



Product Summary

Product Description	Type	Test Number	Input Wattage (W)	LED Current (mA)	Total Lumens	Efficacy (L/W)	L70 (hours)
CAN12, 40W, 45K-60K, T5	LM79 ₁	15213	36W	500mA	2135	59	>85,000
CAN12, 55W, 45K-60K, T5	LM79 ₁	21906	50W	700mA	2546	50	>55,000

1. LM79 is done with 45K or 60K CCTs, however same minimum flux bins are used for CCT of 45K and 60K products

Summary of CCT / CRI Testing

	Integrating Sphere Test ₁	CCT	CRI
Integrating Sphere (45K)	21907	4036K	81.6

1. Typical CCT is 4500K with a CRI >75

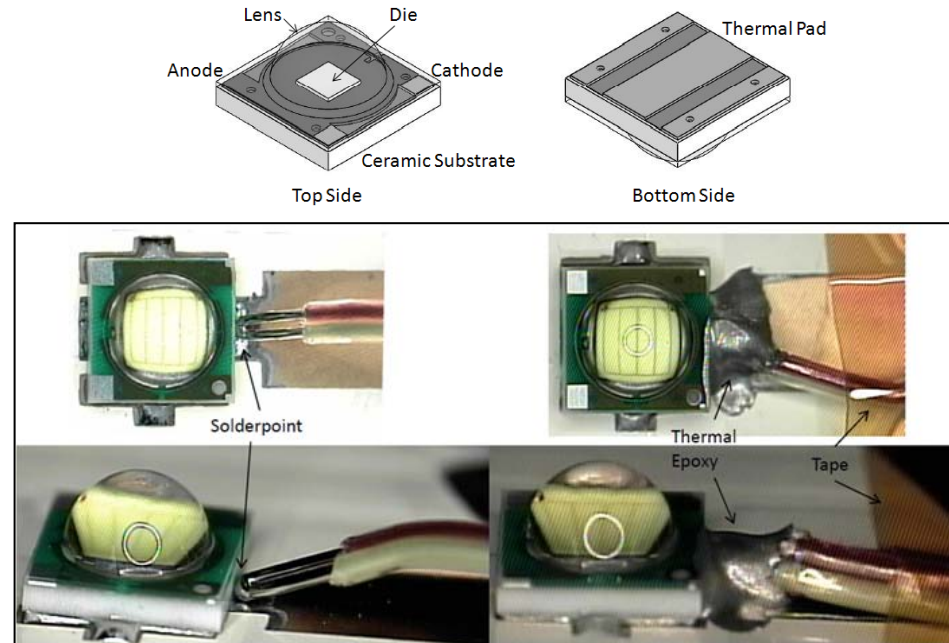
LM80 Lumen Maintenance and L₇₀ Lifetime Projections

Component testing is conducted in accordance with the guidelines in LM-80-08, published by the Illuminating Engineering Society. These guidelines specify the conditions, measurement intervals, and minimum duration of the test. The test takes a minimum of 6000 hours to complete, but this is more feasible than a full lifetime test to L₇₀ – which takes years to complete. The result from the LM-80 test data is a tool that can be used to predict lumen maintenance over time. Figure 1 is a schematic and photograph of the way that the thermal couples were attached at the manufacturer to measure the solder point of the LEDs. Our manufacturer has characterized their packaging so that we can predict junction temperature by knowing the temperature at these soldering points. Appendix A provides the LM80 data and L₇₀ predictions for this product.

