UL Testing Report

Category: UL48, Outdoor Electric Messaging Signs

Certified Test Location: 141 Flushing Ave, Suite 705, Brooklyn, NY 11205

Test Date: July 24th – July 26, 2019

Report Date: August 22, 2022

Description: This report identifies that the NANOV DISPLAY INC Brooklyn Navy Yard Research and Development Center is a certified UL 48 facility and specifies the tests conducted on the outdoor digital signage.

UL Testing

UL testing is a global safety science company that focuses on testing, inspection, and certification services to ensure safety, security, and sustainability for customers. The UL 48 is the Standard for Electric Signs, a standard that all electric signs in the US must comply with. UL48 is used to evaluate the installation, conductors, equipment, and field wiring of electric signs meets the requirements set by NEC.

CERTIFICATE OF COMPLIANCE

Certificate Number	20190911-E501091
Report Reference	E501091-20180831
Issue Date	2019-SEPTEMBER-11

Issued to:	NANOV DISPLAY INC 1978 NW 82ND AVE MIAMI FL 33126
This certificate confirms that representative samples of	SIGNS, CHANGING MESSAGE Permanently installed Changing Message Signs, outdoor use (wet), LCD Signs, designated as NI or NB XXX-YYYZZZ-aaa-bbb series, where XXX may be ADC, ADH, ADM, ASH, ASM, LDH, LDM, LDK, LSM, LSH, LSK, SDH, SDM, SDK, SSH, SSK or SSM; YYY may be 150, 190, 220, 240, 320, 370, 420, 428, 460, 490, 550, 650 or 750; ZZZ may be LCT or PCT; aaa may be three digit numbers; bbb may be letters. Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 48, Electric Signs CAN/CSA-C22.2 No. 207-15, Portable and Stationary Electric Signs and Displays
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number	20180905-E502481
Report Reference	E502481-20180831
Issue Date	2018-SEPTEMBER-05
Issued to:	NANOV DISPLAY INC 1978 NW 82ND AVE MIAMI FL 33126
This is to certify that representative samples of	COMPONENT - SIGN ACCESSORIES See Addendum
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 879, Electric Sign Components CAN/CSA-C22.2 No. 207-M89, Portable and Stationary Electric Signs and Displays
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: ᴿᵁ, may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at http://ul.com/aboutul/locations/

CERTIFICATE OF COMPLIANCE

Certificate Number	20180905-E502481
Report Reference	E502481-20180831
Issue Date	2018-SEPTEMBER-05

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Models: Component Sign Accessories – Sign controller, designated as Control Board Cover designated NRMCB-XYZ, "Remote Control Main" board, NIRCM-XYZ, "Remote Control Power" board, NIRCP-XYZ, "Temperature Sensor" board NTSG-XYZ, "Brightness Sensor" board, NBSG-XYZ and "Pixel Moving Sensor" board, NPSG-XYZ, where XYZ may be any alpha numeric characters for marketing purposes.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

Tests Performed

INPUT TEST (normal & abnormal): Loading the product to its maximum load condition and measuring the input current, input power, input VA, and/or Power Factor are included on the rating plate.

Result: *The input current measurement was normal and passed the test.*

COMPONENT TEMPERATURE TEST: Individually & simultaneously track the temperature of each component to ensure heat on those parts do not exceed the safety range.

Result: *The components in our units were well within the safety range.*

DIELECTRIC VOLTAGE WITHSTAND TEST: Establish the minimum level of electrical insulation necessary to prevent human contact with a potentially harmful voltage and resulting current.

Result: *The electrical insulation was determined and passed safety criteria.*

LOCKED ROTOR TEST: A blocked rotor test is conducted on an induction motor. From this test, short circuit current at normal voltage, power factor on short circuit, total leakage reactance, and starting torque of the motor can be found.

RAIN TEST: Test simulates a downpour resembles a natural rainstorm, with unit power off for the 1st hour, unit on for the 2nd hour, and tested under various abnormal conditions for last 2 hours.
Result: *The engineers inspected the interior to find no water or moisture has penetrated to the inside.*

BOND IMPEDANCE TEST: Test the grounding function of EUT's metal casing or grounding parts to determine if it could act as a re-grounding protection function.

