



LM-80 Test Report

Up to 7,600 hours

Description of LED light sources

Part Number: NVSL219A-H3,NVSW219A
 Part Name: Nichia Chip Type 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 1.5 mm above the reliability test board.

Test Summary

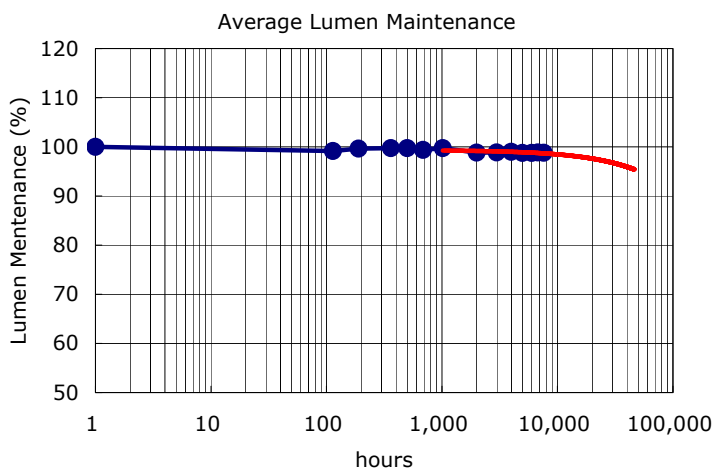
| | LM-80 Required Temperature | | Nichia Specified Temperature |
|--|----------------------------|---------------|------------------------------|
| | I. 55°C | II. 85°C | III. 105°C |
| Number of LED tested | 25 | 25 | 25 |
| Drive Current [I_F] | 700 mA | 700 mA | 700 mA |
| Actual Case Temp. [T_S] | 57.3°C | 86.4°C | 106.4°C |
| Actual Ambient Temp. [T_A] | 57.6°C | 84.9°C | 104.3°C |
| $\Delta[T_S - T_A]$ | -0.3°C | 1.5°C | 2.1°C |
| Measurement Current [I_F] | 350 mA | 350 mA | 350 mA |
| Avg. Lumen Maintenance at 7,600 hours | 98.8% | 97.5% | 97.2% |
| Avg. Chromaticity Shift ($\Delta u'v'$) at 7,600 hours | 0.0022 | 0.0022 | 0.0020 |

LM-80 Test Report

I. 55°C - LM-80 Required Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 57.3^\circ\text{C}$, $T_A = 57.6^\circ\text{C}$
 Drive Current: $I_F = 700\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

