

2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp  
(SAE HLHRI5P)

Nissan P/N: 26060-3NA1D

**CALCOAST - ITL**  
Lighting Technology  
683 Thornton Street  
San Leandro, CA 94577



31 July 2018

FINAL REPORT 108-CAN-18-013

PREPARED FOR

U.S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue SE  
Washington, D.C. 20590

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NHTSA Report No. 108-CAN-18-013

Prepared and Approved By: 

Approval Date: 31 July 2018

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:  \_\_\_\_\_

Acceptance Date: 12/21/2018 \_\_\_\_\_

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TECHNICAL REPORT STANDARD TITLE PAGE

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<b>4. Title and Subtitle</b> Test Series 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp		<b>5. Report Date</b> 31 July 2018	
<b>7. Author(s)</b> Mark Evans, Laboratory Director		<b>6. Performing Organization Code</b> N/A  <b>8. Performing Organization Report No.</b> 180613-01D	
<b>9. Performing Organization Name and Address</b> Calcoast - ITL 683 Thornton Street San Leandro, CA 94577		<b>10. Work Unit No.</b> N/A	
<b>12. Sponsoring Agency Name and Address</b> U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 1200 New Jersey Avenue SE West Building - 4 <sup>th</sup> Floor - NVS222 Washington, D.C. 20590		<b>11. Contract or Grant No.</b> DTNH22-14-D-00370L  <b>13. Type of Report and Period Covered</b>	
<b>15. Supplementary Notes</b>		<b>14. Sponsoring Agency Code</b>	
<b>16. Abstract</b> The scope of this testing was limited to certain photometry, color, and markings tests as indicated. Test failures identified were as follows: None			
<b>17. Key Words</b> Federal Motor Vehicle Safety Standard 108 Lamps, Reflective Devices and Associated Equipment		<b>18. Distribution Statement</b> Unlimited	
<b>19. Security Classif. (of this report)</b> Unclassified	<b>20. Security Classif. (of this report)</b> Unclassified	<b>21. No. of Pages</b> 37	<b>22. Price</b> N/A



INDUSTRIAL TESTING LABORATORY

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TEST REPORT

Report Date: 31 July 2018

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Submitted by: Purchased by CCITL for NHTSA from Autocom Nissan East Bay San Leandro

Test Laboratory: Calcoast - ITL San Leandro, CA 94577

Samples Submitted: Four (4) LH lamps purchased 13 June 2018

SUMMARY

TESTS (FMVSS-108)

PHOTOMETRY - Combination Front Lamp System

- Headlamp, Lower Beam - S10.15.6 / Table XIX-a (LB2V) .....Passed
- Headlamp, Upper Beam - S10.15.6 / Table XVIII (UB2) .....Passed
- Turn Signal Lamp - S7.1.1.13 / Table VI-a .....Passed
- Parking Lamp - S7.8.13 / Table XIV .....Passed

- Lens Area Tests (EPLLA) - Table IV-a (Turn Signal).....Passed
- Visibility Tests - Table V-c, Luminous Intensity Option.....Passed
- Bulb Socket Test- S14.2.....Not Applicable
- Color Tests - S14.4.1.....Passed
- Plastic Optical Material Tests - S14.4.2.....Not Tested
- Physical (Mechanical) Tests - S14.5.....Not Tested
- Physical (Mechanical) Tests - S14.6.....Not Tested
- Aimability Tests - S10.18.9, MVSR 108 (29).....Not Tested
- Markings - S6.5 / S10.18 / Table III.....Passed

Written and Approved by:

Mark A. Evans  
Laboratory Director

**DESCRIPTION SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

**DESCRIPTION:**

The 2012 Nissan Leaf (LH) headlamps (P/N 26060-3NA1D) use LED source for lower beam and one (1) H9 replaceable halogen source for upper beam functions. The lamps also have Turn Signal and Parking functions. The on-vehicle lamp mounting height is unknown.

No horizontal aimer is present.

**PHYSICAL INSPECTION****MARKINGS:**

Lens: "DOT", "VOR", "H9", "SAE HLHRI5P 08", "ICHIKOH", "LH<sub>1</sub>", "DOT", optical axis mark

Housing: "ICHIKOH 1845", "TYPE2 LED 26V19W", "M", "Lens >PC<", "Housing >PP-TD20<", "Inner Lens >PC<", "TYPE1 H9 12V65W", "CLEARANCE W5W 12V5W", "TURN JPN/ECE WY21W 12V21W", "TURN USA 3457NAK 12V27W"

Lot codes: "7D13"

**Marking Requirements:**

S6.5.1: The lens is marked with the symbol "DOT".

S6.5.3.1: The lens is marked with the name and/or trademark of the manufacturer or importer registered with the U.S. Patent and Trademark Office.

S6.5.3.2: The lamp is marked with its voltage. The lamp is marked with its part or trade number.

S6.5.3.4.1: The lens is marked with H9 bulb designation in front of the replaceable light sources.

S10.18.5: Headlamp lens has an optical mark indicating proper alignment.

S10.18.9.6: The lens is marked "VOR" in letters not less than 3 mm high.

Samples meet Markings requirements.

**MATERIAL:**

Not inspected.

