

# Lumileds

## IESNA LM-80 Test Report

### 1. Applicable LUXEON® Series part number(s)

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

Product Family	Part Number	Nominal CCT
LUXEON 2835E 6V	L128-2780EB3500001	2700K
LUXEON 2835E 6V	L128-3080EB3500001	3000K
LUXEON 2835E 6V	L128-3580EB3500001	3500K
LUXEON 2835E 6V	L128-4080EB3500001	4000K
LUXEON 2835E 6V	L128-5080EB3500001	5000K
LUXEON 2835E 6V	L128-5780EB3500001	5700K
LUXEON 2835E 6V	L128-6580EB3500001	6500K
LUXEON 2835E 9V	L128-2780EC3500001	2700K
LUXEON 2835E 9V	L128-3070EC3500001	3000K
LUXEON 2835E 9V	L128-3080EC3500001	3000K
LUXEON 2835E 9V	L128-3570EC3500001	3500K
LUXEON 2835E 9V	L128-3580EC3500001	3500K
LUXEON 2835E 9V	L128-4070EC3500001	4000K
LUXEON 2835E 9V	L128-4080EC3500001	4000K
LUXEON 2835E 9V	L128-5070EC3500001	5000K
LUXEON 2835E 9V	L128-5080EC3500001	5000K
LUXEON 2835E 9V	L128-5780EC3500001	5700K
LUXEON 2835E 9V	L128-5770EC3500001	5700K
LUXEON 2835E 9V	L128-6580EC3500001	6500K
LUXEON 2835E 9V	L128-6570EC3500001	6500K



## 2. $L_{70}$ Extrapolations per IESNA TM-21-11

If = 100mA	
Ts = 105°C	> 60,000
Ts = 85°C	> 60,000

= Limited by TM-21 6x rule

## 3. Number of LED light sources tested

30 units tested per stress condition / data reported for 20 units per test condition

## 4. Description of LED light sources tested

LUXEON 2835E 9V: L128-3080EC3500001 (nominal CCT 3000K)

## 5. Dates Tests Started

All DATA SETs: 2014-10-04

## 6. Date Report First Issued

All DATA SETs: first reported on 2015-12-17

## 7. Package Pictures



Figure 1. Picture of LUXEON 2835.

## 8. Mechanical Drawing

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

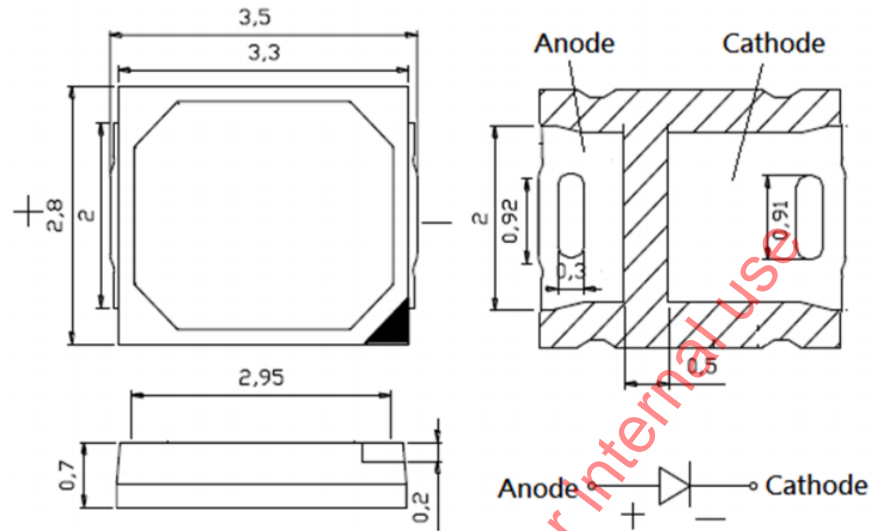


Figure 2: Mechanical Drawing for LUXEON 2835. All dimensions are in millimeters.

## 9. $T_s$ Measurement Point

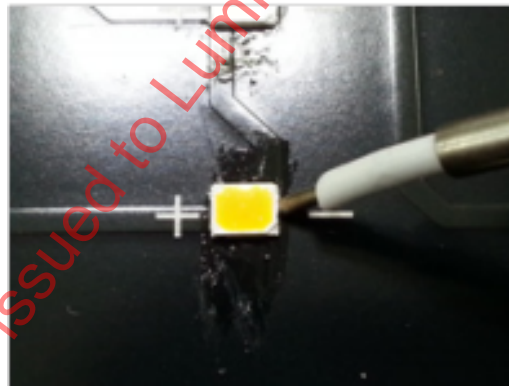


Figure 3: Preferred  $T_s$  measurement point for LUXEON 2835.

For further information on measuring the in-situ  $T_s$ , please see the appropriate application Lumileds Application Brief which is available online at [www.lumileds.com](http://www.lumileds.com).

## 10. Description of auxiliary equipment

LUXEON LED devices are soldered to reliability stress boards that can accommodate up to 25 devices and are driven by a constant current source.

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%.

## 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-80-08 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. Measurement uncertainty

Long-term measurement uncertainty is based on reproducibility tests done over a period of one year, calculated to  $k = 1.97$  coverage (i.e. 95% coverage).

Luminous Flux ( $\Phi_v$ )  $\pm 1.601\%$

Chromaticity shift (x,y)  $\pm 0.000018$

## 20. Chromaticity shift reported over the measurement time

See tables.

## 21. Sampling Method/Sample size

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days. These manufacturing lots are picked to represent a wide parametric distribution.

22. ISO 17025-2005 Accreditation



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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ELECTRICAL

Valid To: July 31, 2017

Certificate Number: 3129.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the laboratory's compliance with A2LA's EPA ENERGY STAR<sup>®</sup> Accreditation Program requirements), accreditation is granted to this laboratory to perform the following tests:

**Test Technology:**

**Test Method:**

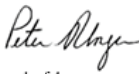
*ENERGY STAR<sup>®</sup> Testing*

Lumen Maintenance of LED Light Sources IESNA LM-80-08

<sup>1</sup> A2LA provides accreditation to the U.S. EPA's [Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program](#) by verifying an organization's compliance to A2LA document [R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program](#) and to the related test methods listed above.

