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Certified Test Report – L11 and L12 – 241007

LED LICENSE LAMP
TECNIQ, INC. MODEL L11 and L12
SINGLE WHITE LED WITH CLEAR LENS

PASSES ALL TEST SPECIFICATIONS

L11 LICENSE LAMP

L12 LICENSE LAMP

Date: October 7th, 2024
Summary: L11 and L12 License Lamp FMVSS 108 Conforming
Tested By: Jack Collins
Report Certified By: Jack Collins
Report Prepared For: TecNiq, Inc. Galesburg, MI

Unless otherwise noted, all included tests follow these criteria:
Test date(s): September and October 2024 (various)
Test standard(s): FMVSS 108 October 2023
Lamp type(s): License
Output color(s): White

Included tests (in report order):
Photometry
Color Test
Vibration Test
Moisture Test
Dust Test
Corrosion Test
Plastic Optical Material Test

Edit(s):

Relevant Sections from Test Standard(s):

S7.7.13	License plate lamps: Photometry
S14.2.2	License plate lamp photometry
Figure 19	License plate lamp target locations
Figure 20	License plate lamp measurement of incident light angle

Test Procedure:

Testing was conducted according to procedures of FMVSS S14.2.2.

Testing was conducted in a single lamp configuration. The DUT (device under test) was evaluated in two configurations, top-mounted and side-mounted. In both configurations, the DUT was mounted along the respective centerline of each configuration. For both tests, the DUT was assessed for compliance within a designated testing zone.

The testing zone for the top-mounted configuration spanned from 0.35” off the outside face of the plate and 0” off the top edge of the plate to 10” off the outside face of the plate and 11” off the top edge of the plate. The testing zone for the side-mounted configuration spanned from 0.9” off the outside face of the plate and 0” off the side edge of the plate to 7” off the outside face of the plate and 6” off the side edge of the plate.

In both mounting configurations, photometry values were measured with the DUT mounted at varying distances to the configuration’s corresponding edge of the plate, as measured from the closest edge of the DUT to the corresponding edge of the plate. The range of distances was dictated by the lamp's geometry and the incident light angle requirement specified in section 7.7.15.4. **For example**, given the DUT is mounted 2.0” off the outside face of the license plate, the side-mounted lamp must be between 0” and 4.60” from the plate while the top-mounted lamp must be between 0” and 9.75” from the plate.

Permissible mounting locations for each configuration were determined through photometric measurements at various distances within the testing zone. The measured data presented below represent the minimum and maximum permissible mounting distances in each direction for each corresponding configuration.