**BULBS:**

FUNCTION	QUANTITY	TYPE	VOLTAGE	POWER	FLUX
Lower Beam (LB)	Unknown	LED	12.8V	21W	-
Upper Beam (UB)	One (1)	H9	12.8V	65W	2000 Lm
Turn Signal (I)	One (1)	3457NA	12.8V	27W	30 Mscd
Parking (P)	One (1)	W5W	13.5V	5W	50 Lm

Samples meet headlamp bulb type requirements for S10.15 Replaceable Bulb Headlighting systems. (See Part 564/Docket 1998-3397)

**PHOTOMETRY SUMMARY SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

**PHOTOMETRY SUMMARY**

Specification(s): FMVSS 108

Reference detector control number: NIST P181-2

Test distance: 100 feet

Tests performed by: MAE/DGC

Date: 28-29 June 2018, 02 July 2018

Samples meet requirements at all points for:

Headlamp, Lower Beam - S10.15.6 / Table XIX-a (LB2V)

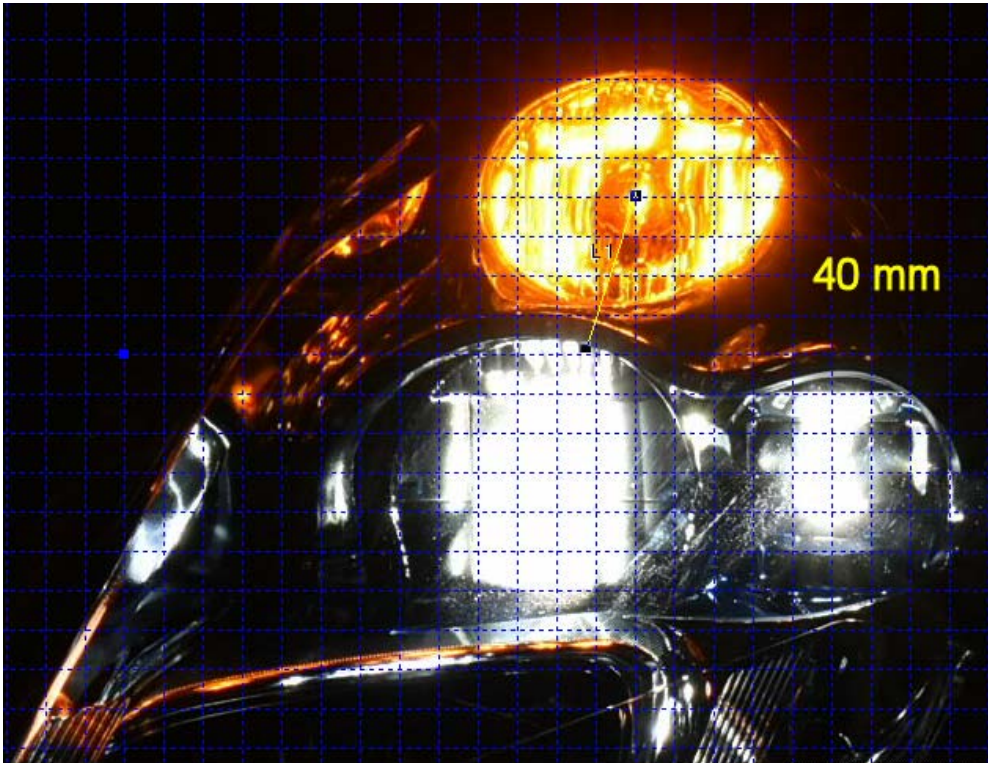
Headlamp, Upper Beam - S10.15.6 / Table XVIII (UB2)

Turn Signal Lamp - S7.1.1.13 / Table VI-a

Parking Lamp - S7.8.13 / Table XIV

Initial photometry compliance verification tests for the headlamp functions (Lower Beam, Upper Beam) were performed using the seasoned furnished bulb at design voltage measured at the lamp terminals. Initial photometry for signaling and marking functions performed using accurate-rated, calibrated bulbs at luminous flux.

All tests were performed with the lamps mounted on a test fixture supplied by the manufacturer.

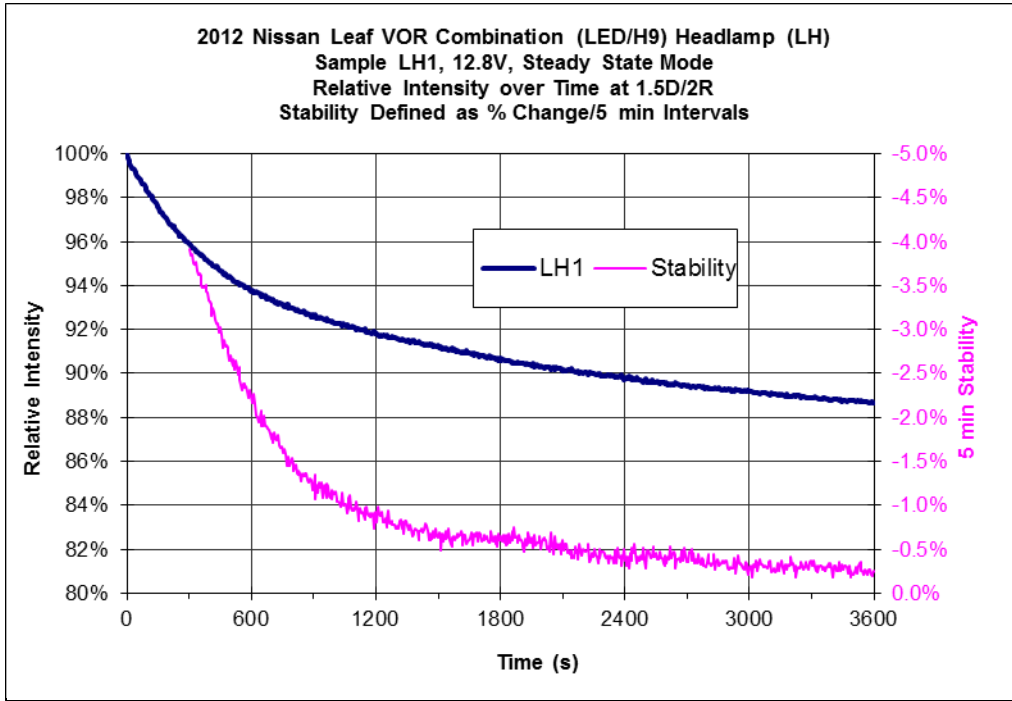


The separation between the turn signal and lighted edge of the lower beam is less than 100 mm so a 2.5X turn signal requirement multiplier is required per S7.1.1.10.

