

Cree® LED Components IES LM-80-2008 Testing Results



NVLAP Lab Code 500041-0

Revision: 12 (December 6, 2012)

INTRODUCTION

This document provides the results of Cree’s IES LM-80-2008 (“LM-80”) testing on its LED components. Cree is providing this data so that the public can verify the reliability of Cree LEDs as part of a complete LED lighting system.

Note that this document only provides the end results of the LM-80 tests. This is not a complete LM-80 report. Do not use this document to submit luminaires or lamps to an agency. Cree customers who need the full LM-80 reports should contact their Cree sales representative.

Cree’s customers who wish to share LM-80 results with their customers have permission to link to this document from their website. This document is subject to change without notice, so please do not link to a local copy.

NVLAP ACCREDITATION FOR LM-80-2008 TESTING

Cree’s SSL testing laboratory in Durham, NC, USA is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to perform IES LM-80-2008 testing. All LM-80-2008 results produced by Cree are generated in Cree’s accredited laboratory. Full details on Cree’s NVLAP accreditation are available here:

<http://ts.nist.gov/standards/scopes/5000410.htm>

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This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any other agency of the federal government.

LED MODULES (REV 1)

Revision: 1 (May 17, 2012)

Description Of LED Light Sources

Module Family	Nominal Light Output	Applicable Order Codes
LMR2	650 lm	LMR020-0650-xxxx-xxxxxTW
LMR4	700 lm	LMR040-0700-xxxx-xxxxxTW
	1000 lm	LMR040-1000-xxxx-xxxxxTW
LMH2	850 lm	LMH020-0850-xxxx-xxxxxTW
	1250 lm	LMH020-1250-xxxx-xxxxxTW
	2000 lm	LMH020-2000-xxxx-xxxxxTW
	3000 lm	LMH020-3000-xxxx-xxxxxTW
LMH6	2000 lm	LMH060-2000-xxxx-xxxxxTW
	2900 lm	LMH060-2900-xxxx-xxxxxTW

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	85°C	85°C	White: 700 mA Single-Color: 1000 mA	96.1%	0.0007	L70(6k) > 36,300 hrs

XLAMP CXA2011 WHITE LEDS (REV 0)

Revision: 0 (May 18, 2012)

Description Of LED Light Sources

XLamp CXA2011 White LEDs (Series: CXA2011)

This LM-80 report is applicable to the following order codes:
CXA2011-xxxx-xxxxxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	85°C	85°C	300 mA	97.2%	0.0012	L70(6k) > 36,300 hrs

XLAMP MC-E WHITE LEDS (REV 1)

Revision: 1 (December 8, 2010)

Description Of LED Light Sources

XLamp MC-E White LEDs (MCE4WT) & XLamp MC-E EasyWhite LEDs (MCEEZW)

All measurements provided are LED package measurements with all LEDs on simultaneously. No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	350 mA	98.1%	0.0009
2	45°C	45°C	700 mA	99.0%	0.0015
3	55°C	55°C	350 mA	98.4%	0.0010
4	55°C	55°C	700 mA	95.8%	0.0027
5	85°C	85°C	350 mA	98.2%	0.0014
6	85°C	85°C	700 mA	92.8%	0.0070

XLAMP ML-B WHITE LEDS (REV 1)

Revision: 1 (May 1, 2012)

Description Of LED Light Sources

XLamp ML-B White LEDs (MLBAWT)

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	45°C	45°C	80 mA	99.0%	0.0009	L70(6k) > 36,300 hrs
2	55°C	55°C	80 mA	98.3%	0.0010	L70(6k) > 36,300 hrs
3	85°C	85°C	80 mA	98.1%	0.0011	L70(6k) > 36,300 hrs
4	85°C	85°C	175 mA	96.3%	0.0012	L70(8k) = 36,300 hrs

XLAMP ML-C & ML-E WHITE LEDS (REV 1)

Revision: 1 (March 19, 2012)

Description Of LED Light Sources

XLamp ML-C (MLCxWT) & ML-E (MLExWT) White LEDs

This LM-80 report is applicable to the following order codes:

- ML-C Parallel : MLCAWT-xx-xxxx-xxxxxx
- ML-C Series : MLCSWT-xx-xxxx-xxxxxx
- ML-E Parallel : MLEAWT-xx-xxxx-xxxxxx
- ML-E Series : MLESWT-xx-xxxx-xxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	45°C	45°C	116 mA (MLCAWT); 58 mA (MLCSWT); 175 mA (MLEAWT); 58 mA (MLESWT)	97.9%	0.0008	L70(6k) > 36,300 hrs
2	55°C	55°C	116 mA (MLCAWT); 58 mA (MLCSWT); 175 mA (MLEAWT); 58 mA (MLESWT)	96.9%	0.0012	L70(6k) > 36,300 hrs
3	85°C	85°C	116 mA (MLCAWT); 58 mA (MLCSWT); 175 mA (MLEAWT); 58 mA (MLESWT)	95.5%	0.0012	L70(6k) > 36,300 hrs

XLAMP MP-L EASYWHITE LEDS (REV 0)

Revision: 0 (September 30, 2010)

Description Of LED Light Sources

XLamp MP-L EasyWhite LEDs (MPLEZW)

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	250 mA	96.9%	0.0007
2	55°C	55°C	250 mA	96.1%	0.0012
3	85°C	85°C	250 mA	96.7%	0.0017

XLAMP MT-G EASYWHITE LEDS (REV 1)

Revision: 1 (February 16, 2012)

Description Of LED Light Sources

XLamp MT-G EasyWhite LED arrays (Series: MTGEZW)

This LM-80 report is applicable to the following order codes:

- MT-G 6V : MTGEZW-xx-xxxx-xBxxxxxxxx
- MT-G 36V : MTGEZW-xx-xxxx-xNxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	55°C	55°C	2000 mA (6V); 333 mA (36V)	97.2%	0.0028	L70(6k) > 36,300 hrs
2	85°C	85°C	2000 mA (6V); 333 mA (36V)	95.5%	0.0027	L70(6k) > 36,300 hrs
3	105°C	105°C	2000 mA (6V); 333 mA (36V)	94.0%	0.0022	L70(6k) > 36,300 hrs
4	55°C	55°C	3000 mA (6V); 500 mA (36V)	95.8%	0.0024	L70(6k) > 36,300 hrs
5	85°C	85°C	3000 mA (6V); 500 mA (36V)	92.7%	0.0021	L70(6k) > 36,300 hrs
6	105°C	105°C	3000 mA (6V); 500 mA (36V)	92.5%	0.0019	L70(6k) > 36,300 hrs
7	105°C	105°C	4200 mA (6V); 700 mA (36V)	91.5%	0.0020	L70(6k) > 36,300 hrs

XLAMP MX-3 WHITE LEDS (REV 0)

Revision: 0 (March 29, 2011)

Description Of LED Light Sources

XLamp MX-3 White LEDs: parallel (MX3AWT) & series (MX3SWT) configurations.

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	400 mA (MX3AWT) 133 mA (MX3SWT)	98.7%	0.0010
2	55°C	55°C	400 mA (MX3AWT) 133 mA (MX3SWT)	97.0%	0.0013
3	85°C	85°C	400 mA (MX3AWT) 133 mA (MX3SWT)	94.9%	0.0009

XLAMP MX-6 WHITE LEDS (REV 2)

Revision: 2 (September 2, 2011)

Description Of LED Light Sources

XLamp MX-6 White LEDs: parallel (MX6AWT) & series (MX6SWT) configurations

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	45°C	45°C	350 mA (MX6AWT) 58 mA (MX6SWT)	97.5%	0.0007	L70(6k) > 36,300 hrs
2	55°C	55°C	350 mA (MX6AWT) 58 mA (MX6SWT)	98.6%	0.0007	L70(6k) > 36,300 hrs
3	85°C	85°C	350 mA (MX6AWT) 58 mA (MX6SWT)	96.5%	0.0014	L70(6k) = 35,600 hrs
4	45°C	45°C	600 mA (MX6AWT) 100 mA (MX6SWT)	98.0%	0.0009	L70(6k) > 36,300 hrs
5	55°C	55°C	600 mA (MX6AWT) 100 mA (MX6SWT)	97.2%	0.0009	L70(6k) > 36,300 hrs
6	85°C	85°C	600 mA (MX6AWT) 100 mA (MX6SWT)	94.5%	0.0008	L70(6k) = 34,400 hrs

XLAMP XB-D WHITE LEDS (REV 1)

Revision: 1 (December 5, 2012)

Description Of LED Light Sources

XLamp XB-D White LEDs (Series: XBDAWT)

This LM-80 report is applicable to the following order codes:

XBDAWT-xx-xxxx-xxxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
2	55°C	55°C	700 mA	97.7%	0.0007	L70(6k) > 36,300 hrs
1	85°C	85°C	700 mA	97.3%	0.0010	L70(6k) > 36,300 hrs
3	105°C	105°C	700 mA	93.9%	0.0012	L70(6k) > 36,300 hrs
4	55°C	55°C	1000 mA	96.9%	0.0006	L70(6k) > 36,300 hrs
5	85°C	85°C	1000 mA	95.1%	0.0007	L70(6k) > 36,300 hrs
6	105°C	105°C	1000 mA	94.4%	0.0014	L70(6k) > 36,300 hrs

XLAMP XM-L EASYWHITE LEDS (REV 0)

Revision: 0 (October 31, 2011)

Description Of LED Light Sources

XLamp XM-L EasyWhite LED arrays (Series: XMLEZW)

This LM-80 report is applicable to the following order codes:

- XM-L EZW 6V : XMLEZW-xx-xxxx-xBxxxxxxxx
- XM-L EZW 12V : XMLEZW-xx-xxxx-xDxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	55°C	55°C	700 mA (6V); 350 mA (12V)	97.2%	0.0029	L70(6k) > 36,300 hrs
2	85°C	85°C	700 mA (6V); 350 mA (12V)	96.1%	0.0026	L70(6k) > 36,300 hrs
3	105°C	105°C	700 mA (6V); 350 mA (12V)	97.3%	0.0025	L70(6k) > 36,300 hrs
4	55°C	55°C	1000 mA (6V); 500 mA (12V)	97.6%	0.0023	L70(6k) > 36,300 hrs
5	85°C	85°C	1000 mA (6V); 500 mA (12V)	96.6%	0.0019	L70(6k) > 36,300 hrs

XLAMP XM-L WHITE LEDS (REV 2)

Revision: 2 (October 31, 2012)

Description Of LED Light Sources

XLamp XM-L White LED packages (Series: XMLAWT)

This LM-80 report is applicable to the following order codes:

XMLAWT-xx-xxxx-xxxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
4	55°C	55°C	1500 mA	99.4%	0.0026	L70(6k) > 36,300 hrs
5	85°C	85°C	1500 mA	96.0%	0.0022	L70(7k) > 42,300 hrs
6	105°C	105°C	1500 mA	96.9%	0.0017	L70(7k) > 42,300 hrs
1	45°C	45°C	2000 mA	98.4%	0.0021	L70(6k) > 36,300 hrs
2	55°C	55°C	2000 mA	98.3%	0.0021	L70(6k) > 36,300 hrs
3	85°C	85°C	2000 mA	97.2%	0.0022	L70(6k) > 36,300 hrs

The following data sets are extended versions of some of the data sets above, but have sample sizes less than 25 units each. Please refer to each individual data set for the exact number of samples included. These data sets are projected according to IES TM-21-11 standards and the Reported L70 lifetimes presented are valid under TM-21-11. However, the use of these extended data sets may not be allowed by a particular program because of the sample size of the data set. Cree recommends reviewing the details on LM-80 lumen maintenance for each program to verify that data sets with fewer than 25 samples are considered valid. If not, then the data sets above should be referenced.

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
5+	85°C	85°C	1500 mA	96.0%	0.0022	L70(12k) > 72,600 hrs
6+	105°C	105°C	1500 mA	96.7%	0.0019	L70(12k) > 72,600 hrs
7+	55°C	55°C	2000 mA	99.9%	0.0033	L70(11k) > 61,000 hrs
8+	85°C	85°C	2000 mA	97.6%	0.0027	L70(12k) > 72,600 hrs
9+	105°C	105°C	2000 mA	95.6%	0.0021	L70(9k) > 47,100 hrs

XLAMP XP-E WHITE LEDS (REV 3)

Revision: 3 (November 9, 2011)

Description Of LED Light Sources

XLamp XP-E White LED packages (Series: XPEWHT)

This LM-80 report is applicable to the following order codes:

XPEWHT-xx-xxxx-xxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
8	55°C	55°C	350 mA	97.7%	0.0022	L70(10k) > 60,500 hrs
9	85°C	85°C	350 mA	98.1%	0.0021	L70(10k) > 60,500 hrs
10	105°C	105°C	350 mA	96.4%	0.0021	L70(6k) > 36,300 hrs
5	45°C	45°C	700 mA	96.6%	0.0013	L70(10k) > 60,500 hrs
6	55°C	55°C	700 mA	96.5%	0.0013	L70(10k) > 60,500 hrs
7	85°C	85°C	700 mA	95.6%	0.0004	L70(10k) > 60,500 hrs