| | Φ_v [lm] | V_F [V] | Lumen Maintenance [%] | | | | | | | | | |
|-------------|------------------|--------------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | | | 0 h (Initial) | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5985 h | 6784 h | 7603 h | |
| NVSL219A-H3 | 114.7 | 3.05 | 99.1 | 98.0 | 98.0 | 98.0 | 97.9 | 98.0 | 98.2 | 97.8 | | |
| | 114.3 | 3.04 | 99.1 | 98.0 | 98.0 | 97.9 | 98.0 | 98.0 | 98.2 | 98.0 | | |
| | 113.6 | 3.08 | 98.8 | 97.6 | 97.7 | 97.5 | 97.3 | 97.3 | 97.4 | 97.4 | | |
| | 104.8 | 3.05 | 99.1 | 98.0 | 97.9 | 97.8 | 97.5 | 97.4 | 97.4 | 97.6 | | |
| | 109.6 | 3.03 | 99.4 | 98.4 | 98.2 | 98.1 | 97.6 | 97.5 | 97.6 | 97.6 | | |
| | 108.5 | 3.04 | 99.2 | 98.1 | 98.0 | 98.0 | 97.6 | 97.6 | 97.8 | 97.5 | | |
| | 108.8 | 3.03 | 99.7 | 98.7 | 98.3 | 98.5 | 98.3 | 98.4 | 98.6 | 98.3 | | |
| | 113.9 | 3.09 | 99.4 | 98.2 | 98.1 | 98.3 | 98.2 | 98.3 | 98.4 | 98.3 | | |
| | 115.1 | 3.08 | 99.3 | 98.0 | 98.0 | 98.2 | 97.9 | 98.0 | 98.1 | 98.2 | | |
| | 115.6 | 3.06 | 99.3 | 98.1 | 98.1 | 98.2 | 97.8 | 97.9 | 97.8 | 98.0 | | |
| | 115.4 | 3.06 | 99.3 | 98.2 | 98.0 | 98.3 | 97.6 | 97.8 | 97.7 | 97.7 | | |
| | 112.1 | 3.07 | 99.2 | 98.1 | 97.9 | 98.1 | 97.5 | 97.7 | 97.7 | 97.5 | | |
| | 114.5 | 3.05 | 99.6 | 98.4 | 98.5 | 98.5 | 98.3 | 98.3 | 98.6 | 98.3 | | |
| | 114.4 | 3.03 | 99.3 | 98.0 | 98.2 | 98.2 | 98.2 | 98.1 | 98.4 | 98.2 | | |
| | 111.2 | 3.06 | 99.4 | 98.0 | 98.2 | 98.1 | 98.1 | 97.9 | 98.1 | 98.1 | | |
| NVSW219A | 132.9 | 3.02 | 100.5 | 99.7 | 99.9 | 100.1 | 99.7 | 99.7 | 99.6 | 100.0 | | |
| | 132.2 | 3.08 | 100.3 | 99.6 | 99.9 | 99.9 | 99.7 | 99.5 | 99.5 | 99.8 | | |
| | 135.2 | 3.05 | 100.4 | 99.9 | 100.1 | 100.3 | 100.1 | 100.2 | 100.3 | 100.2 | | |
| | 134.4 | 3.06 | 100.4 | 100.0 | 100.0 | 100.4 | 100.3 | 100.4 | 100.5 | 100.3 | | |
| | 135.9 | 3.09 | 100.7 | 100.4 | 100.3 | 100.9 | 101.0 | 101.0 | 101.0 | 100.7 | | |
| | 134.4 | 3.04 | 100.9 | 100.4 | 100.2 | 100.7 | 100.6 | 100.5 | 100.5 | 100.6 | | |
| | 136.9 | 3.11 | 100.3 | 99.9 | 100.2 | 100.3 | 100.0 | 99.8 | 99.9 | 100.1 | | |
| | 138.8 | 3.06 | 100.3 | 100.0 | 100.1 | 100.4 | 99.8 | 99.7 | 99.8 | 99.9 | | |
| | 137.7 | 3.03 | 100.1 | 99.7 | 99.9 | 100.2 | 99.9 | 100.0 | 100.1 | 100.0 | | |
| | 135.2 | 3.05 | 100.1 | 99.6 | 99.7 | 100.1 | 100.1 | 100.2 | 100.4 | 100.1 | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 121.6 | 3.056 | 99.7 | 98.8 | 98.9 | 99.0 | 98.8 | 98.8 | 98.9 | 98.8 | | |
| Med. | 115.1 | 3.054 | 99.4 | 98.4 | 98.2 | 98.3 | 98.2 | 98.3 | 98.4 | 98.3 | | |
| σ | 11.79 | 0.023 | 0.610 | 0.931 | 0.996 | 1.134 | 1.185 | 1.172 | 1.156 | 1.172 | | |
| min. | 104.8 | 3.017 | 98.8 | 97.6 | 97.7 | 97.5 | 97.3 | 97.3 | 97.4 | 97.4 | | |
| max. | 138.8 | 3.114 | 100.9 | 100.4 | 100.3 | 100.9 | 101.0 | 101.0 | 101.0 | 100.7 | | |



Average L70 Extrapolation

$L = L_{max}e^{at}$
 $L70 = \ln(0.7/L_{max})/a$

| | |
|-----------|-------------|
| L_{max} | 0.9934 |
| a | -8.7980E-07 |
| L70 | 397857 |
| R^2 | 0.3971 |

LM-80 Test Report

I. 55°C - LM-80 Required Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 57.3^\circ\text{C}$, $T_A = 57.6^\circ\text{C}$
 Drive Current: $I_F = 700\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

