Cree® XLamp® CXA2530 White LEDs

INFORMATION REQUIRED BY LM-80-08

Cree classifies these LEDs as "LED arrays" (Section 3.7) per Sep 9, 2011 ENERGY STAR guidelines[1]: 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 CXA2530 White LEDs (Series: CXA2530) This LM-80 report is applicable to the following order codes: CXA2530-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 lifetime 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

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REVISION HISTORY

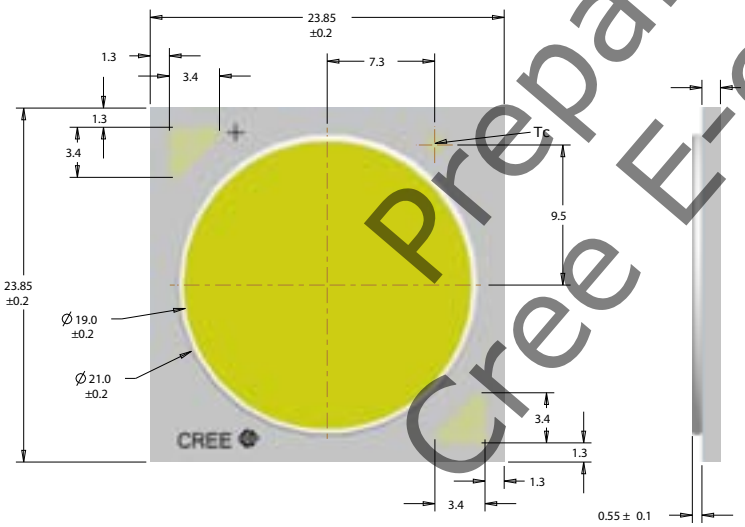
Revision	Date	Change
0	Apr 18, 2013	Date of first issue

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
3050-1	105°C	105°C	808 mA	97.4%	0.0014	L70(6k) > 36,300 hrs
3050-2	85°C	85°C	1212 mA	97.4%	0.0016	L70(6k) > 36,300 hrs
2530-1	85°C	85°C	1400 mA	97.4%	0.0011	L70(6k) > 36,300 hrs

MECHANICAL DIMENSIONS & TEMPERATURE MEASUREMENT POINT

Dimensions are in mm. Tolerances unless otherwise specified:
.x ± .10, .xx ± .03, .xxx ± .010, x° ± 1°, x ± .10