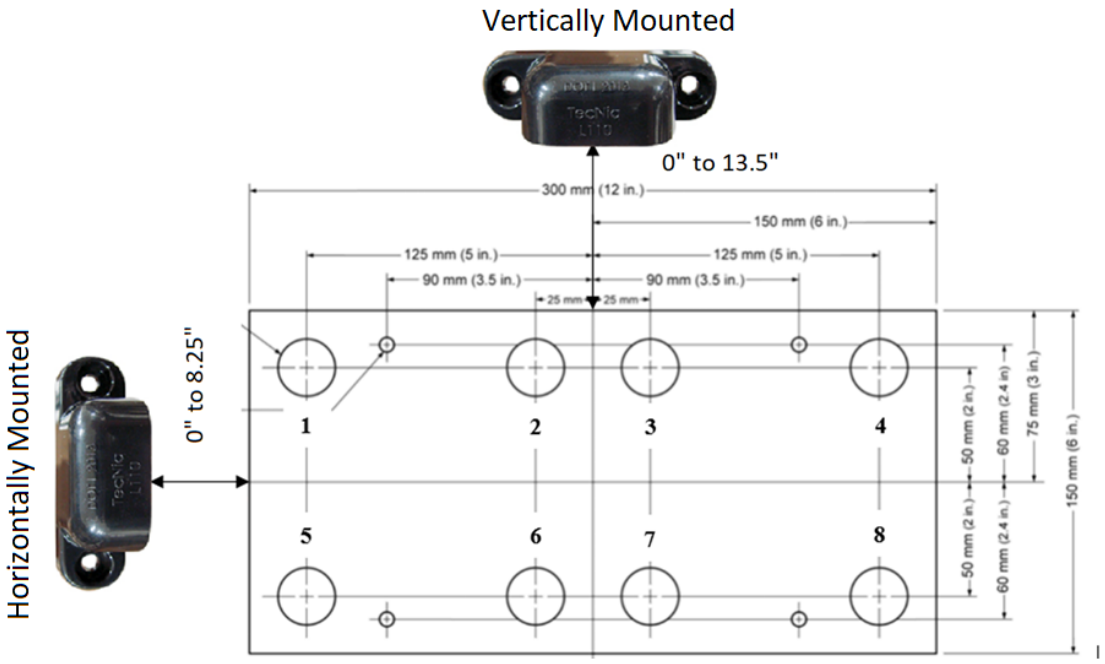

Figure 1: Photometric Test Locations (Figure 19 of FMVSS) and DUT Positions Based on 2" off the Outside Face of the License Plate.

Note: Figure 1 is not the permissible range of mounting positions, that information is included below.

Measured Data and Corresponding Requirement(s) for Vertically Mounted DUT:

Table 1: Photometric Test Results as Measured with the DUT Mounted on Center, 0.5" off the Face of the Test Plate at 0" From the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	103.3
2	8	794.2
3	8	880.6
4	8	104.9
5	8	35.0
6	8	79.9
7	8	77.6
8	8	52.8

Average of two highest values	Required maximum ratio	Ratio of averages
837.4	20	19.1
Average of two lowest values		
43.9		

Table 2: Photometric Test Results as Measured with the DUT Mounted on Center, 1" off the Face of the Test Plate at 5" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	39.6
2	8	73.6
3	8	62.7
4	8	47.8
5	8	10.1
6	8	14.1
7	8	15.1
8	8	15.2

Average of two highest values	Required maximum ratio	Ratio of averages
68.6	20	5.7
Average of two lowest values		
12.1		

Table 3: Photometric Test Results as Measured with the DUT Mounted on Center at, 2" off the Face of the Test Plate at 9" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	23.5
2	8	26.2
3	8	25.8
4	8	23.1
5	8	9.8
6	8	10.6
7	8	10.1
8	8	12.5

Average of two highest values	Required maximum ratio	Ratio of averages
26.0	20	2.6
Average of two lowest values		
10.0		

Table 4: Photometric Test Results as Measured with the DUT Mounted on Center at, 3" off the Face of the Test Plate at 10" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	26.5
2	8	27.3
3	8	23.6
4	8	23.6
5	8	10.1
6	8	10.4
7	8	11.0
8	8	14.0

Average of two highest values	Required maximum ratio	Ratio of averages
26.9	20	2.6
Average of two lowest values		
10.2		

Table 5: Photometric Test Results as Measured with the DUT Mounted on Center at, 4" off the Face of the Test Plate at 11" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	24.9
2	8	24.3
3	8	21.4
4	8	21.9
5	8	10.8
6	8	11.5
7	8	11.6
8	8	14.4

Average of two highest values	Required maximum ratio	Ratio of averages
24.6	20	2.2
Average of two lowest values		
11.2		

Table 6: Photometric Test Results as Measured with the DUT Mounted on Center at, 5" off the Face of the Test Plate at 11" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	19.0
2	8	19.2
3	8	17.0
4	8	20.5
5	8	10.6
6	8	11.6
7	8	11.5
8	8	14.6

Average of two highest values	Required maximum ratio	Ratio of averages
19.9	20	1.8
Average of two lowest values		
11.1		

Table 7: Photometric Test Results as Measured with the DUT Mounted on Center at, 6" off the Face of the Test Plate at 11" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	17.8
2	8	14.4
3	8	13.1
4	8	15.5
5	8	11.7
6	8	10.3
7	8	10.5
8	8	13.9

Average of two highest values	Required maximum ratio	Ratio of averages
16.8	20	1.6
Average of two lowest values		
10.4		

Table 8: Photometric Test Results as Measured with the DUT Mounted on Center at, 7" off the Face of the Test Plate at 11" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	14.7
2	8	11.9
3	8	11.2
4	8	13.9
5	8	10.6
6	8	9.1
7	8	9.4
8	8	14.1

Average of two highest values	Required maximum ratio	Ratio of averages
14.4	20	1.6
Average of two lowest values		
9.2		

Table 9: Photometric Test Results as Measured with the DUT Mounted on Center at, 8" off the Face of the Test Plate at 7" from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	9.4
2	8	9.6
3	8	8.8
4	8	9.3
5	8	14.6
6	8	9.6
7	8	9.7
8	8	14.1

