



Complete
LM-80 Test Report
Up to 6,000 hours

Description of LED light sources

Part Number: NCSL119-H3
Part Name: Nichia Chip Type Warm White LED

Description of auxiliary equipment

Active cooling life test system
Consisting of small enclosed boxes for devices under test and water-cooled heat sinks to control device temperature.
LED Tester
Consisting of an integrating sphere, programmable current-source meter, and polychromator.

Case and ambient temperature

The case temperature T_S is the cathode lead temperature of the LED mounted on a reliability test board; the ambient temperature T_A is the temperature of the air at a distance of 50 mm above the reliability test board.

Test Summary

	LM-80 Required Temperature		Nichia Specified Temperature
	I. 55°C	II. 85°C	III. 105°C
Number of LED tested	25	25	25
Drive Current [I_F]	350 mA	350 mA	350 mA
Actual Case Temp. [T_S]	53.3°C	83.8°C	103.8°C
Actual Ambient Temp. [T_A]	51.5°C	82.5°C	101.2°C
$\Delta[T_S - T_A]$	1.8°C	1.3°C	2.6°C
Avg. Lumen Maintenance at 6,000 hours	97.4%	96.4%	93.6%
Avg. Chromaticity Shift ($\Delta u'v'$) at 6,000 hours	0.0017	0.0020	0.0026

LM-80 Test Report

I. 55°C - LM-80 Required Temperature

Part Number: NCSL119-H3
 Actual Temperature: $T_S = 53.3^\circ\text{C}$, $T_A = 51.5^\circ\text{C}$
 Drive Current: $I_F = 350\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

	Φ_v	V_F	Lumen Maintenance [%]						Chromaticity Shift $\Delta u'v'$					
	[lm]	[V]	0 h (Initial)	980 h	2000 h	3000 h	4000 h	5000 h	6000 h	980 h	2000 h	3000 h	4000 h	5000 h
NCSL119-H3	73.3	3.17	98.3	97.2	97.7	97.0	96.8	97.5	0.0021	0.0023	0.0026	0.0021	0.0019	0.0017
	76.3	3.18	98.4	97.2	97.8	96.9	96.7	96.8	0.0020	0.0018	0.0022	0.0018	0.0014	0.0013
	73.2	3.19	97.9	96.8	97.1	96.4	96.3	96.7	0.0020	0.0022	0.0023	0.0021	0.0016	0.0016
	76.9	3.21	98.7	97.8	98.1	97.3	97.1	97.3	0.0019	0.0017	0.0018	0.0015	0.0011	0.0011
	73.7	3.17	98.5	97.4	97.9	96.8	97.1	97.6	0.0019	0.0017	0.0019	0.0020	0.0018	0.0015
	74.3	3.18	98.5	97.6	97.9	97.1	97.3	97.8	0.0018	0.0016	0.0020	0.0018	0.0016	0.0015
