Philips 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 3030 2D	L130-2780003000W21	2700K
LUXEON 3030 2D	L130-2790003000W21	2700K
LUXEON 3030 2D	L130-3080003000W21	3000K
LUXEON 3030 2D	L130-3090003000W21	3000K
LUXEON 3030 2D	L130-3580003000W21	3500K
LUXEON 3030 2D	L130-4070003000W21	4000K
LUXEON 3030 2D	L130-4080003000W21	4000K
LUXEON 3030 2D	L130-5070003000W21	5000K
LUXEON 3030 2D	L130-5080003000W21	5000K
LUXEON 3030 2D	L130-5770003000W21	5700K
LUXEON 3030 2D	L130-5780003000W21	5700K
LUXEON 3030 2D	L130-6570003000W21	6500K
LUXEON 3030 2D	L130-6580003000W21	6500K

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

	If = 150mA	
Ts = 105°C	> 54,000	
Ts = 85°C	> 54,000	
Ts = 55°C	> 54,000	
		= Limited by TM-21 6x rule

PHILIPS
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3. Number of LED light sources tested

25 units per test condition.

4. Description of LED light sources tested

LUXEON 3030 2D: L130-2780003000W21 (nominal CCT 2700K)

5. Dates Tests Started

All DATA SETs: 09-19-2013.

6. Date Report First Issued

All DATA SETs: first reported on 06-18-2014.

7. Package Pictures

Figure 1. Picture of LUXEON 3030 2D.

8. Mechanical Drawing

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

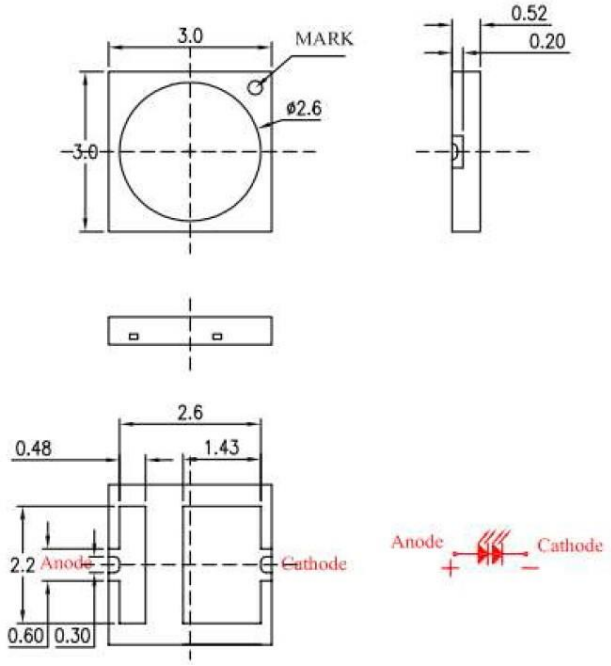

Figure 2: Mechanical Drawing for LUXEON 3030 2D. All dimensions are in millimeters.

9. T_s Measurement Point

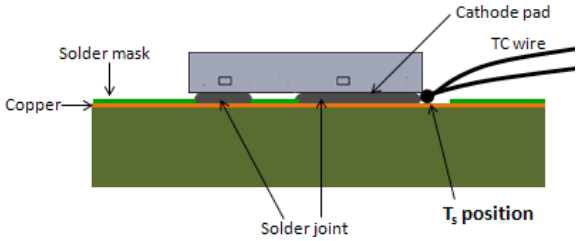

Figure 3: Preferred T_s measurement point for LUXEON 3030 2D.

For further information on measuring the in-situ T_s, please see Philips Lumileds Application Brief AB207, which is available online at www.philipslumileds.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 Ts 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°C ± 2°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-80-08 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. 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) ± 1.59%

Correlated Color Temperature (CCT) ± 21K

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

International Accreditation Service

CERTIFICATE OF ACCREDITATION

This is to signify that

BAY AREA COMPLIANCE LABORATORIES CORP (DONGGUAN)
PULONG CUN 69, PUXINHU INDUSTRIAL AREA
TANGXIA TOWN, GUANG DONG 523719
PEOPLE'S REPUBLIC OF CHINA

Testing Laboratory TL-460
(Revised June 25, 2014)

has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and has been accredited, commencing April 14, 2014, for the test methods listed in the approved scope of accreditation.

Patrick V. McCullen
Vice President, Chief Technical Officer

C. P. Ramani, P.E.
President

ilac-MRA

IAS ACCREDITED

(see attached scope of accreditation for fields of calibration and accredited calibration methods)

Print Date: 06/26/2014

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This accreditation certificate supersedes any IAS accreditation certificate bearing an earlier date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See the IAS Accreditation Listings on the web at www.iasonline.org for current accreditation information, or contact IAS directly at (562) 364-8201.

11-04577

International Accreditation Service

SCOPE OF ACCREDITATION

Bay Area Compliance Laboratories Corp (Dongguan) TL-460

(Revised June 25, 2014)

Bay Area Compliance Laboratories Corp (Dongguan)
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FIELDS OF TESTING	ACCREDITED TEST METHODS	
ENERGY STAR Program Requirements for Lighting (except Electromagnetic and Radio Frequency Interference, Air Tight for Restricted Air Flow, and Mercury Content)	ANSI C62.41.2-2002:	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
	ANSI C78.5-2003:	Specifications for Performance of Self-Ballasted Compact
	ANSI C78.375-1997:	American National Standard for Fluorescent Lamps—Guide for Electrical Measurements
	ANSI C78.376-2001:	Specification for the Chromaticity of Fluorescent Lamps
	ANSI C78.377-2008:	Chromaticity of Solid State Lighting Products
	ANSI C78.377-2011:	Specifications for the Chromaticity of Solid State Lighting Products
	ANSI C78.379:2006:	Electric Lamps – Classification of the Beam Patterns of Reflector Lamps
	ANSI C78.387-1987:	Metal-Halide Lamps - Method of Measuring Characteristics
	ANSI C78.387: 2007:	Metal-Halide Lamps - Method of Measuring Characteristics
	ANSI C78.389-2004:	American National Standard for Electric Lamps – High-Intensity Discharge (HID) – Methods of Measuring Characteristics
	ANSI C82.2-2002:	Fluorescent Lamp Ballasts--Methods of Measurement
	ANSI C82.6-2005:	Ballast For High Intensity Discharge Lamps - Methods of Measurement
	ANSI C82.11-2002:	High-Frequency Fluorescent Lamp Ballasts
	ANSI C82.77-2002:	Harmonic Emission Limits – Related Power Quality Requirements for Lighting
	ANSI/IEEE C62.41 – 1991 (01-May-1991):	Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits, Category A, 7 Strikes
	ANSI/UL 153-2005:	Portable Electric Luminaires
	CIE Pub 13.2-1974:	Method of measuring and Specifying Color Rendering of Light Sources
	CIE 13.3-1995:	Method of Measuring and Specifying Color Rendering of Light Sources
	CIE 15-2004:	Colorimetry Standard
	CIE 84-1989:	The Measurement of Luminous Flux
	CIE 121-1996:	The Photometry and Goniophotometry of Luminaires
	CIE 127-1997:	Measurement of LEDs
	CSA-22.2 No.37-M1989 (R2004):	Christmas Tree and Other Decorative Lighting Outfits
	EPA DLS:	Appendix A
	ENERGY STAR Online	CBCP: Tool for Calculating Minimum Center Beam Intensity
	IEC/TR 61341:	Method of measurement of centre beam intensity and beam angle(s) of reflector lamps
	IES LM-9-99:	Approved Method for the Electrical and Photometric Measurements of Fluorescent Lamps
	IES LM-9-09:	Approved Method for the Electrical and Photometric Measurements of Fluorescent Lamps
	IES LM-10-13:	Photometric Testing of Outdoor Fluorescent Luminaires
	IES TM-16-05:	Technical Memorandum on Light Emitting Diode (LED) Sources and Systems

April 14, 2014
Commencement Date

ACCREDITED

C. P. Ramani, P.E.
President

Print Date: 06/26/2014

International Accreditation Service

SCOPE OF ACCREDITATION

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(Revised June 25, 2014)

FIELDS OF TESTING	ACCREDITED TEST METHODS	
ENERGY STAR Program Requirements for Lighting (except Electromagnetic and Radio Frequency Interference, Air Tight for Restricted Air Flow, and Mercury Content) (continued)	IES LM-16-93:	Practical Guide to Colorimetry of Light Sources
	IES LM-20-13:	Photometric Testing of Reflector-Type Lamps
	IES LM-31-95:	Photometric Testing of Roadway Luminaires Using Incandescent Filament and HID Lamps
	IES LM-35-02:	Photometric Testing of Floodlights Using High Intensity Discharge or Incandescent Filament Lamps
	IES LM-4010:	Approved Method for Life Performance Testing of Fluorescent Lamps
	IES LM- 41-98:	Approved Method for Photometric Testing of Indoor Fluorescent Luminaries
	IES LM-45-02:	Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps
	IES LM-45-09:	Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps
	IES LM-46-04:	Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps
	IES LM-47-12:	Life Testing of High Intensity Discharge (HID) Lamps
	IES LM-49-12:	Life Testing of General Lighting Incandescent Filament Lamps
	IES LM-51-13:	Electrical and Photometric Measurements of HID Lamps Fluorescent Lamps
	IES LM-54-12:	IESNA Guide to Lamp Seasoning
	IES LM-58-13:	Guide to Spectroradiometric Measurements
	IES LM-65-10:	Approved Method for Life Testing of Single-Ended Compact Fluorescent Lamps
	IES LM-66-00:	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
	IES LM-66-11:	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
	ASTM G 154 – 05:	Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
	IES LM-79-08:	Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products, Sections 9, 10 and 12
	IES LM 82-12:	Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature
	IES LM-80-08:	Approved Method for Measuring Lumen Maintenance of LED Light Sources (LED Packages/Modules/Arrays)
	US EPA DLS:	ENERGY STAR Program Requirements for decorative light strings Appendix A
	UL 588-2004:	Standard for Seasonal and Holiday Decorative Products
	UL1993 – 2009:	Self-Ballasted Lamps and Lamp Adapters