Accreditation by A2LA does not infer recognition by the EPA for ENERGY STAR testing. Please verify this organization's recognition status by using the EPA's searchable database, located at [http://www.energystar.gov/index.cfm?fuseaction=recognized\\_bodies\\_list.show\\_RCB\\_search\\_form](http://www.energystar.gov/index.cfm?fuseaction=recognized_bodies_list.show_RCB_search_form)

(A2LA Cert. No. 3129.01) 06/03/2015

  
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## 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 an exponential model for flux(time):

Flux(time) = B exp[-alpha\*time], where normally B ≅ 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.

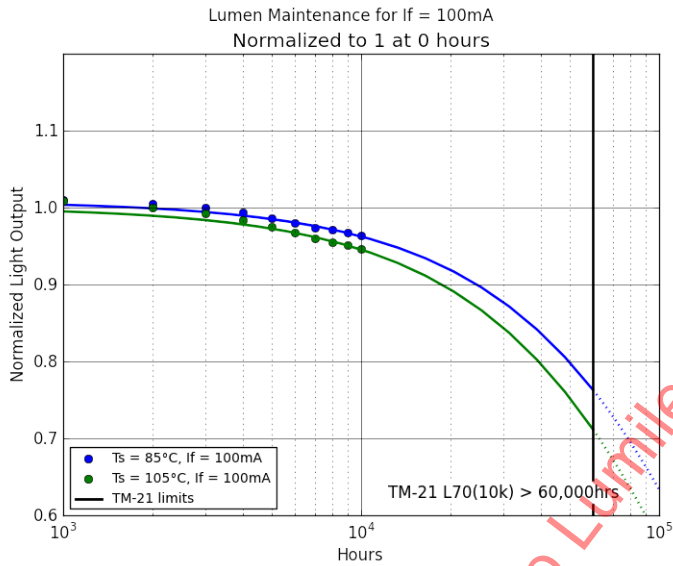
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**Normalized Flux Statistics for  $I_f = 100\text{mA}$**

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs	alpha	B	L70
Ts=Tair=105°C	median = 1.0000	1.0085	0.9987	0.9923	0.9853	0.9755	0.9671	0.9600	0.9554	0.9519	0.9465			
	average = 1.0000	1.0092	0.9998	0.9921	0.9842	0.9744	0.9669	0.9597	0.9550	0.9515	0.9464	5.6816e-06	1.0007	62,898
	st dev = 0.0000	0.0052	0.0060	0.0057	0.0064	0.0066	0.0067	0.0066	0.0067	0.0069	0.0070	TM-21 L70(10k) > 60,000hrs		
	min = 1.0000	1.0008	0.9915	0.9797	0.9696	0.9611	0.9535	0.9459	0.9417	0.9375	0.9324			
	max = 1.0000	1.0187	1.0111	1.0043	0.9991	0.9898	0.9821	0.9727	0.9659	0.9642	0.9625			
Ts=Tair=85°C	median = 1.0000	1.0106	1.0051	1.0017	0.9949	0.9876	0.9812	0.9753	0.9699	0.9677	0.9626			
	average = 1.0000	1.0096	1.0047	1.0001	0.9939	0.9864	0.9804	0.9744	0.9706	0.9676	0.9631	4.6449e-06	1.0082	78,557
	st dev = 0.0000	0.0040	0.0045	0.0057	0.0058	0.0067	0.0064	0.0062	0.0068	0.0068	0.0070	TM-21 L70(10k) > 60,000hrs		
	min = 1.0000	1.0025	0.9958	0.9874	0.9840	0.9722	0.9679	0.9629	0.9578	0.9562	0.9501			
	max = 1.0000	1.0170	1.0110	1.0077	1.0026	0.9957	0.9898	0.9846	0.9820	0.9795	0.9743			



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

	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
Ts=Tair=105°C	median = 0.0000	0.0007	0.0011	0.0007	0.0006	0.0011	0.0018	0.0021	0.0024	0.0026	0.0028
	average = 0.0000	0.0007	0.0011	0.0007	0.0006	0.0011	0.0018	0.0021	0.0024	0.0026	0.0029
	st dev = 0.0000	0.0001	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
	min = 0.0000	0.0006	0.0008	0.0005	0.0005	0.0009	0.0016	0.0018	0.0021	0.0023	0.0025
	max = 0.0000	0.0011	0.0015	0.0012	0.0009	0.0015	0.0022	0.0026	0.0028	0.0031	0.0034
Ts=Tair=85°C	median = 0.0000	0.0006	0.0008	0.0009	0.0012	0.0015	0.0019	0.0021	0.0024	0.0030	0.0032
	average = 0.0000	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0021	0.0024	0.0029	0.0032
	st dev = 0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	0.0001	0.0002
	min = 0.0000	0.0004	0.0006	0.0007	0.0008	0.0011	0.0016	0.0019	0.0022	0.0026	0.0027
	max = 0.0000	0.0007	0.0011	0.0012	0.0014	0.0017	0.0021	0.0025	0.0027	0.0031	0.0035