PHOTOMETRY TEST DATA SHEET

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH1



Samples lower beam LEDs reached 1% stability within 30 minutes of activation

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH1 & LH2, Left Hand (VOR Aim)

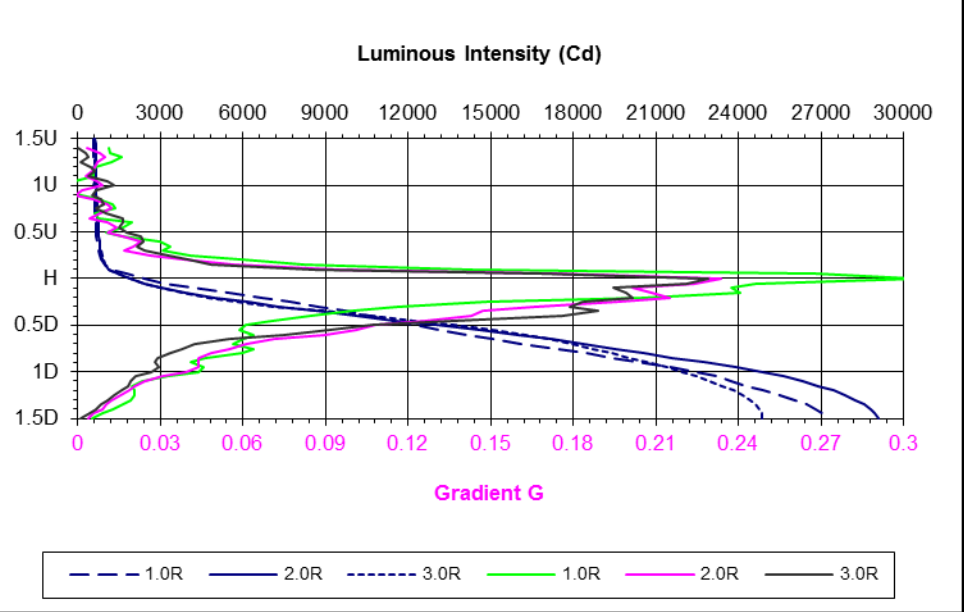
LH1

Maximum Vertical Gradient

Location	Value	Required
H/1.0R	0.304	> 0.13
H/2.0R	0.234	
H/3.0R	0.229	

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



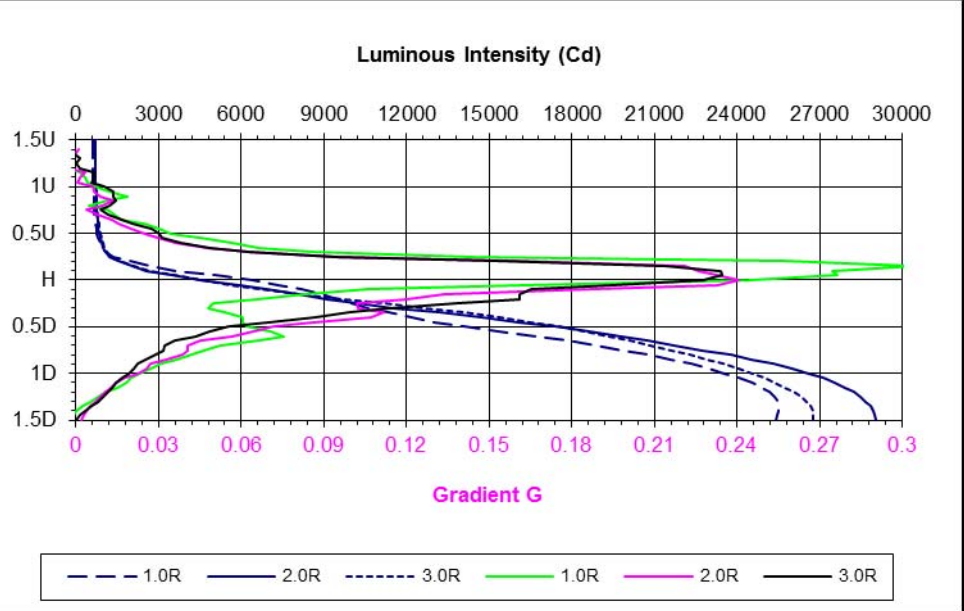
LH2

Maximum Vertical Gradient

Location	Value	Required
0.15U/1.0R	0.305	> 0.13
H/2.0R	0.241	
0.05U/3.0R	0.235	

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



Samples meet S10.18.9 Visual/Optical Aiming cutoff requirements



**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH3 & LH4, Left Hand (VOR Aim)

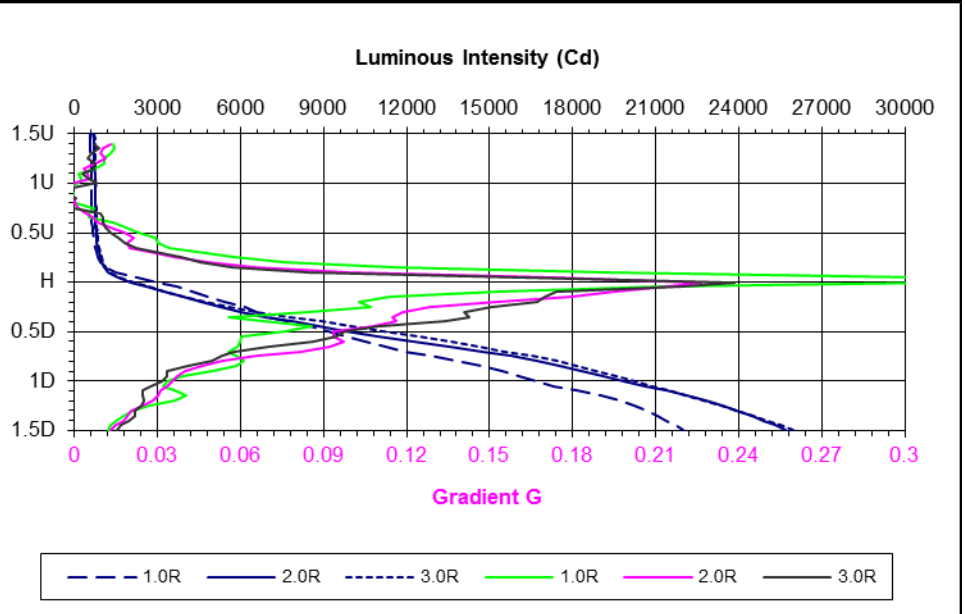
LH3

Maximum Vertical Gradient

Location	Value	Required
H/1.0R	0.310	> 0.13
H/2.0R	0.226	
H/3.0R	0.238	

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



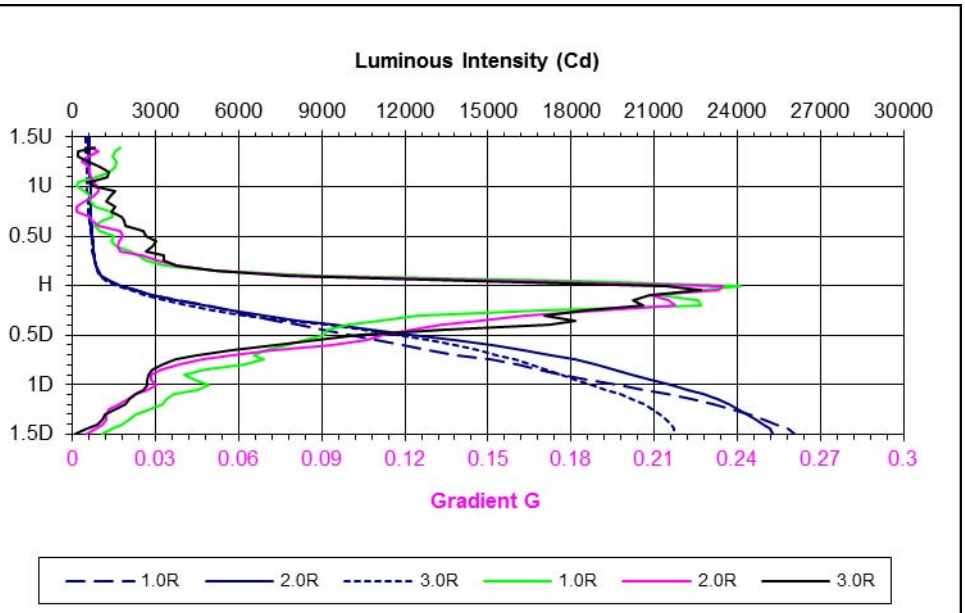
LH4

Maximum Vertical Gradient

Location	Value	Required
H/1.0R	0.241	> 0.13
H/2.0R	0.234	
0.05D/3.0R	0.227	

