

Cree® XLamp® CXA2011 White LEDs

INFORMATION REQUIRED BY LM-80-08

Cree classifies these LEDs as “LED arrays” (Section 3.7) per Sep 9, 2011 ENERGY STAR guidelines¹: LED arrays constructed as an assembly of LED dies on a substrate with one common phosphor layer overlaying all dies.

1. Number of LED light sources tested	See individual data sets on following pages.
2. Description of LED light sources	XLamp CXA2011 White LEDs (Series: CXA2011) This LM-80 report is applicable to the following order codes: CXA2011-xxxx-xxxxxxxxxxx All measurements provided are LED array measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED arrays are driven at constant current.
5. Ambient conditions	LED arrays are operated in environmental control chambers. The temperature of the ambient air around the LED arrays is actively controlled by air flowing through the chamber. T _A : See individual data sets on following pages RH : < 45% Air flow : 800 CFM
6. Case temperature	See individual data sets on following pages.
7. Drive current of the LED light source during life-time test.	See individual data sets on following pages.
8. Initial luminous flux and forward voltage at photometric measurement current	See individual data sets on following pages.
9. Lumen maintenance data for each individual LED light source	See individual data sets on following pages. Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	See individual data sets on following pages.
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	See individual data sets on following pages. Ambient temperature during chromaticity testing set to 25°C ±2°C.
Test Report Authorization	Amber Abare, Components Reliability Laboratory Manager
Sampling method	Cree uses systematic sampling of production LEDs, with checks to ensure that the behavior of early samples are representative of the behavior of later samples.

¹ http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/luminaires/ENERGY_STAR_Final_Lumen_Maintenance_Guidance.pdf

REVISION HISTORY

Revision	Date	Change
0	May 18, 2012	Date of first issue

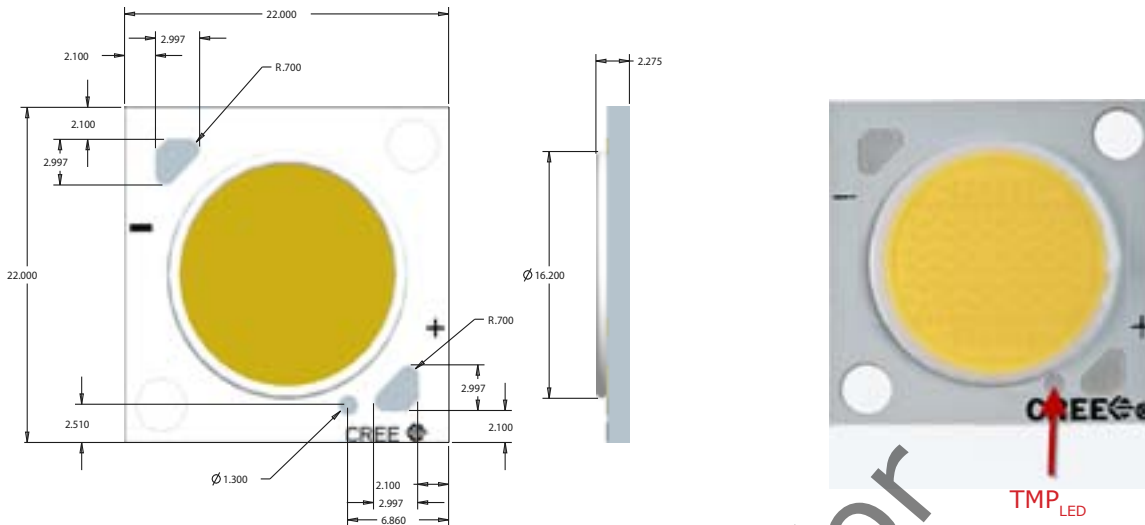
TEST RESULTS SUMMARY

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

Prepared for
E-conolight

MECHANICAL DIMENSIONS & TEMPERATURE MEASUREMENT POINT

All measurements are ± 0.13 mm unless otherwise indicated.



XLamp CXA LEDs case temperature (TMP_{LED}) can be measured at the designated case temperature measurement point, immediately adjacent to the anode or plus (+) solder pad. This measurement point is shown in the picture below. Cree recommends attaching the thermocouple with conductive epoxy.