**Luminous Flux [lm] data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	118.700	119.500	119.300	119.200	118.500	117.700	117.000	116.100	115.800	115.500	115.200
2	2960K	116.900	118.600	118.100	117.800	117.200	116.400	115.700	115.100	114.800	114.500	113.900
3	2981K	117.100	118.300	118.200	118.000	117.400	116.400	115.900	115.000	114.700	114.400	113.700
4	2932K	117.400	118.900	118.300	117.700	116.800	115.900	115.100	114.500	114.100	113.700	113.300
5	2926K	117.300	118.300	117.800	117.300	116.700	115.900	115.300	114.600	113.900	113.600	113.000
6	2947K	116.500	118.000	117.400	116.900	116.200	115.500	114.900	114.500	114.100	113.700	113.000
7	2971K	119.300	119.600	119.200	118.700	118.000	117.400	116.600	115.600	115.300	114.700	114.600
8	2932K	117.700	119.000	118.500	118.100	117.800	117.100	116.100	115.400	115.200	114.700	114.300
9	2950K	117.400	118.900	118.400	117.900	117.200	116.400	115.700	115.300	115.000	114.700	114.200
10	2953K	117.900	119.900	119.200	118.500	117.600	116.700	115.800	115.000	114.200	114.000	113.500
11	2945K	118.100	119.500	119.100	118.500	118.000	117.100	116.300	115.200	114.800	114.500	114.000
12	2918K	118.800	119.400	118.800	118.300	117.600	116.700	116.000	115.200	115.000	114.500	113.900
13	2949K	120.200	120.800	120.500	119.900	119.000	118.000	117.200	116.300	116.000	115.800	115.400
14	2961K	117.500	118.800	117.800	117.300	116.500	115.700	115.100	114.300	113.600	113.300	112.900
15	2932K	118.700	119.700	119.300	118.800	117.600	116.700	116.000	115.400	115.100	114.400	113.900
16	2922K	117.100	118.500	118.100	117.600	116.700	115.800	115.000	114.200	113.600	113.400	112.700
17	2937K	118.300	119.800	118.900	118.100	116.600	115.300	114.500	114.100	113.600	113.200	112.400
18	2927K	117.400	118.400	117.400	116.700	116.100	115.500	115.000	114.100	113.600	113.100	112.700
19	2961K	118.600	118.900	118.100	117.100	116.700	115.300	114.900	114.200	113.600	113.400	112.700
20	2952K	119.300	119.900	118.900	118.000	117.500	116.500	115.800	115.500	114.800	114.600	113.800

**Normalized Luminous Flux data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	1.0000	1.0067	1.0051	1.0042	0.9983	0.9916	0.9857	0.9781	0.9756	0.9730	0.9705
2	2960K	1.0000	1.0145	1.0103	1.0077	1.0026	0.9957	0.9897	0.9846	0.9820	0.9795	0.9743
3	2981K	1.0000	1.0102	1.0094	1.0077	1.0026	0.9940	0.9898	0.9821	0.9795	0.9769	0.9710
4	2932K	1.0000	1.0128	1.0077	1.0026	0.9949	0.9872	0.9804	0.9753	0.9719	0.9685	0.9651
5	2926K	1.0000	1.0085	1.0043	1.0000	0.9949	0.9881	0.9829	0.9770	0.9710	0.9685	0.9633
6	2947K	1.0000	1.0129	1.0077	1.0034	0.9974	0.9914	0.9863	0.9828	0.9794	0.9760	0.9700
7	2971K	1.0000	1.0025	0.9992	0.9950	0.9891	0.9841	0.9774	0.9690	0.9665	0.9614	0.9606
8	2932K	1.0000	1.0110	1.0068	1.0034	1.0008	0.9949	0.9864	0.9805	0.9788	0.9745	0.9711
9	2950K	1.0000	1.0128	1.0085	1.0043	0.9983	0.9915	0.9855	0.9821	0.9796	0.9770	0.9727
10	2953K	1.0000	1.0170	1.0110	1.0051	0.9975	0.9898	0.9822	0.9754	0.9686	0.9669	0.9627
11	2945K	1.0000	1.0119	1.0085	1.0034	0.9992	0.9915	0.9848	0.9754	0.9721	0.9695	0.9653
12	2918K	1.0000	1.0051	1.0000	0.9958	0.9899	0.9823	0.9764	0.9697	0.9680	0.9638	0.9588
13	2949K	1.0000	1.0050	1.0025	0.9975	0.9900	0.9817	0.9750	0.9676	0.9651	0.9634	0.9601
14	2961K	1.0000	1.0111	1.0026	0.9983	0.9915	0.9847	0.9796	0.9728	0.9668	0.9643	0.9609
15	2932K	1.0000	1.0084	1.0051	1.0008	0.9907	0.9832	0.9773	0.9722	0.9697	0.9638	0.9596
16	2922K	1.0000	1.0120	1.0085	1.0043	0.9966	0.9889	0.9821	0.9752	0.9701	0.9684	0.9624
17	2937K	1.0000	1.0127	1.0051	0.9983	0.9856	0.9746	0.9679	0.9645	0.9603	0.9569	0.9501
18	2927K	1.0000	1.0085	1.0000	0.9940	0.9889	0.9838	0.9796	0.9719	0.9676	0.9634	0.9600
19	2961K	1.0000	1.0025	0.9958	0.9874	0.9840	0.9722	0.9688	0.9629	0.9578	0.9562	0.9503
20	2952K	1.0000	1.0050	0.9966	0.9891	0.9849	0.9765	0.9707	0.9681	0.9623	0.9606	0.9539



**TM-21 Extrapolation of Luminous Flux data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	alpha	B	L70
1	2953K	4.2470e-06	1.0107	86,498
2	2960K	4.0699e-06	1.0148	91,248
3	2981K	4.5439e-06	1.0162	82,037
4	2932K	4.3902e-06	1.0073	82,907
5	2926K	5.0682e-06	1.0129	72,899
6	2947K	4.1260e-06	1.0118	89,284
7	2971K	4.9309e-06	1.0063	73,613
8	2932K	4.5468e-06	1.0150	81,725
9	2950K	3.5444e-06	1.0078	102,829
10	2953K	5.5142e-06	1.0154	67,448
11	2945K	5.2692e-06	1.0157	70,656
12	2918K	4.6346e-06	1.0041	77,843
13	2949K	4.2867e-06	1.0004	83,304
14	2961K	5.0263e-06	1.0088	72,700
15	2932K	4.7342e-06	1.0060	76,602
16	2922K	5.2279e-06	1.0135	70,781
17	2937K	4.7433e-06	0.9972	74,605
18	2927K	5.0593e-06	1.0086	72,182
19	2961K	4.5351e-06	0.9946	77,450
20	2952K	4.4164e-06	0.9978	80,271
ave	2945K	4.6449e-06	1.0082	78,557

