

Lumileds

IESNA LM-80 Test Report

1. Description of LED light sources tested

LUXEON 3030 2D: L130-3080003000W21 (nominal CCT 3000K).

2a. Package Pictures



Figure 1. Picture of LUXEON 3030 2D Round LES(left) and LUXEON 3030 2D Square LES(right).

2b. Average current extrapolations of LED light sources tested at max. current tested

360.0 mA/mm²

2c. Average power extrapolations of LED light sources tested at max. current tested

2.21 W/mm²

2d. Average CRI Ra of LED light sources tested at max. current tested

83.10

2e. Minimum die to die spacing of LED light sources tested

0.15 mm

2f. Total Input Power at max. current tested

1.17 W

3a. Projected L₇₀ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
T _s = 115°C	-	-	111,856	-	95,639
T _s = 105°C	152,334	-	130,305	127,139	-
T _s = 85°C	-	147,149	-	-	-
T _s = 55°C	178,932	-	-	-	-

3b. Reported L₇₀ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
T _s = 115°C	-	-	> 102,000	-	95,639
T _s = 105°C	> 102,000	-	> 102,000	> 102,000	-
T _s = 85°C	-	> 102,000	-	-	-
T _s = 55°C	> 102,000	-	-	-	-

4. Applicable LUXEON® Series part number(s)

This IESNA LM-80 Test Report applies to the following LUXEON part numbers:

Product Family	Part Number	CCT
LUXEON 3030 2D	L130-AABBCC30xxxx	white
LUXEON 3030 HE	L130-AABBCC30000DE	white
LUXEON 3030 HE Plus Deep Dimming	L130-AABBHA3000DD1	white

For LUXEON 3030 2D: AA designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K and 65=6500K), BB designates minimum CRI (70=70CRI, 80=80CRI and 90=90CRI), CC designates ESD protection level (00=2kV and 0T=8kV), xx and xxxx designate Lumileds internal codes.

For LUXEON 3030 HE: AA designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K and 65=6500K), BB designates minimum CRI (70=70CRI, 80=80CRI and 90=90CRI), CC designates product code (HA= LUXEON 3030 HE Plus, HB = LUXEON 3030 HE), D designates product code (0=0.08V Vf bin, B=0.1V Vf bin), E designates Lumileds internal code.

LUXEON 3030 HE Plus Deep Dimming: AA designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K and 65=6500K), BB designates minimum CRI (80=80CRI and 90=90CRI).

For LUXEON 3030 HE and LUXEON 3030 HE Plus Deep Dimming, drive current If' can be calculated as follows: If' = If*2, and voltage Vf' = Vf/2 (2 dies in parallel).

5. Number of LED light sources reported

25 units per test condition.

6. Dates Tests Started

2016/08/24.

7. Date Report First Issued

2017/10/17.

This report issued to Mester

8. Mechanical Drawing

For detailed mechanical drawings, please see individual product data sheets.

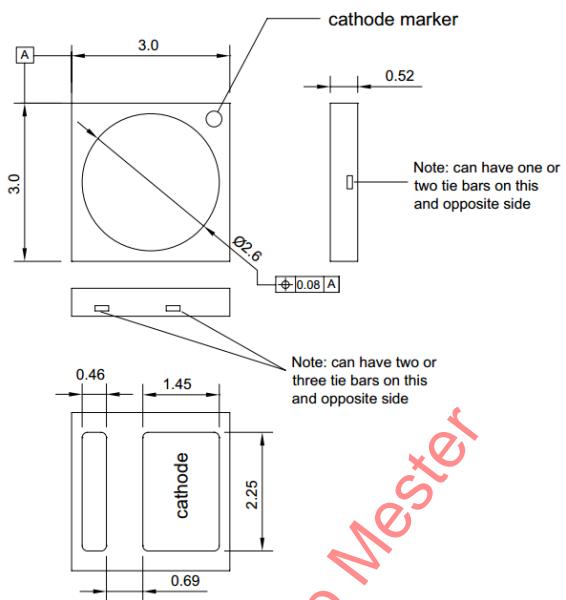


Figure 2a: Mechanical Drawing for LUXEON 3030 2D Round LES. All dimensions are in millimeters.