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



Samples meet S10.18.9 Visual/Optical Aiming cutoff requirements

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS108 Table XIX-a: LB2V (VO Headlamp - 2 Lamp System)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
4.0U 8.0L		165.59		64	-
4.0U 8.0R		299.09		64	-
2.0U 4.0L		207.73		135	-
1.5U 1.0R TO 3.0R	1.0R	539.46		200	-
1.5U 1.0R TO R	2.4R	665.53		-	1400
1.0U 1.5L TO L	4.4L	298.36		-	700
0.5U 1.5L TO L	1.5L	349.75		-	1000
0.5U 1.0R TO 3.0R	1.0R	651.68		500	-
0.5U 1.0R TO 3.0R	2.7R	761.84		-	2700
H 8.0L		263.68		64	-
H 4.0L		365.17		135	-
H V		2128.47		-	-
0.6D 1.3R		13679.38		10000	-
0.9D 3.5L		4113.45		1800	12000
0.9D V		16290.06		4500	-
1.5D 2.0R		29021.07		15000	-
2.0D 15.0L		1731.01		1000	-
2.0D 9.0L		3860.31		1250	-
2.0D 9.0R		7503.69		1250	-
2.0D 15.0R		3288.41		1000	-
4.0D 20.0L		1363.64		300	-
4.0D V		8245.05		-	-
4.0D 4.0R		7954.66		-	12500
4.0D 20.0R		1288.08		300	-

MAXIMUM 1.5D 1.7R 29192.29 - -

MX(10U-90U/90L-90R) 10.0U 3.7R 25.04 - 125

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.677A after 60 min warmup (1% stabilization)  
 Multiply above values by 1.12 to acquire t = 1 minute values