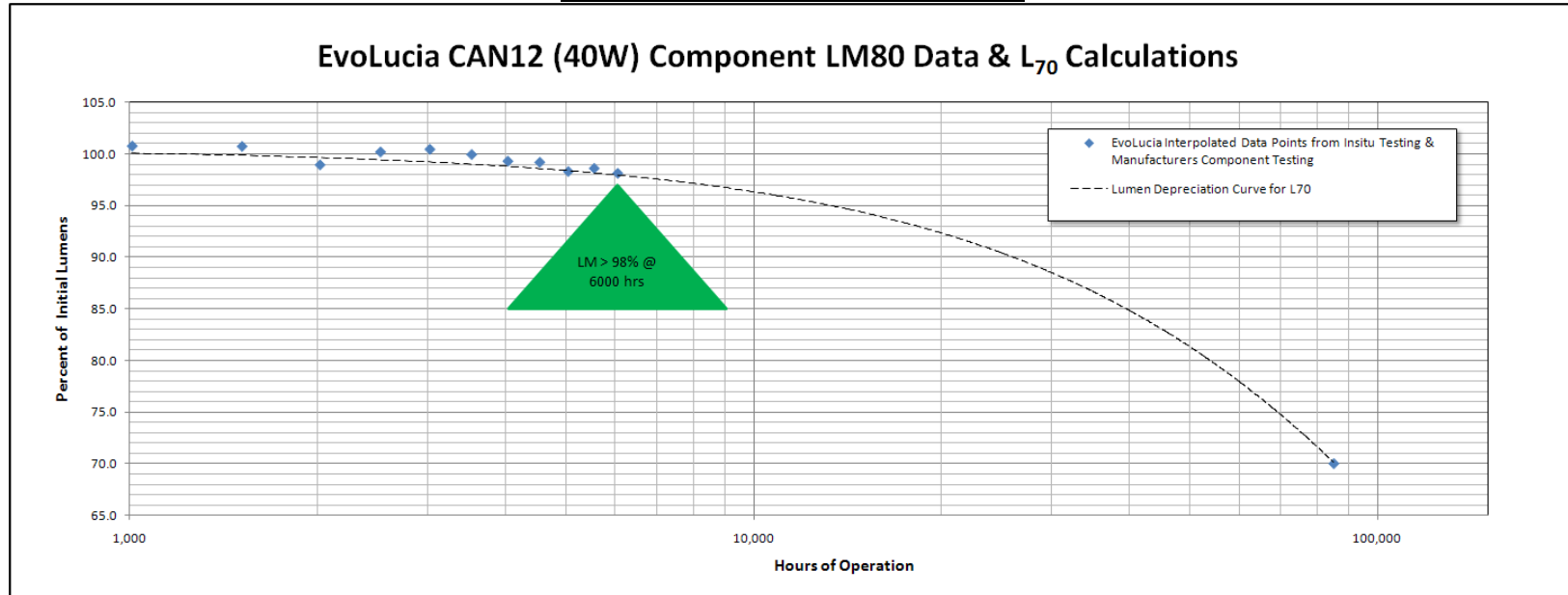
Power Supply:

The power supplies are UL1310/UL48 Class 2 and IP65 certified. They have a constant-current output, providing a DC voltage to the LEDs. Due to this there is no flicker. The power supplies can accept input voltages from 100 VAC to 277 VAC, and up to 480 VAC using an optional transformer. Power factor is better than 0.95 and THD <20%. The power supplies have protection circuits for over-voltage, over-current, over-power, and short-circuit built-in. In the event of a failure, they will automatically recover, so that the luminaire does *not* require the power to be cycled to clear a fault. They comply with EMC directives 47CFR, Part 2, Part 15, and Cispr PUB, 22 Class B. The MTBF is greater than 100,000 hours.