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DATA SET 1: 85°C; 300 mA

LED Array Series	XLamp CXA2011 White LEDs (Series: CXA2011)
	This LM-80 report is applicable to the following order codes: CXA2011-xxxx-xxxxxxxxxxx
Tested Model Number	CXA2011-0000-000P00G030F
Drive Current [I _F]	300 mA
Testing Initiation Date	June 15, 2011
Case Temperature [T _S]	85°C
Ambient Temperature [T _A]	85°C
Failures observed	None

Lamp #	Initial (0 hrs)				Lumen Maintenance (%)											
	LF (lm)	V _F (V)	Calc. CCT	ANSI Target	168	1008	1512	2016	2520	3024	3528	4032	4536	5040	5544	6048
1	1193	42.33	3026	3000	100.9	101.5	101.2	100.9	100.4	99.1	99.5	98.2	98.6	97.5	98.5	98.7
2	1176	42.20	3035	3000	102.1	102.9	102.9	102.6	102.1	101.2	101.3	102.2	100.7	99.6	101.0	100.9
3	1209	42.50	2952	3000	97.8	98.1	98.8	98.7	99.0	98.3	97.8	98.8	95.7	95.8	96.0	95.2
4	1200	42.48	2962	3000	98.0	98.6	99.0	99.2	99.4	98.5	97.8	98.7	95.5	95.6	95.8	95.2
5	1203	42.51	2955	3000	98.1	98.5	99.1	99.4	99.5	98.8	98.3	99.2	95.9	95.9	96.2	95.6
6	1220	42.54	2959	3000	98.1	98.4	97.4	97.9	97.9	97.3	96.7	97.6	94.5	94.6	94.8	94.3
7	1181	41.50	3036	3000	99.5	100.4	98.6	103.0	100.8	102.0	100.6	101.9	100.4	98.7	99.4	98.1
8	1185	41.50	3060	3000	100.2	101.9	99.7	103.1	101.0	102.2	100.5	101.7	100.3	98.6	99.7	98.2
9	1180	41.61	3048	3000	99.7	101.9	101.6	103.2	102.6	102.9	102.8	103.4	101.7	101.5	101.2	100.5
10	1176	41.60	3043	3000	99.5	101.2	100.0	103.2	103.2	103.0	103.0	103.5	100.6	100.1	100.0	99.3
11	1161	42.69	3053	3000	100.5	100.8	100.6	101.1	101.1	100.1	100.0	99.7	97.6	98.1	97.1	97.3
12	1165	42.75	3042	3000	100.0	100.8	101.2	100.8	100.6	99.6	99.4	99.1	97.1	97.8	96.6	96.7
13	1174	42.78	3045	3000	99.8	100.3	100.2	100.4	100.4	99.5	99.3	98.9	96.6	97.4	96.2	96.3
14	1138	42.73	3061	3000	100.8	101.5	101.9	101.8	101.8	100.9	100.7	100.4	98.4	99.2	97.9	97.9
15	1212	42.91	3016	3000	98.9	100.8	100.1	100.0	99.6	100.3	98.2	98.0	97.5	95.9	96.6	95.9
16	1209	43.03	3010	3000	99.0	100.6	99.8	99.6	99.7	100.4	98.4	98.3	97.5	96.3	97.0	96.5
17	1221	42.89	3021	3000	99.3	101.0	100.4	100.2	99.7	100.4	98.3	97.8	96.8	95.5	96.2	95.6
18	1221	43.18	3010	3000	99.1	100.6	100.0	99.6	99.5	100.1	98.1	97.9	96.8	95.7	96.5	95.8
19	1260	42.71	3007	3000	100.7	102.1	101.7	100.6	101.9	100.6	100.1	99.2	97.6	98.0	97.3	96.3
20	1250	42.70	3004	3000	100.8	102.8	102.3	102.2	102.7	102.5	102.2	101.0	100.5	99.0	99.3	98.9
21	1254	42.65	2965	3000	101.4	102.6	102.5	102.5	102.9	102.8	101.2	100.4	98.8	99.5	99.2	99.1
22	1193	42.78	3027	3000	101.2	103.2	102.7	102.4	103.3	103.0	100.8	100.5	100.5	99.5	98.9	98.2
23	1253	42.96	3012	3000	100.9	101.6	101.0	100.6	99.8	101.4	100.9	98.1	98.4	96.8	96.3	95.8
24	1258	43.00	3012	3000	100.6	101.4	100.7	100.5	101.0	100.6	98.1	98.0	96.7	95.8	95.3	95.4
25	1257	42.77	3013	3000	100.1	102.7	102.6	100.0	102.6	102.9	101.2	100.6	100.2	98.1	99.0	98.3
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean	1206	42.53			99.9	101.0	100.6	100.9	100.9	100.7	99.8	99.7	98.2	97.6	97.7	97.2
Median	1203	42.70			100.0	101.2	100.6	100.6	100.8	100.6	100.0	99.2	97.6	97.8	97.1	96.7
σ	35	0.49			1.16	1.44	1.44	1.52	1.48	1.63	1.69	1.77	1.97	1.79	1.80	1.77
Min.	1138	41.50			97.8	98.1	97.4	97.9	97.9	97.3	96.7	97.6	94.5	94.6	94.8	94.3
Max.	1260	43.18			102.1	103.2	102.9	103.2	103.3	103.0	103.0	103.5	101.7	101.5	101.2	100.9