Average of two highest values	Required maximum ratio	Ratio of averages
14.4	20	1.6
Average of two lowest values		
9.1		

Table 10: Photometric Test Results as Measured with the DUT Mounted on Center at, 9” off the Face of the Test Plate at 2” from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	10.5
2	8	40.1
3	8	36.7
4	8	10.0
5	8	11.0
6	8	12.3
7	8	10.7
8	8	9.0

Average of two highest values	Required maximum ratio	Ratio of averages
38.4	20	4.0
Average of two lowest values		
9.5		

Table 11: Photometric Test Results as Measured with the DUT Mounted on Center at, 9” off the Face of the Test Plate at 0” from the top of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	24.5
2	8	47.8
3	8	42.6
4	8	23.0
5	8	11.9
6	8	20.6
7	8	17.2
8	8	8.9

Average of two highest values	Required maximum ratio	Ratio of averages
45.2	20	4.4
Average of two lowest values		
10.4		

Measured Data and Corresponding Requirement(s) for Horizontally Mounted DUT:

Table 12: Photometric Test Results as Measured with the DUT Mounted on Center, 2" off the Face of the Test Plate at 0" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	24.3
2	8	69.1
3	8	116.0
4	8	144.1
5	8	21.5
6	8	56.6
7	8	99.5
8	8	125.6

Average of two highest values	Required maximum ratio	Ratio of averages
134.87	20	5.88
Average of two lowest values		
22.92		

Table 13: Photometric Test Results as Measured with the DUT Mounted on Center, 2" off the Face of the Test Plate at 1" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	17.7
2	8	46.1
3	8	79.4
4	8	110.9
5	8	17.2
6	8	51.1
7	8	99.5
8	8	92.9

Average of two highest values	Required maximum ratio	Ratio of averages
105.20	20	6.02
Average of two lowest values		
17.47		

Table 14: Photometric Test Results as Measured with the DUT Mounted on Center, 2" off the Face of the Test Plate at 2" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	12.5
2	8	35.3
3	8	65.8
4	8	130.8
5	8	12.6
6	8	35.7
7	8	67.4
8	8	139.7

Average of two highest values	Required maximum ratio	Ratio of averages
135.29	20	10.77
Average of two lowest values		
12.57		

Table 15: Photometric Test Results as Measured with the DUT Mounted on Center, 2" off the Face of the Test Plate at 3" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	9.9
2	8	24.6
3	8	44.5
4	8	131.9
5	8	10.0
6	8	26.5
7	8	49.4
8	8	122.2

Average of two highest values	Required maximum ratio	Ratio of averages
127.03	20	12.78
Average of two lowest values		
9.94		

Table 16: Photometric Test Results as Measured with the DUT Mounted on Center, 2" off the Face of the Test Plate at 4" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	8.5
2	8	19.8
3	8	35.3
4	8	112.0
5	8	9.0
6	8	19.3
7	8	35.2
8	8	119.3

Average of two highest values	Required maximum ratio	Ratio of averages
115.64	20	13.29
Average of two lowest values		
8.70		

Table 17: Photometric Test Results as Measured with the DUT Mounted on Center, 3" off the Face of the Test Plate at 5" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	9.9
2	8	19.5
3	8	31.0
4	8	62.7
5	8	9.9
6	8	21.0
7	8	30.5
8	8	64.2

Average of two highest values	Required maximum ratio	Ratio of averages
63.43	20	6.40
Average of two lowest values		
9.91		

Table 18: Photometric Test Results as Measured with the DUT Mounted on Center, 4" off the Face of the Test Plate at 6" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	10.1
2	8	16.9
3	8	23.3
4	8	37.0
5	8	10.4
6	8	17.8
7	8	22.4
8	8	33.3

Average of two highest values	Required maximum ratio	Ratio of averages
35.15	20	3.43
Average of two lowest values		
10.26		

Table 19: Photometric Test Results as Measured with the DUT Mounted on Center, 5" off the Face of the Test Plate at 6" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	11.1
2	8	15.6
3	8	18.2
4	8	30.5
5	8	11.1
6	8	16.1
7	8	17.5
8	8	21.1

Average of two highest values	Required maximum ratio	Ratio of averages
25.79	20	2.33
Average of two lowest values		
11.09		