DATA SET 3050-1: 105°C; 808 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 808 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	1500 mA
Average Current-Per-Die	9.615 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	105°C
Ambient Temperature [T_A]	105°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	6370	38.48	3062	3000	99.5	99.2	99.2	98.6	98.4	98.2	98.0	98.2	98.4	97.8	97.2	97.6
2	6279	38.48	3058	3000	99.4	99.4	99.2	98.9	98.8	98.5	98.3	98.5	98.7	98.2	97.6	97.8
3	6361	38.63	3064	3000	99.3	99.9	99.5	98.9	98.8	98.6	98.9	98.9	98.7	98.4	98.5	98.2
4	6302	38.47	3069	3000	99.3	99.7	99.3	98.7	98.4	98.4	98.5	98.4	98.1	98.2	98.2	97.8
5	6125	38.34	2973	3000	99.3	99.3	99.7	99.0	98.6	98.7	98.6	98.6	98.1	98.6	98.7	98.6
6	6066	38.24	3003	3000	99.5	99.8	100.2	99.4	99.0	99.2	99.0	98.8	98.2	98.7	98.6	98.6
7	6249	38.64	3009	3000	99.1	98.2	98.0	97.9	97.8	97.3	97.4	97.5	97.6	97.3	97.4	96.9
8	6255	38.76	2968	3000	99.0	97.8	98.1	98.0	97.5	97.6	97.2	97.9	97.9	97.6	97.3	97.5
9	6253	38.61	2993	3000	99.2	98.6	98.5	98.1	98.1	97.9	98.0	97.6	97.5	97.3	97.2	97.4
10	6309	38.74	2959	3000	99.2	98.5	98.5	98.2	98.2	97.8	98.0	97.6	97.7	97.1	97.2	97.4
11	6149	37.86	2971	3000	98.9	98.5	98.1	97.7	98.2	97.8	97.8	97.8	97.6	97.4	97.6	95.9
12	6244	37.92	3018	3000	99.2	99.0	98.6	98.5	98.5	98.2	98.2	98.0	98.0	97.7	97.9	96.2
13	6381	38.01	3016	3000	99.0	98.6	98.4	98.2	98.4	98.2	98.2	97.9	98.0	98.0	96.4	97.6
14	6236	37.56	3073	3000	98.3	98.2	97.9	97.6	96.8	97.3	96.8	96.8	96.7	96.6	96.9	96.2
15	6253	38.81	2926	3000	99.6	100.2	99.0	98.4	98.0	99.0	98.7	99.3	99.0	98.6	97.9	98.2
16	5856	38.66	2981	3000	99.5	99.3	99.4	98.1	97.4	98.7	98.5	99.0	98.9	98.1	97.4	97.8
17	5939	37.97	2946	3000	99.5	98.5	98.2	98.4	98.7	98.5	99.3	98.8	98.7	98.4	98.1	98.1
18	6455	38.89	3031	3000	99.7	98.5	97.9	97.0	98.0	98.9	99.1	98.7	98.9	97.8	98.4	97.0
19	6463	38.94	3094	3000	99.8	99.2	98.0	97.8	97.8	98.5	98.7	98.4	98.8	98.0	98.3	97.8
20	6362	38.87	3067	3000	99.9	99.0	98.6	97.9	98.2	98.8	98.8	98.6	98.9	98.4	98.4	98.5
21	6698	38.99	3091	3000	99.9	98.6	98.2	98.3	98.4	98.7	98.8	98.6	98.9	98.2	98.1	97.4
22	6361	38.90	3043	3000	98.6	98.7	98.3	97.5	98.3	98.4	98.7	98.0	98.4	98.3	97.6	96.7
23	5986	38.96	2917	3000	100.0	100.1	99.5	99.9	99.3	99.0	99.1	99.2	98.7	98.6	98.3	98.1
24	6284	39.35	2927	3000	100.0	99.6	99.4	99.9	99.4	99.0	98.7	98.6	97.4	97.9	97.7	97.1
25	6266	39.78	3039	3000	98.9	98.5	98.0	98.2	98.1	97.8	97.4	97.3	96.8	96.6	96.1	95.9
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean	**6260**	**38.59**			**99.3**	**99.0**	**98.7**	**98.4**	**98.3**	**98.4**	**98.4**	**98.3**	**98.2**	**97.9**	**97.7**	**97.4**
Median	6266	38.64			99.3	99.0	98.5	98.2	98.3	98.5	98.5	98.4	98.2	98.0	97.7	97.6
σ	176	0.49			0.43	0.64	0.67	0.68	0.58	0.53	0.65	0.62	0.66	0.59	0.69	0.80
Min.	5856	37.56			98.3	97.8	97.9	97.0	96.8	97.3	96.8	96.8	96.7	96.6	96.1	95.9
Max.	6698	39.78			100.0	100.2	100.2	99.9	99.4	99.2	99.3	99.3	99.0	98.7	98.7	98.6

DATA SET 3050-1: 105°C; 808 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 808 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	1500 mA
Average Current-Per-Die	9.615 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	105°C
Ambient Temperature [T_A]	105°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	0.4336	0.4041	3062	3000	0.0007	0.0011	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0014	0.0014	0.0015
2	0.4344	0.4053	3058	3000	0.0007	0.0010	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
3	0.4336	0.4043	3064	3000	0.0007	0.0011	0.0012	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016
4	0.4335	0.4046	3069	3000	0.0007	0.0010	0.0012	0.0013	0.0014	0.0013	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015
5	0.4411	0.4088	2973	3000	0.0007	0.0010	0.0012	0.0013	0.0013	0.0014	0.0015	0.0014	0.0014	0.0014	0.0014	0.0015
6	0.4389	0.4079	3003	3000	0.0008	0.0010	0.0012	0.0012	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016
7	0.4405	0.4120	3009	3000	0.0006	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0012	0.0011	0.0013	0.0012
8	0.4437	0.4135	2968	3000	0.0006	0.0012	0.0012	0.0012	0.0013	0.0013	0.0014	0.0011	0.0011	0.0011	0.0013	0.0012
9	0.4421	0.4133	2993	3000	0.0006	0.0010	0.0010	0.0011	0.0011	0.0010	0.0011	0.0010	0.0011	0.0011	0.0013	0.0012
10	0.4453	0.4157	2959	3000	0.0005	0.0009	0.0010	0.0011	0.0011	0.0010	0.0011	0.0010	0.0011	0.0011	0.0012	0.0012
11	0.4436	0.4137	2971	3000	0.0005	0.0010	0.0010	0.0010	0.0011	0.0011	0.0012	0.0011	0.0012	0.0013	0.0013	0.0012
12	0.4401	0.4124	3018	3000	0.0006	0.0010	0.0011	0.0010	0.0011	0.0012	0.0012	0.0012	0.0013	0.0014	0.0013	0.0013
13	0.4404	0.4127	3016	3000	0.0006	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0011	0.0013
14	0.4327	0.4034	3073	3000	0.0007	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014	0.0015	0.0015	0.0014
15	0.4478	0.4164	2926	3000	0.0009	0.0010	0.0010	0.0011	0.0012	0.0013	0.0013	0.0014	0.0015	0.0014	0.0015	0.0015
16	0.4430	0.4137	2981	3000	0.0008	0.0010	0.0013	0.0012	0.0012	0.0013	0.0012	0.0012	0.0013	0.0012	0.0012	0.0013
17	0.4436	0.4104	2946	3000	0.0008	0.0011	0.0011	0.0012	0.0013	0.0012	0.0011	0.0013	0.0013	0.0013	0.0013	0.0014
18	0.4372	0.4079	3031	3000	0.0009	0.0008	0.0010	0.0011	0.0012	0.0012	0.0012	0.0012	0.0012	0.0011	0.0013	0.0012
19	0.4312	0.4027	3094	3000	0.0008	0.0010	0.0013	0.0014	0.0014	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0015
20	0.4333	0.4039	3067	3000	0.0008	0.0010	0.0012	0.0011	0.0013	0.0013	0.0013	0.0013	0.0014	0.0015	0.0014	0.0015
21	0.4310	0.4018	3091	3000	0.0009	0.0013	0.0015	0.0015	0.0015	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015
22	0.4368	0.4084	3043	3000	0.0008	0.0010	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0016
23	0.4443	0.4085	2917	3000	0.0008	0.0010	0.0011	0.0013	0.0012	0.0013	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015
24	0.4444	0.4097	2927	3000	0.0008	0.0009	0.0009	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0013	0.0013	0.0014
25	0.4354	0.4049	3039	3000	0.0007	0.0008	0.0010	0.0010	0.0012	0.0011	0.0012	0.0013	0.0013	0.0014	0.0015	0.0015
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean					**0.0007**	**0.0010**	**0.0011**	**0.0012**	**0.0012**	**0.0012**	**0.0013**	**0.0013**	**0.0013**	**0.0013**	**0.0014**	**0.0014**
Median					0.0007	0.0010	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	0.0014	0.0014	0.0014	0.0014
σ					0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Min.					0.0005	0.0008	0.0009	0.0010	0.0010	0.0010	0.0011	0.0010	0.0011	0.0011	0.0011	0.0012
Max.					0.0009	0.0013	0.0015	0.0015	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016