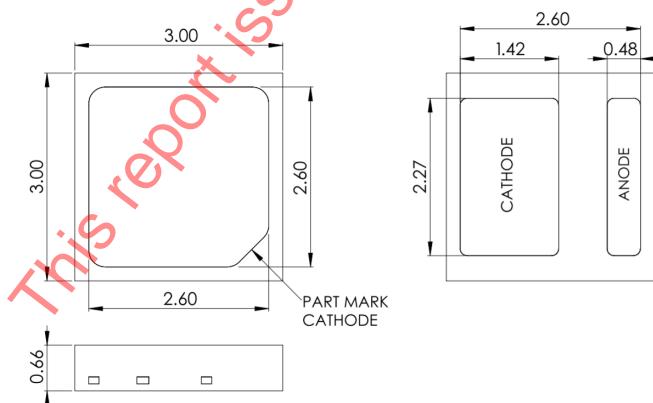


Figure 2b: Mechanical Drawing for LUXEON 3030 2D Square LES. All dimensions are in millimeters.

9. T_s Measurement Point

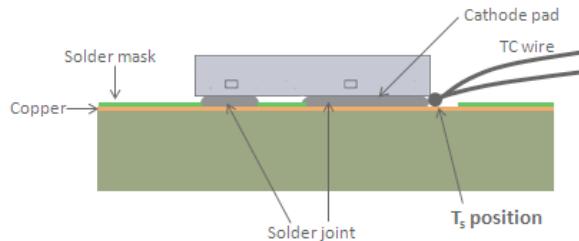


Figure 3: Preferred T_s measurement point for LUXEON 3030 2D.

For further information on measuring the in-situ T_s , please see Lumileds Application Brief AB207, which is available online at www.lumileds.com.

10. Description of auxiliary equipment

LUXEON LED devices are soldered to reliability stress boards.

Reliability stress boards are mounted in a chamber with minimal ambient airflow. The chamber temperature is controlled based on the temperature of a control T_s point, which is located on the stress board.

The reliability stress board is periodically removed from the thermal chamber, allowed to cool to room temperature, and then tested. After testing, the reliability stress board is returned to the thermal chamber for additional operation.

11. Operating Cycle

LUXEON LEDs are driven with a constant direct current (DC).

12. Ambient conditions including airflow, temperature, and relative humidity

The typical relative humidity within the chamber is < 65%. The temperature uniformity of the board (center to edge) was experimentally determined to be less than 2°C.

The photometry measurement temperature is set and monitored to be within $25^\circ\text{C} \pm 2^\circ\text{C}$ with no forced airflow and RH < 65%.

13. T_s and ambient temperatures (ambient temperature measured 5mm above reliability stress board)

In all cases, both T_s and T_{air} meet or exceed the IESNA LM-80-15 limits.

14. Drive current of the LED light source during lifetime test

See tables.

15. Initial luminous flux and forward voltage at photometric measurement current

See tables.

16. Lumen maintenance for data for each individual light source along with median value, standard deviation, minimum and maximum lumen maintenance value for all of the light sources

See tables.

17. Observation of LED light source failures including the failure conditions and time of failure

No failures observed in devices reported.

18. LED light source monitoring interval

Units were tested at 0 hour and at subsequent 1,000 hours intervals.

19. Photometric measurement uncertainty

Long-term measurement uncertainty is based on reproducibility tests done over a period of one year, calculated to $k = 2$ coverage (i.e. 95% coverage).

Luminous Flux (Φ_v) $\pm 1.59\%$

Correlated Color Temperature (CCT) $\pm 21K$

20. Chromaticity shift reported over the measurement time

See tables.

21. Sampling Method/Sample size

Tested samples are selected to be representative of the overall LED population. LED sample size is indicated in Section 5 of this report.

22. ISO 17025-2005 Accreditation



Number : LA-2016-0634-E

Date of Issue : 14 December 2016

Date of Expiry: 13 December 2020

Certificate of Accreditation

This certifies that

Lumileds Malaysia Sdn. Bhd.

Reliability Test Laboratory

No. 3, Lintang Bayan Lepas 8,

Phase 4, Bayan Lepas Industrial Park

11900, Penang, Malaysia

is accredited by the Singapore Accreditation Council to

ISO / IEC 17025 : 2005

for specific scope within the limit of

Electrical Testing

as detailed in the attached schedule.