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS108 Table XVIII: UB2 (Headlamp - 2 Lamp System)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
2.0U V		7770.60		1500	-
1.0U 3.0L		20523.76		5000	-
1.0U 3.0R		9764.69		5000	-
H 12.0L		3370.69		1500	-
H 9.0L		5455.39		3000	-
H 6.0L		8570.57		5000	-
H 3.0L		26876.85		15000	-
H V		56858.91		40000	75000
H 3.0R		18439.53		15000	-
H 6.0R		9165.25		5000	-
H 9.0R		6694.53		3000	-
H 12.0R		3760.02		1500	-
1.5D 9.0L		6352.38		2000	-
1.5D V		36096.05		5000	-
1.5D 9.0R		11161.50		2000	-
2.5D 12.0L		4398.60		1000	-
2.5D V		20274.34		2500	-
2.5D 12.0R		6301.46		1000	-
4.0D V		8950.55		-	12000
MAXIMUM	0.4D 0.4R	62414.79		-	-

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.677A after 60 min warmup per SAE J2560

Bulb: Seasoned Philips H9 furnished with sample @ 12.80V / 5.416A

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS108 Table XIX-a: LB2V (VO Headlamp - 2 Lamp System)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
4.0U 8.0L		156.68		64	-
4.0U 8.0R		330.31		64	-
2.0U 4.0L		213.90		135	-
1.5U 1.0R TO 3.0R	1.0R	614.30		200	-
1.5U 1.0R TO R	2.3R	744.14		-	1400
1.0U 1.5L TO L	1.5L	310.39		-	700
0.5U 1.5L TO L	1.5L	384.28		-	1000
0.5U 1.0R TO 3.0R	1.0R	765.36		500	-
0.5U 1.0R TO 3.0R	3.0R	881.89		-	2700
H 8.0L		260.93		64	-
H 4.0L		400.34		135	-
H V		6885.79		-	-
0.6D 1.3R		16802.40		10000	-
0.9D 3.5L		5411.86		1800	12000
0.9D V		19404.58		4500	-
1.5D 2.0R		28762.09		15000	-
2.0D 15.0L		1883.91		1000	-
2.0D 9.0L		4023.24		1250	-
2.0D 9.0R		7074.17		1250	-
2.0D 15.0R		3067.45		1000	-
4.0D 20.0L		1353.20		300	-
4.0D V		7124.29		-	-
4.0D 4.0R		7524.27		-	12500
4.0D 20.0R		1218.62		300	-
MAXIMUM	1.5D 2.2R	29186.51		-	-
MX(10U-90U/90L-90R)	10.0U 3.6R	26.23		-	125

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.685A after 30 min warmup (1% stabilization)  
 Multiply above values by 1.12 to acquire t = 1 minute values

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS108 Table XVIII: UB2 (Headlamp - 2 Lamp System)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
2.0U V		6070.62		1500	-
1.0U 3.0L		15965.12		5000	-
1.0U 3.0R		6908.46		5000	-
H 12.0L		3209.92		1500	-
H 9.0L		5230.26		3000	-
H 6.0L		8236.01		5000	-
H 3.0L		29843.26		15000	-
H V		53698.96		40000	75000
H 3.0R		17074.98		15000	-
H 6.0R		10015.70		5000	-
H 9.0R		7212.52		3000	-
H 12.0R		4295.71		1500	-
1.5D 9.0L		6790.55		2000	-
1.5D V		43277.68		5000	-
1.5D 9.0R		11646.02		2000	-
2.5D 12.0L		4464.94		1000	-
2.5D V		18927.63		2500	-
2.5D 12.0R		6321.41		1000	-
4.0D V		8572.39		-	12000
MAXIMUM	0.9D 0.2R	66185.85		-	-

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.682A after 30 min warmup (1% stabilization)

Bulb: Seasoned Philips H9 furnished with sample @ 12.80V / 5.364A

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS108 Table XIX-a: LB2V (VO Headlamp - 2 Lamp System)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
4.0U 8.0L		147.97		64	-
4.0U 8.0R		284.90		64	-
2.0U 4.0L		215.84		135	-
1.5U 1.0R TO 3.0R	1.0R	543.49		200	-
1.5U 1.0R TO R	2.7R	735.10		-	1400
1.0U 1.5L TO L	1.5L	320.05		-	700
0.5U 1.5L TO L	1.5L	372.45		-	1000
0.5U 1.0R TO 3.0R	1.0R	659.78		500	-
0.5U 1.0R TO 3.0R	2.9R	829.64		-	2700
H 8.0L		262.49		64	-
H 4.0L		394.87		135	-
H V		2760.30		-	-
0.6D 1.3R		9917.42	14463.89	10000	-
0.9D 3.5L		2716.96		1800	12000
0.9D V		12624.55		4500	-
1.5D 2.0R		25358.41		15000	-
2.0D 15.0L		1331.75		1000	-
2.0D 9.0L		2805.14		1250	-
2.0D 9.0R		6843.95		1250	-
2.0D 15.0R		3026.51		1000	-
4.0D 20.0L		1238.96		300	-
4.0D V		8460.57		-	-
4.0D 4.0R		8955.22		-	12500
4.0D 20.0R		1268.87		300	-
MAXIMUM	1.8D 2.6R	27344.59		-	-
MX(10U-90U/90L-90R)	10.0U 3.1R	33.05		-	125