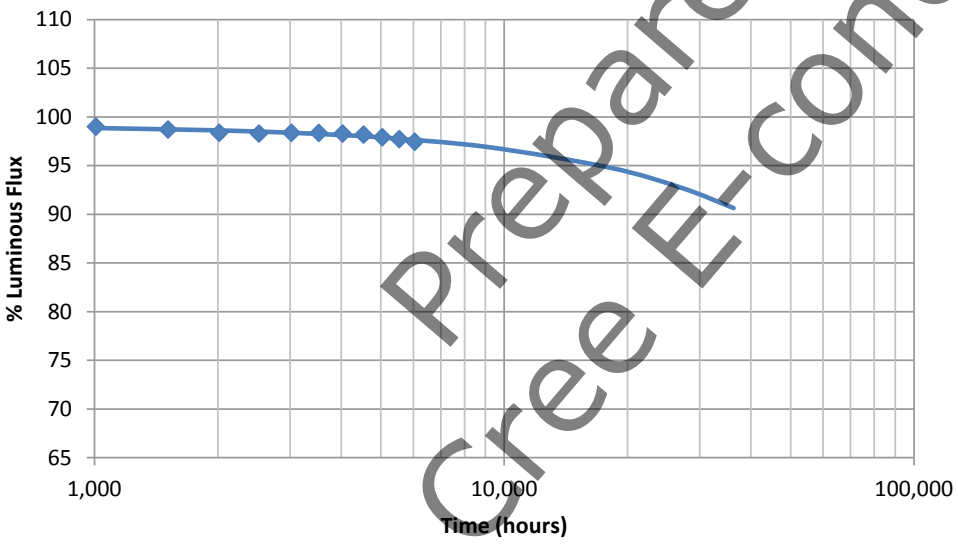
DATA SET 3050-1: 105°C; 808 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 808 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	1500 mA
Average Current-Per-Die	9.615 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	105°C
Ambient Temperature [T_A]	105°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	2.454E-06
β	9.909E-01
Calculated Lifetime	L70(6k) = 142,000 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	99.3400%
1008	99.0010%
1512	98.7070%
2016	98.3670%
2520	98.2900%
3024	98.3680%
3528	98.3550%
4032	98.2890%
4536	98.1830%
5040	97.9150%
5544	97.7200%
6048	97.4490%

* 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)