XLAMP XP-E HIGH EFFICIENCY WHITE LEDS (REV 4)

Revision: 4 (April 25, 2012)

Description Of LED Light Sources

XLamp XP-E High Efficiency White LEDs (XPEHEW)

This LM-80 report is applicable to the following order codes:

XPEHEW-xx-xxxx-xxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
11	85°C	85°C	350 mA	99.8%	0.0007	L70(10k) > 60,500 hrs
12	105°C	105°C	350 mA	95.7%	0.0009	L70(6k) > 36,300 hrs
8	55°C	55°C	500 mA	100.0%	0.0008	L70(8k) > 48,400 hrs
9	85°C	85°C	500 mA	97.7%	0.0005	L70(8k) > 48,400 hrs
10	85°C	85°C	700 mA	97.6%	0.0006	L70(9k) > 54,400 hrs

XLAMP XP-G WHITE LEDS (REV 5)

Revision: 5 (November 30, 2012)

Description Of LED Light Sources

XLamp XP-G White LEDs (Series: XPGWHT)

This LM-80 report is applicable to the following order codes:

XPGWHT-xx-xxxx-xxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
13	85°C	85°C	1000 mA	98.4%	0.0011	L70(9k) > 51,400 hrs
14	105°C	105°C	1000 mA	96.6%	0.0005	L70(9k) > 51,400 hrs
15	55°C	55°C	1500 mA	97.8%	0.0009	L70(9k) > 51,400 hrs
16	85°C	85°C	1500 mA	98.5%	0.0006	L70(9k) > 51,400 hrs

XLAMP XR-E WHITE LEDS (REV 1)

Revision: 1 (September 20, 2010)

Description Of LED Light Sources

XLamp XR-E White LEDs (Series: XREWHT)

No failures occurred during testing.

Test Summary

Data Set	Color	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	Cool White	25°C	25°C	350 mA	98.1%	0.0040
2	Warm White	25°C	25°C	350 mA	98.8%	0.0020
3	Cool White	25°C	25°C	700 mA	98.0%	0.0040
4	Warm White	25°C	25°C	700 mA	97.8%	0.0022
5	Cool White	45°C	45°C	350 mA	97.8%	0.0129
6	Cool White	45°C	45°C	1000 mA	97.9%	0.0017
7	Cool White	55°C	55°C	350 mA	98.0%	0.0031
8	Warm White	55°C	55°C	350 mA	97.7%	0.0019
9	Cool White	55°C	55°C	1000 mA	97.0%	0.0047
10	Warm White	55°C	55°C	1000 mA	96.2%	0.0026
11	Cool White	85°C	85°C	350 mA	94.3%	0.0030
12	Warm White	85°C	85°C	350 mA	96.9%	0.0012
13	Cool White	85°C	85°C	1000 mA	95.0%	0.0022

XLAMP XT-E HIGH VOLTAGE WHITE LEDs (REV 0)

Revision: 0 (August 21, 2012)

Description Of LED Light Sources

XLamp XT-E High Voltage White LEDs (Series: XTEHVW)

This LM-80 report is applicable to the following order codes:

XTEHVW-xx-xxxx-xxxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
1	55°C	55°C	44 mA	98.5%	0.0007	L70(6k) > 36,300 hrs
2	85°C	85°C	44 mA	94.1%	0.0009	L70(6k) > 36,300 hrs
3	105°C	105°C	44 mA	93.3%	0.0012	L70(6k) > 36,300 hrs
4	55°C	55°C	66 mA	95.6%	0.0008	L70(6k) > 36,300 hrs
5	85°C	85°C	66 mA	93.7%	0.0011	L70(6k) > 36,300 hrs

XLAMP XT-E WHITE LEDs (REV 3)

Revision: 3 (November 14, 2012)

Description Of LED Light Sources

XLamp XT-E White LEDs (Series: XTEAWT)

This LM-80 report is applicable to the following order codes:

XTEAWT-xx-xxxx-xxxxxxxxxx

No failures occurred during testing.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours	Reported TM-21 L70 Lifetime
3	55°C	55°C	1000 mA	98.1%	0.0010	L70(6k) > 36,300 hrs
2	85°C	85°C	1000 mA	98.8%	0.0012	L70(6k) > 36,300 hrs
4	105°C	105°C	1000 mA	96.1%	0.0019	L70(6k) > 36,300 hrs