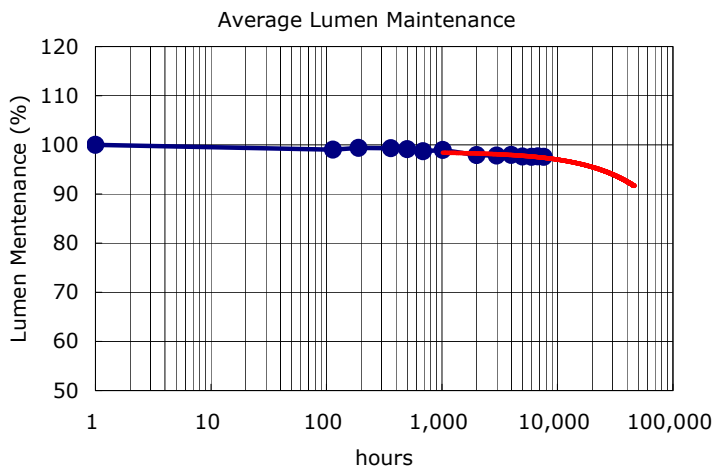
| | Chromaticity Shift $\Delta u'v'$ | | | | | | | | | |
|-------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5985 h | 6784 h | 7603 h | | |
| NVSL219A-H3 | 0.0020 | 0.0022 | 0.0025 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0028 | | |
| | 0.0020 | 0.0023 | 0.0026 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0019 | 0.0022 | 0.0025 | 0.0026 | 0.0027 | 0.0028 | 0.0028 | 0.0028 | | |
| | 0.0019 | 0.0022 | 0.0024 | 0.0025 | 0.0026 | 0.0027 | 0.0026 | 0.0027 | | |
| | 0.0020 | 0.0023 | 0.0025 | 0.0026 | 0.0028 | 0.0028 | 0.0027 | 0.0028 | | |
| | 0.0020 | 0.0023 | 0.0025 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0019 | 0.0022 | 0.0024 | 0.0025 | 0.0027 | 0.0027 | 0.0027 | 0.0028 | | |
| | 0.0020 | 0.0023 | 0.0026 | 0.0026 | 0.0028 | 0.0028 | 0.0027 | 0.0028 | | |
| | 0.0020 | 0.0023 | 0.0026 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0021 | 0.0024 | 0.0027 | 0.0027 | 0.0029 | 0.0029 | 0.0029 | 0.0030 | | |
| | 0.0021 | 0.0023 | 0.0026 | 0.0027 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | | |
| | 0.0020 | 0.0023 | 0.0026 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0020 | 0.0022 | 0.0026 | 0.0026 | 0.0027 | 0.0027 | 0.0027 | 0.0028 | | |
| | NVSW219A | 0.0011 | 0.0010 | 0.0012 | 0.0011 | 0.0012 | 0.0013 | 0.0012 | 0.0012 | |
| 0.0011 | | 0.0010 | 0.0013 | 0.0012 | 0.0013 | 0.0014 | 0.0013 | 0.0013 | | |
| 0.0013 | | 0.0012 | 0.0016 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | | |
| 0.0012 | | 0.0011 | 0.0014 | 0.0012 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | | |
| 0.0010 | | 0.0010 | 0.0012 | 0.0011 | 0.0012 | 0.0013 | 0.0012 | 0.0013 | | |
| 0.0012 | | 0.0011 | 0.0013 | 0.0012 | 0.0012 | 0.0013 | 0.0012 | 0.0012 | | |
| 0.0008 | | 0.0009 | 0.0010 | 0.0010 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | |
| 0.0010 | | 0.0010 | 0.0012 | 0.0011 | 0.0012 | 0.0013 | 0.0013 | 0.0012 | | |
| 0.0010 | | 0.0010 | 0.0011 | 0.0010 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | | |
| 0.0010 | | 0.0010 | 0.0013 | 0.0011 | 0.0013 | 0.0014 | 0.0013 | 0.0013 | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 0.0016 | 0.0018 | 0.0020 | 0.0020 | 0.0021 | 0.0022 | 0.0022 | 0.0022 | | |
| Med. | 0.0019 | 0.0022 | 0.0025 | 0.0025 | 0.0027 | 0.0027 | 0.0027 | 0.0028 | | |
| σ | 0.0005 | 0.0006 | 0.0006 | 0.0007 | 0.0008 | 0.0008 | 0.0008 | 0.0008 | | |
| min. | 0.0008 | 0.0009 | 0.0010 | 0.0010 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | |
| max. | 0.0021 | 0.0024 | 0.0027 | 0.0027 | 0.0029 | 0.0029 | 0.0029 | 0.0030 | | |