Table 20: Photometric Test Results as Measured with the DUT Mounted on Center, 6" off the Face of the Test Plate at 6" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	10.0
2	8	11.9
3	8	13.8
4	8	26.4
5	8	10.4
6	8	12.4
7	8	13.4
8	8	25.7

Average of two highest values	Required maximum ratio	Ratio of averages
26.03	20	2.55
Average of two lowest values		
10.19		

Table 21: Photometric Test Results as Measured with the DUT Mounted on Center, 6" off the Face of the Test Plate at 2" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	12.1
2	8	9.7
3	8	16.1
4	8	31.1
5	8	12.2
6	8	17.4
7	8	30.6
8	8	24.0

Average of two highest values	Required maximum ratio	Ratio of averages
30.87	20	2.83
Average of two lowest values		
10.92		

Table 22: Photometric Test Results as Measured with the DUT Mounted on Center, 7" off the Face of the Test Plate at 2" from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	9.2
2	8	8.9
3	8	21.2
4	8	31.2
5	8	8.6
6	8	9.6
7	8	25.1
8	8	23.7

Average of two highest values	Required maximum ratio	Ratio of averages
28.13	20	3.20
Average of two lowest values		
8.78		

Table 23: Photometric Test Results as Measured with the DUT Mounted on Center, 7” off the Face of the Test Plate at 1” from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	9.1
2	8	16.3
3	8	18.4
4	8	50.7
5	8	8.9
6	8	20.2
7	8	22.0
8	8	33.0

Average of two highest values	Required maximum ratio	Ratio of averages
34.57	20	3.85
Average of two lowest values		
8.98		

Table 24: Photometric Test Results as Measured with the DUT Mounted on Center, 6” off the Face of the Test Plate at 1” from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	12.1
2	8	12.9
3	8	29.5
4	8	45.0
5	8	11.6
6	8	24.4
7	8	27.6
8	8	28.7

Average of two highest values	Required maximum ratio	Ratio of averages
37.26	20	3.14
Average of two lowest values		
11.86		

Table 25: Photometric Test Results as Measured with the DUT Mounted on Center, 6” off the Face of the Test Plate at 0” from the side edge of the Test Plate

Test Location (See Figure 1)	Required Minimum [lux]	Measurement [lux]
1	8	10.4
2	8	22.1
3	8	32.2
4	8	70.6
5	8	10.5
6	8	18.3
7	8	30.0
8	8	67.1

Average of two highest values	Required maximum ratio	Ratio of averages
68.86	20	6.59
Average of two lowest values		
10.45		

Acceptance Criteria:

S7.7.13.1: Each license plate lamp must be designed to conform to the photometry requirements of this section when tested according to the procedure of S14.2.2.

S7.7.13.2: An illumination value of no less than 8 lx [0.75 fc] must be met at each test station target location shown in Figure 19.

S7.7.13.3: The ratio of the average of the two highest illumination values divided by the average of the two lowest illumination values must not exceed 20:1 for vehicles other than motorcycles and motor driven cycles.

Results:

PASS—ABOVE ALL MINIMUMS AND BELOW MAXIMUMS

When mounted on center and in the vertical direction, L11 and L12 can be mounted anywhere on or inside the acceptance box detailed in figure 2. When mounted on center and in the horizontal direction L11 and L12 can be mounted anywhere on or inside the acceptance box detailed in figure 3.