Chairman

This Certificate is awarded subject to the organisation's compliance with the stated criteria and terms and conditions laid down by the Singapore Accreditation Council.

This Certificate may not be reproduced except with the written permission of the Chairman.

Notes

Data is for reference only and is not an endorsement to exceed the Data Sheet operating conditions.

The TM-21 extrapolations are based on IES TM-21-11 "Projecting Long Term Lumen Maintenance of LED Light Sources". The TM-21 lumen maintenance model is based on the flux data normalized to 1 at 0 hours and the use of a exponential model for flux(time):

Flux(time) = B exp[-alpha*time], where normally B \geq 1, and alpha > 0.

An L70 extrapolation less than 0 means that the model predicts an increasing flux output with time, i.e. alpha < 0 (see graphs). Generally, this means that additional test time is needed to determine the long-term lumen maintenance behavior.

Customer needs to check for all applicable local rules regarding application of LM-80 reports.

Number of LED light sources tested: 50 units per test condition.

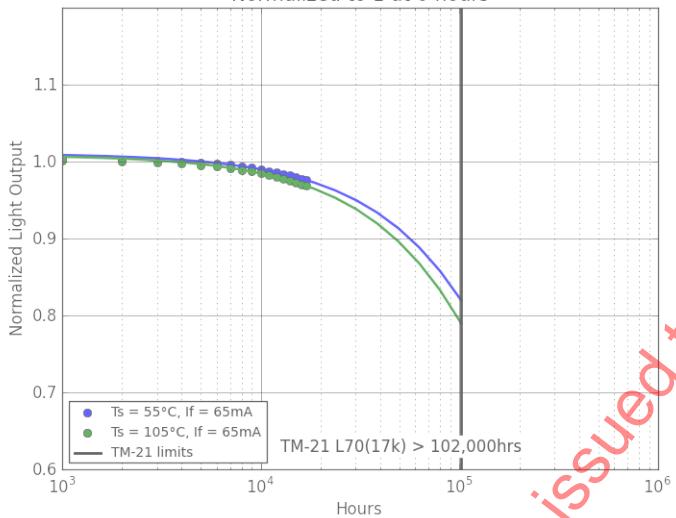
This report issued to Mester

Normalized Flux Statistics for $I_f = 65\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	alpha	B	L70	
median =	1.0000	1.0018	0.9999	0.9985	0.9970	0.9953	0.9928	0.9910	0.9895	0.9878	0.9855	0.9828	0.9800	0.9769	0.9746	0.9733	0.9701	0.9682				
Ts=Tair=105°C	average =	1.0000	1.0017	1.0001	0.9988	0.9972	0.9953	0.9932	0.9913	0.9892	0.9873	0.9852	0.9827	0.9799	0.9773	0.9752	0.9728	0.9704	0.9690	2.3979e-06	1.0086	152,334
	st dev =	0.0000	0.0008	0.0011	0.0013	0.0015	0.0015	0.0015	0.0017	0.0021	0.0022	0.0024	0.0026	0.0028	0.0030	0.0031	0.0037	0.0036	TM-21 L70(17k) > 102,000hrs			
	min =	1.0000	1.0001	0.9983	0.9970	0.9945	0.9925	0.9911	0.9879	0.9846	0.9823	0.9796	0.9770	0.9739	0.9708	0.9696	0.9647	0.9610	0.9595			
	max =	1.0000	1.0031	1.0023	1.0015	0.9996	0.9989	0.9970	0.9951	0.9932	0.9918	0.9910	0.9891	0.9869	0.9849	0.9824	0.9782	0.9771	0.9751			
Ts=Tair=55°C	median =	1.0000	1.0037	1.0026	1.0018	1.0003	0.9990	0.9972	0.9960	0.9939	0.9917	0.9900	0.9877	0.9862	0.9836	0.9818	0.9792	0.9775	0.9759			
	average =	1.0000	1.0035	1.0026	1.0019	1.0004	0.9990	0.9975	0.9958	0.9939	0.9920	0.9901	0.9881	0.9860	0.9838	0.9820	0.9798	0.9779	0.9758	2.0518e-06	1.0105	178,932
	st dev =	0.0000	0.0010	0.0010	0.0013	0.0009	0.0012	0.0011	0.0012	0.0016	0.0019	0.0022	0.0022	0.0023	0.0023	0.0024	0.0024	0.0027	0.0023	TM-21 L70(17k) > 102,000hrs		
	min =	1.0000	1.0014	1.0004	0.9996	0.9989	0.9973	0.9951	0.9934	0.9907	0.9890	0.9866	0.9850	0.9829	0.9802	0.9789	0.9759	0.9730	0.9718			
	max =	1.0000	1.0052	1.0045	1.0038	1.0020	1.0015	0.9992	0.9976	0.9969	0.9968	0.9962	0.9941	0.9924	0.9903	0.9889	0.9865	0.9841	0.9818			