Result: *Our units have a safe grounding function.*

LEAKAGE CURRENT: Test to measure the amount of current that passes through a person when contact the unit is energized with a current meter.
Result: *The leakage current from our units was well within safety range.*

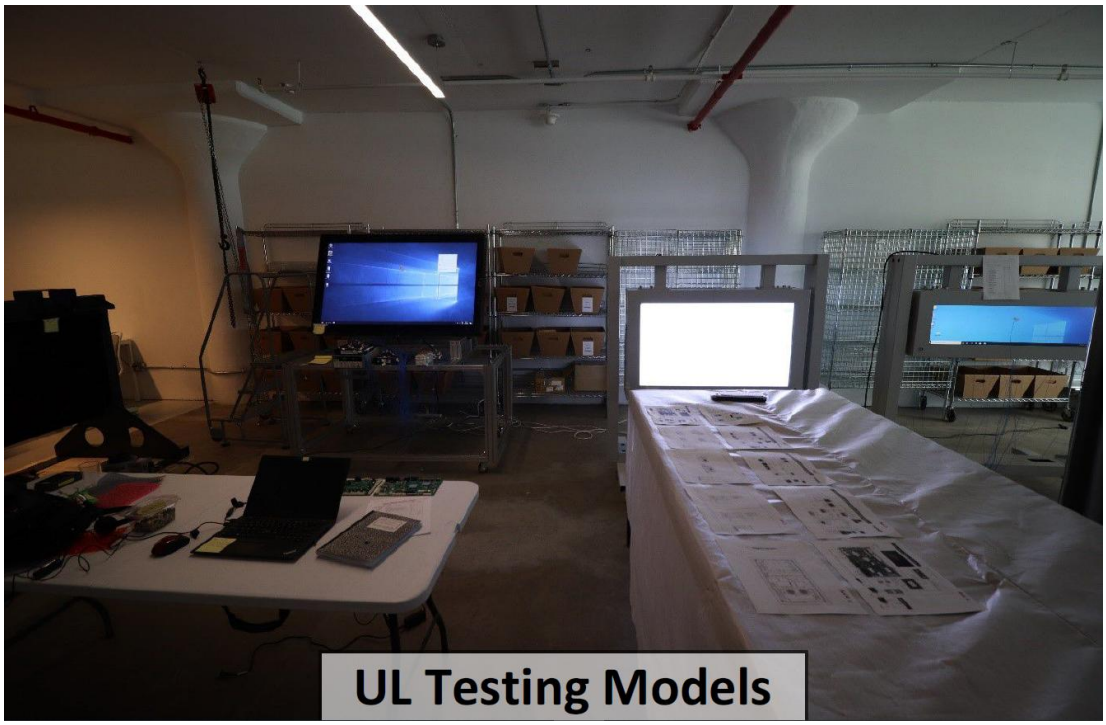
ABNORMAL OPERATION TEST: Test to ensure no risk of shock or fire in foreseeable abnormal operating condition and protected from such hazards in the event of any single fault condition.
Result: *Performed safely under abnormal circumstances and circumvented these potential vulnerabilities.*

MAXIMUM OUTPUT VOLTAGE TEST: Test Class 2 power supplies and battery chargers power levels in accordance with the National Electrical Code, NFPA 70. Maximum output voltage does not exceed 42.4 V peak for alternating current, 60 V for continuous direct current.
Result: *Maximum output voltage is within expected range.*

MAXIMUM OUTPUT CURRENT AND POWER TEST (Hi-Voltage): Test electricity overload by replicating the voltage power of a lightning strike (1500V) for a minute.
Result: *The unit continued to work normally with no safety issue and encountered no problems.*

GLASS IMPACT TEST : Test to check the quality of glass for vandalism safety. Dropping a 5kg metal sphere from 1 meter height, 3 times in the center, corner and side of our glass screen prototype.
Result*: No damage to the glass, satisfying durability quality of IK 08*

Test Results: Over the course of 4 days, two UL engineers rigorously test for three Nanov's outdoor units: NBSDM-460LC-105-SAN, NBSSM-5500LC-105-YYC & NBADH-428LC-124-SEA. On the final day our units performed well, showed satisfactory results and received their UL 48 certification.



End Results: All the marks made by the UL engineers over the course of 4 days yielded satisfactory results and our tested units successfully passed all the tests. The UL Engineers were in particularly impressed by the fans and the design of the cooling/ heating system. The tested devices received UL Certification as well as 400sq ft of NANOV R&D facility for research and development testing conditions for next 3 years to come.