DATA SET 3050-2: 85°C; 1212 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1212 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	2250 mA
Average Current-Per-Die	14.423 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	8335	39.91	3069	3000	99.7	100.4	99.8	99.9	99.4	98.8	98.3	99.2	98.8	98.3	98.0	97.7
2	8241	39.91	3064	3000	99.9	100.3	99.8	100.0	99.6	98.9	98.5	99.2	98.9	98.6	98.1	97.7
3	8204	39.35	2963	3000	99.8	100.3	100.0	99.8	99.8	98.8	99.2	99.9	99.4	99.4	98.9	98.9
4	8444	39.47	2967	3000	100.7	100.6	100.4	100.1	99.9	99.8	99.4	99.0	99.0	98.6	98.8	98.8
5	8427	39.63	2920	3000	100.3	99.7	99.7	99.5	99.3	99.0	98.8	98.4	98.4	98.0	97.9	96.7
6	8721	40.67	2976	3000	99.2	99.3	99.0	98.8	98.3	98.5	98.4	98.2	98.2	98.0	98.0	97.1
7	8522	39.77	2993	3000	99.3	99.7	99.4	99.3	98.3	99.0	98.9	98.3	98.4	98.0	98.3	97.5
8	8238	40.04	2964	3000	100.2	100.4	99.8	99.3	98.6	98.7	98.6	98.7	98.5	98.2	97.7	97.4
9	8126	40.19	2968	3000	100.2	100.0	99.5	98.7	98.7	98.7	98.6	98.5	98.3	97.8	97.3	96.3
10	8133	39.93	2950	3000	100.5	100.5	100.4	99.7	99.0	99.0	98.4	98.7	98.2	97.3	97.6	97.5
11	8230	40.00	2954	3000	100.4	99.3	98.8	98.7	98.7	98.5	98.8	98.0	98.4	98.0	97.4	97.3
12	8083	39.91	2966	3000	100.6	99.9	99.7	99.7	99.5	99.1	99.1	98.5	98.9	98.6	97.8	97.7
13	8289	40.37	3181	3000	99.3	99.2	99.2	99.7	99.5	99.4	99.2	99.1	98.4	98.1	97.4	97.3
14	8188	40.30	3137	3000	99.4	98.8	99.0	99.4	99.1	98.7	98.3	98.3	97.8	97.7	96.8	96.8
15	8429	41.11	2949	3000	98.9	99.0	99.3	99.4	99.1	99.1	98.5	98.7	98.0	97.6	97.4	97.0
16	8426	40.75	2969	3000	98.8	99.1	99.1	99.4	99.1	99.1	98.5	98.7	97.9	97.6	97.6	97.0
17	8372	40.86	2913	3000	98.7	99.0	99.2	99.4	99.1	98.9	98.5	98.8	98.1	97.8	97.7	97.2
18	8354	40.95	2973	3000	98.8	99.1	99.2	99.3	99.0	98.9	98.3	98.6	97.9	97.6	97.3	96.5
19	8413	41.13	2949	3000	99.4	99.8	99.8	99.6	99.6	99.2	98.9	98.9	98.3	98.0	97.9	97.1
20	8402	40.93	2977	3000	98.9	99.5	99.3	99.3	98.9	99.0	98.9	98.8	98.3	97.8	97.8	97.1
21	8347	40.98	2918	3000	99.2	99.5	99.5	99.4	99.1	99.0	98.8	98.8	98.2	97.9	97.8	97.1
22	8393	40.80	2960	3000	99.0	99.5	99.3	99.3	99.3	99.1	98.8	98.8	98.3	98.0	98.0	97.0
23	8356	41.00	3069	3000	99.9	100.1	99.8	100.1	99.9	99.7	99.3	99.1	99.2	98.7	98.0	98.3
24	8414	40.76	3017	3000	99.6	99.8	99.4	99.8	99.7	99.5	99.1	99.1	98.0	97.7	97.0	97.3
25	8346	40.82	3013	3000	99.9	100.0	99.9	100.1	99.9	99.6	99.3	99.2	98.7	98.4	97.9	98.1
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean	**8337**	**40.38**			**99.6**	**99.7**	**99.5**	**99.5**	**99.2**	**99.0**	**98.8**	**98.8**	**98.4**	**98.1**	**97.8**	**97.4**
Median	8354	40.37			99.6	99.7	99.5	99.4	99.1	99.0	98.8	98.8	98.3	98.0	97.8	97.3
σ	139	0.56			0.62	0.52	0.42	0.39	0.47	0.34	0.35	0.40	0.42	0.46	0.47	0.62
Min.	8083	39.35			98.7	98.8	98.8	98.7	98.3	98.5	98.3	98.0	97.8	97.3	96.8	96.3
Max.	8721	41.13			100.7	100.6	100.4	100.1	99.9	99.8	99.4	99.9	99.4	99.4	98.9	98.9