Lumen Maintenance for $I_f = 65\text{mA}$

Normalized to 1 at 0 hours



Delta u'v' for $I_f = 65\text{mA}$

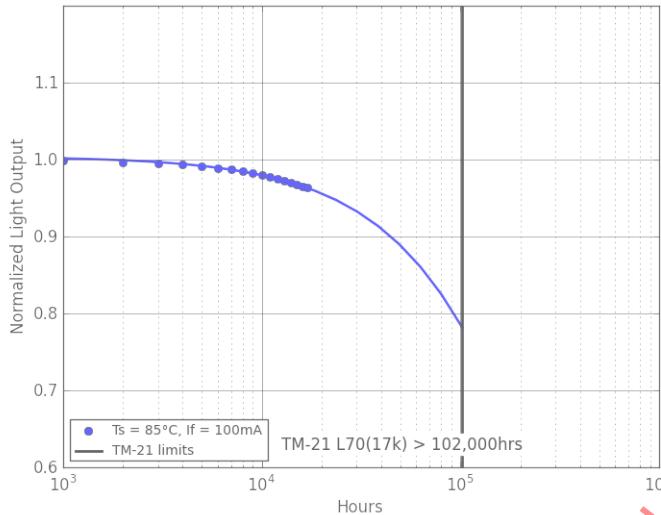
	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	
median =	0.0000	0.0004	0.0007	0.0009	0.0013	0.0014	0.0016	0.0020	0.0023	0.0026	0.0030	0.0033	0.0035	0.0037	0.0039	0.0040	0.0041	0.0041	
Ts=Tair=105°C	average =	0.0000	0.0004	0.0007	0.0008	0.0013	0.0015	0.0016	0.0019	0.0023	0.0026	0.0029	0.0033	0.0035	0.0037	0.0038	0.0040	0.0039	0.0041
	st dev =	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0006	0.0006
	min =	0.0000	0.0002	0.0005	0.0007	0.0011	0.0013	0.0014	0.0017	0.0021	0.0025	0.0027	0.0031	0.0033	0.0034	0.0035	0.0037	0.0023	0.0027
	max =	0.0000	0.0006	0.0009	0.0010	0.0014	0.0017	0.0018	0.0022	0.0026	0.0029	0.0032	0.0035	0.0038	0.0040	0.0041	0.0045	0.0049	0.0051
Ts=Tair=55°C	median =	0.0000	0.0003	0.0004	0.0005	0.0010	0.0012	0.0014	0.0018	0.0022	0.0024	0.0026	0.0030	0.0032	0.0034	0.0035	0.0039	0.0040	0.0041
	average =	0.0000	0.0003	0.0004	0.0005	0.0010	0.0013	0.0015	0.0018	0.0022	0.0024	0.0027	0.0029	0.0032	0.0034	0.0035	0.0039	0.0040	0.0041
	st dev =	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005
	min =	0.0000	0.0001	0.0003	0.0003	0.0008	0.0011	0.0012	0.0016	0.0019	0.0022	0.0024	0.0027	0.0029	0.0031	0.0032	0.0034	0.0031	0.0031
	max =	0.0000	0.0009	0.0010	0.0010	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030	0.0033	0.0034	0.0038	0.0039	0.0041	0.0044	0.0050	0.0050