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ENERGY STAR Program Requirements for Lighting (except Electromagnetic and Radio Frequency Interference, Air Tight for Restricted Air Flow, and Mercury Content) (continued)	US EPA Lamps v1 ENERGY STAR Program Requirements for Lamps (Light Bulbs), (except Sections 12,4 and 13) Elevated Temperature Life Test - ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Life Testing Elevated Temperature Light Output Ratio- ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Elevated Temperature Light Output Ratio Ambient Temperature Life Test Start Time Test- ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Start Time Run Up Time Test- ENERGY STAR Program Requirements Product Specification for Lamps Version 1.0: Run-up Time 10 CFR 430 Subpart B Appendix W Uniform Test Method for Measuring the Energy Consumption of Medium Base Compact Fluorescent Lamps
ENERGY STAR Program Requirements for Electronics	**Computers** ENERGY STAR Program Requirements Product Specification for Computers, Version 6.0 ENERGY STAR Test Method for Computer, Rev. Oct 2013 EPRI Generalized Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc and Dc-Dc Power Supplies. Version 6.6 (for products that have internal, multi-output, or single output with integral cooling power supplies; available at: www.efficientpowersupplies.org) IEC 62301:2011 Household Electrical Appliances - Measurement of Standby Power **Computer (Enterprise) Servers** ENERGY STAR Test Method for Computer Servers Version 2.0, ENERGY STAR Test Procedure for Determining the Power Use of Computer Servers at Idle and Full Load (Appendix A of specification) EPRI Generalized Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc and Dc-Dc Power Supplies. Version 6.6 Available at www.efficientpowersupplies.org IEC 62301:2011 Household Electrical Appliances - Measurement of Standby Power **Small Network Equipment** ENERGY STAR Program Requirements for Small Network Equipment ENERGY STAR Test Procedure for Small Network Equipment **Imaging Equipment** ENERGY STAR Imaging Equipment Test Method Version 2.0, ENERGY STAR Program Requirements ENERGY STAR Test Method for Computer, Rev. Oct 2013 IEC 62301 Ed 1.0: Household Electrical Appliances – Measurement of Standby Power IEC 62301 Ed 2.0: Household Electrical Appliances – Measurement of Standby Power EPRI Generalized Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc and Dc-Dc Power Supplies Version 6.6. Available at www.efficientpowersupplies.org ENGRGY STAR Program Requirements Produtct Specification for Imaging Equipment, Version 2.0 EPRI Test Method for Calculating the Energy Efficiency of Single Voltage External AC-DC and AC-AC Power Supplies, Rev. August 11, 2004, Available at www.efficientpowersupplies.org

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FIELDS OF TESTING	ACCREDITED TEST METHODS
ENERGY STAR Program Requirements for Electronics (continued)	**Battery Charging Systems** ENERGY STAR Test Method, ENERGY STAR Program Requirements for Battery Charging Systems Version 1.1, ENERGY STAR Test Method for Battery Charging Systems, Rev. Aug 2012 IEC Standard 61951-1: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 1: Nickel-cadmium. Ed. 2.1. January 2006 IEC Standard 61951-2: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride. Ed. 2.0. April 2003 IEC Standard 61951-2: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Portable sealed rechargeable single cells – Part 2: Nickel-metal hydride. Ed. 3.0. May 2011 IEC Standard 61960: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications. Ed. 1.0. December 2003 IEC Standard 61960: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications. Ed. 2.0. June 2011 **Telephony** ENERGY STAR Test Method for Telephony, ENERGY STAR Program Requirements for Telephony Version 3.0, (except VoIP) ENERGY STAR Test Method for Telephony, Rev. Nov. 2013 **Set Top Boxes** ENERGY STAR Test Method for Set-top Boxes Version 3.0 (Testing Products for ENERGY STAR) ENERGY STAR Program Requirements for Set-top Boxes Version 3.0 **Televisions** ENERGY STAR Program Requirements Product Specification for Televisions Eligibility Criteria Version 6.1 10 CFR 430 Subpart B Appendix H Uniform Test Method for Measuring the Power Consumption of Television Sets 10 CFR 429.25 Subpart B Television Sets 77FR 2864 NOPR Test Procedure for Television sets ENERGY STAR Test Method for Televisions, Rev. Aug 2010 **Displays** ENERGY STAR® Program Requirements Product Specification for Displays Eligibility Criteria Version 6.0 ENERGY STAR Test Method for Determining Displays Energy use Version 6.0, Rev. Jan. 2013 **Audio/Video** ENERGY STAR Program Requirements for Audio/Video ENERGY STAR Test Procedure for Audio/Video product
ENERGY STAR Program Requirements for Appliances	**Water Coolers** ENERGY STAR Program Requirements Product Specification for Water Coolers Version 2.0, ENERGY STAR Test Method for Water Coolers, Rev. May 2013
Safety Testing for UV Exposure	IEC 62471:2006/EN 62471:2008: Photobiological Safety of Lamps and Lamp Systems

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FIELDS OF TESTING	ACCREDITED TEST METHODS	
Safety Testing	IEC 62031 Edition 2.0:	LED Modules for General Lighting – Safety Specifications
	ANSI/UL 1598: 2008:	Luminaires
	ANSI/UL 1574:2004:	Standard for Track Lighting Systems
	ASTM G154:2006:	Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
	UL153-2005:	Portable Luminaires
Energy Efficiency	IEC 62623:2012-10 Edition 1.0:	Desktop and Notebook Computers – Measurement of Energy Consumption
	IEC 62612:2013:	Self-ballasted LED lamps for general lighting services with supply voltage >50v – Performance requirements
	IEC 62087 Ed. 3.0 -2011-04:	Methods of measurement for the power consumption of audio, video and related equipment
	EN/IEC 60969 Ed. 1.2:2001:	Self-Ballasted Lamps for General Lighting Services - Performance Requirements

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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 a exponential model for flux(time):

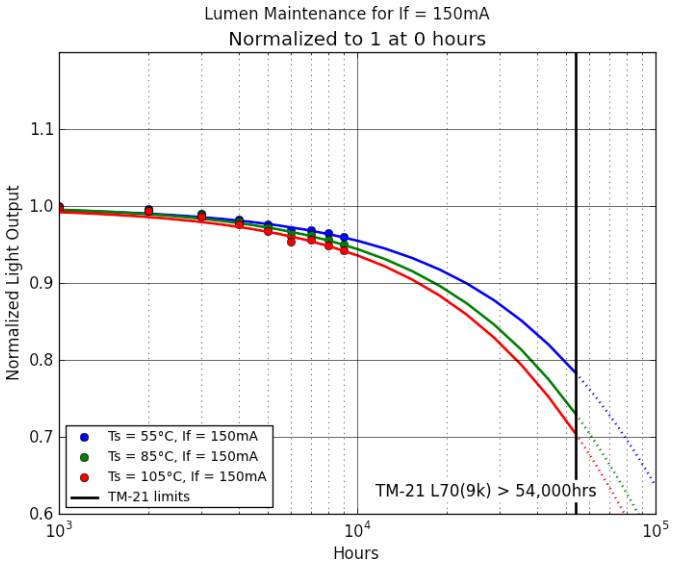
Flux(time) = B exp[-alpha*time], where normally B ≅ 1, and alpha > 0.

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.

Disclaimer

Normalized Flux Statistics for I_f = 150mA

		0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs	alpha	B	L70
	median =	1.0000	0.9983	0.9937	0.9859	0.9755	0.9673	0.9544	0.9559	0.9480	0.9410			
Ts=Tair=105°C	average =	1.0000	0.9985	0.9932	0.9859	0.9758	0.9669	0.9538	0.9565	0.9492	0.9424	6.4729e-06	0.9985	54,872
	st dev =	0.0000	0.0019	0.0038	0.0029	0.0036	0.0038	0.0053	0.0054	0.0057	0.0056	TM-21 L70(9k) > 54,000hrs		
	min =	1.0000	0.9948	0.9866	0.9811	0.9704	0.9608	0.9465	0.9484	0.9394	0.9342			
	max =	1.0000	1.0029	0.9995	0.9921	0.9824	0.9739	0.9650	0.9671	0.9599	0.9545			
	median =	1.0000	0.9990	0.9940	0.9875	0.9799	0.9711	0.9612	0.9626	0.9563	0.9503			
Ts=Tair=85°C	average =	1.0000	0.9985	0.9942	0.9882	0.9800	0.9724	0.9616	0.9624	0.9564	0.9499	5.8536e-06	1.0011	61,120
	st dev =	0.0000	0.0026	0.0045	0.0040	0.0027	0.0034	0.0047	0.0049	0.0057	0.0057	TM-21 L70(9k) > 54,000hrs		
	min =	1.0000	0.9948	0.9862	0.9825	0.9756	0.9677	0.9545	0.9551	0.9467	0.9403			
	max =	1.0000	1.0039	1.0002	0.9959	0.9859	0.9791	0.9696	0.9718	0.9697	0.9624			
	median =	1.0000	0.9998	0.9960	0.9903	0.9825	0.9767	0.9685	0.9682	0.9635	0.9586			
Ts=Tair=55°C	average =	1.0000	0.9996	0.9957	0.9903	0.9831	0.9763	0.9688	0.9692	0.9644	0.9594	4.5102e-06	0.9990	78,870
	st dev =	0.0000	0.0014	0.0048	0.0048	0.0028	0.0031	0.0040	0.0040	0.0044	0.0044	TM-21 L70(9k) > 54,000hrs		
	min =	1.0000	0.9963	0.9831	0.9819	0.9779	0.9710	0.9614	0.9617	0.9556	0.9509			
	max =	1.0000	1.0038	1.0043	0.9987	0.9880	0.9825	0.9773	0.9760	0.9705	0.9658			



Delta u'v' for I_f = 150mA

		0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
	median =	0.0000	0.0009	0.0010	0.0014	0.0017	0.0021	0.0025	0.0024	0.0028	0.0031
Ts=Tair=105°C	average =	0.0000	0.0009	0.0010	0.0014	0.0017	0.0022	0.0026	0.0024	0.0028	0.0032
	st dev =	0.0000	0.0001	0.0002	0.0002	0.0001	0.0002	0.0003	0.0003	0.0003	0.0003
	min =	0.0000	0.0006	0.0008	0.0011	0.0014	0.0019	0.0021	0.0017	0.0022	0.0028
	max =	0.0000	0.0011	0.0014	0.0017	0.0019	0.0025	0.0035	0.0031	0.0036	0.0039
	median =	0.0000	0.0010	0.0011	0.0014	0.0017	0.0019	0.0022	0.0021	0.0025	0.0030
Ts=Tair=85°C	average =	0.0000	0.0010	0.0011	0.0014	0.0016	0.0019	0.0022	0.0021	0.0025	0.0029
	st dev =	0.0000	0.0002	0.0003	0.0002	0.0002	0.0001	0.0003	0.0003	0.0003	0.0004
	min =	0.0000	0.0005	0.0005	0.0009	0.0013	0.0016	0.0015	0.0013	0.0015	0.0018
	max =	0.0000	0.0013	0.0016	0.0017	0.0019	0.0022	0.0026	0.0026	0.0030	0.0035
	median =	0.0000	0.0009	0.0011	0.0013	0.0015	0.0018	0.0020	0.0021	0.0024	0.0028
Ts=Tair=55°C	average =	0.0000	0.0009	0.0011	0.0013	0.0015	0.0018	0.0020	0.0021	0.0024	0.0027
	st dev =	0.0000	0.0001	0.0002	0.0002	0.0001	0.0002	0.0003	0.0003	0.0003	0.0003
	min =	0.0000	0.0008	0.0007	0.0010	0.0012	0.0014	0.0015	0.0016	0.0018	0.0022
	max =	0.0000	0.0011	0.0014	0.0016	0.0017	0.0020	0.0026	0.0025	0.0030	0.0033