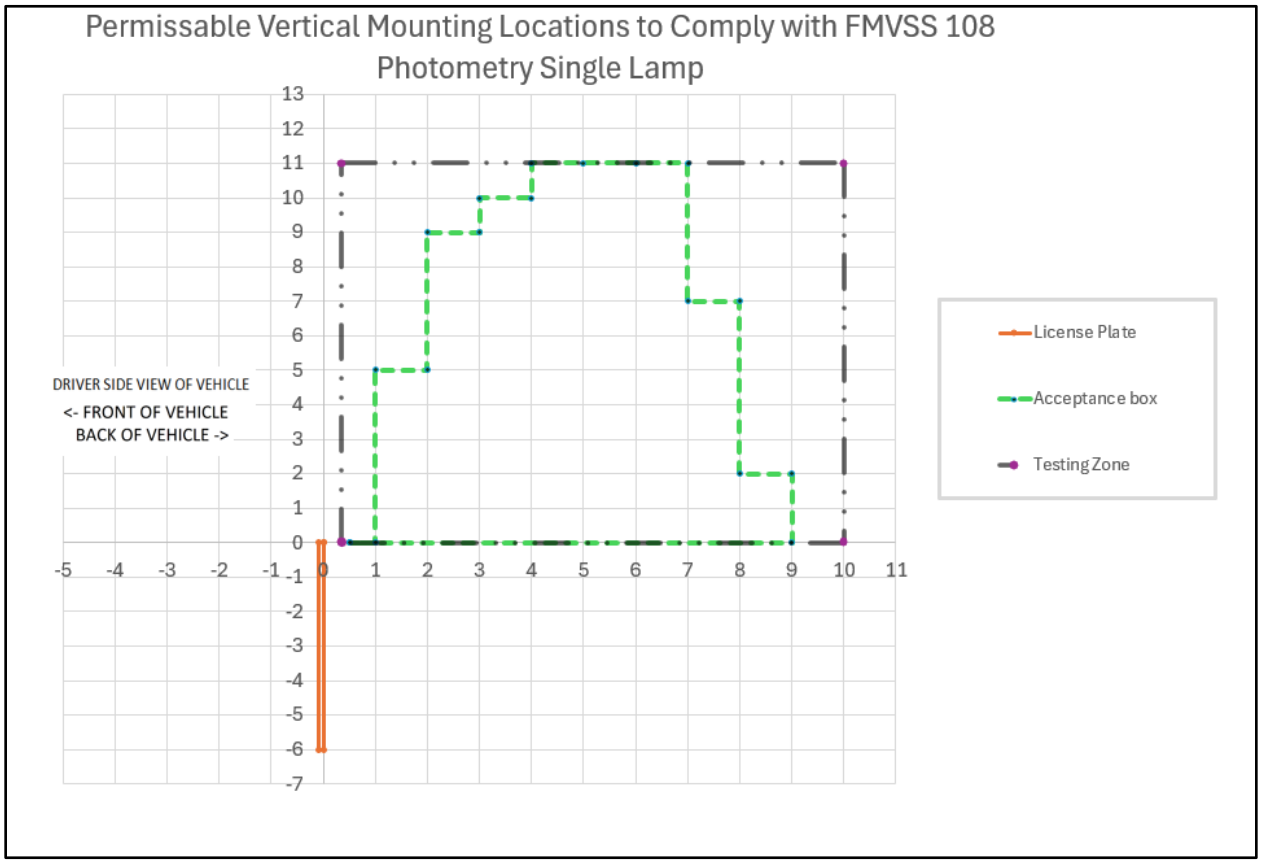

Figure 2: Permissible Vertical Mounting Locations for the L11 and L12 (All values are in inches)