	74.4	3.18	98.6	97.5	97.8	97.0	97.2	97.6	0.0019	0.0018	0.0020	0.0019	0.0016	0.0013
	73.6	3.21	98.6	97.7	97.7	96.9	97.1	97.4	0.0023	0.0023	0.0021	0.0018	0.0020	0.0016
	75.1	3.18	98.4	97.5	97.8	97.0	97.1	97.4	0.0017	0.0016	0.0016	0.0018	0.0013	0.0012
	75.6	3.21	98.6	97.4	97.8	95.9	97.0	97.0	0.0021	0.0020	0.0020	0.0020	0.0017	0.0017
	72.1	3.20	98.8	97.7	98.0	96.8	96.9	97.5	0.0024	0.0023	0.0023	0.0021	0.0014	0.0015
	75.0	3.18	98.7	97.9	98.1	97.2	97.5	97.8	0.0019	0.0019	0.0020	0.0017	0.0015	0.0016
	72.6	3.19	98.8	97.9	98.0	97.5	97.4	98.0	0.0023	0.0024	0.0025	0.0024	0.0017	0.0017
	75.0	3.17	98.8	97.8	98.0	97.4	97.2	97.7	0.0017	0.0016	0.0019	0.0018	0.0016	0.0014
	75.3	3.17	98.9	97.9	98.2	97.5	97.4	97.7	0.0020	0.0018	0.0018	0.0018	0.0016	0.0016
	71.6	3.18	98.3	97.6	97.6	97.0	96.9	97.4	0.0020	0.0022	0.0022	0.0020	0.0018	0.0015
	71.5	3.17	100.1	99.1	99.0	97.9	97.6	97.8	0.0031	0.0031	0.0031	0.0028	0.0026	0.0023
	72.7	3.18	99.8	98.7	98.7	97.6	97.3	97.4	0.0024	0.0024	0.0027	0.0024	0.0021	0.0020
	71.8	3.18	99.2	98.0	98.1	96.9	96.9	97.1	0.0024	0.0021	0.0023	0.0023	0.0020	0.0018
	73.2	3.18	100.1	99.1	99.0	98.0	97.7	97.8	0.0024	0.0024	0.0026	0.0026	0.0021	0.0021
71.3	3.18	99.8	98.7	98.5	97.6	97.4	97.6	0.0029	0.0026	0.0029	0.0026	0.0025	0.0021	
71.6	3.19	99.9	98.7	98.3	97.5	97.2	97.0	0.0029	0.0029	0.0027	0.0030	0.0025	0.0022	
72.7	3.18	99.8	98.6	97.9	97.2	96.8	96.9	0.0030	0.0027	0.0026	0.0026	0.0023	0.0022	
72.6	3.18	99.1	98.0	97.8	97.0	96.8	97.2	0.0023	0.0023	0.0022	0.0023	0.0020	0.0019	
71.2	3.18	100.0	98.9	98.7	97.7	97.5	97.6	0.0028	0.0027	0.0029	0.0024	0.0024	0.0023	
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	73.5	3.182	99.0	98.0	98.0	97.2	97.1	97.4	0.0022	0.0022	0.0023	0.0021	0.0018	0.0017
Med.	73.2	3.178	98.8	97.8	98.0	97.1	97.1	97.5	0.0021	0.0022	0.0022	0.0021	0.0018	0.0016
σ	1.65	0.011	0.655	0.623	0.447	0.461	0.334	0.345	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
min.	71.2	3.170	97.9	96.8	97.1	95.9	96.3	96.7	0.0017	0.0016	0.0016	0.0015	0.0011	0.0011
max.	76.9	3.214	100.1	99.1	99.0	98.0	97.7	98.0	0.0031	0.0031	0.0031	0.0030	0.0026	0.0023