LM-80 Test Report

II. 85°C - LM-80 Required Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 86.4^\circ\text{C}$, $T_A = 84.9^\circ\text{C}$
 Drive Current: $I_F = 700\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

| | Φ_v [lm] | V_F [V] | Lumen Maintenance [%] | | | | | | | | | |
|-------------|------------------|--------------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | | | 0 h (Initial) | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5984 h | 6784 h | 7604 h | |
| NVSL219A-H3 | 114.9 | 3.06 | 97.9 | 96.7 | 96.9 | 97.0 | 96.6 | 96.8 | 96.8 | 96.6 | | |
| | 111.5 | 3.08 | 98.2 | 97.0 | 97.2 | 97.3 | 96.9 | 97.2 | 97.3 | 97.0 | | |
| | 114.1 | 3.05 | 97.9 | 96.9 | 96.9 | 96.9 | 96.8 | 96.7 | 96.8 | 96.9 | | |
| | 108.8 | 3.05 | 98.1 | 96.5 | 96.6 | 96.6 | 96.3 | 96.0 | 96.1 | 96.2 | | |
| | 109.6 | 3.02 | 98.3 | 96.8 | 96.8 | 96.8 | 96.4 | 96.3 | 96.4 | 96.3 | | |
| | 109.3 | 3.03 | 98.3 | 97.1 | 96.9 | 97.0 | 96.6 | 96.6 | 96.8 | 96.5 | | |
| | 108.9 | 3.04 | 98.2 | 97.1 | 96.9 | 97.0 | 96.7 | 96.7 | 96.9 | 96.5 | | |
| | 112.8 | 3.07 | 97.9 | 97.0 | 97.1 | 97.2 | 97.2 | 97.3 | 97.4 | 97.2 | | |
| | 115.0 | 3.07 | 98.2 | 97.0 | 97.1 | 97.1 | 97.1 | 96.9 | 97.0 | 97.1 | | |
| | 115.0 | 3.05 | 98.1 | 96.8 | 96.6 | 97.0 | 96.6 | 96.5 | 96.7 | 96.8 | | |
| | 114.9 | 3.06 | 98.2 | 97.1 | 96.7 | 97.1 | 96.7 | 96.6 | 96.8 | 96.8 | | |
| | 115.5 | 3.03 | 98.3 | 97.0 | 96.9 | 97.3 | 96.8 | 96.9 | 97.0 | 96.8 | | |
| | 112.6 | 3.04 | 98.0 | 96.9 | 96.8 | 97.0 | 96.8 | 96.8 | 97.0 | 96.7 | | |
| | 112.6 | 3.06 | 98.1 | 96.7 | 96.3 | 96.8 | 96.8 | 96.7 | 96.8 | 96.7 | | |
| | 112.3 | 3.10 | 98.1 | 96.7 | 96.7 | 96.9 | 96.9 | 96.7 | 96.9 | 96.9 | | |
| NVSW219A | 132.2 | 3.08 | 100.2 | 99.1 | 99.1 | 99.1 | 98.7 | 98.5 | 98.5 | 98.6 | | |
| | 133.5 | 3.03 | 100.2 | 99.3 | 99.0 | 99.0 | 98.2 | 98.0 | 98.0 | 97.9 | | |
| | 132.2 | 3.08 | 100.2 | 99.4 | 99.1 | 99.1 | 98.7 | 98.5 | 98.6 | 98.3 | | |
| | 133.8 | 3.08 | 100.2 | 99.4 | 99.1 | 99.1 | 98.8 | 98.8 | 98.8 | 98.5 | | |
| | 136.7 | 3.04 | 100.3 | 99.8 | 99.5 | 99.5 | 99.3 | 99.2 | 99.3 | 99.0 | | |
| | 134.7 | 3.04 | 100.4 | 99.5 | 99.4 | 99.4 | 99.1 | 98.9 | 98.9 | 98.9 | | |
| | 138.0 | 3.09 | 100.2 | 99.4 | 99.3 | 99.5 | 99.0 | 98.8 | 98.9 | 99.1 | | |
| | 138.8 | 3.10 | 100.3 | 99.8 | 99.7 | 99.7 | 99.2 | 99.1 | 99.2 | 99.3 | | |
| | 137.3 | 3.04 | 100.1 | 99.6 | 99.3 | 99.5 | 99.1 | 99.0 | 99.1 | 98.9 | | |
| | 137.4 | 3.03 | 100.1 | 99.5 | 99.3 | 99.4 | 99.2 | 99.1 | 99.2 | 99.0 | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 121.7 | 3.057 | 99.0 | 97.9 | 97.8 | 97.9 | 97.6 | 97.5 | 97.6 | 97.5 | | |
| Med. | 115.0 | 3.053 | 98.3 | 97.1 | 97.1 | 97.2 | 96.9 | 96.9 | 97.0 | 97.0 | | |
| σ | 11.71 | 0.024 | 1.050 | 1.311 | 1.248 | 1.183 | 1.113 | 1.092 | 1.069 | 1.061 | | |
| min. | 108.8 | 3.024 | 97.9 | 96.5 | 96.3 | 96.6 | 96.3 | 96.0 | 96.1 | 96.2 | | |
| max. | 138.8 | 3.103 | 100.4 | 99.8 | 99.7 | 99.7 | 99.3 | 99.2 | 99.3 | 99.3 | | |