DATA SET 3050-2: 85°C; 1212 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1212 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	2250 mA
Average Current-Per-Die	14.423 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	0.4343	0.4063	3069	3000	0.0006	0.0008	0.0009	0.0010	0.0009	0.0009	0.0010	0.0011	0.0012	0.0011	0.0013	0.0013
2	0.4346	0.4064	3064	3000	0.0006	0.0008	0.0008	0.0009	0.0009	0.0009	0.0009	0.0011	0.0011	0.0012	0.0011	0.0012
3	0.4437	0.4128	2963	3000	0.0006	0.0010	0.0011	0.0012	0.0012	0.0013	0.0014	0.0013	0.0013	0.0014	0.0014	0.0014
4	0.4428	0.4116	2967	3000	0.0010	0.0012	0.0013	0.0013	0.0013	0.0015	0.0015	0.0015	0.0016	0.0017	0.0017	0.0018
5	0.4467	0.4134	2920	3000	0.0009	0.0012	0.0013	0.0013	0.0013	0.0014	0.0016	0.0015	0.0016	0.0017	0.0018	0.0018
6	0.4415	0.4100	2976	3000	0.0010	0.0014	0.0014	0.0014	0.0015	0.0016	0.0015	0.0016	0.0016	0.0017	0.0017	0.0018
7	0.4400	0.4089	2993	3000	0.0011	0.0013	0.0014	0.0015	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0017	0.0017
8	0.4454	0.4164	2964	3000	0.0009	0.0011	0.0013	0.0015	0.0015	0.0016	0.0016	0.0016	0.0016	0.0017	0.0018	0.0018
9	0.4449	0.4159	2968	3000	0.0009	0.0013	0.0014	0.0014	0.0015	0.0017	0.0015	0.0016	0.0017	0.0018	0.0018	0.0019
10	0.4462	0.4162	2950	3000	0.0010	0.0011	0.0012	0.0014	0.0016	0.0016	0.0018	0.0018	0.0017	0.0020	0.0019	0.0019
11	0.4460	0.4163	2954	3000	0.0009	0.0017	0.0016	0.0018	0.0017	0.0018	0.0017	0.0018	0.0018	0.0018	0.0019	0.0020
12	0.4454	0.4167	2966	3000	0.0009	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0017	0.0016	0.0017
13	0.4194	0.3864	3181	3000	0.0009	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0013	0.0013	0.0015
14	0.4256	0.3956	3137	3000	0.0009	0.0009	0.0010	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0014
15	0.4442	0.4121	2949	3000	0.0008	0.0008	0.0009	0.0009	0.0010	0.0011	0.0011	0.0012	0.0013	0.0014	0.0015	0.0017
16	0.4424	0.4111	2969	3000	0.0008	0.0008	0.0009	0.0010	0.0010	0.0011	0.0011	0.0013	0.0013	0.0013	0.0016	0.0017
17	0.4452	0.4096	2913	3000	0.0010	0.0010	0.0011	0.0012	0.0012	0.0012	0.0013	0.0015	0.0016	0.0017	0.0018	0.0019
18	0.4404	0.4074	2973	3000	0.0009	0.0009	0.0010	0.0011	0.0011	0.0012	0.0013	0.0014	0.0015	0.0015	0.0017	0.0019
19	0.4438	0.4113	2949	3000	0.0008	0.0008	0.0009	0.0009	0.0010	0.0010	0.0011	0.0012	0.0013	0.0014	0.0015	0.0016
20	0.4414	0.4098	2977	3000	0.0007	0.0008	0.0009	0.0010	0.0010	0.0011	0.0011	0.0012	0.0013	0.0014	0.0015	0.0016
21	0.4449	0.4097	2918	3000	0.0009	0.0010	0.0010	0.0011	0.0012	0.0012	0.0013	0.0014	0.0015	0.0016	0.0018	0.0019
22	0.4419	0.4088	2960	3000	0.0008	0.0009	0.0010	0.0010	0.0011	0.0012	0.0012	0.0013	0.0014	0.0015	0.0016	0.0017
23	0.4372	0.4127	3069	3000	0.0006	0.0007	0.0008	0.0009	0.0009	0.0010	0.0009	0.0009	0.0010	0.0010	0.0011	0.0012
24	0.4378	0.4073	3017	3000	0.0007	0.0008	0.0009	0.0010	0.0010	0.0011	0.0010	0.0010	0.0012	0.0012	0.0012	0.0014
25	0.4368	0.4048	3013	3000	0.0007	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0013	0.0013	0.0013	0.0015
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean					**0.0008**	**0.0010**	**0.0011**	**0.0012**	**0.0012**	**0.0013**	**0.0013**	**0.0014**	**0.0014**	**0.0015**	**0.0015**	**0.0016**
Median					0.0009	0.0009	0.0010	0.0011	0.0011	0.0012	0.0013	0.0013	0.0014	0.0015	0.0016	0.0017
σ					0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0002	0.0003	0.0002	0.0002
Min.					0.0006	0.0007	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0011	0.0012
Max.					0.0011	0.0017	0.0016	0.0018	0.0017	0.0018	0.0018	0.0018	0.0018	0.0020	0.0019	0.0020