DATA SET 1: 85°C; 300 mA

LED Array Series	XLamp CXA2011 White LEDs (Series: CXA2011)
	This LM-80 report is applicable to the following order codes: CXA2011-xxxx-xxxxxxxxxxx
Tested Model Number	CXA2011-0000-000P00G030F
Drive Current [I _F]	300 mA
Testing Initiation Date	June 15, 2011
Case Temperature [T _s]	85°C
Ambient Temperature [T _A]	85°C
Failures observed	None

Lamp #	Initial (0 hrs)				Chromaticity Shift (Δu'v')											
	CCx	CCy	Calc. CCT	ANSI Target	168	1008	1512	2016	2520	3024	3528	4032	4536	5040	5544	6048
1	0.4338	0.4000	3026	3000	0.0009	0.0007	0.0007	0.0007	0.0007	0.0008	0.0010	0.0010	0.0012	0.0012	0.0013	0.0013
2	0.4345	0.4026	3035	3000	0.0010	0.0008	0.0008	0.0007	0.0006	0.0006	0.0008	0.0009	0.0010	0.0010	0.0011	0.0012
3	0.4441	0.4123	2952	3000	0.0005	0.0008	0.0010	0.0012	0.0011	0.0012	0.0012	0.0013	0.0012	0.0014	0.0014	0.0014
4	0.4432	0.4117	2962	3000	0.0005	0.0008	0.0009	0.0011	0.0011	0.0012	0.0012	0.0013	0.0012	0.0013	0.0014	0.0013
5	0.4438	0.4120	2955	3000	0.0005	0.0008	0.0010	0.0012	0.0011	0.0011	0.0012	0.0013	0.0012	0.0013	0.0013	0.0014
6	0.4433	0.4115	2959	3000	0.0005	0.0008	0.0011	0.0013	0.0012	0.0013	0.0014	0.0015	0.0014	0.0015	0.0016	0.0015
7	0.4340	0.4017	3036	3000	0.0009	0.0011	0.0008	0.0012	0.0010	0.0012	0.0011	0.0012	0.0013	0.0010	0.0013	0.0013
8	0.4327	0.4019	3060	3000	0.0009	0.0010	0.0008	0.0012	0.0010	0.0013	0.0011	0.0013	0.0014	0.0010	0.0012	0.0011
9	0.4336	0.4022	3048	3000	0.0009	0.0010	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0011	0.0012	0.0012	0.0011
10	0.4343	0.4031	3043	3000	0.0008	0.0010	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0012	0.0012	0.0011
11	0.4357	0.4075	3053	3000	0.0005	0.0007	0.0008	0.0007	0.0009	0.0008	0.0008	0.0010	0.0008	0.0009	0.0009	0.0010
12	0.4368	0.4084	3042	3000	0.0005	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0010	0.0008	0.0010	0.0009	0.0010
13	0.4370	0.4091	3045	3000	0.0006	0.0007	0.0009	0.0008	0.0009	0.0009	0.0010	0.0010	0.0010	0.0011	0.0010	0.0013
14	0.4351	0.4070	3061	3000	0.0005	0.0006	0.0007	0.0007	0.0008	0.0007	0.0007	0.0009	0.0007	0.0009	0.0008	0.0010
15	0.4382	0.4080	3016	3000	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0009	0.0011	0.0011	0.0009	0.0011	0.0011
16	0.4384	0.4078	3010	3000	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010	0.0011	0.0012	0.0009	0.0012	0.0011
17	0.4378	0.4078	3021	3000	0.0008	0.0009	0.0008	0.0009	0.0010	0.0009	0.0009	0.0010	0.0011	0.0009	0.0010	0.0011
18	0.4388	0.4086	3010	3000	0.0008	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0010	0.0011	0.0012
19	0.4409	0.4125	3007	3000	0.0008	0.0008	0.0008	0.0007	0.0009	0.0007	0.0011	0.0009	0.0007	0.0010	0.0010	0.0008
20	0.4407	0.4117	3004	3000	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0008	0.0011	0.0010	0.0008	0.0011	0.0011
21	0.4443	0.4143	2965	3000	0.0007	0.0009	0.0008	0.0008	0.0009	0.0009	0.0010	0.0009	0.0007	0.0010	0.0010	0.0010
22	0.4388	0.4107	3027	3000	0.0013	0.0012	0.0012	0.0013	0.0012	0.0012	0.0013	0.0014	0.0013	0.0013	0.0014	0.0015
23	0.4407	0.4127	3012	3000	0.0008	0.0009	0.0009	0.0009	0.0006	0.0008	0.0009	0.0008	0.0010	0.0010	0.0009	0.0011
24	0.4403	0.4120	3012	3000	0.0008	0.0009	0.0008	0.0009	0.0008	0.0009	0.0008	0.0010	0.0010	0.0009	0.0011	0.0011
25	0.4383	0.4079	3013	3000	0.0005	0.0005	0.0006	0.0005	0.0005	0.0006	0.0006	0.0007	0.0007	0.0008	0.0007	0.0008
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean					0.0007	0.0008	0.0009	0.0009	0.0009	0.0010	0.0010	0.0011	0.0010	0.0011	0.0011	0.0012
Median					0.0008	0.0008	0.0008	0.0009	0.0010	0.0009	0.0010	0.0011	0.0011	0.0010	0.0011	0.0011
σ					0.0002	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.					0.0005	0.0005	0.0006	0.0005	0.0005	0.0006	0.0006	0.0007	0.0007	0.0008	0.0007	0.0008
Max.					0.0013	0.0012	0.0012	0.0013	0.0012	0.0013	0.0014	0.0015	0.0014	0.0015	0.0016	0.0015