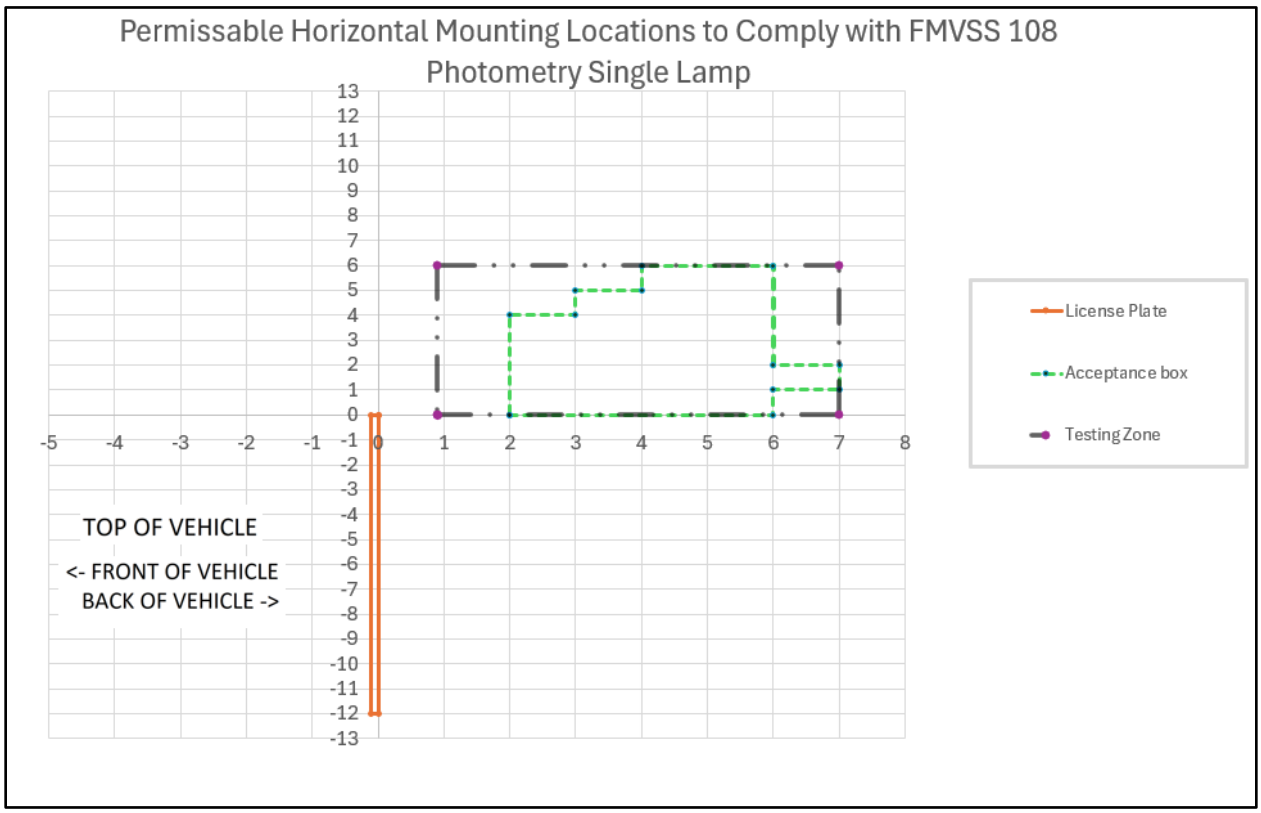

Figure 2: Permissible Horizontal Mounting Locations for the L11 and L12 (All values are in inches)

COLOR TEST OF LED LICENSE LAMP
TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests
S14.4.1 Color test
S14.4.1.4 Tristimulus method

Test Procedure:

Testing conducted according to procedures of FMVSS S14.4.1.4.1

Acceptance Criteria:

S14.4.1.4.2.3 White (achromatic). The color of light emitted must fall within the following boundaries:

x = 0.31 (blue boundary)
y = 0.44 (green boundary)
x = 0.50 (yellow boundary)
y = 0.15 + 0.64x (green boundary)
y = 0.38 (red boundary)
y = 0.05 + 0.75x (purple boundary)

Results:

Chromaticity Coordinates (averaged from four measurements)
x = 0.3774
y = 0.3860

PASSED—CHROMATICITY COORDINATES FALL WITHIN SPECIFIED BOUNDARIES

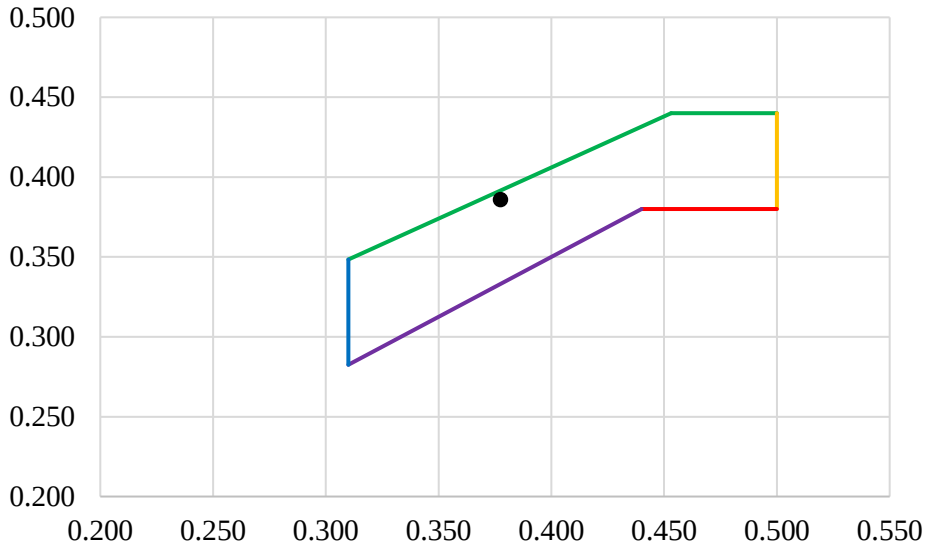

Figure 3: Measured Color Coordinate is within FMVSS Specified Boundaries

VIBRATION TEST OF LED LICENSE LAMP TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests
S14.5.1 Vibration test