Normalized Flux Statistics for $I_f = 100\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	alpha	B	L70	
median =	1.0000	0.9982	0.9963	0.9953	0.9935	0.9917	0.9889	0.9870	0.9851	0.9823	0.9790	0.9771	0.9740	0.9713	0.9701	0.9673	0.9658	0.9647				
Ts=Tair=85°C	average =	1.0000	0.9986	0.9968	0.9952	0.9937	0.9916	0.9893	0.9870	0.9848	0.9825	0.9798	0.9774	0.9745	0.9720	0.9700	0.9673	0.9652	0.9642	2.4514e-06	1.0040	147,149
st dev =	0.0000	0.0017	0.0019	0.0018	0.0019	0.0020	0.0020	0.0022	0.0026	0.0026	0.0027	0.0029	0.0032	0.0034	0.0034	0.0034	0.0034	0.0042	TM-21 L70(17k) > 102,000hrs			
min =	1.0000	0.9962	0.9935	0.9925	0.9906	0.9880	0.9859	0.9835	0.9806	0.9784	0.9752	0.9725	0.9679	0.9651	0.9633	0.9622	0.9594	0.9576				
max =	1.0000	1.0028	1.0018	0.9991	0.9982	0.9963	0.9935	0.9915	0.9896	0.9877	0.9852	0.9830	0.9811	0.9786	0.9773	0.9754	0.9726	0.9711				

Lumen Maintenance for $I_f = 100\text{mA}$

Normalized to 1 at 0 hours



Delta u'v' for $I_f = 100\text{mA}$

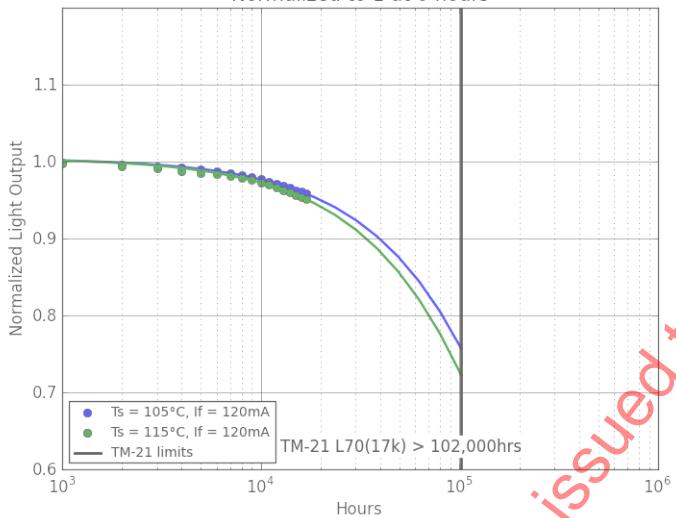
	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	
median =	0.0000	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0028	0.0031	0.0032	0.0035	0.0036	0.0038	0.0041	0.0041	0.0043	
Ts=Tair=85°C	average =	0.0000	0.0005	0.0007	0.0009	0.0012	0.0014	0.0017	0.0021	0.0023	0.0028	0.0031	0.0033	0.0035	0.0037	0.0038	0.0041	0.0043	
st dev =	0.0000	0.0002	0.0001	0.0001	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	
min =	0.0000	0.0002	0.0005	0.0007	0.0010	0.0012	0.0013	0.0019	0.0021	0.0025	0.0028	0.0030	0.0032	0.0033	0.0034	0.0034	0.0035	0.0037	
max =	0.0000	0.0009	0.0011	0.0014	0.0017	0.0020	0.0022	0.0025	0.0028	0.0032	0.0035	0.0038	0.0041	0.0044	0.0046	0.0049	0.0049	0.0050	