**CIE 1976 u' data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	0.2524	0.2520	0.2517	0.2516	0.2514	0.2512	0.2505	0.2502	0.2501	0.2498	0.2500
2	2960K	0.2524	0.2521	0.2519	0.2517	0.2516	0.2514	0.2510	0.2506	0.2504	0.2502	0.2503
3	2981K	0.2520	0.2515	0.2513	0.2510	0.2508	0.2506	0.2503	0.2500	0.2497	0.2494	0.2493
4	2932K	0.2536	0.2532	0.2530	0.2528	0.2525	0.2523	0.2519	0.2516	0.2513	0.2510	0.2509
5	2926K	0.2535	0.2530	0.2528	0.2526	0.2523	0.2520	0.2519	0.2516	0.2512	0.2509	0.2507
6	2947K	0.2530	0.2528	0.2524	0.2522	0.2519	0.2517	0.2512	0.2509	0.2506	0.2502	0.2500
7	2971K	0.2521	0.2517	0.2514	0.2512	0.2510	0.2508	0.2507	0.2503	0.2500	0.2497	0.2496
8	2932K	0.2532	0.2527	0.2525	0.2523	0.2520	0.2519	0.2518	0.2513	0.2510	0.2506	0.2506
9	2950K	0.2526	0.2523	0.2520	0.2517	0.2515	0.2513	0.2511	0.2509	0.2506	0.2502	0.2500
10	2953K	0.2525	0.2522	0.2518	0.2515	0.2513	0.2510	0.2509	0.2507	0.2504	0.2500	0.2498
11	2945K	0.2529	0.2525	0.2522	0.2520	0.2517	0.2514	0.2513	0.2511	0.2508	0.2504	0.2502
12	2918K	0.2538	0.2534	0.2530	0.2526	0.2525	0.2523	0.2522	0.2519	0.2517	0.2512	0.2510
13	2949K	0.2526	0.2522	0.2520	0.2517	0.2515	0.2512	0.2511	0.2509	0.2506	0.2502	0.2500
14	2961K	0.2528	0.2526	0.2524	0.2521	0.2520	0.2516	0.2513	0.2511	0.2509	0.2505	0.2502
15	2932K	0.2532	0.2529	0.2526	0.2522	0.2520	0.2516	0.2516	0.2514	0.2512	0.2508	0.2505
16	2922K	0.2537	0.2535	0.2531	0.2528	0.2526	0.2522	0.2520	0.2519	0.2517	0.2513	0.2511
17	2937K	0.2531	0.2529	0.2526	0.2523	0.2520	0.2517	0.2514	0.2513	0.2511	0.2508	0.2506
18	2927K	0.2534	0.2531	0.2529	0.2526	0.2524	0.2520	0.2516	0.2515	0.2514	0.2509	0.2508
19	2961K	0.2525	0.2521	0.2517	0.2514	0.2511	0.2509	0.2506	0.2505	0.2504	0.2499	0.2498
20	2952K	0.2526	0.2522	0.2520	0.2517	0.2514	0.2511	0.2509	0.2508	0.2507	0.2503	0.2501

**CIE 1976 v' data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	0.5217	0.5222	0.5221	0.5217	0.5216	0.5212	0.5207	0.5206	0.5204	0.5201	0.5198
2	2960K	0.5205	0.5211	0.5210	0.5207	0.5205	0.5201	0.5198	0.5196	0.5194	0.5191	0.5188
3	2981K	0.5187	0.5191	0.5191	0.5188	0.5185	0.5180	0.5177	0.5175	0.5172	0.5170	0.5166
4	2932K	0.5204	0.5209	0.5210	0.5208	0.5203	0.5199	0.5195	0.5194	0.5191	0.5188	0.5184
5	2926K	0.5218	0.5222	0.5222	0.5219	0.5216	0.5211	0.5209	0.5208	0.5205	0.5202	0.5198
6	2947K	0.5203	0.5210	0.5210	0.5206	0.5203	0.5199	0.5195	0.5193	0.5192	0.5189	0.5185
7	2971K	0.5199	0.5203	0.5203	0.5199	0.5195	0.5192	0.5189	0.5186	0.5185	0.5181	0.5179
8	2932K	0.5219	0.5224	0.5224	0.5221	0.5218	0.5214	0.5212	0.5210	0.5209	0.5204	0.5202
9	2950K	0.5214	0.5219	0.5219	0.5215	0.5213	0.5210	0.5207	0.5205	0.5203	0.5200	0.5197
10	2953K	0.5212	0.5217	0.5217	0.5213	0.5210	0.5205	0.5202	0.5201	0.5200	0.5196	0.5193
11	2945K	0.5209	0.5214	0.5214	0.5210	0.5208	0.5203	0.5201	0.5199	0.5198	0.5194	0.5191
12	2918K	0.5219	0.5223	0.5222	0.5219	0.5217	0.5213	0.5210	0.5209	0.5208	0.5204	0.5201
13	2949K	0.5215	0.5218	0.5218	0.5215	0.5212	0.5208	0.5205	0.5204	0.5203	0.5199	0.5196
14	2961K	0.5187	0.5192	0.5193	0.5189	0.5186	0.5181	0.5178	0.5176	0.5175	0.5171	0.5168
15	2932K	0.5219	0.5223	0.5224	0.5219	0.5216	0.5213	0.5210	0.5208	0.5208	0.5204	0.5201
16	2922K	0.5216	0.5221	0.5221	0.5217	0.5214	0.5210	0.5207	0.5206	0.5205	0.5201	0.5199
17	2937K	0.5215	0.5220	0.5220	0.5218	0.5215	0.5209	0.5206	0.5205	0.5203	0.5200	0.5197
18	2927K	0.5220	0.5225	0.5225	0.5222	0.5220	0.5215	0.5211	0.5209	0.5208	0.5204	0.5201
19	2961K	0.5199	0.5203	0.5206	0.5201	0.5198	0.5194	0.5191	0.5189	0.5189	0.5185	0.5181
20	2952K	0.5210	0.5212	0.5212	0.5210	0.5207	0.5203	0.5200	0.5198	0.5197	0.5194	0.5190