Test Procedure:

S14.5.1.1 Vibration test: Procedure

Acceptance Criteria:

S14.5.1.2 After completion of the vibration test a device showing evidence of material physical weakness, lens or reflector rotation, displacement or rupture of parts except bulb failures, must be considered to have failed, providing that the rotation of lens or reflector must not be considered as a failure when tests show compliance with specifications despite such rotation.

Results:

PASSES—NO APPARENT MATERIAL WEAKNESS OR DISPLACEMENT

MOISTURE TEST OF LED LICENSE LAMP
TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests
S14.5.2 Moisture test

Test Procedure:

Vacuum submersion exceeds FMVSS 108 S14.5.2.1 as it evaluates the lamp's seal against air egress. Submerge the sample in a sealed transparent tank containing water with small amount of chlorine. Pump air from the tank to create a vacuum of 12psi in the volume above the water, as measured relative to the ambient air pressure. The air in the sample was sealed at ambient pressure and will push outward at vacuum pressure. Failure is indicated by air bubbles emanating from the sample or internal moisture observed when the sample is removed.

Acceptance Criteria:

S14.5.2.2. Accumulation of moisture in excess of 2 cc or any visible moisture in a sealed reflex unit must constitute a failure.

Results:

PASSED—NO AIR BUBBLES DURING TEST OR MOISTURE APPARENT IN SAMPLE

DUST TEST OF LED LICENSE LAMP
TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests
S14.5.3 Dust test

Test Procedure:

Test not conducted. See acceptance criteria below.

Acceptance Criteria:

S14.5.3.1 A sealed unit is not required to meet the requirements of this test.

Results:

PASSES—SAMPLES ARE SEALED UNITS

CORROSION TEST OF LED LICENSE LAMP
TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests
S14.5.4 Corrosion test

Test Procedure:

Test conducted according to S14.5.4.1 in a salt fog chamber.

Acceptance Criteria:

S14.5.4.2 After the completion of the corrosion test there must be no evidence of excessive corrosion which would affect the proper function of the device.

Results:

PASSES—NO CORROSION APPARENT

MATERIAL TEST OF LED LICENSE LAMP TECNIQ, INC. MODEL L11 and L12

Relevant Sections from Test Standard(s):

S7.7.14 License plate lamps: Physical tests

S14.4.2 Plastic optical materials tests.

Test Procedure:

Test conducted by AMECA (Automotive Manufacturers Equipment Compliance Agency) for compliance with FMVSS outdoor exposure test. The list of acceptable plastics is published as the "AMECA List of Acceptable Plastics for Optical Lenses and Reflex Reflectors" online at https://ameca.org/list-of-acceptable-plastics/. The list is updated regularly—a copy will be provided with this certification report.

The Makrolon AL2647 polycarbonate resin used in the L11 and L12 lenses are manufactured by Covestro LLC and supplied by M. Holland. This formulation is found on page 28 of the AMECA document: https://ameca.org/wp-content/uploads/2023/02/AMECA-List-of-Acceptable-Plastics-for-Optical-Lenses-and-Reflex-Reflectors-February-17-2023.pdf.

From the AMECA List of Acceptable Plastics for Optical Lenses and Reflex Reflectors Used on Motor Vehicles:

1 STATUS: The following materials have been accepted by the Automotive Manufacturers Equipment Compliance Agency as meeting the 3-year weathering test of FMVSS 108 for plastics used in optical lenses and reflectors used on motor vehicles. No evaluation has been made as to the suitability of individual materials for particular automotive uses, or to the manufacturing methods.

NOTE: TecNiq reserves the right to use different resin formulations that are found on the AMECA list, depending on supply.

Acceptance Criteria:

S14.4.2.2.4 Outdoor exposure test: Performance requirements.

S14.4.2.3 Heat test: Performance requirements.

Results:

PASSES—MATERIAL USED IS ON THE AMECA LIST OF ACCEPTABLE PLASTICS