Luminous Flux [lm] data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	95.030	95.390	94.990	94.730	93.700	92.870	92.040	92.330	92.080	91.710
2	2673K	95.860	95.910	95.010	94.730	94.150	93.160	92.990	92.800	92.360	91.860
3	2677K	95.170	95.210	94.020	93.810	93.420	92.750	92.240	92.130	91.710	91.330
4	2713K	95.420	95.350	95.290	94.670	93.880	93.080	92.640	92.900	92.410	91.980
5	2714K	96.360	96.390	96.770	96.230	95.200	94.670	94.170	94.050	93.450	93.060
6	2702K	96.210	96.240	96.350	95.940	94.890	93.970	93.180	92.980	92.450	91.680
7	2697K	96.060	96.100	95.380	94.970	94.380	93.800	93.100	93.470	93.010	92.530
8	2693K	96.650	96.460	96.260	95.730	94.640	93.970	93.380	93.580	93.120	92.640
9	2697K	95.460	95.330	94.930	94.350	93.650	92.830	92.120	92.250	91.680	91.200
10	2710K	96.070	96.050	96.360	95.840	94.830	94.100	93.380	93.530	93.100	92.590
11	2687K	94.900	94.800	94.210	93.240	93.010	92.390	91.790	91.480	90.970	90.580
12	2685K	95.900	95.750	95.100	94.360	93.920	93.400	92.670	92.860	92.280	91.810
13	2704K	95.640	95.510	94.020	93.910	93.530	92.890	92.020	91.980	91.390	90.940
14	2699K	97.560	97.520	97.150	96.610	95.820	95.670	94.700	94.750	94.570	94.060
15	2679K	94.240	94.250	93.740	93.280	92.450	92.180	90.800	90.800	90.320	89.890
16	2714K	96.690	96.560	96.390	95.960	95.210	94.730	94.130	94.100	93.620	93.220
17	2692K	96.340	96.330	95.620	94.760	94.570	94.140	93.630	93.720	93.250	92.550
18	2710K	95.600	95.550	95.690	95.310	94.230	93.550	92.570	92.480	92.110	91.640
19	2670K	95.330	95.330	94.670	94.180	93.910	92.570	91.650	91.880	91.330	90.930
20	2697K	97.010	97.040	96.230	96.120	95.620	95.010	94.730	94.610	94.150	93.630
21	2692K	95.270	95.390	94.970	94.520	94.000	93.220	92.430	92.610	92.080	91.480
22	2723K	97.360	97.190	97.310	96.670	95.790	95.330	94.090	94.180	93.730	93.260
23	2690K	94.320	94.260	94.230	93.240	92.490	91.980	91.350	91.230	90.740	90.260
24	2678K	97.310	96.950	96.940	96.020	95.330	94.850	93.880	93.930	93.550	93.100
25	2715K	95.660	95.670	95.380	94.920	94.250	93.430	93.020	93.070	92.740	92.280

Normalized Luminous Flux data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	1.0000	1.0038	0.9996	0.9968	0.9860	0.9773	0.9685	0.9716	0.9690	0.9651
2	2673K	1.0000	1.0005	0.9911	0.9882	0.9822	0.9718	0.9701	0.9681	0.9635	0.9583
3	2677K	1.0000	1.0004	0.9879	0.9857	0.9816	0.9746	0.9692	0.9681	0.9636	0.9597
4	2713K	1.0000	0.9993	0.9986	0.9921	0.9839	0.9755	0.9709	0.9736	0.9685	0.9639
5	2714K	1.0000	1.0003	1.0043	0.9987	0.9880	0.9825	0.9773	0.9760	0.9698	0.9658
6	2702K	1.0000	1.0003	1.0015	0.9972	0.9863	0.9767	0.9685	0.9664	0.9609	0.9529
7	2697K	1.0000	1.0004	0.9929	0.9887	0.9825	0.9765	0.9692	0.9730	0.9682	0.9633
8	2693K	1.0000	0.9980	0.9960	0.9905	0.9792	0.9723	0.9662	0.9682	0.9635	0.9585
9	2697K	1.0000	0.9986	0.9944	0.9884	0.9810	0.9724	0.9650	0.9664	0.9604	0.9554
10	2710K	1.0000	0.9998	1.0030	0.9976	0.9871	0.9795	0.9720	0.9736	0.9691	0.9638
11	2687K	1.0000	0.9989	0.9927	0.9825	0.9801	0.9736	0.9672	0.9640	0.9586	0.9545
12	2685K	1.0000	0.9984	0.9917	0.9839	0.9794	0.9739	0.9663	0.9683	0.9623	0.9574
13	2704K	1.0000	0.9986	0.9831	0.9819	0.9779	0.9712	0.9621	0.9617	0.9556	0.9509
14	2699K	1.0000	0.9996	0.9958	0.9903	0.9822	0.9806	0.9707	0.9712	0.9694	0.9641
15	2679K	1.0000	1.0001	0.9947	0.9898	0.9810	0.9781	0.9635	0.9635	0.9584	0.9538
16	2714K	1.0000	0.9987	0.9969	0.9925	0.9847	0.9797	0.9735	0.9732	0.9682	0.9641
17	2692K	1.0000	0.9999	0.9925	0.9836	0.9816	0.9772	0.9719	0.9728	0.9679	0.9607
18	2710K	1.0000	0.9995	1.0009	0.9970	0.9857	0.9786	0.9683	0.9674	0.9635	0.9586
19	2670K	1.0000	1.0000	0.9931	0.9879	0.9851	0.9710	0.9614	0.9638	0.9580	0.9538
20	2697K	1.0000	1.0003	0.9920	0.9908	0.9857	0.9794	0.9765	0.9753	0.9705	0.9652
21	2692K	1.0000	1.0013	0.9969	0.9921	0.9867	0.9785	0.9702	0.9721	0.9665	0.9602
22	2723K	1.0000	0.9983	0.9995	0.9929	0.9839	0.9791	0.9664	0.9673	0.9627	0.9579
23	2690K	1.0000	0.9994	0.9990	0.9885	0.9806	0.9752	0.9685	0.9672	0.9620	0.9570
24	2678K	1.0000	0.9963	0.9962	0.9867	0.9797	0.9747	0.9648	0.9653	0.9614	0.9567
25	2715K	1.0000	1.0001	0.9971	0.9923	0.9853	0.9767	0.9724	0.9729	0.9695	0.9647

TM-21 Extrapolation of Luminous Flux data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	alpha	B	L70
1	2696K	3.7090e-06	0.9966	95,250
2	2673K	4.3153e-06	0.9965	81,845
3	2677K	4.2329e-06	0.9965	83,428
4	2713K	3.4600e-06	0.9948	101,579
5	2714K	4.3961e-06	1.0048	82,229
6	2702K	6.3755e-06	1.0095	57,436
7	2697K	3.4397e-06	0.9941	101,967
8	2693K	3.7690e-06	0.9920	92,492
9	2697K	4.8153e-06	0.9975	73,547
10	2710K	4.2849e-06	1.0017	83,626
11	2687K	5.2062e-06	0.9995	68,420
12	2685K	4.2215e-06	0.9948	83,258
13	2704K	5.4196e-06	0.9977	65,395
14	2699K	3.6245e-06	0.9962	97,356
15	2679K	5.7588e-06	1.0032	62,491
16	2714K	4.0369e-06	0.9998	88,301
17	2692K	3.8712e-06	0.9968	91,295
18	2710K	5.3390e-06	1.0045	67,656
19	2670K	5.6910e-06	1.0019	63,002
20	2697K	3.8201e-06	0.9999	93,347
21	2692K	4.8811e-06	1.0037	73,822
22	2723K	5.2474e-06	1.0032	68,573
23	2690K	4.6875e-06	0.9984	75,738
24	2678K	4.5492e-06	0.9961	77,539
25	2715K	3.6376e-06	0.9968	97,182
ave	2696K	4.5102e-06	0.9990	78,870

CIE 1976 u' data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	0.2614	0.2606	0.2603	0.2600	0.2598	0.2594	0.2591	0.2597	0.2596	0.2594
2	2673K	0.2624	0.2615	0.2612	0.2610	0.2608	0.2605	0.2602	0.2606	0.2605	0.2604
3	2677K	0.2623	0.2614	0.2609	0.2609	0.2608	0.2605	0.2600	0.2602	0.2601	0.2598
4	2713K	0.2606	0.2597	0.2593	0.2591	0.2589	0.2589	0.2587	0.2587	0.2586	0.2583
5	2714K	0.2608	0.2597	0.2594	0.2592	0.2591	0.2588	0.2588	0.2587	0.2586	0.2584
6	2702K	0.2613	0.2604	0.2603	0.2601	0.2599	0.2596	0.2597	0.2597	0.2596	0.2593
7	2697K	0.2614	0.2603	0.2603	0.2601	0.2599	0.2594	0.2596	0.2599	0.2595	0.2591
8	2693K	0.2615	0.2605	0.2603	0.2601	0.2599	0.2596	0.2595	0.2600	0.2597	0.2593
9	2697K	0.2614	0.2606	0.2603	0.2601	0.2600	0.2596	0.2594	0.2598	0.2597	0.2594
10	2710K	0.2609	0.2600	0.2598	0.2596	0.2593	0.2592	0.2589	0.2593	0.2593	0.2589
11	2687K	0.2617	0.2609	0.2607	0.2605	0.2602	0.2601	0.2600	0.2606	0.2603	0.2598
12	2685K	0.2618	0.2610	0.2610	0.2607	0.2606	0.2602	0.2602	0.2608	0.2605	0.2601
13	2704K	0.2611	0.2601	0.2598	0.2596	0.2594	0.2592	0.2587	0.2596	0.2590	0.2588
14	2699K	0.2614	0.2603	0.2601	0.2598	0.2597	0.2595	0.2593	0.2602	0.2599	0.2597
15	2679K	0.2622	0.2614	0.2611	0.2609	0.2608	0.2603	0.2604	0.2611	0.2610	0.2606
16	2714K	0.2608	0.2598	0.2597	0.2594	0.2593	0.2590	0.2591	0.2597	0.2595	0.2592
17	2692K	0.2617	0.2606	0.2605	0.2603	0.2600	0.2599	0.2599	0.2605	0.2602	0.2599
18	2710K	0.2609	0.2600	0.2599	0.2599	0.2595	0.2594	0.2595	0.2599	0.2598	0.2594
19	2670K	0.2625	0.2615	0.2614	0.2612	0.2610	0.2608	0.2606	0.2609	0.2609	0.2603
20	2697K	0.2614	0.2605	0.2607	0.2603	0.2600	0.2600	0.2596	0.2602	0.2601	0.2597
21	2692K	0.2616	0.2608	0.2609	0.2607	0.2603	0.2602	0.2599	0.2602	0.2603	0.2599
22	2723K	0.2601	0.2593	0.2592	0.2590	0.2586	0.2582	0.2581	0.2585	0.2583	0.2579
23	2690K	0.2617	0.2609	0.2606	0.2605	0.2601	0.2597	0.2597	0.2601	0.2599	0.2596
24	2678K	0.2623	0.2613	0.2615	0.2612	0.2608	0.2604	0.2605	0.2607	0.2605	0.2601
25	2715K	0.2607	0.2598	0.2596	0.2595	0.2591	0.2590	0.2589	0.2592	0.2591	0.2589