Figure 1

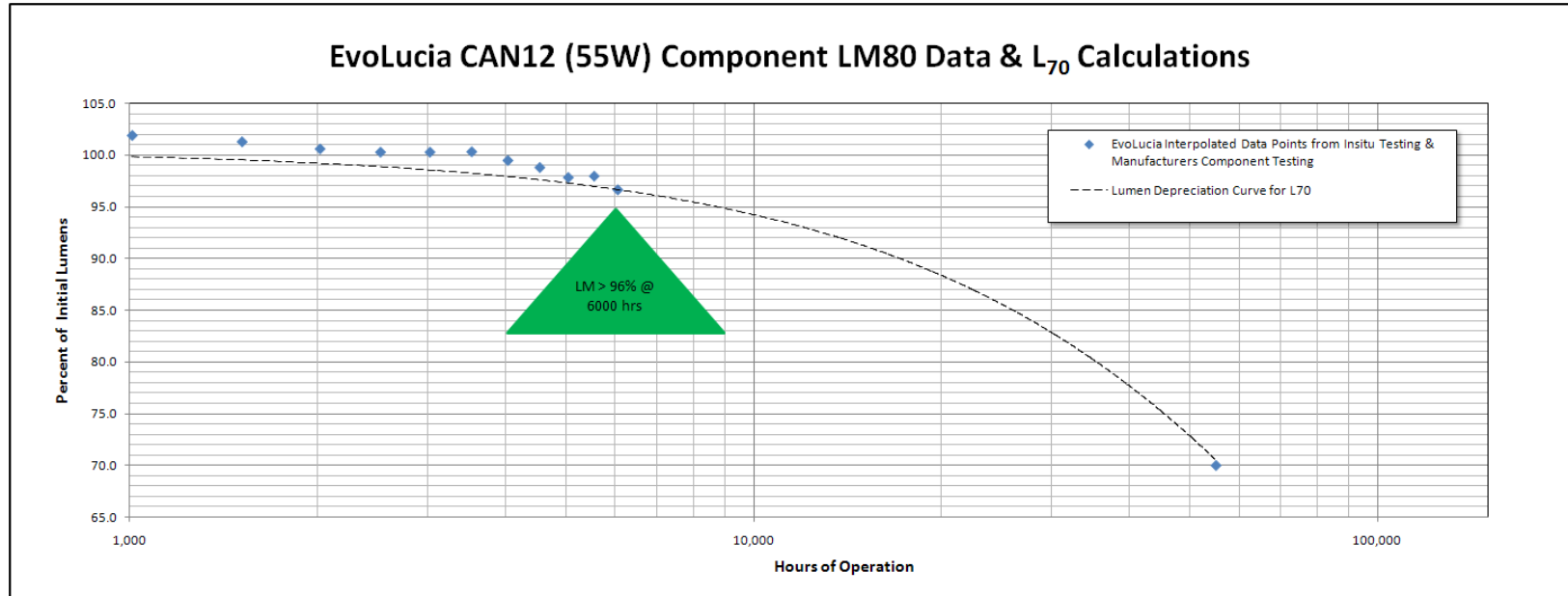


Appendix A – Lumen Maintenance



Manufacturers Component LM80 Data for White LEDs																				L ₇₀		
Comments	LM80 Test Conditions			Statistics				Initial Lumens, Vf		Mean Lumen Maintenance (%)										Greater Than 85,000		
	T _{s,a} (C)	T _j (C)	If (mA)	n	Sigma	Min	Max	Mean Values		t=0	1008	1512	2016	2520	3024	3528	4032	4536	5040		5544	6048
XPE WHT	85	105	700	27	4.4	66.2	81.1	74.94	3.10	100.0	101.9	101.3	100.6	100.2	100.2	100.3	99.4	98.8	97.8	97.9	96.6	
XPE WHT	85	95	350	29	3.8	65.9	81.4	75.52	3.08	100.0	99.1	99.1	99.2	99.0	99.3	99.1	98.5	98.2	98.2	98.1	97.8	
XPE WHT	55	75	700	30	5.1	63.9	81.4	74.04	3.10	100.0	102.5	101.5	103.3	101.9	101.7	101.2	101.0	100.9	100.5	100.4	99.4	
XPE WHT	45	66	700	29	5.03	63.9	81.4	74.25	3.09	100.0	97.9	96.6	96.1	96.0	95.6	96.4	96.1	95.7	97.7	96.9	97.7	
EvoLucia Interpolated Data Points from Insitu Testing & Manufacturers Component Testing																						
XPE WHT	85	105	700	27	4.4	66.2	81.1	74.94	3.10	100.0	101.9	101.3	100.6	100.2	100.2	100.3	99.4	98.8	97.8	97.9	96.6	
XPE WHT	55	75	1000	30	4.1	105.1	123.5	118.64	3.02	100.0	100.4	100.5	98.4	100.1	100.5	99.8	99.2	99.3	98.4	98.8	98.6	
CAN12 40W	69	82.5	500				NA			100.0	100.7	100.7	98.9	100.2	100.4	99.9	99.3	99.2	98.3	98.6	98.1	70