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.677A after 30 min warmup (1% stabilization)  
 Multiply above values by 1.06 to acquire t = 1 minute values

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS108 Table XVIII: UB2 (Headlamp - 2 Lamp System)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
2.0U V		4466.07		1500	-
1.0U 3.0L		8908.01		5000	-
1.0U 3.0R		5942.20		5000	-
H 12.0L		2646.09		1500	-
H 9.0L		4425.75		3000	-
H 6.0L		7185.12		5000	-
H 3.0L		18453.37		15000	-
H V		44851.49		40000	75000
H 3.0R		14101.76	16978.65	15000	-
H 6.0R		7735.14		5000	-
H 9.0R		5960.03		3000	-
H 12.0R		3510.79		1500	-
1.5D 9.0L		5351.92		2000	-
1.5D V		46344.84		5000	-
1.5D 9.0R		11246.25		2000	-
2.5D 12.0L		3952.82		1000	-
2.5D V		22790.42		2500	-
2.5D 12.0R		6976.87		1000	-
4.0D V		10331.98		-	12000
MAXIMUM	1.0D 0.7R	62194.02		-	-

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.673A after 30 min warmup (1% stabilization)

Bulb: Seasoned Philips H9 furnished with sample @ 12.80V / 5.349A

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS108 Table XIX-a: LB2V (VO Headlamp - 2 Lamp System)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
4.0U 8.0L		178.52		64	-
4.0U 8.0R		244.46		64	-
2.0U 4.0L		232.02		135	-
1.5U 1.0R TO 3.0R	2.7R	486.59		200	-
1.5U 1.0R TO R	2.0R	602.90		-	1400
1.0U 1.5L TO L	1.5L	333.16		-	700
0.5U 1.5L TO L	1.5L	385.25		-	1000
0.5U 1.0R TO 3.0R	3.0R	659.23		500	-
0.5U 1.0R TO 3.0R	1.4R	722.02		-	2700
H 8.0L		300.45		64	-
H 4.0L		379.88		135	-
H V		2438.31		-	-
0.6D 1.3R		12565.70		10000	-
0.9D 3.5L		4696.52		1800	12000
0.9D V		15679.85		4500	-
1.5D 2.0R		25211.81		15000	-
2.0D 15.0L		1744.30		1000	-
2.0D 9.0L		4189.88		1250	-
2.0D 9.0R		6582.54		1250	-
2.0D 15.0R		2892.87		1000	-
4.0D 20.0L		1489.70		300	-
4.0D V		8172.23		-	-
4.0D 4.0R		7263.14		-	12500
4.0D 20.0R		1286.78		300	-
MAXIMUM	1.7D 0.9R	26473.49		-	-
MX(10U-90U/90L-90R)	10.0U 3.7R	25.84		-	125

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.718A after 30 min warmup (1% stabilization)  
 Multiply above values by 1.12 to acquire t = 1 minute values

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).



**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS108 Table XVIII: UB2 (Headlamp - 2 Lamp System)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
2.0U V		5531.46		1500	-
1.0U 3.0L		20139.85		5000	-
1.0U 3.0R		6811.34		5000	-
H 12.0L		3311.98		1500	-
H 9.0L		5490.13		3000	-
H 6.0L		8521.22		5000	-
H 3.0L		31495.42		15000	-
H V		48351.29		40000	75000
H 3.0R		13407.92	16427.88	15000	-
H 6.0R		7694.21		5000	-
H 9.0R		5714.70		3000	-
H 12.0R		3256.31		1500	-
1.5D 9.0L		6966.13		2000	-
1.5D V		43706.13		5000	-
1.5D 9.0R		10389.20		2000	-
2.5D 12.0L		4531.24		1000	-
2.5D V		22314.14		2500	-
2.5D 12.0R		6135.27		1000	-
4.0D V		9289.28		-	12000
MAXIMUM	0.9D V	60886.49		-	-

Sample meets test requirements at all points.

Bulb: Seasoned LEDs @ 12.80V / 1.718A after 30 min warmup (1% stabilization)

Bulb: Seasoned Philips H9 furnished with sample @ 12.80V / 5.374A

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with LED Array located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV. Adjusted aim hardware until LB Gmax located at H/2.0R and level from H/1.0R to H/3.0R (VOR aim).

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS 108 Table VI-a: Front Turn Signal Lamp

Color: Yellow (Lamp &lt;100mm from Headlamp Edge), 1 Lighted Section

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		299.71		100	-
10.0U 5.0R		325.06		100	-
5.0U 20.0L		131.14		63	-
5.0U 10.0L		349.35		188	-
5.0U V		591.36		438	-
5.0U 10.0R		396.57		188	-
5.0U 20.0R		127.23		63	-
H 10.0L		443.25		250	-
H 5.0L		505.54		500	-
H V		699.05		500	-
H 5.0R		488.33+		500	-
H 10.0R		374.42		250	-
5.0D 20.0L		101.25		63	-
5.0D 10.0L		159.94+		188	-
5.0D V		344.09+		438	-
5.0D 10.0R		257.49		188	-
5.0D 20.0R		75.45		63	-
10.0D 5.0L		148.38		100	-
10.0D 5.0R		109.33		100	-
MAXIMUM	2.0U 1.9L	867.97		-	-
Zone 1		680.48		325	-
Zone 2		952.54		625	-
Zone 3		2628.37		2375	-
Zone 4		1028.48		625	-
Zone 5		637.07		325	-

+ Test point meets 60% of specified intensity

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.41V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS 108 Table VI-a: Front Turn Signal Lamp