Average L70 Extrapolation

$$L = L_{max}e^{at}$$

$$L70 = \ln(0.7/L_{max})/a$$

| | |
|-----------|-------------|
| L_{max} | 0.9856 |
| a | -1.5888E-06 |
| L70 | 215355 |
| R^2 | 0.6163 |

LM-80 Test Report

II. 85°C - LM-80 Required Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 86.4^\circ\text{C}$, $T_A = 84.9^\circ\text{C}$
 Drive Current: $I_F = 700\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

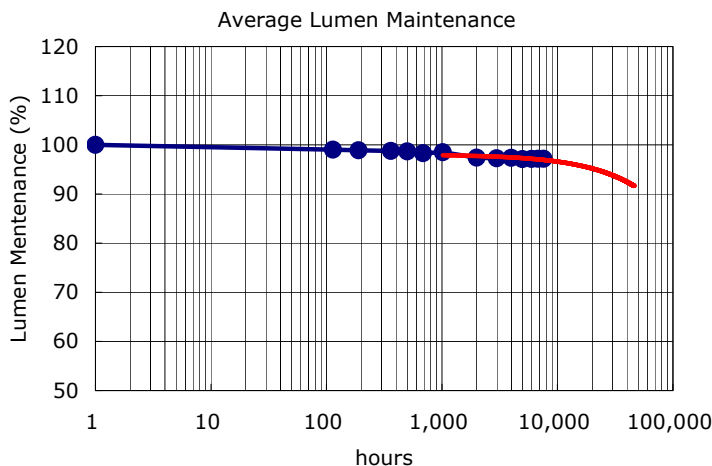
| | Chromaticity Shift $\Delta u'v'$ | | | | | | | | | |
|-------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--|--|
| | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5984 h | 6784 h | 7604 h | | |
| NVSL219A-H3 | 0.0023 | 0.0026 | 0.0028 | 0.0029 | 0.0031 | 0.0030 | 0.0030 | 0.0030 | | |
| | 0.0023 | 0.0026 | 0.0029 | 0.0030 | 0.0031 | 0.0030 | 0.0030 | 0.0030 | | |
| | 0.0022 | 0.0025 | 0.0028 | 0.0028 | 0.0029 | 0.0029 | 0.0028 | 0.0029 | | |
| | 0.0022 | 0.0026 | 0.0028 | 0.0029 | 0.0030 | 0.0028 | 0.0028 | 0.0028 | | |
| | 0.0022 | 0.0025 | 0.0028 | 0.0028 | 0.0030 | 0.0029 | 0.0028 | 0.0029 | | |
| | 0.0022 | 0.0025 | 0.0027 | 0.0028 | 0.0030 | 0.0029 | 0.0029 | 0.0029 | | |
| | 0.0022 | 0.0026 | 0.0028 | 0.0028 | 0.0030 | 0.0029 | 0.0029 | 0.0030 | | |
| | 0.0023 | 0.0025 | 0.0029 | 0.0029 | 0.0030 | 0.0030 | 0.0030 | 0.0030 | | |
| | 0.0022 | 0.0026 | 0.0028 | 0.0029 | 0.0030 | 0.0029 | 0.0029 | 0.0029 | | |
| | 0.0022 | 0.0025 | 0.0027 | 0.0028 | 0.0029 | 0.0028 | 0.0028 | 0.0028 | | |
| | 0.0022 | 0.0025 | 0.0027 | 0.0028 | 0.0029 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0021 | 0.0024 | 0.0027 | 0.0027 | 0.0029 | 0.0028 | 0.0028 | 0.0029 | | |
| | 0.0023 | 0.0026 | 0.0029 | 0.0029 | 0.0031 | 0.0030 | 0.0030 | 0.0030 | | |
| 0.0023 | 0.0026 | 0.0028 | 0.0030 | 0.0030 | 0.0030 | 0.0029 | 0.0030 | | | |
| 0.0023 | 0.0026 | 0.0028 | 0.0028 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | | | |
| NVSW219A | 0.0012 | 0.0011 | 0.0013 | 0.0012 | 0.0012 | 0.0012 | 0.0013 | 0.0011 | | |
| | 0.0010 | 0.0010 | 0.0012 | 0.0010 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | |
| | 0.0012 | 0.0010 | 0.0013 | 0.0011 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | | |
| | 0.0011 | 0.0010 | 0.0012 | 0.0010 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | |
| | 0.0011 | 0.0011 | 0.0013 | 0.0012 | 0.0011 | 0.0012 | 0.0012 | 0.0012 | | |
| | 0.0013 | 0.0011 | 0.0014 | 0.0012 | 0.0012 | 0.0013 | 0.0013 | 0.0012 | | |
| | 0.0010 | 0.0009 | 0.0011 | 0.0010 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | | |
| | 0.0009 | 0.0009 | 0.0009 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | | |
| | 0.0012 | 0.0011 | 0.0014 | 0.0012 | 0.0013 | 0.0014 | 0.0013 | 0.0013 | | |
| | 0.0013 | 0.0012 | 0.0014 | 0.0013 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 0.0018 | 0.0019 | 0.0022 | 0.0022 | 0.0023 | 0.0022 | 0.0022 | 0.0022 | | |
| Med. | 0.0022 | 0.0025 | 0.0027 | 0.0028 | 0.0029 | 0.0028 | 0.0028 | 0.0029 | | |
| σ | 0.0006 | 0.0008 | 0.0008 | 0.0009 | 0.0009 | 0.0009 | 0.0008 | 0.0009 | | |
| min. | 0.0009 | 0.0009 | 0.0009 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | | |
| max. | 0.0023 | 0.0026 | 0.0029 | 0.0030 | 0.0031 | 0.0030 | 0.0030 | 0.0030 | | |