LM-80 Test Report

II. 85°C - LM-80 Required Temperature

Part Number: NCSL119-H3
 Actual Temperature: $T_S = 83.8^\circ\text{C}$, $T_A = 82.5^\circ\text{C}$
 Drive Current: $I_F = 350\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

	Φ_v [lm]	V_F [V]	Lumen Maintenance [%]						Chromaticity Shift $\Delta u'v'$					
	0 h (Initial)		980 h	2000 h	3000 h	4000 h	5000 h	6000 h	980 h	2000 h	3000 h	4000 h	5000 h	6000 h
NCSL119-H3	76.3	3.21	97.8	96.4	96.9	96.0	96.0	96.3	0.0024	0.0021	0.0019	0.0020	0.0018	0.0014
	74.7	3.18	97.6	96.7	96.9	96.2	95.9	96.3	0.0018	0.0017	0.0019	0.0017	0.0015	0.0014
	73.3	3.19	97.3	96.3	96.7	95.8	95.5	96.2	0.0023	0.0021	0.0022	0.0018	0.0016	0.0019
	75.7	3.22	97.9	96.8	97.2	96.1	96.2	96.2	0.0022	0.0022	0.0020	0.0020	0.0017	0.0016
	73.4	3.17	97.7	96.8	97.2	96.1	96.2	96.8	0.0021	0.0020	0.0021	0.0021	0.0017	0.0017
	75.5	3.19	97.7	96.8	97.1	96.3	96.3	96.7	0.0023	0.0021	0.0022	0.0020	0.0019	0.0019
	73.2	3.18	97.5	96.5	96.9	96.0	96.0	96.5	0.0022	0.0022	0.0022	0.0021	0.0018	0.0018
	74.9	3.18	97.7	96.8	97.0	96.2	96.1	96.7	0.0021	0.0022	0.0023	0.0024	0.0018	0.0019
	73.9	3.20	97.7	96.8	97.1	96.4	96.2	96.8	0.0026	0.0022	0.0022	0.0022	0.0019	0.0018
	73.2	3.20	97.8	97.1	97.4	96.6	96.3	96.7	0.0022	0.0022	0.0020	0.0019	0.0016	0.0019
	77.0	3.22	97.5	96.6	96.9	96.2	95.9	96.3	0.0022	0.0020	0.0021	0.0020	0.0018	0.0020
	75.3	3.23	97.9	97.0	97.4	96.5	96.3	96.7	0.0019	0.0017	0.0021	0.0018	0.0019	0.0016
	76.5	3.22	97.2	96.5	96.6	95.7	95.7	95.9	0.0019	0.0019	0.0018	0.0017	0.0015	0.0016
	71.7	3.18	96.9	96.0	96.5	95.8	95.5	96.2	0.0022	0.0022	0.0025	0.0024	0.0020	0.0018
	73.3	3.17	98.0	96.9	97.3	96.3	96.2	96.4	0.0022	0.0021	0.0021	0.0021	0.0018	0.0017
	73.7	3.17	97.7	96.6	96.8	96.0	95.4	96.5	0.0022	0.0020	0.0019	0.0019	0.0016	0.0018
	73.6	3.18	98.3	97.3	97.6	96.5	95.8	96.6	0.0029	0.0027	0.0030	0.0028	0.0022	0.0026
	72.6	3.18	97.7	96.7	96.9	95.8	95.4	95.7	0.0031	0.0029	0.0031	0.0030	0.0027	0.0025
	73.5	3.18	98.3	97.3	97.3	96.2	96.0	96.3	0.0027	0.0025	0.0025	0.0024	0.0021	0.0024
	71.5	3.18	98.1	97.1	97.5	96.4	96.0	96.5	0.0028	0.0025	0.0025	0.0025	0.0023	0.0021
71.6	3.17	99.0	97.7	97.9	97.0	96.7	97.0	0.0030	0.0027	0.0028	0.0028	0.0024	0.0025	
72.3	3.18	98.2	96.9	97.0	96.1	96.0	96.3	0.0029	0.0027	0.0030	0.0028	0.0027	0.0025	
71.3	3.18	97.3	96.3	96.2	95.5	95.2	95.5	0.0028	0.0026	0.0026	0.0025	0.0024	0.0023	
71.0	3.18	98.4	97.3	97.2	96.3	96.0	96.3	0.0029	0.0028	0.0028	0.0026	0.0027	0.0024	
71.2	3.20	97.2	96.2	96.2	95.1	94.9	95.6	0.0026	0.0025	0.0026	0.0025	0.0021	0.0021	
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	73.6	3.188	97.8	96.8	97.0	96.1	95.9	96.4	0.0024	0.0023	0.0023	0.0022	0.0020	0.0020
Med.	73.4	3.182	97.7	96.8	97.0	96.2	96.0	96.3	0.0023	0.0022	0.0022	0.0021	0.0019	0.0019
σ	1.75	0.018	0.463	0.397	0.404	0.386	0.400	0.380	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004
min.	71.0	3.166	96.9	96.0	96.2	95.1	94.9	95.5	0.0018	0.0017	0.0018	0.0017	0.0015	0.0014
max.	77.0	3.228	99.0	97.7	97.9	97.0	96.7	97.0	0.0031	0.0029	0.0031	0.0030	0.0027	0.0026

LM-80 Test Report

III. 105°C - Nichia Specified Temperature

Part Number: NCSL119-H3
 Actual Temperature: $T_S = 103.8^\circ\text{C}$, $T_A = 101.2^\circ\text{C}$
 Drive Current: $I_F = 350\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