Color: Yellow (Lamp &lt;100mm from Headlamp Edge), 1 Lighted Section

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		272.93		100	-
10.0U 5.0R		301.74		100	-
5.0U 20.0L		118.13		63	-
5.0U 10.0L		349.27		188	-
5.0U V		550.53		438	-
5.0U 10.0R		354.92		188	-
5.0U 20.0R		131.91		63	-
H 10.0L		450.03		250	-
H 5.0L		536.23		500	-
H V		763.38		500	-
H 5.0R		507.88		500	-
H 10.0R		380.83		250	-
5.0D 20.0L		117.47		63	-
5.0D 10.0L		171.18+		188	-
5.0D V		347.57+		438	-
5.0D 10.0R		271.55		188	-
5.0D 20.0R		85.29		63	-
10.0D 5.0L		136.70		100	-
10.0D 5.0R		116.49		100	-
MAXIMUM	0.4U 0.6L	813.50		-	-
Zone 1		645.23		325	-
Zone 2		970.47		625	-
Zone 3		2705.58		2375	-
Zone 4		1007.29		625	-
Zone 5		635.43		325	-

+ Test point meets 60% of specified intensity

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.26V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS 108 Table VI-a: Front Turn Signal Lamp

Color: Yellow (Lamp &lt;100mm from Headlamp Edge), 1 Lighted Section

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		279.60		100	-
10.0U 5.0R		294.43		100	-
5.0U 20.0L		121.22		63	-
5.0U 10.0L		344.39		188	-
5.0U V		558.54		438	-
5.0U 10.0R		354.98		188	-
5.0U 20.0R		126.22		63	-
H 10.0L		412.75		250	-
H 5.0L		527.88		500	-
H V		729.53		500	-
H 5.0R		471.96+		500	-
H 10.0R		366.39		250	-
5.0D 20.0L		111.90		63	-
5.0D 10.0L		167.35+		188	-
5.0D V		352.40+		438	-
5.0D 10.0R		260.20		188	-
5.0D 20.0R		78.68		63	-
10.0D 5.0L		134.75		100	-
10.0D 5.0R		104.39		100	-
MAXIMUM	2.1U 1.5L	833.52		-	-
Zone 1		647.47		325	-
Zone 2		924.49		625	-
Zone 3		2640.32		2375	-
Zone 4		981.58		625	-
Zone 5		603.73		325	-

+ Test point meets 60% of specified intensity

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.14V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS 108 Table VI-a: Front Turn Signal Lamp

Color: Yellow (Lamp &lt;100mm from Headlamp Edge), 1 Lighted Section

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		295.91		100	-
10.0U 5.0R		281.09		100	-
5.0U 20.0L		131.80		63	-
5.0U 10.0L		322.04		188	-
5.0U V		532.31		438	-
5.0U 10.0R		361.37		188	-
5.0U 20.0R		115.11		63	-
H 10.0L		451.76		250	-
H 5.0L		585.53		500	-
H V		713.33		500	-
H 5.0R		467.84+		500	-
H 10.0R		378.95		250	-
5.0D 20.0L		113.30		63	-
5.0D 10.0L		183.46+		188	-
5.0D V		345.42+		438	-
5.0D 10.0R		271.17		188	-
5.0D 20.0R		74.03		63	-
10.0D 5.0L		143.93		100	-
10.0D 5.0R		99.57+		100	-
MAXIMUM	2.0U 1.9L	847.33		-	-
Zone 1		684.94		325	-
Zone 2		957.26		625	-
Zone 3		2644.43		2375	-
Zone 4		1011.49		625	-
Zone 5		569.80		325	-

+ Test point meets 60% of specified intensity

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.25V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS 108 Table XIV: Parking Lamp

Color: White

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		9.66		0.8	125.0
10.0U 5.0R		8.93		0.8	125.0
5.0U 20.0L		7.17		0.4	125.0
5.0U 10.0L		8.32		0.8	125.0
5.0U V		11.21		2.8	125.0
5.0U 10.0R		3.22		0.8	125.0
5.0U 20.0R		2.03		0.4	125.0
H 10.0L		7.33		1.4	125.0
H 5.0L		9.83		3.6	125.0
H V		11.69		4.0	125.0
H 5.0R		9.87		3.6	125.0
H 10.0R		6.16		1.4	125.0
5.0D 20.0L		7.66		0.4	250.0
5.0D 10.0L		8.23		0.8	250.0
5.0D V		14.60		2.8	250.0
5.0D 10.0R		5.68		0.8	250.0
5.0D 20.0R		1.16		0.4	250.0
10.0D 5.0L		11.59		0.8	250.0
10.0D 5.0R		8.64		0.8	250.0
MX(H-90U/45L-45R)	H 1.6R	14.98		-	125.0
MAXIMUM	1.8D 0.7L	16.33		-	250.0
Zone 1		36.08		2.4	-
Zone 2		23.88		3.0	-
Zone 3		57.21		16.8	-
Zone 4		15.06		3.0	-
Zone 5		20.76		2.4	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.81V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS 108 Table XIV: Parking Lamp