**Delta u'v' data for tested units**

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	0.0000	0.0006	0.0008	0.0008	0.0010	0.0013	0.0021	0.0025	0.0026	0.0031	0.0031
2	2960K	0.0000	0.0007	0.0007	0.0007	0.0008	0.0011	0.0016	0.0020	0.0023	0.0026	0.0027
3	2981K	0.0000	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0023	0.0027	0.0031	0.0034
4	2932K	0.0000	0.0006	0.0008	0.0009	0.0011	0.0014	0.0019	0.0022	0.0026	0.0031	0.0034
5	2926K	0.0000	0.0006	0.0008	0.0009	0.0012	0.0017	0.0018	0.0021	0.0026	0.0031	0.0034
6	2947K	0.0000	0.0007	0.0009	0.0009	0.0011	0.0014	0.0020	0.0023	0.0026	0.0031	0.0035
7	2971K	0.0000	0.0006	0.0008	0.0009	0.0012	0.0015	0.0017	0.0022	0.0025	0.0030	0.0032
8	2932K	0.0000	0.0007	0.0009	0.0009	0.0012	0.0014	0.0016	0.0021	0.0024	0.0030	0.0031
9	2950K	0.0000	0.0006	0.0008	0.0009	0.0011	0.0014	0.0017	0.0019	0.0023	0.0028	0.0031
10	2953K	0.0000	0.0006	0.0009	0.0010	0.0012	0.0017	0.0019	0.0021	0.0024	0.0030	0.0033
11	2945K	0.0000	0.0006	0.0009	0.0009	0.0012	0.0016	0.0018	0.0021	0.0024	0.0029	0.0032
12	2918K	0.0000	0.0006	0.0009	0.0012	0.0013	0.0016	0.0018	0.0021	0.0024	0.0030	0.0033
13	2949K	0.0000	0.0005	0.0007	0.0009	0.0011	0.0016	0.0018	0.0020	0.0023	0.0029	0.0032
14	2961K	0.0000	0.0005	0.0007	0.0007	0.0008	0.0013	0.0017	0.0020	0.0022	0.0028	0.0032
15	2932K	0.0000	0.0005	0.0008	0.0010	0.0012	0.0017	0.0018	0.0021	0.0023	0.0028	0.0032
16	2922K	0.0000	0.0005	0.0008	0.0009	0.0011	0.0016	0.0019	0.0021	0.0023	0.0028	0.0031
17	2937K	0.0000	0.0005	0.0007	0.0009	0.0011	0.0015	0.0019	0.0021	0.0023	0.0027	0.0031
18	2927K	0.0000	0.0006	0.0007	0.0008	0.0010	0.0015	0.0020	0.0022	0.0023	0.0030	0.0032
19	2961K	0.0000	0.0006	0.0011	0.0011	0.0014	0.0017	0.0021	0.0022	0.0023	0.0030	0.0032
20	2952K	0.0000	0.0004	0.0006	0.0009	0.0012	0.0017	0.0020	0.0022	0.0023	0.0028	0.0032

Forward Voltage [V] data for tested units

$T_s = T_{air} = 85^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 83^{\circ}\text{C}$  and  $T_{air} \geq 80^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2953K	9.154	9.182	9.187	9.239	9.179	9.179	9.155	9.196	9.174	9.217	9.217
2	2960K	9.176	9.210	9.220	9.270	9.203	9.204	9.181	9.221	9.195	9.234	9.234
3	2981K	9.147	9.182	9.193	9.242	9.179	9.177	9.163	9.199	9.174	9.210	9.210
4	2932K	9.144	9.181	9.190	9.233	9.172	9.169	9.150	9.198	9.168	9.210	9.210
5	2926K	9.138	9.175	9.192	9.232	9.172	9.169	9.151	9.186	9.168	9.197	9.197
6	2947K	9.094	9.138	9.150	9.185	9.136	9.133	9.116	9.152	9.133	9.163	9.163
7	2971K	9.137	9.185	9.203	9.241	9.178	9.181	9.164	9.199	9.179	9.220	9.220
8	2932K	9.193	9.222	9.242	9.286	9.223	9.210	9.198	9.239	9.216	9.253	9.253
9	2950K	9.170	9.201	9.217	9.252	9.193	9.191	9.164	9.211	9.187	9.228	9.228
10	2953K	9.153	9.187	9.199	9.232	9.178	9.179	9.160	9.199	9.176	9.212	9.212
11	2945K	9.136	9.169	9.180	9.213	9.160	9.158	9.134	9.177	9.155	9.190	9.190
12	2918K	9.173	9.217	9.235	9.270	9.200	9.206	9.181	9.219	9.207	9.234	9.234
13	2949K	9.171	9.207	9.222	9.259	9.193	9.197	9.178	9.217	9.198	9.235	9.235
14	2961K	9.172	9.202	9.223	9.256	9.188	9.191	9.174	9.213	9.195	9.226	9.226
15	2932K	9.131	9.167	9.184	9.207	9.157	9.162	9.136	9.171	9.158	9.192	9.192
16	2922K	9.172	9.199	9.217	9.250	9.194	9.193	9.172	9.207	9.192	9.219	9.219
17	2937K	9.148	9.181	9.199	9.232	9.172	9.168	9.152	9.186	9.172	9.204	9.204
18	2927K	9.150	9.185	9.207	9.244	9.179	9.176	9.161	9.188	9.181	9.214	9.214
19	2961K	9.079	9.118	9.152	9.175	9.134	9.128	9.113	9.137	9.130	9.156	9.156
20	2952K	9.137	9.164	9.182	9.213	9.160	9.156	9.140	9.168	9.160	9.187	9.187