Notes:
 1. Interpolation was done using: $L_{TMP} = L_{Below} + (L_{Above} - L_{below} / T_{s,Above} - T_{s,Below}) (TMP_{LED} - T_{s,Below})$ per Energy Star Requirements
 2. L₇₀ is Predicted using an Exponential Degredation Curve Fit from Interpolated Insitu Data based on Mean Lumen Depreciation at 6000 Hrs Operation per Energy Star Requirements
 3. IES TM-21 will be used for L₇₀ calculations when it has been finalized and approved
 4. Thermal data has been scaled & calculated from insitu temperature measurements at max temp or nominal temp conditions (25C ambient) and stated LED drive currents



Manufacturers Component LM80 Data for White LEDs																				L ₇₀	
Comments	LM80 Test Conditions			Statistics				Initial Lumens, Vf		Mean Lumen Maintenance (%)											Greater Than 55,000
	T _{s,a} (C)	T _j (C)	If (mA)	n	Sigma	Min	Max	Mean Values		t=0	1008	1512	2016	2520	3024	3528	4032	4536	5040	5544	
XPE WHT	85	105	700	27	4.4	66.2	81.1	74.94	3.10	100.0	101.9	101.3	100.6	100.2	100.2	100.3	99.4	98.8	97.8	97.9	96.6
XPE WHT	85	95	350	29	3.8	65.9	81.4	75.52	3.08	100.0	99.1	99.1	99.2	99.0	99.3	99.1	98.5	98.2	98.2	98.1	97.8
XPE WHT	55	75	700	30	5.1	63.9	81.4	74.04	3.10	100.0	102.5	101.5	103.3	101.9	101.7	101.2	101.0	100.9	100.5	100.4	99.4
XPE WHT	45	66	700	29	5.03	63.9	81.4	74.25	3.09	100.0	97.9	96.6	96.1	96.0	95.6	96.4	96.1	95.7	97.7	96.9	97.7
EvoLucia Interpolated Data Points from Insitu Testing & Manufacturers Component Testing																					
XPE WHT	85	105	700	27	4.4	66.2	81.1	74.94	3.10	100.0	101.9	101.3	100.6	100.2	100.2	100.3	99.4	98.8	97.8	97.9	96.6
XPE WHT	55	75	700	30	5.1	63.9	81.4	74.04	3.10	100.0	102.5	101.5	103.3	101.9	101.7	101.2	101.0	100.9	100.5	100.4	99.4
CAN12 55W	85	105	700				NA			100.0	101.9	101.3	100.6	100.2	100.2	100.3	99.4	98.8	97.8	97.9	96.6

Notes:

- Interpolation was done using: $L_{TMP} = L_{Below} + (L_{Above} - L_{below} / T_{s,Above} - T_{s,Below}) (TMP_{LED} - T_{s,Below})$ per Energy Star Requirements
- L₇₀ is Predicted using an Exponential Degredation Curve Fit from Interpolated Insitu Data based on Mean Lumen Depreciation at 6000 Hrs Operation per Energy Star Requirements
- IES TM-21 will be used for L₇₀ calculations when it has been finalized and approved
- Thermal data has been scaled & calculated from insitu temperature measurements at max temp or nominal temp conditions (25C ambient typical) and stated LED drive currents