Normalized Flux Statistics for $I_f = 120\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	alpha	B	L70	
median =	1.0000	0.9969	0.9944	0.9920	0.9882	0.9850	0.9833	0.9805	0.9782	0.9756	0.9730	0.9699	0.9665	0.9628	0.9597	0.9572	0.9548	0.9523				
Ts=Tair=115°C	average =	1.0000	0.9973	0.9939	0.9912	0.9879	0.9848	0.9831	0.9808	0.9785	0.9756	0.9728	0.9700	0.9666	0.9630	0.9600	0.9562	0.9534	0.9516	3.2286e-06	1.0045	111,856
	st dev =	0.0000	0.0018	0.0021	0.0025	0.0031	0.0035	0.0035	0.0036	0.0037	0.0038	0.0040	0.0041	0.0037	0.0041	0.0040	0.0040	0.0045	0.0047	TM-21 L70(17k) > 102,000hrs		
	min =	1.0000	0.9945	0.9904	0.9867	0.9824	0.9778	0.9762	0.9736	0.9715	0.9691	0.9659	0.9628	0.9596	0.9556	0.9517	0.9453	0.9429	0.9398			
	max =	1.0000	1.0008	0.9984	0.9953	0.9929	0.9913	0.9889	0.9866	0.9842	0.9818	0.9788	0.9770	0.9733	0.9694	0.9658	0.9621	0.9606	0.9590			
Ts=Tair=105°C	average =	1.0000	0.9984	0.9961	0.9944	0.9920	0.9890	0.9866	0.9841	0.9824	0.9797	0.9771	0.9743	0.9711	0.9680	0.9661	0.9618	0.9603	0.9582			
	st dev =	0.0000	0.0017	0.0016	0.0016	0.0016	0.0018	0.0020	0.0023	0.0028	0.0031	0.0032	0.0032	0.0033	0.0031	0.0031	0.0036	0.0034	0.0034	TM-21 L70(17k) > 102,000hrs		
	min =	1.0000	0.9952	0.9929	0.9907	0.9890	0.9859	0.9835	0.9811	0.9780	0.9740	0.9725	0.9693	0.9662	0.9630	0.9607	0.9563	0.9547	0.9536			
	max =	1.0000	1.0016	0.9984	0.9976	0.9952	0.9936	0.9920	0.9904	0.9888	0.9857	0.9833	0.9801	0.9777	0.9753	0.9721	0.9697	0.9679	0.9650			

Lumen Maintenance for $I_f = 120\text{mA}$

Normalized to 1 at 0 hours



Delta u'v' for $I_f = 120\text{mA}$

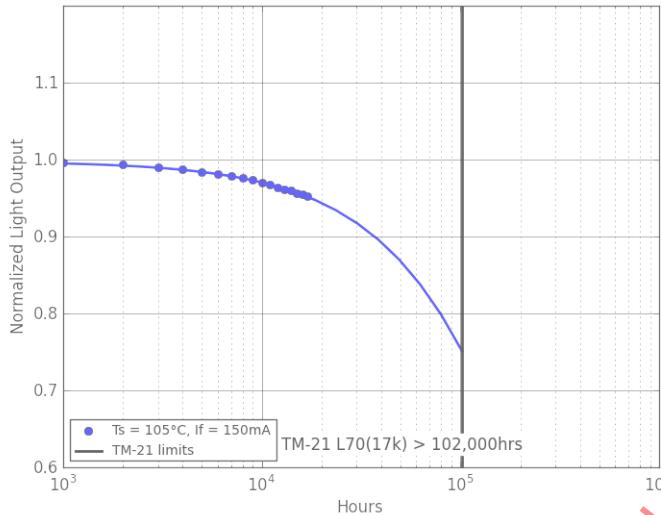
	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	
median =	0.0000	0.0007	0.0009	0.0013	0.0014	0.0017	0.0022	0.0024	0.0026	0.0028	0.0031	0.0035	0.0037	0.0039	0.0040	0.0042	0.0042	0.0044	
Ts=Tair=115°C	average =	0.0000	0.0007	0.0010	0.0013	0.0015	0.0018	0.0021	0.0024	0.0026	0.0028	0.0032	0.0035	0.0037	0.0039	0.0040	0.0043	0.0043	0.0044
	st dev =	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003
	min =	0.0000	0.0005	0.0008	0.0011	0.0013	0.0015	0.0019	0.0023	0.0023	0.0025	0.0029	0.0029	0.0033	0.0035	0.0036	0.0039	0.0038	0.0039
	max =	0.0000	0.0010	0.0013	0.0017	0.0020	0.0023	0.0025	0.0029	0.0031	0.0033	0.0037	0.0043	0.0042	0.0044	0.0046	0.0049	0.0050	0.0051
Ts=Tair=105°C	average =	0.0000	0.0006	0.0007	0.0011	0.0013	0.0017	0.0019	0.0021	0.0024	0.0027	0.0030	0.0034	0.0036	0.0038	0.0039	0.0042	0.0042	0.0043
	st dev =	0.0000	0.0006	0.0008	0.0011	0.0013	0.0017	0.0019	0.0022	0.0025	0.0028	0.0030	0.0034	0.0037	0.0038	0.0040	0.0043	0.0042	0.0043
	min =	0.0000	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0004	0.0003	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004
	max =	0.0000	0.0002	0.0006	0.0009	0.0008	0.0012	0.0017	0.0019	0.0020	0.0022	0.0024	0.0029	0.0031	0.0029	0.0030	0.0034	0.0032	0.0035