LM-80 Test Report

III. 105°C - Nichia Specified Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 106.4^{\circ}\text{C}$, $T_A = 104.3^{\circ}\text{C}$
 Drive Current: $I_F = 700 \text{ mA}$
 Measurement Current: $I_F = 350 \text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

| | Φ_v [lm] | V_F [V] | Lumen Maintenance [%] | | | | | | | | | |
|-------------|------------------|--------------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| | | | 0 h (Initial) | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5982 h | 6782 h | 7601 h | |
| NVSL219A-H3 | 108.9 | 3.06 | 97.6 | 96.4 | 96.5 | 96.4 | 96.3 | 96.5 | 96.6 | 96.4 | | |
| | 110.3 | 3.10 | 98.2 | 96.9 | 97.2 | 97.0 | 97.1 | 97.3 | 97.3 | 97.3 | | |
| | 112.9 | 3.04 | 97.9 | 96.6 | 96.6 | 96.7 | 96.7 | 96.8 | 96.7 | 97.0 | | |
| | 108.5 | 3.06 | 97.1 | 95.9 | 95.8 | 95.9 | 95.4 | 95.3 | 95.2 | 95.5 | | |
| | 108.6 | 3.04 | 97.1 | 96.1 | 95.9 | 96.1 | 95.5 | 95.4 | 95.4 | 95.6 | | |
| | 110.6 | 3.03 | 97.2 | 96.1 | 95.9 | 96.0 | 95.6 | 95.6 | 95.8 | 95.6 | | |
| | 110.6 | 3.03 | 97.6 | 96.4 | 96.1 | 96.2 | 96.0 | 96.1 | 96.2 | 96.0 | | |
| | 113.3 | 3.08 | 98.1 | 96.9 | 97.0 | 97.0 | 97.0 | 97.2 | 97.2 | 97.2 | | |
| | 112.6 | 3.08 | 97.9 | 96.6 | 96.8 | 96.8 | 96.7 | 96.7 | 96.7 | 96.9 | | |
| | 113.6 | 3.08 | 97.5 | 96.3 | 96.4 | 96.6 | 96.2 | 96.2 | 96.2 | 96.4 | | |
| | 115.2 | 3.06 | 97.7 | 96.7 | 96.6 | 96.9 | 96.4 | 96.4 | 96.5 | 96.5 | | |
| | 114.9 | 3.04 | 97.6 | 96.6 | 96.4 | 96.7 | 96.2 | 96.4 | 96.4 | 96.2 | | |
| | 114.3 | 3.05 | 97.8 | 96.8 | 96.8 | 96.9 | 96.7 | 96.9 | 97.0 | 96.7 | | |
| | 109.5 | 3.06 | 97.6 | 96.3 | 96.3 | 96.4 | 96.4 | 96.5 | 96.5 | 96.5 | | |
| 111.5 | 3.07 | 98.1 | 96.9 | 96.9 | 96.9 | 96.8 | 96.8 | 96.9 | 96.9 | | | |