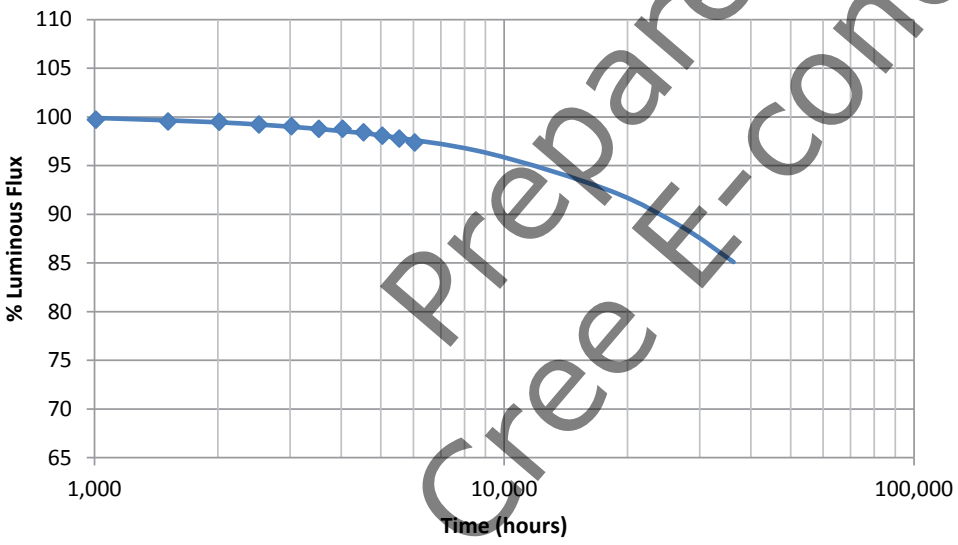
DATA SET 3050-2: 85°C; 1212 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1212 mA
Tested Model Number	CXA3050-0000-000N00W230F
Tested Drive Current [I_F]	2250 mA
Average Current-Per-Die	14.423 mA per die
Testing Initiation Date	June 15, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	4.543E-06
β	1.003E+00
Calculated Lifetime	L70(6k) = 79,200 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	99.6260%
1008	99.7130%
1512	99.5300%
2016	99.4980%
2520	99.2210%
3024	99.0440%
3528	98.7780%
4032	98.7830%
4536	98.4200%
5040	98.0740%
5544	97.7760%
6048	97.3750%

* 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)