CIE 1976 v' data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	0.5338	0.5339	0.5338	0.5339	0.5336	0.5336	0.5331	0.5322	0.5320	0.5318
2	2673K	0.5348	0.5348	0.5347	0.5347	0.5346	0.5347	0.5341	0.5332	0.5330	0.5328
3	2677K	0.5342	0.5343	0.5340	0.5342	0.5342	0.5340	0.5334	0.5329	0.5326	0.5323
4	2713K	0.5338	0.5340	0.5337	0.5338	0.5339	0.5334	0.5331	0.5325	0.5322	0.5321
5	2714K	0.5324	0.5324	0.5323	0.5326	0.5324	0.5322	0.5317	0.5312	0.5310	0.5307
6	2702K	0.5329	0.5330	0.5329	0.5332	0.5331	0.5329	0.5324	0.5318	0.5316	0.5314
7	2697K	0.5336	0.5336	0.5336	0.5340	0.5337	0.5337	0.5331	0.5322	0.5319	0.5319
8	2693K	0.5342	0.5343	0.5341	0.5345	0.5343	0.5340	0.5336	0.5326	0.5325	0.5325
9	2697K	0.5336	0.5336	0.5333	0.5337	0.5336	0.5334	0.5327	0.5319	0.5316	0.5316
10	2710K	0.5328	0.5328	0.5326	0.5330	0.5328	0.5327	0.5322	0.5313	0.5312	0.5311
11	2687K	0.5347	0.5349	0.5348	0.5351	0.5348	0.5347	0.5341	0.5332	0.5331	0.5330
12	2685K	0.5346	0.5346	0.5345	0.5349	0.5344	0.5343	0.5338	0.5330	0.5328	0.5327
13	2704K	0.5335	0.5336	0.5332	0.5335	0.5331	0.5334	0.5324	0.5316	0.5314	0.5312
14	2699K	0.5332	0.5332	0.5329	0.5334	0.5330	0.5334	0.5324	0.5316	0.5316	0.5315
15	2679K	0.5341	0.5342	0.5340	0.5342	0.5339	0.5341	0.5333	0.5325	0.5323	0.5322
16	2714K	0.5324	0.5324	0.5322	0.5325	0.5321	0.5327	0.5317	0.5309	0.5307	0.5306
17	2692K	0.5335	0.5335	0.5332	0.5337	0.5333	0.5336	0.5328	0.5319	0.5318	0.5315
18	2710K	0.5328	0.5329	0.5327	0.5331	0.5327	0.5334	0.5324	0.5316	0.5314	0.5312
19	2670K	0.5349	0.5351	0.5348	0.5351	0.5347	0.5351	0.5340	0.5332	0.5329	0.5328
20	2697K	0.5337	0.5339	0.5339	0.5343	0.5339	0.5340	0.5333	0.5326	0.5323	0.5322
21	2692K	0.5338	0.5340	0.5339	0.5343	0.5338	0.5337	0.5333	0.5324	0.5322	0.5322
22	2723K	0.5338	0.5339	0.5337	0.5341	0.5336	0.5334	0.5329	0.5320	0.5319	0.5317
23	2690K	0.5340	0.5341	0.5339	0.5342	0.5337	0.5336	0.5331	0.5322	0.5320	0.5319
24	2678K	0.5339	0.5340	0.5346	0.5348	0.5340	0.5341	0.5335	0.5327	0.5323	0.5321
25	2715K	0.5326	0.5327	0.5326	0.5328	0.5325	0.5326	0.5321	0.5312	0.5310	0.5307

Delta u'v' data for tested units
$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	0.0000	0.0008	0.0011	0.0014	0.0016	0.0020	0.0024	0.0023	0.0025	0.0028
2	2673K	0.0000	0.0009	0.0012	0.0014	0.0016	0.0019	0.0023	0.0024	0.0026	0.0028
3	2677K	0.0000	0.0009	0.0014	0.0014	0.0015	0.0018	0.0024	0.0025	0.0027	0.0031
4	2713K	0.0000	0.0009	0.0013	0.0015	0.0017	0.0017	0.0020	0.0023	0.0026	0.0029
5	2714K	0.0000	0.0011	0.0014	0.0016	0.0017	0.0020	0.0021	0.0024	0.0026	0.0029
6	2702K	0.0000	0.0009	0.0010	0.0012	0.0014	0.0017	0.0017	0.0019	0.0021	0.0025
7	2697K	0.0000	0.0011	0.0011	0.0014	0.0015	0.0020	0.0019	0.0021	0.0025	0.0029
8	2693K	0.0000	0.0010	0.0012	0.0014	0.0016	0.0019	0.0021	0.0022	0.0025	0.0028
9	2697K	0.0000	0.0008	0.0011	0.0013	0.0014	0.0018	0.0022	0.0023	0.0026	0.0028
10	2710K	0.0000	0.0009	0.0011	0.0013	0.0016	0.0017	0.0021	0.0022	0.0023	0.0026
11	2687K	0.0000	0.0008	0.0010	0.0013	0.0015	0.0016	0.0018	0.0019	0.0021	0.0025
12	2685K	0.0000	0.0008	0.0008	0.0011	0.0012	0.0016	0.0018	0.0019	0.0022	0.0025
13	2704K	0.0000	0.0010	0.0013	0.0015	0.0017	0.0019	0.0026	0.0024	0.0030	0.0033
14	2699K	0.0000	0.0011	0.0013	0.0016	0.0017	0.0019	0.0022	0.0020	0.0022	0.0024
15	2679K	0.0000	0.0008	0.0011	0.0013	0.0014	0.0019	0.0020	0.0019	0.0022	0.0025
16	2714K	0.0000	0.0010	0.0011	0.0014	0.0015	0.0018	0.0018	0.0019	0.0021	0.0024
17	2692K	0.0000	0.0011	0.0012	0.0014	0.0017	0.0018	0.0019	0.0020	0.0023	0.0027
18	2710K	0.0000	0.0009	0.0010	0.0010	0.0014	0.0016	0.0015	0.0016	0.0018	0.0022
19	2670K	0.0000	0.0010	0.0011	0.0013	0.0015	0.0017	0.0021	0.0023	0.0026	0.0030
20	2697K	0.0000	0.0009	0.0007	0.0013	0.0014	0.0014	0.0018	0.0016	0.0019	0.0023
21	2692K	0.0000	0.0008	0.0007	0.0010	0.0013	0.0014	0.0018	0.0020	0.0021	0.0023
22	2723K	0.0000	0.0008	0.0009	0.0011	0.0015	0.0019	0.0022	0.0024	0.0026	0.0030
23	2690K	0.0000	0.0008	0.0011	0.0012	0.0016	0.0020	0.0022	0.0024	0.0027	0.0030
24	2678K	0.0000	0.0010	0.0011	0.0014	0.0015	0.0019	0.0018	0.0020	0.0024	0.0028
25	2715K	0.0000	0.0009	0.0011	0.0012	0.0016	0.0017	0.0019	0.0021	0.0023	0.0026

Forward Voltage [V] data for tested units

$T_s = T_{air} = 55°C$, $I_f = 150mA$; $T_s \geq 53°C$ and $T_{air} \geq 50°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2696K	6.297	6.317	6.378	6.347	6.371	6.355	6.335	6.333	6.346	6.353
2	2673K	6.294	6.319	6.391	6.349	6.375	6.366	6.340	6.342	6.362	6.358
3	2677K	6.304	6.327	6.405	6.361	6.388	6.386	6.357	6.361	6.389	6.383
4	2713K	6.318	6.337	6.405	6.366	6.402	6.373	6.356	6.349	6.355	6.364
5	2714K	6.306	6.325	6.384	6.353	6.383	6.361	6.333	6.338	6.346	6.343
6	2702K	6.296	6.316	6.382	6.345	6.376	6.354	6.336	6.329	6.344	6.345
7	2697K	6.289	6.314	6.385	6.346	6.378	6.369	6.347	6.339	6.373	6.369
8	2693K	6.314	6.330	6.398	6.361	6.394	6.383	6.359	6.357	6.377	6.377
9	2697K	6.305	6.329	6.396	6.356	6.391	6.382	6.350	6.354	6.391	6.380
10	2710K	6.341	6.360	6.439	6.395	6.425	6.405	6.384	6.386	6.403	6.403
11	2687K	6.328	6.345	6.408	6.368	6.402	6.380	6.359	6.353	6.357	6.366
12	2685K	6.315	6.333	6.398	6.360	6.388	6.372	6.351	6.341	6.357	6.360
13	2704K	6.318	6.334	6.404	6.366	6.394	6.374	6.353	6.348	6.354	6.356
14	2699K	6.328	6.348	6.422	6.382	6.407	6.394	6.375	6.374	6.391	6.390
15	2679K	6.240	6.253	6.321	6.280	6.313	6.286	6.263	6.261	6.263	6.270
16	2714K	6.303	6.326	6.391	6.352	6.391	6.358	6.340	6.336	6.343	6.349
17	2692K	6.313	6.339	6.412	6.373	6.403	6.391	6.363	6.365	6.377	6.376
18	2710K	6.300	6.319	6.386	6.347	6.379	6.358	6.338	6.330	6.342	6.346
19	2670K	6.303	6.328	6.396	6.356	6.388	6.362	6.346	6.344	6.347	6.353
20	2697K	6.316	6.337	6.402	6.366	6.399	6.375	6.351	6.357	6.352	6.359
21	2692K	6.310	6.334	6.392	6.356	6.393	6.371	6.350	6.348	6.344	6.353
22	2723K	6.315	6.334	6.397	6.361	6.388	6.372	6.353	6.351	6.353	6.356
23	2690K	6.233	6.249	6.306	6.272	6.304	6.279	6.260	6.260	6.254	6.259
24	2678K	6.317	6.334	6.402	6.359	6.389	6.371	6.354	6.354	6.360	6.416
25	2715K	6.312	6.334	6.402	6.362	6.392	6.373	6.354	6.352	6.353	6.353