| NVSW219A | 135.9 | 3.06 | 99.7 | 98.6 | 98.3 | 98.5 | 98.0 | 97.9 | 97.9 | 98.1 | | |
| | 135.4 | 3.05 | 99.8 | 98.6 | 98.2 | 98.5 | 97.8 | 97.7 | 97.7 | 97.8 | | |
| | 135.7 | 3.06 | 99.8 | 98.7 | 98.4 | 98.6 | 98.0 | 98.0 | 98.1 | 98.0 | | |
| | 136.4 | 3.04 | 99.7 | 98.8 | 98.4 | 98.3 | 98.2 | 98.3 | 98.3 | 98.0 | | |
| | 134.4 | 3.04 | 99.9 | 98.7 | 98.4 | 98.2 | 98.3 | 98.3 | 98.2 | 98.2 | | |
| | 134.1 | 3.04 | 99.8 | 98.7 | 98.4 | 98.3 | 98.2 | 98.1 | 98.1 | 98.2 | | |
| | 136.7 | 3.10 | 100.0 | 99.1 | 99.0 | 99.4 | 99.0 | 98.9 | 98.9 | 99.3 | | |
| | 136.4 | 3.05 | 99.7 | 98.6 | 98.0 | 98.3 | 97.6 | 97.5 | 97.5 | 97.6 | | |
| | 137.5 | 3.04 | 99.6 | 98.7 | 98.4 | 98.7 | 98.2 | 98.3 | 98.3 | 98.2 | | |
| | 137.0 | 3.05 | 100.0 | 99.0 | 98.9 | 99.0 | 98.9 | 99.1 | 99.2 | 99.1 | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 121.4 | 3.057 | 98.5 | 97.4 | 97.3 | 97.4 | 97.1 | 97.1 | 97.2 | 97.2 | | |
| Med. | 114.3 | 3.054 | 98.1 | 96.9 | 96.9 | 96.9 | 96.8 | 96.9 | 97.0 | 97.0 | | |
| σ | 12.28 | 0.020 | 1.094 | 1.152 | 1.049 | 1.071 | 1.059 | 1.051 | 1.052 | 1.062 | | |
| min. | 108.5 | 3.028 | 97.1 | 95.9 | 95.8 | 95.9 | 95.4 | 95.3 | 95.2 | 95.5 | | |
| max. | 137.5 | 3.104 | 100.0 | 99.1 | 99.0 | 99.4 | 99.0 | 99.1 | 99.2 | 99.3 | | |



Average L70 Extrapolation

$$L = L_{max}e^{at}$$

$$L70 = \ln(0.7/L_{max})/a$$

| | |
|-----------|-------------|
| L_{max} | 0.9802 |
| a | -1.4726E-06 |
| L70 | 228645 |
| R^2 | 0.5148 |

LM-80 Test Report

III. 105°C - Nichia Specified Temperature

Part Number: NVSL219A-H3,NVSW219A
 Actual Temperature: $T_S = 106.4^{\circ}\text{C}$, $T_A = 104.3^{\circ}\text{C}$
 Drive Current: $I_F = 700\text{ mA}$
 Measurement Current: $I_F = 350\text{ mA}$
 Air flow: Minimal air flow
 Comments: No failure observed