DATA SET 2530-1: 85°C; 1400 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1400 mA
Tested Model Number	CXA2530-0000-000N00S430F
Tested Drive Current [I_F]	1400 mA
Average Current-Per-Die	16.667 mA per die
Testing Initiation Date	June 12, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	5287	40.83	3064	3000	99.7	100.0	100.2	100.3	99.7	99.5	99.8	99.0	98.6	98.3	98.9	98.4
2	5267	41.63	3064	3000	99.3	98.9	99.9	99.5	98.9	98.8	98.6	98.9	98.9	98.4	98.5	98.2
3	5201	40.84	3082	3000	99.8	100.2	100.3	100.4	99.9	99.7	99.9	99.2	99.0	98.7	99.2	98.8
4	5274	41.48	3062	3000	99.5	98.7	99.2	99.2	98.6	98.4	98.0	98.2	98.4	97.8	97.2	97.6
5	5199	41.48	3058	3000	99.4	99.4	99.2	98.9	98.8	98.5	98.3	98.5	98.7	98.2	97.6	97.8
6	5218	41.47	3069	3000	99.3	99.7	99.3	98.7	98.4	98.4	98.5	98.4	98.1	98.2	98.2	97.8
7	5064	41.40	3037	3000	99.3	99.6	99.0	98.7	98.7	98.5	98.4	98.4	98.3	98.5	98.0	97.9
8	5148	41.13	2967	3000	99.0	98.1	97.8	97.9	98.0	97.8	97.9	98.1	97.9	98.1	97.6	97.8
9	5048	40.50	3006	3000	99.1	98.7	98.2	98.3	97.5	97.4	97.1	96.7	96.2	96.6	96.9	96.3
10	4975	40.50	2912	3000	98.9	98.4	97.7	97.5	97.1	97.0	96.6	96.1	95.5	95.9	96.3	95.7
11	5090	40.47	3047	3000	99.0	98.6	98.1	97.9	97.5	97.3	97.1	96.8	96.5	96.7	96.9	96.4
12	5000	40.42	3017	3000	99.3	98.9	98.3	98.1	97.6	97.5	97.3	97.1	97.0	97.0	97.0	96.6
13	5079	40.42	3049	3000	99.0	98.6	98.3	97.9	97.5	97.2	97.1	97.0	96.9	97.0	97.1	96.7
14	5224	40.74	3005	3000	99.4	98.5	98.8	98.8	98.7	98.0	97.3	97.7	97.5	97.6	97.8	97.4
15	5137	40.73	3008	3000	99.3	98.6	98.6	98.8	98.5	98.0	97.4	97.8	97.7	97.8	97.9	97.5
16	5256	40.71	3007	3000	99.4	98.7	98.4	98.5	97.8	97.0	98.0	97.9	97.8	97.7	97.7	97.3
17	5189	41.55	3054	3000	99.3	98.7	98.6	98.8	98.4	97.2	98.0	97.9	97.9	97.9	98.0	97.8
18	5285	41.49	3069	3000	99.5	99.0	98.9	98.3	98.3	98.5	98.4	98.3	97.8	97.7	97.6	97.4
19	5225	41.49	3072	3000	99.4	98.9	98.9	98.5	98.4	98.6	98.4	98.2	98.0	98.0	98.0	97.7
20	5244	40.84	3130	3000	99.8	99.0	99.2	98.8	98.7	98.6	98.3	98.2	98.2	98.2	97.2	96.6
21	5157	40.81	3132	3000	99.8	99.3	99.3	99.0	98.8	98.7	98.5	98.5	98.4	98.4	97.8	96.9
22	5115	41.24	3031	3000	99.3	99.2	99.0	98.9	98.8	98.5	98.3	98.1	98.2	98.0	97.8	98.2
23	5033	41.15	3027	3000	99.2	99.1	98.7	98.7	98.7	98.4	98.1	98.3	98.3	98.1	97.9	98.1
24	5224	40.78	3121	3000	99.4	98.4	98.3	97.9	97.8	97.7	97.4	97.3	97.2	97.4	97.6	96.6
25	5178	40.82	3116	3000	99.5	98.7	98.6	97.8	98.0	97.8	97.7	97.4	97.2	97.6	98.0	97.4
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean	**5165**	**41.00**			**99.3**	**99.0**	**98.8**	**98.6**	**98.4**	**98.1**	**98.0**	**97.9**	**97.8**	**97.7**	**97.7**	**97.4**
Median	5189	40.84			99.3	98.9	98.8	98.7	98.4	98.4	98.0	98.1	97.9	97.9	97.8	97.5
σ	92	0.41			0.25	0.51	0.67	0.70	0.68	0.73	0.78	0.76	0.85	0.66	0.64	0.75
Min.	4975	40.42			98.9	98.1	97.7	97.5	97.1	97.0	96.6	96.1	95.5	95.9	96.3	95.7
Max.	5287	41.63			99.8	100.2	100.3	100.4	99.9	99.7	99.9	99.2	99.0	98.7	99.2	98.8

DATA SET 2530-1: 85°C; 1400 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1400 mA
Tested Model Number	CXA2530-0000-000N00S430F
Tested Drive Current [I_F]	1400 mA
Average Current-Per-Die	16.667 mA per die
Testing Initiation Date	June 12, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	0.4341	0.4053	3064	3000	0.0001	0.0005	0.0005	0.0007	0.0008	0.0008	0.0009	0.0009	0.0009	0.0008	0.0010	0.0010
2	0.4336	0.4043	3064	3000	0.0002	0.0004	0.0007	0.0009	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012
3	0.4322	0.4034	3082	3000	0.0001	0.0005	0.0005	0.0007	0.0008	0.0009	0.0009	0.0009	0.0008	0.0008	0.0010	0.0009
4	0.4336	0.4041	3062	3000	0.0003	0.0005	0.0007	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0010	0.0011
5	0.4344	0.4053	3058	3000	0.0003	0.0007	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0010	0.0010	0.0010
6	0.4335	0.4046	3069	3000	0.0002	0.0006	0.0008	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
7	0.4346	0.4031	3037	3000	0.0003	0.0007	0.0009	0.0010	0.0011	0.0011	0.0012	0.0011	0.0012	0.0012	0.0013	0.0013
8	0.4389	0.4035	2967	3000	0.0003	0.0008	0.0010	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014
9	0.4416	0.4138	3006	3000	0.0004	0.0006	0.0008	0.0009	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012
10	0.4494	0.4179	2912	3000	0.0004	0.0007	0.0008	0.0010	0.0011	0.0011	0.0012	0.0012	0.0011	0.0012	0.0013	0.0013
11	0.4376	0.4106	3047	3000	0.0004	0.0007	0.0008	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013
12	0.4405	0.4131	3017	3000	0.0004	0.0007	0.0009	0.0010	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0014	0.0013
13	0.4378	0.4115	3049	3000	0.0004	0.0007	0.0008	0.0010	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
14	0.4400	0.4104	3005	3000	0.0003	0.0006	0.0009	0.0010	0.0010	0.0009	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012
15	0.4397	0.4102	3008	3000	0.0003	0.0006	0.0009	0.0010	0.0010	0.0009	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011
16	0.4403	0.4112	3007	3000	0.0002	0.0005	0.0008	0.0010	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012
17	0.4356	0.4072	3054	3000	0.0002	0.0005	0.0008	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
18	0.4336	0.4049	3069	3000	0.0003	0.0008	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012	0.0012	0.0012
19	0.4333	0.4046	3072	3000	0.0003	0.0008	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0012	0.0012
20	0.4296	0.4035	3130	3000	0.0003	0.0007	0.0008	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010	0.0010	0.0011	0.0009
21	0.4294	0.4034	3132	3000	0.0003	0.0007	0.0008	0.0009	0.0009	0.0010	0.0009	0.0010	0.0010	0.0010	0.0010	0.0008
22	0.4356	0.4045	3031	3000	0.0003	0.0006	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0009	0.0010
23	0.4360	0.4048	3027	3000	0.0003	0.0006	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0010	0.0010	0.0010	0.0010
24	0.4303	0.4040	3121	3000	0.0003	0.0008	0.0009	0.0009	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
25	0.4308	0.4044	3116	3000	0.0004	0.0007	0.0009	0.0009	0.0010	0.0010	0.0011	0.0010	0.0010	0.0010	0.0010	0.0011
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mean					**0.0003**	**0.0006**	**0.0008**	**0.0009**	**0.0010**	**0.0010**	**0.0011**	**0.0011**	**0.0011**	**0.0011**	**0.0011**	**0.0011**
Median					0.0003	0.0007	0.0008	0.0010	0.0010	0.0010	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
σ					0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
Min.					0.0001	0.0004	0.0005	0.0007	0.0008	0.0008	0.0009	0.0009	0.0008	0.0008	0.0009	0.0008
Max.					0.0004	0.0008	0.0010	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	0.0013	0.0014	0.0014