Normalized Flux Statistics for $I_f = 150\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	alpha	B	L70
median =	1.0000	0.9961	0.9929	0.9902	0.9867	0.9837	0.9813	0.9791	0.9762	0.9741	0.9714	0.9684	0.9646	0.9627	0.9597	0.9569	0.9551	0.9530			
Ts=Tair=105°C average =	1.0000	0.9965	0.9934	0.9904	0.9870	0.9840	0.9812	0.9787	0.9761	0.9733	0.9703	0.9676	0.9643	0.9618	0.9594	0.9566	0.9544	0.9522	2.7876e-06	0.9977	127,139
st dev =	0.0000	0.0017	0.0018	0.0021	0.0022	0.0024	0.0022	0.0023	0.0024	0.0026	0.0028	0.0030	0.0033	0.0033	0.0035	0.0036	0.0036	0.0036	TM-21 L70(17k) > 102,000hrs		
min =	1.0000	0.9942	0.9904	0.9866	0.9838	0.9806	0.9780	0.9741	0.9715	0.9683	0.9651	0.9612	0.9567	0.9535	0.9522	0.9505	0.9470	0.9444			
max =	1.0000	1.0013	0.9980	0.9954	0.9935	0.9895	0.9852	0.9830	0.9810	0.9784	0.9758	0.9725	0.9699	0.9680	0.9654	0.9647	0.9634	0.9601			

Lumen Maintenance for $I_f = 150\text{mA}$

Normalized to 1 at 0 hours



Delta u'v' for $I_f = 150\text{mA}$

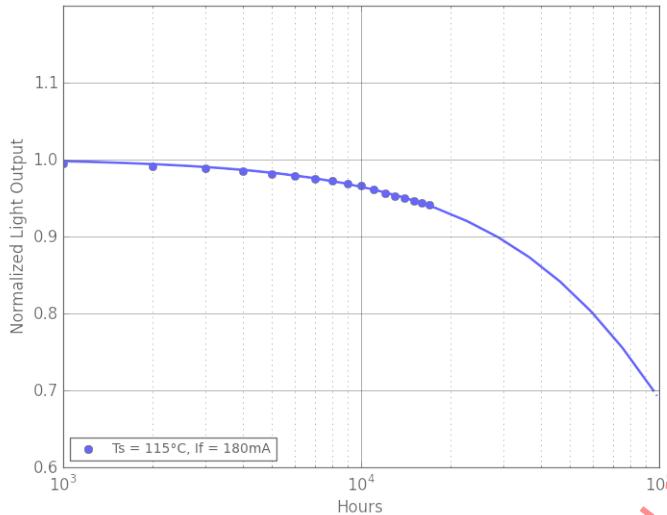
	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
median =	0.0000	0.0008	0.0011	0.0014	0.0019	0.0021	0.0023	0.0026	0.0029	0.0032	0.0036	0.0038	0.0042	0.0044	0.0046	0.0049	0.0049	0.0052
Ts=Tair=105°C average =	0.0000	0.0008	0.0011	0.0014	0.0019	0.0021	0.0022	0.0026	0.0029	0.0032	0.0036	0.0039	0.0042	0.0044	0.0046	0.0049	0.0049	0.0052
st dev =	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	
min =	0.0000	0.0006	0.0009	0.0013	0.0017	0.0018	0.0021	0.0023	0.0027	0.0030	0.0033	0.0030	0.0038	0.0041	0.0042	0.0043	0.0044	0.0043
max =	0.0000	0.0010	0.0012	0.0016	0.0021	0.0023	0.0025	0.0028	0.0030	0.0034	0.0040	0.0045	0.0047	0.0048	0.0053	0.0053	0.0059	