This report issued to Lumileds for internal use

**Luminous Flux [lm] data for tested units**

$T_s = T_{air} = 105^{\circ}C, I_f = 100mA; T_s \geq 103^{\circ}C$  and  $T_{air} \geq 100^{\circ}C$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	117.600	118.000	117.400	116.800	115.900	114.800	113.900	113.000	112.800	112.300	111.600
2	2950K	117.200	118.100	117.100	116.300	115.800	114.800	113.900	112.900	112.700	112.400	112.000
3	2928K	117.300	118.400	117.000	115.700	114.600	113.500	112.700	112.100	111.400	110.900	110.400
4	2952K	119.000	120.100	118.800	117.700	116.400	115.100	114.100	113.100	112.500	112.000	111.600
5	2922K	118.400	118.700	117.500	116.000	114.800	113.800	112.900	112.000	111.500	111.000	110.400
6	2942K	118.100	119.900	118.900	117.600	116.700	115.700	114.900	114.000	113.200	112.600	112.000
7	2963K	119.900	120.500	119.700	118.900	117.300	116.100	115.200	114.300	113.600	113.100	112.500
8	2942K	119.200	120.300	119.500	118.600	117.900	117.000	116.300	115.400	114.900	114.400	113.700
9	2953K	119.100	119.900	119.000	118.300	117.500	116.300	115.300	114.500	114.600	114.000	113.400
10	2941K	119.700	120.400	119.300	118.600	117.900	116.900	115.800	114.900	114.400	113.900	113.300
11	2935K	117.700	119.700	118.700	117.600	116.600	115.300	114.300	113.600	113.200	112.700	111.900
12	2948K	117.600	119.200	117.900	116.700	115.700	114.400	113.700	112.800	112.700	112.400	111.600
13	2984K	117.900	120.000	119.000	117.800	116.700	115.300	114.400	113.400	112.600	112.200	111.600
14	2949K	119.100	119.900	118.300	117.400	116.500	115.300	114.100	113.500	113.200	112.900	112.500
15	2959K	117.700	117.800	116.700	116.200	115.400	114.400	113.800	113.000	112.200	112.000	111.400
16	2946K	118.900	120.000	117.900	117.500	116.500	115.100	114.300	113.300	112.600	112.200	111.500
17	2963K	118.600	120.200	119.200	118.400	117.000	115.300	114.600	113.500	112.900	112.400	111.600
18	2942K	117.900	118.800	118.000	117.100	116.400	115.400	114.600	113.500	112.900	112.500	111.800
19	2951K	119.100	119.600	118.400	117.500	117.000	116.100	114.900	114.200	113.600	113.400	112.700
20	2940K	117.400	119.600	118.700	117.900	117.300	116.200	115.300	114.200	113.400	113.200	113.000

**Normalized Luminous Flux data for tested units**

$T_s = T_{air} = 105^{\circ}C, I_f = 100mA; T_s \geq 103^{\circ}C$  and  $T_{air} \geq 100^{\circ}C$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	1.0000	1.0034	0.9983	0.9932	0.9855	0.9762	0.9685	0.9609	0.9592	0.9549	0.9490
2	2950K	1.0000	1.0077	0.9991	0.9923	0.9881	0.9795	0.9718	0.9633	0.9616	0.9590	0.9556
3	2928K	1.0000	1.0094	0.9974	0.9864	0.9770	0.9676	0.9608	0.9557	0.9497	0.9454	0.9412
4	2952K	1.0000	1.0092	0.9983	0.9891	0.9782	0.9672	0.9588	0.9504	0.9454	0.9412	0.9378
5	2922K	1.0000	1.0025	0.9924	0.9797	0.9696	0.9611	0.9535	0.9459	0.9417	0.9375	0.9324
6	2942K	1.0000	1.0152	1.0068	0.9958	0.9881	0.9797	0.9729	0.9653	0.9585	0.9534	0.9483
7	2963K	1.0000	1.0050	0.9983	0.9917	0.9783	0.9683	0.9608	0.9533	0.9475	0.9433	0.9383
8	2942K	1.0000	1.0092	1.0025	0.9950	0.9891	0.9815	0.9757	0.9681	0.9639	0.9597	0.9539
9	2953K	1.0000	1.0067	0.9992	0.9933	0.9866	0.9765	0.9681	0.9673	0.9622	0.9572	0.9521
10	2941K	1.0000	1.0058	0.9967	0.9908	0.9850	0.9766	0.9674	0.9599	0.9557	0.9515	0.9465
11	2935K	1.0000	1.0170	1.0085	0.9992	0.9907	0.9796	0.9711	0.9652	0.9618	0.9575	0.9507
12	2948K	1.0000	1.0136	1.0026	0.9923	0.9838	0.9728	0.9668	0.9592	0.9583	0.9558	0.9490
13	2984K	1.0000	1.0178	1.0093	0.9992	0.9898	0.9779	0.9703	0.9618	0.9550	0.9517	0.9466
14	2949K	1.0000	1.0067	0.9933	0.9857	0.9782	0.9681	0.9580	0.9530	0.9505	0.9479	0.9446
15	2959K	1.0000	1.0008	0.9915	0.9873	0.9805	0.9720	0.9669	0.9601	0.9533	0.9516	0.9465
16	2946K	1.0000	1.0093	0.9916	0.9882	0.9798	0.9680	0.9613	0.9529	0.9470	0.9437	0.9378
17	2963K	1.0000	1.0135	1.0051	0.9983	0.9865	0.9722	0.9663	0.9570	0.9519	0.9477	0.9410
18	2942K	1.0000	1.0076	1.0008	0.9932	0.9873	0.9788	0.9720	0.9627	0.9576	0.9542	0.9483
19	2951K	1.0000	1.0042	0.9941	0.9866	0.9824	0.9748	0.9647	0.9589	0.9538	0.9521	0.9463
20	2940K	1.0000	1.0187	1.0111	1.0043	0.9991	0.9898	0.9821	0.9727	0.9659	0.9642	0.9625

**TM-21 Extrapolation of Luminous Flux data for tested units**

$T_s = T_{air} = 105^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 103^{\circ}\text{C}$  and  $T_{air} \geq 100^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	alpha	B	L70
1	2955K	5.3018e-06	1.0004	67,351
2	2950K	4.7145e-06	0.9999	75,626
3	2928K	5.5151e-06	0.9936	63,511
4	2952K	6.1557e-06	0.9950	57,124
5	2922K	5.9158e-06	0.9882	58,289
6	2942K	6.5775e-06	1.0117	55,989
7	2963K	6.2522e-06	0.9975	56,655
8	2942K	5.6232e-06	1.0088	64,980
9	2953K	4.7285e-06	0.9987	75,147
10	2941K	6.0112e-06	1.0038	59,970
11	2935K	5.5851e-06	1.0055	64,848
12	2948K	4.5510e-06	0.9936	76,968
13	2984K	6.5262e-06	1.0087	55,978
14	2949K	4.4939e-06	0.9863	76,308
15	2959K	5.3658e-06	0.9977	66,039
16	2946K	6.3061e-06	0.9978	56,214
17	2963K	6.4724e-06	1.0035	55,648
18	2942K	6.2642e-06	1.0085	58,287
19	2951K	5.5229e-06	0.9989	64,386
20	2940K	5.7657e-06	1.0158	64,585
ave	2948K	5.6816e-06	1.0007	62,898