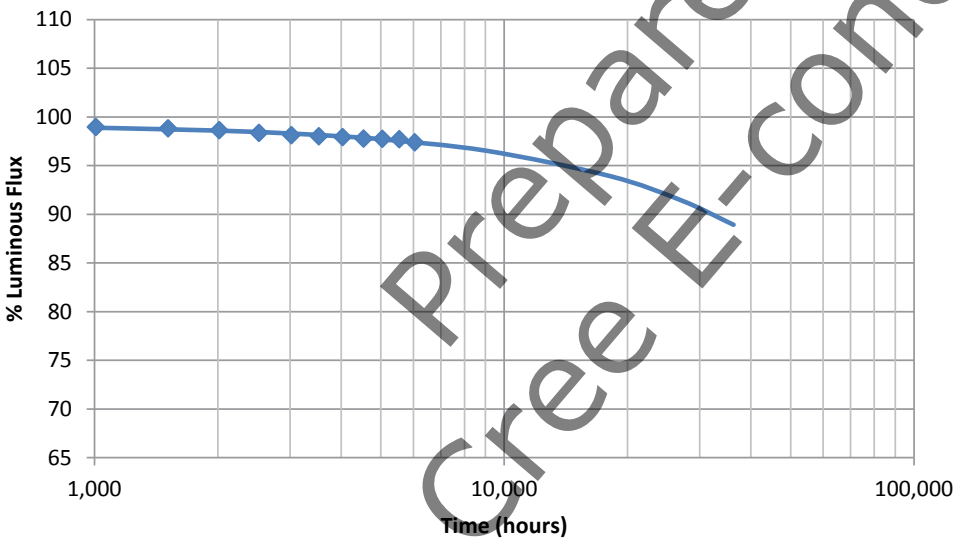
DATA SET 2530-1: 85°C; 1400 mA

LED Array Series	XLamp CXA2530 White LEDs (Series: CXA2530) This LM-80 data set is applicable to the following order codes and currents: CXA2530-xxxx-xxxxxxxxxxx 1400 mA
Tested Model Number	CXA2530-0000-000N00S430F
Tested Drive Current [I_F]	1400 mA
Average Current-Per-Die	16.667 mA per die
Testing Initiation Date	June 12, 2012
Case Temperature [T_s]	85°C
Ambient Temperature [T_A]	85°C
Failures observed	None

This data set meets the all criteria for one LM-80 report to apply to a range of LED arrays, as defined in ENERGY STAR Sep 9, 2011 guidelines, Section 3.7.d. The tested model number and tested drive current are listed in the table above.

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	3.007E-06
β	9.918E-01
Calculated Lifetime	L70(6k) = 116,000 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	99.3430%
1008	98.9630%
1512	98.8280%
2016	98.6390%
2520	98.3610%
3024	98.1240%
3528	98.0140%
4032	97.9260%
4536	97.7720%
5040	97.7490%
5544	97.7100%
6048	97.3930%

* 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)