DATA SET 1: 85°C; 300 mA

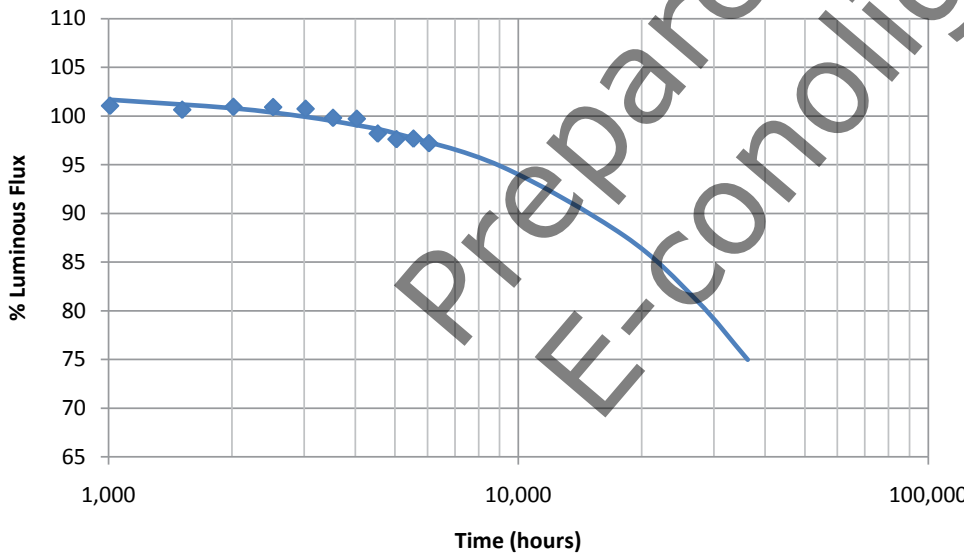
LED Array Series	XLamp CXA2011 White LEDs (Series: CXA2011)
	This LM-80 report is applicable to the following order codes: CXA2011-xxxx-xxxxxxxxxxxx
Tested Model Number	CXA2011-0000-000P00G030F
Drive Current [I _F]	300 mA
Testing Initiation Date	June 15, 2011
Case Temperature [T _s]	85°C
Ambient Temperature [T _A]	85°C
Failures observed	None

Projection Generated By Cree's Internal TM-21 Calculator:

Test duration	6,048 hours
Test duration used for projection	t=1,008 to t=6,048
α	8.627E-06
β	1.026E+00
Calculated Lifetime	L70(6k) = 44,300 hours
Reported Lifetime	L70(6k) > 36,300 hours

LM-80 Data For The Official TM-21 Calculator*

Time (hours)	Lumen Maintenance
0	100.0000%
168	99.8840%
1008	101.0460%
1512	100.6360%
2016	100.9320%
2520	100.9060%
3024	100.7330%
3528	99.8060%
4032	99.7120%
4536	98.1920%
5040	97.6160%
5544	97.6730%
6048	97.2040%



* <http://www.energystar.gov/TM-21calculator>

Suggestion for exporting the LM-80 data:

1. Copy above table from PDF & paste into Microsoft Word.
2. Copy table out of Word & paste into Microsoft Excel (Match destination formatting)