the current employed in application is lower than the specified current of the respective devices as stated above.*



## 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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