Luminous Flux [lm] data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	96.160	95.790	95.360	94.880	94.140	93.320	92.700	92.640	92.160	91.490
2	2721K	96.990	96.960	97.010	96.490	95.260	94.650	93.530	93.630	93.190	92.550
3	2705K	97.590	97.490	97.120	96.380	95.550	95.240	94.470	94.350	93.940	93.410
4	2711K	98.170	97.970	97.940	97.140	96.290	95.580	94.070	93.910	93.300	92.600
5	2681K	97.250	96.860	96.830	96.430	95.410	95.140	94.100	94.510	94.300	93.590
6	2705K	95.910	95.830	95.900	95.520	94.560	93.910	92.870	93.060	92.570	91.800
7	2679K	95.160	95.090	94.350	93.970	93.270	92.990	91.950	91.920	91.240	90.900
8	2697K	96.990	96.490	95.650	95.290	94.620	93.860	92.610	92.860	92.100	91.560
9	2693K	96.320	96.400	95.840	95.410	94.710	93.540	92.110	92.390	91.690	91.070
10	2688K	95.670	95.660	95.680	95.150	94.240	93.430	92.320	92.620	92.050	91.420
11	2711K	94.450	94.590	93.690	92.910	92.440	91.530	90.750	90.700	89.980	89.190
12	2696K	96.880	97.030	96.300	95.770	95.100	94.560	93.120	93.520	92.880	92.090
13	2676K	93.930	93.640	92.710	92.410	91.700	91.000	90.080	90.320	89.710	89.090
14	2724K	94.630	94.300	94.030	93.540	92.590	91.840	90.930	91.050	90.410	89.810
15	2706K	96.280	96.550	96.290	95.410	94.420	93.770	92.050	92.310	91.730	91.140
16	2692K	97.090	97.050	97.040	96.460	95.310	94.530	93.420	93.590	93.060	92.400
17	2703K	95.810	95.530	94.800	94.220	93.550	92.940	91.450	91.530	90.950	90.440
18	2712K	95.420	95.790	95.340	94.770	93.590	92.580	92.030	92.220	91.630	91.070
19	2696K	96.480	96.030	95.330	94.900	94.340	93.490	92.160	92.280	91.560	90.950
20	2696K	96.280	96.000	95.210	95.020	94.260	93.400	92.530	92.820	92.230	91.690
21	2710K	96.400	96.470	95.770	95.190	94.810	93.750	93.470	93.380	92.820	92.140
22	2733K	95.300	94.830	94.330	93.760	93.010	92.350	91.050	91.020	90.220	89.610
23	2701K	95.250	94.800	94.840	93.760	93.120	92.310	91.920	91.430	90.850	90.300
24	2689K	97.010	97.010	96.860	95.780	95.060	94.370	93.420	93.380	92.770	92.190
25	2685K	96.090	95.700	95.270	94.710	94.000	93.200	92.000	91.810	91.360	90.560

Normalized Luminous Flux data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	1.0000	0.9962	0.9917	0.9867	0.9790	0.9705	0.9640	0.9634	0.9584	0.9514
2	2721K	1.0000	0.9997	1.0002	0.9948	0.9822	0.9759	0.9643	0.9654	0.9608	0.9542
3	2705K	1.0000	0.9990	0.9952	0.9876	0.9791	0.9759	0.9680	0.9668	0.9626	0.9572
4	2711K	1.0000	0.9980	0.9977	0.9895	0.9808	0.9736	0.9582	0.9566	0.9504	0.9433
5	2681K	1.0000	0.9960	0.9957	0.9916	0.9811	0.9783	0.9676	0.9718	0.9697	0.9624
6	2705K	1.0000	0.9992	0.9999	0.9959	0.9859	0.9791	0.9683	0.9703	0.9652	0.9571
7	2679K	1.0000	0.9993	0.9915	0.9875	0.9801	0.9772	0.9663	0.9660	0.9588	0.9552
8	2697K	1.0000	0.9948	0.9862	0.9825	0.9756	0.9677	0.9548	0.9574	0.9496	0.9440
9	2693K	1.0000	1.0008	0.9950	0.9906	0.9833	0.9711	0.9563	0.9592	0.9519	0.9455
10	2688K	1.0000	0.9999	1.0001	0.9946	0.9851	0.9766	0.9650	0.9681	0.9622	0.9556
11	2711K	1.0000	1.0015	0.9920	0.9837	0.9787	0.9691	0.9608	0.9603	0.9527	0.9443
12	2696K	1.0000	1.0015	0.9940	0.9885	0.9816	0.9761	0.9612	0.9653	0.9587	0.9506
13	2676K	1.0000	0.9969	0.9870	0.9838	0.9763	0.9688	0.9590	0.9616	0.9551	0.9485
14	2724K	1.0000	0.9965	0.9937	0.9885	0.9784	0.9705	0.9609	0.9622	0.9554	0.9491
15	2706K	1.0000	1.0028	1.0001	0.9910	0.9807	0.9739	0.9561	0.9588	0.9527	0.9466
16	2692K	1.0000	0.9996	0.9995	0.9935	0.9817	0.9736	0.9622	0.9640	0.9585	0.9517
17	2703K	1.0000	0.9971	0.9895	0.9834	0.9764	0.9700	0.9545	0.9553	0.9493	0.9440
18	2712K	1.0000	1.0039	0.9992	0.9932	0.9808	0.9702	0.9645	0.9665	0.9603	0.9544
19	2696K	1.0000	0.9953	0.9881	0.9836	0.9778	0.9690	0.9552	0.9565	0.9490	0.9427
20	2696K	1.0000	0.9971	0.9889	0.9869	0.9790	0.9701	0.9611	0.9641	0.9579	0.9523
21	2710K	1.0000	1.0007	0.9935	0.9874	0.9835	0.9725	0.9696	0.9687	0.9629	0.9558
22	2733K	1.0000	0.9951	0.9898	0.9838	0.9760	0.9690	0.9554	0.9551	0.9467	0.9403
23	2701K	1.0000	0.9953	0.9957	0.9844	0.9776	0.9691	0.9650	0.9599	0.9538	0.9480
24	2689K	1.0000	1.0000	0.9985	0.9873	0.9799	0.9728	0.9630	0.9626	0.9563	0.9503
25	2685K	1.0000	0.9959	0.9915	0.9856	0.9782	0.9699	0.9574	0.9555	0.9508	0.9424

TM-21 Extrapolation of Luminous Flux data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	alpha	B	L70
1	2690K	5.1697e-06	0.9974	68,484
2	2721K	5.4249e-06	1.0018	66,077
3	2705K	4.4502e-06	0.9967	79,395
4	2711K	7.7003e-06	1.0097	47,573
5	2681K	3.3873e-06	0.9934	103,348
6	2705K	5.4052e-06	1.0057	67,033
7	2679K	5.3147e-06	1.0012	67,341
8	2697K	6.2418e-06	0.9978	56,791
9	2693K	7.2242e-06	1.0074	50,386
10	2688K	5.5228e-06	1.0041	65,324
11	2711K	6.5927e-06	1.0030	54,555
12	2696K	6.0087e-06	1.0040	60,020
13	2676K	5.2728e-06	0.9950	66,697
14	2724K	5.6624e-06	0.9988	62,777
15	2706K	6.8556e-06	1.0052	52,784
16	2692K	5.7211e-06	1.0018	62,657
17	2703K	6.6602e-06	1.0006	53,640
18	2712K	4.7245e-06	0.9962	74,691
19	2696K	6.9787e-06	1.0028	51,505
20	2696K	4.9402e-06	0.9955	71,286
21	2710K	4.9629e-06	1.0006	71,980
22	2733K	7.3295e-06	1.0037	49,167
23	2701K	5.9123e-06	0.9999	60,312
24	2689K	5.8575e-06	1.0015	61,150
25	2685K	7.0942e-06	1.0042	50,872
ave	2700K	5.8536e-06	1.0011	61,120

CIE 1976 u' data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	0.2618	0.2605	0.2602	0.2602	0.2601	0.2598	0.2594	0.2597	0.2594	0.2590
2	2721K	0.2604	0.2592	0.2592	0.2591	0.2589	0.2586	0.2585	0.2591	0.2589	0.2584
3	2705K	0.2610	0.2603	0.2601	0.2600	0.2596	0.2596	0.2595	0.2603	0.2602	0.2600
4	2711K	0.2606	0.2601	0.2603	0.2598	0.2593	0.2586	0.2581	0.2591	0.2590	0.2588
5	2681K	0.2621	0.2614	0.2612	0.2611	0.2606	0.2601	0.2596	0.2607	0.2605	0.2602
6	2705K	0.2609	0.2604	0.2603	0.2600	0.2596	0.2592	0.2587	0.2597	0.2596	0.2592
7	2679K	0.2621	0.2613	0.2613	0.2610	0.2607	0.2603	0.2601	0.2609	0.2609	0.2608
8	2697K	0.2614	0.2601	0.2599	0.2597	0.2596	0.2595	0.2588	0.2596	0.2594	0.2591
9	2693K	0.2615	0.2606	0.2606	0.2603	0.2598	0.2596	0.2592	0.2601	0.2598	0.2596
10	2688K	0.2617	0.2606	0.2606	0.2604	0.2600	0.2598	0.2596	0.2604	0.2601	0.2600
11	2711K	0.2608	0.2598	0.2597	0.2593	0.2591	0.2586	0.2583	0.2592	0.2589	0.2585
12	2696K	0.2614	0.2601	0.2600	0.2598	0.2595	0.2593	0.2588	0.2595	0.2592	0.2591
13	2676K	0.2622	0.2614	0.2612	0.2608	0.2606	0.2605	0.2600	0.2609	0.2605	0.2602
14	2724K	0.2601	0.2588	0.2585	0.2585	0.2584	0.2580	0.2575	0.2585	0.2580	0.2578
15	2706K	0.2609	0.2599	0.2597	0.2596	0.2594	0.2590	0.2588	0.2598	0.2592	0.2590
16	2692K	0.2616	0.2607	0.2604	0.2602	0.2600	0.2596	0.2595	0.2604	0.2600	0.2597
17	2703K	0.2610	0.2600	0.2595	0.2594	0.2593	0.2590	0.2587	0.2596	0.2592	0.2589
18	2712K	0.2608	0.2599	0.2597	0.2594	0.2591	0.2590	0.2588	0.2598	0.2592	0.2589
19	2696K	0.2615	0.2605	0.2603	0.2601	0.2597	0.2595	0.2594	0.2604	0.2598	0.2595
20	2696K	0.2615	0.2606	0.2605	0.2601	0.2598	0.2597	0.2596	0.2605	0.2600	0.2598
21	2710K	0.2607	0.2599	0.2597	0.2593	0.2592	0.2589	0.2585	0.2595	0.2590	0.2588
22	2733K	0.2596	0.2585	0.2583	0.2581	0.2579	0.2580	0.2574	0.2577	0.2573	0.2569
23	2701K	0.2611	0.2599	0.2601	0.2598	0.2594	0.2593	0.2593	0.2596	0.2593	0.2589
24	2689K	0.2617	0.2607	0.2608	0.2605	0.2601	0.2600	0.2598	0.2605	0.2601	0.2596
25	2685K	0.2619	0.2608	0.2609	0.2605	0.2603	0.2601	0.2600	0.2606	0.2603	0.2598