| | Chromaticity Shift $\Delta u'v'$ | | | | | | | | | |
|-------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--|--|
| | 1016 h | 2002 h | 2980 h | 3982 h | 4984 h | 5982 h | 6782 h | 7601 h | | |
| NVSL219A-H3 | 0.0024 | 0.0026 | 0.0028 | 0.0028 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | | |
| | 0.0024 | 0.0026 | 0.0028 | 0.0028 | 0.0029 | 0.0028 | 0.0027 | 0.0027 | | |
| | 0.0023 | 0.0025 | 0.0028 | 0.0028 | 0.0028 | 0.0028 | 0.0027 | 0.0027 | | |
| | 0.0023 | 0.0024 | 0.0026 | 0.0026 | 0.0027 | 0.0026 | 0.0025 | 0.0026 | | |
| | 0.0022 | 0.0024 | 0.0026 | 0.0026 | 0.0026 | 0.0026 | 0.0025 | 0.0026 | | |
| | 0.0023 | 0.0024 | 0.0026 | 0.0027 | 0.0027 | 0.0027 | 0.0026 | 0.0027 | | |
| | 0.0023 | 0.0024 | 0.0027 | 0.0027 | 0.0028 | 0.0028 | 0.0027 | 0.0027 | | |
| | 0.0024 | 0.0025 | 0.0027 | 0.0027 | 0.0028 | 0.0028 | 0.0027 | 0.0027 | | |
| | 0.0024 | 0.0025 | 0.0028 | 0.0028 | 0.0028 | 0.0028 | 0.0027 | 0.0027 | | |
| | 0.0024 | 0.0026 | 0.0028 | 0.0028 | 0.0028 | 0.0028 | 0.0027 | 0.0028 | | |
| | 0.0023 | 0.0025 | 0.0027 | 0.0027 | 0.0028 | 0.0027 | 0.0026 | 0.0027 | | |
| | 0.0025 | 0.0026 | 0.0029 | 0.0029 | 0.0030 | 0.0029 | 0.0029 | 0.0029 | | |
| | 0.0024 | 0.0026 | 0.0027 | 0.0028 | 0.0029 | 0.0029 | 0.0028 | 0.0028 | | |
| 0.0025 | 0.0027 | 0.0029 | 0.0029 | 0.0029 | 0.0029 | 0.0028 | 0.0029 | | | |
| 0.0025 | 0.0027 | 0.0029 | 0.0029 | 0.0030 | 0.0029 | 0.0029 | 0.0029 | | | |
| NVSW219A | 0.0012 | 0.0011 | 0.0012 | 0.0010 | 0.0010 | 0.0009 | 0.0010 | 0.0007 | | |
| | 0.0013 | 0.0012 | 0.0013 | 0.0011 | 0.0011 | 0.0010 | 0.0011 | 0.0009 | | |
| | 0.0010 | 0.0010 | 0.0011 | 0.0009 | 0.0010 | 0.0010 | 0.0010 | 0.0009 | | |
| | 0.0013 | 0.0011 | 0.0013 | 0.0011 | 0.0011 | 0.0011 | 0.0012 | 0.0010 | | |
| | 0.0013 | 0.0011 | 0.0013 | 0.0012 | 0.0011 | 0.0011 | 0.0012 | 0.0011 | | |
| | 0.0013 | 0.0011 | 0.0014 | 0.0011 | 0.0012 | 0.0011 | 0.0011 | 0.0010 | | |
| | 0.0008 | 0.0007 | 0.0008 | 0.0007 | 0.0008 | 0.0007 | 0.0008 | 0.0006 | | |
| | 0.0010 | 0.0009 | 0.0011 | 0.0009 | 0.0009 | 0.0008 | 0.0008 | 0.0006 | | |
| | 0.0011 | 0.0010 | 0.0011 | 0.0010 | 0.0010 | 0.0009 | 0.0009 | 0.0007 | | |
| 0.0011 | 0.0010 | 0.0011 | 0.0009 | 0.0010 | 0.0009 | 0.0009 | 0.0007 | | | |
| n | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | |
| Avg. | 0.0019 | 0.0019 | 0.0021 | 0.0021 | 0.0021 | 0.0021 | 0.0020 | 0.0020 | | |
| Med. | 0.0023 | 0.0024 | 0.0026 | 0.0027 | 0.0027 | 0.0027 | 0.0026 | 0.0027 | | |
| σ | 0.0006 | 0.0008 | 0.0008 | 0.0009 | 0.0009 | 0.0009 | 0.0009 | 0.0010 | | |
| min. | 0.0008 | 0.0007 | 0.0008 | 0.0007 | 0.0008 | 0.0007 | 0.0008 | 0.0006 | | |
| max. | 0.0025 | 0.0027 | 0.0029 | 0.0029 | 0.0030 | 0.0029 | 0.0029 | 0.0029 | | |