

# Lumen Maintenance Projection of BXEN SMD Products

May 24, 2022

# Non-Disclosure

This presentation contains confidential or proprietary information of Bridgelux, Inc. ("Proprietary Information"), including, for example, information concerning our technology and current or prospective products and business plans. By participating in this discussion, you agree (on your own behalf and on behalf of your company) to: (a) hold the Proprietary Information in strict confidence and not to disclose the Proprietary Information without our consent; (b) use the Proprietary Information solely in contemplation or furtherance of a business relationship with Bridgelux; (c) not to copy the Proprietary Information unless authorized by Bridgelux; (d) exercise a high degree of care to restrict disclosure not authorized by Bridgelux; and (e) Bridgelux' right to make, have made, use, market or sell any products or services, now or in the future, will not be impaired or restricted in any way by virtue of any ideas that you may disclose to Bridgelux. Unless otherwise agreed in a separate written agreement, all information that you disclose to Bridgelux will be deemed and treated as non-confidential.

# Lumen Maintenance Projection of BXEN Series SMD Products

- Lumen maintenance projection of LED light sources follows the IESNA TM-21-11 Method and is in accordance with the ENERGY STAR and Design Lights Consortium requirements.
- Lumen maintenance projection of 2835 SMD is based on 10,000 hours of LM80 test data of BXEN-27E-13H-99N SMD at drive current of 100 mA and solder point temperatures (Tc) of 85 & 105 C.
- Per the table below, Bridgelux certifies that the “Tested” SMDs are equivalent to the “Equivalent” SMDs, per all LM-80, TM-21, Energy Star, and DLC criteria

Tested SMD Part Number	Equivalent SMD Part Number(s)	LM-80 Report Number	Test Hours	Drive Current	Tc	L70 Reported	L70B50 Calculated	L70B20 Calculated	L70B10 Calculated
BXEN-27E-13H-99N	BXEN-XXE-13H-9C1	STD180743NB-B	10,000	100mA	85C	>60,000 hr	121,000 hr	109,000 hr	108,000 hr

L80 Reported	L80B50 Calculated	L80B20 Calculated	L80B10 Calculated	L90 Reported	L90B50 Calculated	L90B20 Calculated	L90B10 Calculated
>60,000 hr	78,000 hr	70,000 hr	69,000 hr	39,000 hr	39,000 hr	36,000 hr	35,000 hr

# Lumen Maintenance Projection Worksheet: L70



Description of LED Light Source Tested (manufacturer, model, catalog number)		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature		Tested Case Temperature 3	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
BXEN-27E-13H-99N Report# STD180743NB-B		0	100.00%	0	100.00%		
		1000	100.54%	1000	100.09%		
		2000	100.50%	2000	99.81%		
		3000	100.29%	3000	99.40%		
		4000	100.11%	4000	99.01%		
		5000	99.96%	5000	98.55%		
		6000	99.50%	6000	98.06%		
		7000	99.44%	7000	97.43%		
		8000	99.06%	8000	96.83%		
		9000	98.72%	9000	96.05%		
		10000	98.38%	10000	95.28%		

  

LM-80 Testing Details	
Total number of units tested per case temperature	20
Number of failures:	0
Number of units measured:	20
Test duration (hours):	10000
Tested drive current (mA):	100
Tested case temperature 1 (T <sub>c</sub> , °C):	85
Tested case temperature 2 (T <sub>c</sub> , °C):	105
Tested case temperature 3 (T <sub>c</sub> , °C):	

  

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	100
In-situ case temperature (T <sub>c</sub> , °C):	85
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	70

  

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	87.08%
Reported L70 (hours):	>60000

Case Temperature 1		Case Temperature 2	
Temperature (°C):	85	Temperature (°C):	105
Temperature (°K):	358.15	Temperature (°K):	378.15
α:	3.06E-06	α:	6.77E-06
B:	1.01	B:	1.02
Calculated L70 (hrs):	121000	Calculated L70 (hrs):	56000
Reported L70 (hrs):	>60000	Reported L70 (hrs):	56000

# Lumen Maintenance Projection Worksheet: L80



Description of LED Light Source Tested (manufacturer, model, catalog number)		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature		Tested Case Temperature 3	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
BXEN-27E-13H-99N Report# STD180743NB-B		0	100.00%	0	100.00%		
		1000	100.54%	1000	100.09%		
		2000	100.50%	2000	99.81%		
		3000	100.29%	3000	99.40%		
		4000	100.11%	4000	99.01%		
		5000	99.96%	5000	98.55%		
		6000	99.50%	6000	98.06%		
		7000	99.44%	7000	97.43%		
		8000	99.06%	8000	96.83%		
		9000	98.72%	9000	96.05%		
		10000	98.38%	10000	95.28%		

  

LM-80 Testing Details	
Total number of units tested per case temperature:	20
Number of failures:	0
Number of units measured:	20
Test duration (hours):	10000
Tested drive current (mA):	100
Tested case temperature 1 (T <sub>c</sub> , °C):	85
Tested case temperature 2 (T <sub>c</sub> , °C):	105
Tested case temperature 3 (T <sub>c</sub> , °C):	

  

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	100
In-situ case temperature (T <sub>c</sub> , °C):	85
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	80

  

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	87.08%
Reported L80 (hours):	>60000

Case Temperature 1		Case Temperature 2	
Temperature (°C):	85	Temperature (°C):	105
Temperature (°K):	358.15	Temperature (°K):	378.15
α:	3.06E-06	α:	6.77E-06
B:	1.01	B:	1.02
Calculated L80 (hrs):	78000	Calculated L80 (hrs):	36000
Reported L80 (hrs):	>60000	Reported L80 (hrs):	36000

# Lumen Maintenance Projection Worksheet: L90

Description of LED Light Source Tested (manufacturer, model, catalog number)		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature		Tested Case Temperature 3	
		Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
BXEN-27E-13H-99N Report# STD180743NB-B		0	100.00%	0	100.00%	0	100.00%
		1000	100.54%	1000	100.09%	1000	
		2000	100.50%	2000	99.81%	2000	
		3000	100.29%	3000	99.40%	3000	
		4000	100.11%	4000	99.01%	4000	
		5000	99.96%	5000	98.55%	5000	
		6000	99.50%	6000	98.06%	6000	
		7000	99.44%	7000	97.43%	7000	
		8000	99.06%	8000	96.83%	8000	
		9000	98.72%	9000	96.05%	9000	
		10000	98.38%	10000	95.28%	10000	

  

LM-80 Testing Details	
Total number of units tested per case temperature:	20
Number of failures:	0
Number of units measured:	20
Test duration (hours):	10000
Tested drive current (mA):	100
Tested case temperature 1 (T <sub>c</sub> , °C):	85
Tested case temperature 2 (T <sub>c</sub> , °C):	105
Tested case temperature 3 (T <sub>c</sub> , °C):	

  

In-Situ Inputs	
Drive current for each LED package/array/module (mA):	100
In-situ case temperature (T <sub>c</sub> , °C):	85
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70):	90

  

Results	
Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	87.08%
Reported L90 (hours):	39,000



Case Temperature 1		Case Temperature 2	
Temperature (°C):	85	Temperature (°C):	105
Temperature (°K):	358.15	Temperature (°K):	378.15
α:	3.06E-06	α:	6.77E-06
B:	1.01	B:	1.02
Calculated L90 (hrs):	39000	Calculated L90 (hrs):	19000
Reported L90 (hrs):	39000	Reported L90 (hrs):	19000

Thank You