CIE 1976 v' data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	0.5334	0.5334	0.5336	0.5338	0.5335	0.5339	0.5333	0.5325	0.5322	0.5319
2	2721K	0.5327	0.5328	0.5330	0.5331	0.5328	0.5333	0.5327	0.5315	0.5314	0.5314
3	2705K	0.5337	0.5339	0.5341	0.5342	0.5338	0.5345	0.5339	0.5326	0.5324	0.5322
4	2711K	0.5342	0.5344	0.5346	0.5346	0.5342	0.5347	0.5340	0.5327	0.5324	0.5322
5	2681K	0.5343	0.5346	0.5345	0.5349	0.5344	0.5350	0.5343	0.5330	0.5328	0.5326
6	2705K	0.5342	0.5344	0.5343	0.5347	0.5343	0.5349	0.5341	0.5329	0.5326	0.5324
7	2679K	0.5346	0.5348	0.5348	0.5352	0.5347	0.5349	0.5347	0.5331	0.5327	0.5325
8	2697K	0.5336	0.5337	0.5336	0.5340	0.5337	0.5342	0.5335	0.5318	0.5314	0.5312
9	2693K	0.5343	0.5345	0.5344	0.5347	0.5344	0.5348	0.5342	0.5325	0.5323	0.5319
10	2688K	0.5345	0.5344	0.5346	0.5350	0.5346	0.5347	0.5345	0.5329	0.5326	0.5323
11	2711K	0.5332	0.5335	0.5334	0.5338	0.5334	0.5332	0.5332	0.5315	0.5312	0.5308
12	2696K	0.5338	0.5338	0.5338	0.5342	0.5338	0.5338	0.5337	0.5320	0.5318	0.5315
13	2676K	0.5349	0.5350	0.5347	0.5351	0.5346	0.5351	0.5348	0.5331	0.5330	0.5327
14	2724K	0.5336	0.5336	0.5334	0.5339	0.5336	0.5334	0.5334	0.5317	0.5317	0.5315
15	2706K	0.5339	0.5340	0.5339	0.5343	0.5339	0.5345	0.5339	0.5322	0.5320	0.5318
16	2692K	0.5339	0.5338	0.5339	0.5343	0.5339	0.5343	0.5338	0.5322	0.5321	0.5318
17	2703K	0.5343	0.5342	0.5339	0.5343	0.5339	0.5347	0.5340	0.5324	0.5323	0.5319
18	2712K	0.5329	0.5331	0.5331	0.5334	0.5330	0.5335	0.5330	0.5313	0.5312	0.5308
19	2696K	0.5334	0.5335	0.5334	0.5338	0.5333	0.5338	0.5333	0.5317	0.5314	0.5311
20	2696K	0.5334	0.5336	0.5336	0.5339	0.5335	0.5340	0.5336	0.5319	0.5318	0.5315
21	2710K	0.5340	0.5341	0.5341	0.5343	0.5339	0.5346	0.5339	0.5323	0.5322	0.5319
22	2733K	0.5337	0.5338	0.5337	0.5341	0.5335	0.5343	0.5336	0.5319	0.5318	0.5314
23	2701K	0.5343	0.5343	0.5343	0.5347	0.5340	0.5348	0.5343	0.5325	0.5325	0.5323
24	2689K	0.5342	0.5343	0.5343	0.5346	0.5339	0.5347	0.5342	0.5324	0.5322	0.5321
25	2685K	0.5342	0.5342	0.5343	0.5345	0.5338	0.5346	0.5340	0.5323	0.5321	0.5319

Delta u'v' data for tested units
$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	0.0000	0.0013	0.0016	0.0016	0.0017	0.0021	0.0024	0.0023	0.0027	0.0032
2	2721K	0.0000	0.0012	0.0012	0.0014	0.0015	0.0019	0.0019	0.0018	0.0020	0.0024
3	2705K	0.0000	0.0007	0.0010	0.0011	0.0014	0.0016	0.0015	0.0013	0.0015	0.0018
4	2711K	0.0000	0.0005	0.0005	0.0009	0.0013	0.0021	0.0025	0.0021	0.0024	0.0027
5	2681K	0.0000	0.0008	0.0009	0.0012	0.0015	0.0021	0.0025	0.0019	0.0022	0.0025
6	2705K	0.0000	0.0005	0.0006	0.0010	0.0013	0.0018	0.0022	0.0018	0.0021	0.0025
7	2679K	0.0000	0.0008	0.0008	0.0013	0.0014	0.0018	0.0020	0.0019	0.0022	0.0025
8	2697K	0.0000	0.0013	0.0015	0.0017	0.0018	0.0020	0.0026	0.0025	0.0030	0.0033
9	2693K	0.0000	0.0009	0.0009	0.0013	0.0017	0.0020	0.0023	0.0023	0.0026	0.0031
10	2688K	0.0000	0.0011	0.0011	0.0014	0.0017	0.0019	0.0021	0.0021	0.0025	0.0028
11	2711K	0.0000	0.0010	0.0011	0.0016	0.0017	0.0022	0.0025	0.0023	0.0028	0.0033
12	2696K	0.0000	0.0013	0.0014	0.0016	0.0019	0.0021	0.0026	0.0026	0.0030	0.0033
13	2676K	0.0000	0.0008	0.0010	0.0014	0.0016	0.0017	0.0022	0.0022	0.0025	0.0030
14	2724K	0.0000	0.0013	0.0016	0.0016	0.0017	0.0021	0.0026	0.0025	0.0028	0.0031
15	2706K	0.0000	0.0010	0.0012	0.0014	0.0015	0.0020	0.0021	0.0020	0.0025	0.0028
16	2692K	0.0000	0.0009	0.0012	0.0015	0.0016	0.0020	0.0021	0.0021	0.0024	0.0028
17	2703K	0.0000	0.0010	0.0016	0.0016	0.0017	0.0020	0.0023	0.0024	0.0027	0.0032
18	2712K	0.0000	0.0009	0.0011	0.0015	0.0017	0.0019	0.0020	0.0019	0.0023	0.0028
19	2696K	0.0000	0.0010	0.0012	0.0015	0.0018	0.0020	0.0021	0.0020	0.0026	0.0030
20	2696K	0.0000	0.0009	0.0010	0.0015	0.0017	0.0019	0.0019	0.0018	0.0022	0.0025
21	2710K	0.0000	0.0008	0.0010	0.0014	0.0015	0.0019	0.0022	0.0021	0.0025	0.0028
22	2733K	0.0000	0.0011	0.0013	0.0016	0.0017	0.0017	0.0022	0.0026	0.0030	0.0035
23	2701K	0.0000	0.0012	0.0010	0.0014	0.0017	0.0019	0.0018	0.0023	0.0025	0.0030
24	2689K	0.0000	0.0010	0.0009	0.0013	0.0016	0.0018	0.0019	0.0022	0.0026	0.0030
25	2685K	0.0000	0.0011	0.0010	0.0014	0.0016	0.0018	0.0019	0.0023	0.0026	0.0031

Forward Voltage [V] data for tested units

$T_s = T_{air} = 85°C$, $I_f = 150mA$; $T_s \geq 83°C$ and $T_{air} \geq 80°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2690K	6.312	6.342	6.411	6.379	6.398	6.395	6.374	6.370	6.390	6.386
2	2721K	6.309	6.341	6.410	6.370	6.395	6.386	6.364	6.360	6.384	6.379
3	2705K	6.323	6.351	6.427	6.392	6.417	6.411	6.390	6.388	6.402	6.400
4	2711K	6.321	6.347	6.419	6.381	6.408	6.398	6.382	6.379	6.401	6.398
5	2681K	6.308	6.336	6.410	6.375	6.399	6.392	6.374	6.366	6.387	6.383
6	2705K	6.304	6.339	6.417	6.368	6.397	6.388	6.367	6.364	6.397	6.391
7	2679K	6.284	6.318	6.393	6.349	6.380	6.367	6.350	6.342	6.365	6.366
8	2697K	6.314	6.344	6.420	6.384	6.410	6.403	6.384	6.377	6.410	6.409
9	2693K	6.286	6.313	6.392	6.350	6.380	6.369	6.347	6.346	6.360	6.355
10	2688K	6.298	6.316	6.386	6.344	6.371	6.367	6.342	6.341	6.347	6.352
11	2711K	6.305	6.332	6.468	6.434	6.462	6.451	6.434	6.432	6.440	6.446
12	2696K	6.311	6.335	6.409	6.373	6.401	6.386	6.370	6.364	6.383	6.379
13	2676K	6.240	6.249	6.303	6.264	6.289	6.278	6.255	6.255	6.262	6.263
14	2724K	6.315	6.339	6.416	6.378	6.405	6.400	6.377	6.377	6.387	6.384
15	2706K	6.306	6.331	6.402	6.363	6.389	6.378	6.358	6.353	6.368	6.369
16	2692K	6.332	6.355	6.425	6.388	6.415	6.406	6.383	6.379	6.398	6.399
17	2703K	6.319	6.333	6.389	6.344	6.373	6.366	6.348	6.343	6.349	6.355
18	2712K	6.308	6.340	6.413	6.370	6.400	6.397	6.374	6.372	6.379	6.386
19	2696K	6.285	6.309	6.382	6.342	6.369	6.363	6.338	6.339	6.353	6.350
20	2696K	6.302	6.334	6.404	6.368	6.397	6.388	6.367	6.365	6.371	6.373
21	2710K	6.315	6.341	6.414	6.372	6.393	6.382	6.367	6.364	6.375	6.371
22	2733K	6.324	6.351	6.425	6.381	6.411	6.407	6.382	6.382	6.392	6.398
23	2701K	6.315	6.343	6.419	6.376	6.405	6.397	6.373	6.372	6.383	6.387
24	2689K	6.318	6.353	6.422	6.387	6.429	6.402	6.485	6.383	6.402	6.398
25	2685K	6.320	6.340	6.413	6.372	6.399	6.387	6.367	6.363	6.376	6.378