	Φ_v [lm]	V_F [V]	Lumen Maintenance [%]						Chromaticity Shift $\Delta u'v'$					
	0 h (Initial)		980 h	2000 h	3000 h	4000 h	5000 h	6000 h	980 h	2000 h	3000 h	4000 h	5000 h	6000 h
NCSL119-H3	75.0	3.17	96.3	95.2	95.3	94.5	93.7	94.2	0.0025	0.0023	0.0022	0.0022	0.0024	0.0025
	74.6	3.22	96.5	95.8	95.6	94.7	93.8	94.0	0.0026	0.0024	0.0023	0.0024	0.0023	0.0025
	73.4	3.17	96.1	95.2	95.2	94.4	93.8	94.4	0.0022	0.0020	0.0019	0.0021	0.0018	0.0021
	75.0	3.18	96.3	95.3	95.3	94.4	93.8	94.1	0.0022	0.0018	0.0019	0.0019	0.0021	0.0025
	75.7	3.23	96.6	95.7	95.8	94.8	94.3	94.5	0.0023	0.0021	0.0020	0.0021	0.0023	0.0025
	76.1	3.22	96.0	95.0	95.1	94.0	93.6	93.9	0.0019	0.0016	0.0017	0.0017	0.0020	0.0023
	76.3	3.22	96.1	95.2	95.0	94.2	93.3	93.8	0.0022	0.0020	0.0022	0.0022	0.0021	0.0024
	75.5	3.18	96.0	95.1	95.0	94.0	93.6	94.0	0.0020	0.0018	0.0018	0.0018	0.0023	0.0024
	76.1	3.18	96.0	94.6	94.8	93.8	93.3	93.7	0.0019	0.0018	0.0019	0.0019	0.0022	0.0024
	77.1	3.22	96.0	94.5	94.9	93.5	93.1	93.2	0.0021	0.0017	0.0021	0.0022	0.0024	0.0026
	74.1	3.19	96.2	95.2	95.0	93.9	93.7	94.2	0.0030	0.0025	0.0026	0.0023	0.0024	0.0025
	74.7	3.21	96.0	95.0	95.0	94.0	93.4	94.1	0.0023	0.0019	0.0020	0.0022	0.0024	0.0026
	75.2	3.20	96.3	94.8	94.8	93.9	93.2	93.6	0.0023	0.0020	0.0023	0.0022	0.0024	0.0029
	75.9	3.18	96.2	95.0	94.8	93.6	93.3	93.4	0.0019	0.0018	0.0018	0.0020	0.0021	0.0024
	73.5	3.19	96.8	95.2	95.1	94.2	93.7	94.3	0.0023	0.0021	0.0020	0.0022	0.0021	0.0023
	74.5	3.16	96.3	95.0	95.1	94.2	93.6	94.1	0.0024	0.0018	0.0023	0.0023	0.0023	0.0026
	74.0	3.18	96.9	95.1	94.8	93.7	92.8	92.7	0.0027	0.0024	0.0027	0.0028	0.0028	0.0031
	72.2	3.17	97.5	95.8	95.3	94.2	93.1	93.6	0.0030	0.0027	0.0026	0.0024	0.0025	0.0026
	72.6	3.17	97.0	95.5	94.9	93.6	92.8	92.9	0.0029	0.0024	0.0026	0.0027	0.0027	0.0028
	71.5	3.17	97.2	95.6	95.4	94.2	93.2	93.6	0.0029	0.0023	0.0024	0.0025	0.0026	0.0029
72.8	3.18	96.0	94.5	94.0	93.1	92.4	92.5	0.0029	0.0025	0.0026	0.0026	0.0026	0.0030	
72.6	3.18	96.3	94.8	94.5	93.2	92.6	92.6	0.0027	0.0024	0.0025	0.0024	0.0026	0.0027	
72.0	3.18	95.6	93.9	93.5	92.4	91.7	91.6	0.0029	0.0023	0.0024	0.0025	0.0023	0.0025	
73.9	3.18	96.8	95.3	94.7	93.4	92.8	92.9	0.0028	0.0021	0.0027	0.0026	0.0028	0.0032	
72.3	3.18	96.9	95.5	95.0	93.8	93.2	93.6	0.0029	0.0024	0.0023	0.0025	0.0024	0.0026	
n	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Avg.	74.3	3.187	96.4	95.1	95.0	93.9	93.3	93.6	0.0025	0.0021	0.0022	0.0023	0.0024	0.0026
Med.	74.5	3.179	96.3	95.2	95.0	94.0	93.3	93.7	0.0024	0.0021	0.0023	0.0022	0.0024	0.0025
σ	1.55	0.019	0.460	0.443	0.465	0.535	0.550	0.704	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
min.	71.5	3.163	95.6	93.9	93.5	92.4	91.7	91.6	0.0019	0.0016	0.0017	0.0017	0.0018	0.0021
max.	77.1	3.230	97.5	95.8	95.8	94.8	94.3	94.5	0.0030	0.0027	0.0027	0.0028	0.0028	0.0032