Normalized Flux Statistics for $I_f = 180\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs	alpha	B	L70	
median =	1.0000	0.9945	0.9912	0.9888	0.9848	0.9818	0.9786	0.9752	0.9724	0.9692	0.9662	0.9613	0.9573	0.9532	0.9499	0.9476	0.9443	0.9421				
Ts=Tair=115°C	average =	1.0000	0.9949	0.9917	0.9887	0.9849	0.9816	0.9784	0.9753	0.9724	0.9692	0.9659	0.9610	0.9562	0.9526	0.9494	0.9464	0.9436	0.9416	3.7460e-06	1.0016	95,639
st dev =	0.0000	0.0018	0.0022	0.0023	0.0024	0.0026	0.0029	0.0029	0.0024	0.0024	0.0021	0.0028	0.0032	0.0034	0.0034	0.0038	0.0039	0.0039	TM-21 L70(17k) = 95,639hrs			
min =	1.0000	0.9917	0.9873	0.9846	0.9791	0.9757	0.9719	0.9680	0.9658	0.9631	0.9609	0.9541	0.9487	0.9432	0.9399	0.9371	0.9337	0.9321				
max =	1.0000	0.9989	0.9972	0.9949	0.9898	0.9864	0.9835	0.9801	0.9761	0.9733	0.9690	0.9655	0.9601	0.9566	0.9535	0.9522	0.9483	0.9471				

Lumen Maintenance for $I_f = 180\text{mA}$

Normalized to 1 at 0 hours



Delta u'v' for $I_f = 180\text{mA}$

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	11000hrs	12000hrs	13000hrs	14000hrs	15000hrs	16000hrs	17000hrs
median =	0.0000	0.0008	0.0010	0.0015	0.0019	0.0021	0.0025	0.0026	0.0029	0.0031	0.0035	0.0038	0.0042	0.0044	0.0045	0.0047	0.0047	0.0048
Ts=Tair=115°C	average =	0.0000	0.0008	0.0011	0.0015	0.0019	0.0021	0.0025	0.0028	0.0029	0.0031	0.0035	0.0038	0.0043	0.0044	0.0045	0.0047	0.0048
st dev =	0.0000	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0003	0.0004	0.0004
min =	0.0000	0.0005	0.0008	0.0013	0.0015	0.0017	0.0023	0.0026	0.0027	0.0028	0.0030	0.0031	0.0034	0.0036	0.0038	0.0039	0.0037	0.0036
max =	0.0000	0.0012	0.0015	0.0019	0.0023	0.0025	0.0029	0.0032	0.0033	0.0035	0.0039	0.0042	0.0051	0.0052	0.0053	0.0055	0.0055	0.0057

Disclaimer

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Company Information

Lumileds is a leading provider of power LEDs for everyday lighting applications. The company's records for light output, efficacy and thermal management are direct results of the ongoing commitment to advancing solid-state lighting technology and enabling lighting solutions that are more environmentally friendly, help reduce CO₂ emissions and reduce the need for power plant expansion. Lumileds LUXEON LEDs are enabling never before possible applications in outdoor lighting, shop lighting, home lighting, digital imaging, display and automotive lighting.

Lumileds is a fully integrated supplier, producing core LED material in all three base colors, (red, green, blue) and white. Lumileds has R & D centers in San Jose, California and in the Netherlands, and production capabilities in San Jose, Singapore and Penang, Malaysia. Founded in 1999, Lumileds is the high flux LED technology leader and is dedicated to bridging the gap between solid-state technology and the lighting world. More information about the company's LUXEON LED products and solid-state lighting technologies can be found at www.lumileds.com.

Appendix: Additional Projected Extrapolations per IESNA TM-21-11

Projected L₇₅ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	90,487	-	77,221
Ts = 105°C	123,561	-	105,396	102,389	-
Ts = 85°C	-	119,004	-	-	-
Ts = 55°C	145,307	-	-	-	-

Projected L₈₀ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	70,497	-	59,992
Ts = 105°C	96,647	-	82,096	79,237	-
Ts = 85°C	-	92,677	-	-	-
Ts = 55°C	113,852	-	-	-	-

Projected L₈₅ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	51,720	-	43,808
Ts = 105°C	71,365	-	60,209	57,489	-
Ts = 85°C	-	67,946	-	-	-
Ts = 55°C	84,306	-	-	-	-

Projected L₉₀ extrapolations per IESNA TM-21-11

	If = 65mA	If = 100mA	If = 120mA	If = 150mA	If = 180mA
Ts = 115°C	-	-	34,016	-	28,550
Ts = 105°C	47,528	-	39,573	36,984	-
Ts = 85°C	-	44,629	-	-	-
Ts = 55°C	56,448	-	-	-	-