Luminous Flux [lm] data for tested units
$T_s = T_{air} = 105°C$, $I_f = 150mA$; $T_s \geq 103°C$ and $T_{air} \geq 100°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	96.700	96.790	96.650	95.920	94.830	94.180	92.830	93.180	92.820	92.300
2	2725K	96.230	96.210	96.150	95.470	94.540	93.660	91.080	91.690	91.080	90.390
3	2689K	95.770	95.630	95.170	94.650	93.800	92.770	91.540	91.850	91.080	90.490
4	2658K	94.320	94.110	93.440	92.880	92.060	91.210	90.020	90.140	89.330	88.890
5	2723K	96.690	96.750	96.320	95.330	93.990	93.090	91.630	92.030	91.070	90.430
6	2701K	94.560	94.340	94.510	93.290	92.060	91.040	89.840	90.750	90.160	89.360
7	2672K	95.520	95.440	95.060	94.330	93.040	91.900	90.510	90.970	90.260	89.580
8	2707K	96.280	95.970	95.800	94.970	93.560	92.840	91.170	91.630	90.990	90.460
9	2690K	95.890	95.830	94.710	94.390	93.840	93.000	91.970	92.100	91.580	91.070
10	2711K	96.630	96.280	95.790	95.520	94.190	93.090	91.530	91.640	91.040	90.420
11	2749K	94.950	94.590	93.700	93.160	92.140	91.230	90.090	90.130	89.500	88.800
12	2697K	96.820	96.590	96.280	95.700	94.690	93.660	91.930	92.070	91.440	90.810
13	2692K	96.200	96.110	96.050	95.190	94.360	93.420	91.580	91.770	91.200	90.430
14	2729K	96.870	96.370	96.380	95.560	94.760	93.740	92.520	92.600	91.900	91.130
15	2706K	96.030	96.200	95.390	94.610	93.780	93.030	92.120	92.520	91.870	91.070
16	2685K	96.610	96.500	95.870	95.100	94.090	93.290	92.300	92.350	91.660	90.990
17	2681K	96.210	96.010	95.090	94.490	93.430	92.890	91.920	91.730	91.110	90.630
18	2700K	95.740	95.700	95.110	94.310	93.490	92.720	92.390	92.370	91.550	90.960
19	2696K	96.850	96.880	96.410	95.540	94.480	93.330	92.350	92.680	92.010	91.360
20	2695K	96.330	96.080	95.340	94.520	93.590	92.940	91.910	92.120	91.260	90.520
21	2658K	95.040	94.880	94.440	93.580	92.440	91.930	91.290	91.740	91.210	90.530
22	2694K	97.000	96.650	95.890	95.330	94.470	93.900	91.950	92.040	91.120	90.620
23	2699K	97.040	96.750	96.260	95.650	95.070	94.420	92.630	93.080	92.110	91.310
24	2733K	96.990	96.700	95.690	95.220	94.150	93.200	92.770	92.730	91.900	91.120
25	2715K	95.440	95.720	94.930	94.200	93.620	92.720	91.860	92.300	91.310	90.640

Normalized Luminous Flux data for tested units
$T_s = T_{air} = 105°C$, $I_f = 150mA$; $T_s \geq 103°C$ and $T_{air} \geq 100°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	1.0000	1.0009	0.9995	0.9919	0.9807	0.9739	0.9600	0.9636	0.9599	0.9545
2	2725K	1.0000	0.9998	0.9992	0.9921	0.9824	0.9733	0.9465	0.9528	0.9465	0.9393
3	2689K	1.0000	0.9985	0.9937	0.9883	0.9794	0.9687	0.9558	0.9591	0.9510	0.9449
4	2658K	1.0000	0.9978	0.9907	0.9847	0.9760	0.9670	0.9544	0.9557	0.9471	0.9424
5	2723K	1.0000	1.0006	0.9962	0.9859	0.9721	0.9628	0.9477	0.9518	0.9419	0.9353
6	2701K	1.0000	0.9977	0.9995	0.9866	0.9736	0.9628	0.9501	0.9597	0.9535	0.9450
7	2672K	1.0000	0.9992	0.9952	0.9875	0.9740	0.9621	0.9476	0.9524	0.9449	0.9378
8	2707K	1.0000	0.9968	0.9950	0.9864	0.9717	0.9643	0.9469	0.9517	0.9451	0.9396
9	2690K	1.0000	0.9994	0.9877	0.9844	0.9786	0.9699	0.9591	0.9605	0.9551	0.9497
10	2711K	1.0000	0.9964	0.9913	0.9885	0.9747	0.9634	0.9472	0.9484	0.9422	0.9357
11	2749K	1.0000	0.9962	0.9868	0.9811	0.9704	0.9608	0.9488	0.9492	0.9426	0.9352
12	2697K	1.0000	0.9976	0.9944	0.9884	0.9780	0.9674	0.9495	0.9509	0.9444	0.9379
13	2692K	1.0000	0.9991	0.9984	0.9895	0.9809	0.9711	0.9520	0.9540	0.9480	0.9400
14	2729K	1.0000	0.9948	0.9949	0.9865	0.9782	0.9677	0.9551	0.9559	0.9487	0.9407
15	2706K	1.0000	1.0018	0.9933	0.9852	0.9766	0.9688	0.9593	0.9634	0.9567	0.9483
16	2685K	1.0000	0.9989	0.9923	0.9844	0.9739	0.9656	0.9554	0.9559	0.9488	0.9418
17	2681K	1.0000	0.9979	0.9884	0.9821	0.9711	0.9655	0.9554	0.9534	0.9470	0.9420
18	2700K	1.0000	0.9996	0.9934	0.9851	0.9765	0.9685	0.9650	0.9648	0.9562	0.9501
19	2696K	1.0000	1.0003	0.9955	0.9865	0.9755	0.9637	0.9535	0.9569	0.9500	0.9433
20	2695K	1.0000	0.9974	0.9897	0.9812	0.9716	0.9648	0.9541	0.9563	0.9474	0.9397
21	2658K	1.0000	0.9983	0.9937	0.9846	0.9726	0.9673	0.9605	0.9653	0.9597	0.9525
22	2694K	1.0000	0.9964	0.9886	0.9828	0.9739	0.9680	0.9479	0.9489	0.9394	0.9342
23	2699K	1.0000	0.9970	0.9920	0.9857	0.9797	0.9730	0.9546	0.9592	0.9492	0.9410
24	2733K	1.0000	0.9970	0.9866	0.9818	0.9707	0.9609	0.9565	0.9561	0.9475	0.9395
25	2715K	1.0000	1.0029	0.9947	0.9870	0.9809	0.9715	0.9625	0.9671	0.9567	0.9497

TM-21 Extrapolation of Luminous Flux data for tested units
$T_s = T_{air} = 105°C$, I = 150mA; $T_s \geq 103°C$ and $T_{air} \geq 100°C$ in compliance with LM-80-08

	CCT (t=0)	alpha	B	L70
1	2729K	5.0024e-06	0.9973	70,759
2	2725K	8.6163e-06	1.0118	42,755
3	2689K	6.6115e-06	1.0019	54,234
4	2658K	6.7530e-06	1.0000	52,816
5	2723K	7.2720e-06	0.9979	48,758
6	2701K	4.7971e-06	0.9877	71,775
7	2672K	6.8125e-06	0.9962	51,799
8	2707K	6.3951e-06	0.9936	54,769
9	2690K	5.5589e-06	0.9975	63,712
10	2711K	7.7099e-06	1.0008	46,360
11	2749K	6.9030e-06	0.9948	50,909
12	2697K	7.9896e-06	1.0055	45,326
13	2692K	8.0796e-06	1.0092	45,277
14	2729K	7.2545e-06	1.0039	49,701
15	2706K	5.1407e-06	0.9948	68,374
16	2685K	6.2814e-06	0.9967	56,260
17	2681K	6.0643e-06	0.9941	57,841
18	2700K	5.0139e-06	0.9954	70,216
19	2696K	5.9162e-06	0.9946	59,378
20	2695K	6.2630e-06	0.9953	56,195
21	2658K	3.5161e-06	0.9852	97,211
22	2694K	8.4919e-06	1.0060	42,703
23	2699K	7.7494e-06	1.0089	47,170
24	2733K	5.8895e-06	0.9924	59,270
25	2715K	5.7982e-06	1.0017	61,815
ave	2701K	6.4729e-06	0.9985	54,872

CIE 1976 u' data for tested units
$T_s = T_{air} = 105°C$, I = 150mA; $T_s \geq 103°C$ and $T_{air} \geq 100°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	0.2600	0.2590	0.2591	0.2587	0.2582	0.2583	0.2578	0.2588	0.2585	0.2578
2	2725K	0.2602	0.2592	0.2591	0.2590	0.2585	0.2585	0.2575	0.2588	0.2587	0.2579
3	2689K	0.2618	0.2613	0.2613	0.2611	0.2602	0.2601	0.2595	0.2610	0.2608	0.2598
4	2658K	0.2632	0.2626	0.2625	0.2624	0.2619	0.2615	0.2608	0.2621	0.2620	0.2613
5	2723K	0.2602	0.2592	0.2590	0.2589	0.2585	0.2578	0.2567	0.2582	0.2580	0.2573
6	2701K	0.2611	0.2605	0.2603	0.2602	0.2596	0.2594	0.2586	0.2600	0.2597	0.2590
7	2672K	0.2625	0.2618	0.2617	0.2615	0.2609	0.2606	0.2599	0.2613	0.2611	0.2604
8	2707K	0.2610	0.2606	0.2606	0.2605	0.2596	0.2590	0.2583	0.2596	0.2594	0.2586
9	2690K	0.2616	0.2609	0.2608	0.2607	0.2599	0.2599	0.2592	0.2606	0.2603	0.2597
10	2711K	0.2608	0.2600	0.2598	0.2597	0.2593	0.2587	0.2580	0.2595	0.2591	0.2584
11	2749K	0.2592	0.2581	0.2578	0.2578	0.2575	0.2569	0.2561	0.2575	0.2572	0.2565
12	2697K	0.2613	0.2605	0.2605	0.2604	0.2599	0.2594	0.2587	0.2601	0.2597	0.2590
13	2692K	0.2616	0.2608	0.2607	0.2605	0.2600	0.2596	0.2589	0.2603	0.2601	0.2593
14	2729K	0.2601	0.2593	0.2591	0.2588	0.2586	0.2578	0.2571	0.2585	0.2582	0.2575
15	2706K	0.2610	0.2601	0.2599	0.2597	0.2594	0.2589	0.2583	0.2596	0.2594	0.2587
16	2685K	0.2619	0.2611	0.2611	0.2608	0.2603	0.2599	0.2595	0.2610	0.2604	0.2597
17	2681K	0.2621	0.2613	0.2611	0.2609	0.2604	0.2600	0.2597	0.2611	0.2607	0.2600
18	2700K	0.2613	0.2604	0.2602	0.2600	0.2596	0.2591	0.2588	0.2602	0.2598	0.2591
19	2696K	0.2615	0.2606	0.2605	0.2602	0.2599	0.2597	0.2593	0.2607	0.2601	0.2593
20	2695K	0.2614	0.2608	0.2606	0.2602	0.2597	0.2595	0.2592	0.2605	0.2601	0.2592
21	2658K	0.2633	0.2624	0.2624	0.2620	0.2617	0.2613	0.2610	0.2624	0.2620	0.2611
22	2694K	0.2616	0.2609	0.2607	0.2602	0.2599	0.2598	0.2594	0.2608	0.2602	0.2596
23	2699K	0.2613	0.2607	0.2607	0.2599	0.2598	0.2596	0.2593	0.2607	0.2602	0.2593
24	2733K	0.2599	0.2588	0.2586	0.2583	0.2581	0.2576	0.2572	0.2586	0.2582	0.2571
25	2715K	0.2605	0.2595	0.2594	0.2590	0.2587	0.2583	0.2580	0.2594	0.2592	0.2583