**CIE 1976 u' data for tested units**

$T_s = T_{air} = 105^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 103^{\circ}\text{C}$  and  $T_{air} \geq 100^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	0.2528	0.2522	0.2527	0.2525	0.2521	0.2516	0.2509	0.2507	0.2505	0.2503	0.2500
2	2950K	0.2529	0.2526	0.2530	0.2526	0.2523	0.2516	0.2511	0.2509	0.2507	0.2505	0.2502
3	2928K	0.2536	0.2531	0.2535	0.2531	0.2528	0.2522	0.2516	0.2513	0.2512	0.2509	0.2507
4	2952K	0.2526	0.2523	0.2528	0.2525	0.2521	0.2515	0.2509	0.2506	0.2505	0.2503	0.2501
5	2922K	0.2539	0.2537	0.2542	0.2539	0.2533	0.2528	0.2522	0.2520	0.2519	0.2516	0.2515
6	2942K	0.2527	0.2525	0.2530	0.2527	0.2523	0.2517	0.2512	0.2509	0.2508	0.2506	0.2504
7	2963K	0.2521	0.2517	0.2522	0.2519	0.2516	0.2510	0.2504	0.2502	0.2501	0.2498	0.2497
8	2942K	0.2527	0.2524	0.2529	0.2526	0.2522	0.2516	0.2510	0.2508	0.2507	0.2504	0.2502
9	2953K	0.2527	0.2522	0.2528	0.2525	0.2521	0.2516	0.2509	0.2507	0.2506	0.2503	0.2502
10	2941K	0.2529	0.2525	0.2529	0.2526	0.2522	0.2517	0.2510	0.2507	0.2506	0.2504	0.2501
11	2935K	0.2532	0.2530	0.2534	0.2531	0.2528	0.2522	0.2516	0.2514	0.2512	0.2510	0.2508
12	2948K	0.2530	0.2527	0.2532	0.2529	0.2526	0.2520	0.2514	0.2512	0.2511	0.2508	0.2505
13	2984K	0.2516	0.2513	0.2518	0.2515	0.2512	0.2506	0.2500	0.2497	0.2495	0.2494	0.2492
14	2949K	0.2528	0.2525	0.2530	0.2527	0.2523	0.2518	0.2511	0.2508	0.2506	0.2504	0.2502
15	2959K	0.2526	0.2525	0.2527	0.2524	0.2521	0.2515	0.2510	0.2508	0.2505	0.2504	0.2503
16	2946K	0.2526	0.2522	0.2529	0.2525	0.2520	0.2515	0.2509	0.2505	0.2503	0.2502	0.2500
17	2963K	0.2522	0.2519	0.2523	0.2520	0.2517	0.2512	0.2506	0.2503	0.2500	0.2499	0.2498
18	2942K	0.2534	0.2530	0.2535	0.2532	0.2529	0.2523	0.2518	0.2514	0.2510	0.2510	0.2507
19	2951K	0.2529	0.2525	0.2530	0.2528	0.2524	0.2517	0.2512	0.2509	0.2506	0.2505	0.2503
20	2940K	0.2529	0.2527	0.2532	0.2529	0.2525	0.2520	0.2514	0.2511	0.2507	0.2506	0.2505

**CIE 1976 v' data for tested units**

$T_s = T_{air} = 105^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 103^{\circ}\text{C}$  and  $T_{air} \geq 100^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	0.5197	0.5202	0.5206	0.5202	0.5198	0.5193	0.5189	0.5186	0.5184	0.5183	0.5181
2	2950K	0.5202	0.5207	0.5211	0.5207	0.5203	0.5197	0.5193	0.5192	0.5189	0.5188	0.5186
3	2928K	0.5211	0.5215	0.5219	0.5215	0.5211	0.5206	0.5201	0.5199	0.5196	0.5195	0.5193
4	2952K	0.5211	0.5217	0.5222	0.5217	0.5214	0.5208	0.5204	0.5202	0.5199	0.5198	0.5197
5	2922K	0.5208	0.5217	0.5222	0.5217	0.5213	0.5208	0.5204	0.5202	0.5200	0.5198	0.5197
6	2942K	0.5224	0.5231	0.5235	0.5231	0.5228	0.5222	0.5219	0.5217	0.5214	0.5213	0.5212
7	2963K	0.5212	0.5219	0.5223	0.5220	0.5215	0.5209	0.5206	0.5205	0.5202	0.5200	0.5199
8	2942K	0.5223	0.5233	0.5238	0.5233	0.5230	0.5224	0.5220	0.5219	0.5217	0.5215	0.5214
9	2953K	0.5204	0.5210	0.5215	0.5210	0.5207	0.5202	0.5198	0.5196	0.5194	0.5192	0.5191
10	2941K	0.5216	0.5222	0.5225	0.5221	0.5218	0.5212	0.5209	0.5206	0.5204	0.5202	0.5201
11	2935K	0.5215	0.5222	0.5226	0.5222	0.5220	0.5213	0.5209	0.5208	0.5205	0.5203	0.5202
12	2948K	0.5200	0.5206	0.5210	0.5206	0.5203	0.5198	0.5193	0.5192	0.5189	0.5188	0.5186
13	2984K	0.5198	0.5205	0.5209	0.5206	0.5202	0.5196	0.5192	0.5190	0.5187	0.5186	0.5185
14	2949K	0.5207	0.5212	0.5216	0.5212	0.5209	0.5203	0.5199	0.5197	0.5194	0.5193	0.5192
15	2959K	0.5199	0.5210	0.5213	0.5211	0.5206	0.5200	0.5197	0.5195	0.5193	0.5191	0.5190
16	2946K	0.5221	0.5227	0.5232	0.5228	0.5223	0.5217	0.5213	0.5211	0.5209	0.5207	0.5207
17	2963K	0.5208	0.5214	0.5218	0.5214	0.5210	0.5206	0.5201	0.5199	0.5197	0.5196	0.5194
18	2942K	0.5194	0.5199	0.5202	0.5200	0.5195	0.5190	0.5186	0.5184	0.5180	0.5179	0.5178
19	2951K	0.5199	0.5206	0.5211	0.5208	0.5203	0.5198	0.5194	0.5192	0.5188	0.5187	0.5186
20	2940K	0.5218	0.5224	0.5229	0.5227	0.5221	0.5215	0.5211	0.5209	0.5207	0.5206	0.5204