CIE 1976 v' data for tested units
$T_s = T_{air}$ = 105°C, I_f = 150mA; $T_s \geq$ 103°C and $T_{air} \geq$ 100°C in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	0.5328	0.5330	0.5332	0.5335	0.5328	0.5338	0.5332	0.5312	0.5310	0.5311
2	2725K	0.5328	0.5331	0.5333	0.5336	0.5329	0.5338	0.5329	0.5310	0.5308	0.5309
3	2689K	0.5336	0.5340	0.5343	0.5346	0.5337	0.5347	0.5342	0.5316	0.5312	0.5313
4	2658K	0.5344	0.5349	0.5350	0.5353	0.5350	0.5354	0.5350	0.5324	0.5320	0.5322
5	2723K	0.5332	0.5335	0.5336	0.5339	0.5336	0.5338	0.5335	0.5308	0.5304	0.5306
6	2701K	0.5342	0.5346	0.5347	0.5350	0.5347	0.5354	0.5347	0.5321	0.5317	0.5319
7	2672K	0.5344	0.5347	0.5348	0.5351	0.5348	0.5354	0.5349	0.5322	0.5320	0.5321
8	2707K	0.5332	0.5339	0.5340	0.5344	0.5341	0.5340	0.5336	0.5309	0.5307	0.5308
9	2690K	0.5344	0.5347	0.5348	0.5351	0.5348	0.5355	0.5348	0.5322	0.5320	0.5320
10	2711K	0.5333	0.5336	0.5337	0.5340	0.5338	0.5339	0.5337	0.5311	0.5308	0.5309
11	2749K	0.5320	0.5322	0.5323	0.5327	0.5325	0.5328	0.5324	0.5297	0.5295	0.5295
12	2697K	0.5341	0.5345	0.5345	0.5348	0.5346	0.5350	0.5345	0.5318	0.5317	0.5317
13	2692K	0.5339	0.5341	0.5342	0.5345	0.5342	0.5346	0.5342	0.5315	0.5314	0.5314
14	2729K	0.5322	0.5326	0.5327	0.5330	0.5328	0.5331	0.5327	0.5301	0.5299	0.5299
15	2706K	0.5335	0.5338	0.5339	0.5342	0.5340	0.5343	0.5340	0.5313	0.5310	0.5312
16	2685K	0.5341	0.5343	0.5344	0.5347	0.5344	0.5349	0.5345	0.5319	0.5317	0.5316
17	2681K	0.5341	0.5343	0.5344	0.5347	0.5344	0.5350	0.5345	0.5318	0.5316	0.5316
18	2700K	0.5335	0.5337	0.5338	0.5341	0.5339	0.5344	0.5340	0.5314	0.5312	0.5310
19	2696K	0.5335	0.5337	0.5338	0.5341	0.5339	0.5340	0.5337	0.5314	0.5314	0.5313
20	2695K	0.5342	0.5345	0.5345	0.5349	0.5346	0.5351	0.5348	0.5325	0.5322	0.5322
21	2658K	0.5339	0.5342	0.5342	0.5345	0.5342	0.5347	0.5344	0.5321	0.5319	0.5319
22	2694K	0.5333	0.5336	0.5337	0.5340	0.5337	0.5342	0.5338	0.5315	0.5311	0.5312
23	2699K	0.5336	0.5340	0.5341	0.5344	0.5342	0.5348	0.5342	0.5320	0.5317	0.5317
24	2733K	0.5323	0.5325	0.5326	0.5329	0.5326	0.5330	0.5327	0.5304	0.5300	0.5300
25	2715K	0.5336	0.5339	0.5340	0.5343	0.5341	0.5345	0.5342	0.5319	0.5315	0.5315

Delta u'v' data for tested units
$T_s = T_{air}$ = 105°C, I_f = 150mA; $T_s \geq$ 103°C and $T_{air} \geq$ 100°C in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	0.0000	0.0010	0.0010	0.0015	0.0018	0.0020	0.0022	0.0020	0.0023	0.0028
2	2725K	0.0000	0.0010	0.0012	0.0014	0.0017	0.0020	0.0027	0.0023	0.0025	0.0030
3	2689K	0.0000	0.0006	0.0009	0.0012	0.0016	0.0020	0.0024	0.0022	0.0026	0.0030
4	2658K	0.0000	0.0008	0.0009	0.0012	0.0014	0.0020	0.0025	0.0023	0.0027	0.0029
5	2723K	0.0000	0.0010	0.0013	0.0015	0.0017	0.0025	0.0035	0.0031	0.0036	0.0039
6	2701K	0.0000	0.0007	0.0009	0.0012	0.0016	0.0021	0.0025	0.0024	0.0029	0.0031
7	2672K	0.0000	0.0008	0.0009	0.0012	0.0016	0.0021	0.0026	0.0025	0.0028	0.0031
8	2707K	0.0000	0.0008	0.0009	0.0013	0.0017	0.0022	0.0027	0.0027	0.0030	0.0034
9	2690K	0.0000	0.0008	0.0009	0.0011	0.0017	0.0020	0.0024	0.0024	0.0027	0.0031
10	2711K	0.0000	0.0009	0.0011	0.0013	0.0016	0.0022	0.0028	0.0026	0.0030	0.0034
11	2749K	0.0000	0.0011	0.0014	0.0016	0.0018	0.0024	0.0031	0.0029	0.0032	0.0037
12	2697K	0.0000	0.0009	0.0009	0.0011	0.0015	0.0021	0.0026	0.0026	0.0029	0.0033
13	2692K	0.0000	0.0008	0.0009	0.0013	0.0016	0.0021	0.0027	0.0027	0.0029	0.0034
14	2729K	0.0000	0.0009	0.0011	0.0015	0.0016	0.0025	0.0030	0.0026	0.0030	0.0035
15	2706K	0.0000	0.0009	0.0012	0.0015	0.0017	0.0022	0.0027	0.0026	0.0030	0.0033
16	2685K	0.0000	0.0008	0.0009	0.0013	0.0016	0.0022	0.0024	0.0024	0.0028	0.0033
17	2681K	0.0000	0.0008	0.0010	0.0013	0.0017	0.0023	0.0024	0.0025	0.0029	0.0033
18	2700K	0.0000	0.0009	0.0011	0.0014	0.0017	0.0024	0.0025	0.0024	0.0027	0.0033
19	2696K	0.0000	0.0009	0.0010	0.0014	0.0016	0.0019	0.0022	0.0022	0.0025	0.0031
20	2695K	0.0000	0.0007	0.0009	0.0014	0.0017	0.0021	0.0023	0.0019	0.0024	0.0030
21	2658K	0.0000	0.0009	0.0009	0.0014	0.0016	0.0022	0.0024	0.0020	0.0024	0.0030
22	2694K	0.0000	0.0008	0.0010	0.0016	0.0017	0.0020	0.0023	0.0020	0.0026	0.0029
23	2699K	0.0000	0.0007	0.0008	0.0016	0.0016	0.0021	0.0021	0.0017	0.0022	0.0028
24	2733K	0.0000	0.0011	0.0013	0.0017	0.0018	0.0024	0.0027	0.0023	0.0029	0.0036
25	2715K	0.0000	0.0010	0.0012	0.0017	0.0019	0.0024	0.0026	0.0020	0.0025	0.0030

Forward Voltage [V] data for tested units
$T_s = T_{air} = 105°C$, $I_f = 150mA$; $T_s \geq 103°C$ and $T_{air} \geq 100°C$ in compliance with LM-80-08

	CCT (t=0)	0hrs	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs	8000hrs	9000hrs
1	2729K	6.309	6.343	6.388	6.380	6.402	6.398	6.376	6.372	6.392	6.392
2	2725K	6.307	6.348	6.392	6.385	6.408	6.404	6.380	6.378	6.390	6.392
3	2689K	6.310	6.349	6.384	6.379	6.406	6.400	6.382	6.380	6.384	6.391
4	2658K	6.323	6.366	6.418	6.404	6.436	6.430	6.412	6.407	6.416	6.422
5	2723K	6.309	6.341	6.392	6.385	6.406	6.405	6.381	6.380	6.391	6.398
6	2701K	6.238	6.258	6.302	6.288	6.313	6.309	6.595	6.286	6.294	6.296
7	2672K	6.296	6.335	6.386	6.369	6.397	6.391	6.370	6.363	6.392	6.392
8	2707K	6.291	6.324	6.369	6.360	6.379	6.381	6.355	6.356	6.367	6.369
9	2690K	6.321	6.353	6.391	6.380	6.409	6.401	6.383	6.376	6.396	6.402
10	2711K	6.295	6.335	6.379	6.374	6.394	6.397	6.371	6.371	6.398	6.397
11	2749K	6.312	6.348	6.390	6.382	6.406	6.407	6.431	6.378	6.397	6.397
12	2697K	6.300	6.328	6.377	6.364	6.391	6.387	6.370	6.365	6.385	6.388
13	2692K	6.304	6.336	6.382	6.371	6.399	6.396	6.373	6.365	6.387	6.391
14	2729K	6.304	6.338	6.381	6.369	6.397	6.395	6.368	6.366	6.388	6.386
15	2706K	6.325	6.359	6.413	6.403	6.426	6.427	6.408	6.399	6.419	6.421
16	2685K	6.299	6.334	6.375	6.365	6.390	6.393	6.365	6.366	6.385	6.390
17	2681K	6.326	6.360	6.412	6.398	6.430	6.427	6.406	6.404	6.409	6.412
18	2700K	6.303	6.327	6.366	6.359	6.382	6.374	6.351	6.348	6.360	6.367
19	2696K	6.314	6.344	6.382	6.373	6.403	6.391	6.367	6.366	6.366	6.375
20	2695K	6.322	6.362	6.410	6.403	6.429	6.425	6.399	6.400	6.407	6.411
21	2658K	6.318	6.348	6.395	6.384	6.408	6.405	6.386	6.384	6.391	6.391
22	2694K	6.312	6.342	6.391	6.383	6.404	6.401	6.384	6.380	6.382	6.391
23	2699K	6.322	6.346	6.389	6.379	6.405	6.401	6.375	6.376	6.386	6.387
24	2733K	6.305	6.340	6.380	6.377	6.398	6.396	6.374	6.369	6.381	6.383
25	2715K	6.308	6.338	6.394	6.385	6.411	6.410	6.387	6.384	6.394	6.398

Company Information

Philips 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. Philips Lumileds LUXEON LEDs are enabling never before possible applications in outdoor lighting, shop lighting, home lighting, digital imaging, display and automotive lighting.

Philips Lumileds is a fully integrated supplier, producing core LED material in all three base colors, (red, green, blue) and white. Philips 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, Philips 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.philipslumileds.com.