**Delta u'v' data for tested units**

$T_s = T_{air} = 105^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 103^{\circ}\text{C}$  and  $T_{air} \geq 100^{\circ}\text{C}$  in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	0.0000	0.0008	0.0009	0.0006	0.0007	0.0013	0.0021	0.0024	0.0026	0.0029	0.0032
2	2950K	0.0000	0.0006	0.0009	0.0006	0.0006	0.0014	0.0020	0.0022	0.0026	0.0028	0.0031
3	2928K	0.0000	0.0006	0.0008	0.0006	0.0008	0.0015	0.0022	0.0026	0.0028	0.0031	0.0034
4	2952K	0.0000	0.0007	0.0011	0.0006	0.0006	0.0011	0.0018	0.0022	0.0024	0.0026	0.0029
5	2922K	0.0000	0.0009	0.0014	0.0009	0.0008	0.0011	0.0017	0.0020	0.0022	0.0025	0.0026
6	2942K	0.0000	0.0007	0.0011	0.0007	0.0006	0.0010	0.0016	0.0019	0.0021	0.0024	0.0026
7	2963K	0.0000	0.0008	0.0011	0.0008	0.0006	0.0011	0.0018	0.0020	0.0022	0.0026	0.0027
8	2942K	0.0000	0.0010	0.0015	0.0010	0.0009	0.0011	0.0017	0.0019	0.0021	0.0024	0.0027
9	2953K	0.0000	0.0008	0.0011	0.0006	0.0007	0.0011	0.0019	0.0022	0.0023	0.0027	0.0028
10	2941K	0.0000	0.0007	0.0009	0.0006	0.0007	0.0013	0.0020	0.0024	0.0026	0.0029	0.0032
11	2935K	0.0000	0.0007	0.0011	0.0007	0.0006	0.0010	0.0017	0.0019	0.0022	0.0025	0.0027
12	2948K	0.0000	0.0007	0.0010	0.0006	0.0005	0.0010	0.0017	0.0020	0.0022	0.0025	0.0029
13	2984K	0.0000	0.0008	0.0011	0.0008	0.0006	0.0010	0.0017	0.0021	0.0024	0.0025	0.0027
14	2949K	0.0000	0.0006	0.0009	0.0005	0.0005	0.0011	0.0019	0.0022	0.0026	0.0028	0.0030
15	2959K	0.0000	0.0011	0.0014	0.0012	0.0009	0.0011	0.0016	0.0018	0.0022	0.0023	0.0025
16	2946K	0.0000	0.0007	0.0011	0.0007	0.0006	0.0012	0.0019	0.0023	0.0026	0.0028	0.0030
17	2963K	0.0000	0.0007	0.0010	0.0006	0.0005	0.0010	0.0017	0.0021	0.0025	0.0026	0.0028
18	2942K	0.0000	0.0006	0.0008	0.0006	0.0005	0.0012	0.0018	0.0022	0.0028	0.0028	0.0031
19	2951K	0.0000	0.0008	0.0012	0.0009	0.0006	0.0012	0.0018	0.0021	0.0025	0.0027	0.0029
20	2940K	0.0000	0.0006	0.0011	0.0009	0.0005	0.0009	0.0017	0.0020	0.0025	0.0026	0.0028

**Forward Voltage [V] data for tested units**

**$T_s = T_{air} = 105^{\circ}\text{C}$ ,  $I_f = 100\text{mA}$ ;  $T_s \geq 103^{\circ}\text{C}$  and  $T_{air} \geq 100^{\circ}\text{C}$  in compliance with LM-80-08**

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	10000hrs
1	2955K	9.189	9.222	9.255	9.287	9.218	9.226	9.195	9.240	9.218	9.260	9.260
2	2950K	9.194	9.232	9.263	9.281	9.229	9.219	9.205	9.246	9.217	9.263	9.263
3	2928K	9.196	9.229	9.262	9.290	9.229	9.223	9.200	9.242	9.226	9.265	9.265
4	2952K	9.112	9.153	9.178	9.199	9.158	9.145	9.136	9.163	9.148	9.190	9.190
5	2922K	9.090	9.136	9.165	9.176	9.134	9.134	9.112	9.149	9.137	9.162	9.162
6	2942K	9.173	9.202	9.234	9.257	9.204	9.198	9.178	9.213	9.198	9.229	9.229
7	2963K	9.155	9.199	9.225	9.248	9.197	9.183	9.173	9.218	9.196	9.222	9.222
8	2942K	9.095	9.143	9.179	9.193	9.155	9.141	9.129	9.168	9.151	9.175	9.175
9	2953K	9.118	9.156	9.189	9.204	9.157	9.149	9.140	9.177	9.161	9.187	9.187
10	2941K	9.127	9.165	9.187	9.201	9.157	9.147	9.133	9.169	9.165	9.184	9.184
11	2935K	9.172	9.207	9.226	9.254	9.210	9.188	9.179	9.216	9.206	9.228	9.228
12	2948K	9.165	9.201	9.217	9.244	9.210	9.197	9.166	9.213	9.196	9.231	9.231
13	2984K	9.150	9.184	9.210	9.235	9.195	9.180	9.159	9.192	9.181	9.225	9.225
14	2949K	9.131	9.167	9.194	9.218	9.172	9.161	9.141	9.175	9.164	9.206	9.206
15	2959K	9.104	9.137	9.170	9.194	9.158	9.138	9.130	9.160	9.176	9.179	9.179
16	2946K	9.131	9.168	9.189	9.212	9.174	9.161	9.139	9.178	9.161	9.200	9.200
17	2963K	9.163	9.196	9.229	9.253	9.204	9.186	9.175	9.209	9.203	9.227	9.227
18	2942K	9.121	9.156	9.185	9.202	9.156	9.151	9.133	9.160	9.157	9.183	9.183
19	2951K	9.142	9.174	9.216	9.221	9.186	9.180	9.165	9.198	9.188	9.217	9.217
20	2940K	9.158	9.181	9.237	9.238	9.186	9.171	9.161	9.186	9.184	9.210	9.210

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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](http://www.lumileds.com).

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