Color: White

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		9.43		0.8	125.0
10.0U 5.0R		8.64		0.8	125.0
5.0U 20.0L		6.60		0.4	125.0
5.0U 10.0L		8.53		0.8	125.0
5.0U V		10.80		2.8	125.0
5.0U 10.0R		4.67		0.8	125.0
5.0U 20.0R		2.21		0.4	125.0
H 10.0L		7.52		1.4	125.0
H 5.0L		10.00		3.6	125.0
H V		11.39		4.0	125.0
H 5.0R		10.79		3.6	125.0
H 10.0R		7.34		1.4	125.0
5.0D 20.0L		7.39		0.4	250.0
5.0D 10.0L		8.47		0.8	250.0
5.0D V		15.23		2.8	250.0
5.0D 10.0R		6.04		0.8	250.0
5.0D 20.0R		1.11		0.4	250.0
10.0D 5.0L		10.54		0.8	250.0
10.0D 5.0R		11.38		0.8	250.0
MX(H-90U/45L-45R)	H 2.2R	14.28		-	125.0
MAXIMUM	4.3D 2.2L	21.98		-	250.0
Zone 1		33.95		2.4	-
Zone 2		24.51		3.0	-
Zone 3		58.21		16.8	-
Zone 4		18.05		3.0	-
Zone 5		23.34		2.4	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.86V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS 108 Table XIV: Parking Lamp

Color: White

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		8.94		0.8	125.0
10.0U 5.0R		7.48		0.8	125.0
5.0U 20.0L		6.94		0.4	125.0
5.0U 10.0L		8.56		0.8	125.0
5.0U V		11.52		2.8	125.0
5.0U 10.0R		3.39		0.8	125.0
5.0U 20.0R		1.77		0.4	125.0
H 10.0L		7.31		1.4	125.0
H 5.0L		10.25		3.6	125.0
H V		12.80		4.0	125.0
H 5.0R		11.30		3.6	125.0
H 10.0R		5.89		1.4	125.0
5.0D 20.0L		7.91		0.4	250.0
5.0D 10.0L		8.01		0.8	250.0
5.0D V		15.23		2.8	250.0
5.0D 10.0R		5.41		0.8	250.0
5.0D 20.0R		1.19		0.4	250.0
10.0D 5.0L		11.28		0.8	250.0
10.0D 5.0R		9.04		0.8	250.0
MX(H-90U/45L-45R)	H 4.1R	14.01		-	125.0
MAXIMUM	4.7D 0.9R	17.03		-	250.0
Zone 1		35.07		2.4	-
Zone 2		23.89		3.0	-
Zone 3		61.10		16.8	-
Zone 4		14.69		3.0	-
Zone 5		19.49		2.4	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.79V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.



**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS 108 Table XIV: Parking Lamp

Color: White

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
10.0U 5.0L		10.22		0.8	125.0
10.0U 5.0R		8.18		0.8	125.0
5.0U 20.0L		6.92		0.4	125.0
5.0U 10.0L		7.73		0.8	125.0
5.0U V		11.55		2.8	125.0
5.0U 10.0R		3.43		0.8	125.0
5.0U 20.0R		2.19		0.4	125.0
H 10.0L		8.46		1.4	125.0
H 5.0L		10.56		3.6	125.0
H V		11.48		4.0	125.0
H 5.0R		12.54		3.6	125.0
H 10.0R		11.34		1.4	125.0
5.0D 20.0L		8.59		0.4	250.0
5.0D 10.0L		9.23		0.8	250.0
5.0D V		15.27		2.8	250.0
5.0D 10.0R		6.87		0.8	250.0
5.0D 20.0R		1.27		0.4	250.0
10.0D 5.0L		12.38		0.8	250.0
10.0D 5.0R		9.66		0.8	250.0
MX(H-90U/45L-45R)	H 1.5R	14.74		-	125.0
MAXIMUM	4.7D 0.6R	17.65		-	250.0
Zone 1		38.11		2.4	-
Zone 2		25.41		3.0	-
Zone 3		61.40		16.8	-
Zone 4		21.64		3.0	-
Zone 5		21.30		2.4	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.96V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**PHOTOMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH1-LH4

Specification: FMVSS 108 Table VI-a: Front Turn Signal Lamp  
Turn/Parking Ratio

	Turn Signal				Parking				I/P				Required
	LH1	LH2	LH3	LH4	LH1	LH2	LH3	LH4	LH1	LH2	LH3	LH4	
10.0U 5.0L	299.7	272.9	279.6	295.9	9.7	9.4	8.9	10.2	31.0	28.9	31.3	29.0	3
10.0U 5.0R	325.1	301.7	294.4	281.1	8.9	8.6	7.5	8.2	36.4	34.9	39.4	34.4	3
5.0U 20.0L	131.1	118.1	121.2	131.8	7.2	6.6	6.9	6.9	18.3	17.9	17.5	19.0	3
5.0U 10.0L	349.4	349.3	344.4	322.0	8.3	8.5	8.6	7.7	42.0	40.9	40.2	41.7	3
5.0U V	591.4	550.5	558.5	532.3	11.2	10.8	11.5	11.6	52.8	51.0	48.5	46.1	5
5.0U 10.0R	396.6	354.9	355.0	361.4	3.2	4.7	3.4	3.4	123.2	76.0	104.7	105.4	3
5.0U 20.0R	127.2	131.9	126.2	115.1	2.0	2.2	1.8	2.2	62.7	59.7	71.3	52.6	3
H 10.0L	443.3	450.0	412.8	451.8	7.3	7.5	7.3	8.5	60.5	59.8	56.5	53.4	3
H 5.0L	505.5	536.2	527.9	585.5	9.8	10.0	10.3	10.6	51.4	53.6	51.5	55.4	5
H V	699.1	763.4	729.5	713.3	11.7	11.4	12.8	11.5	59.8	67.0	57.0	62.1	5
H 5.0R	488.3	507.9	472.0	467.8	9.9	10.8	11.3	12.5	49.5	47.1	41.8	37.3	5
H 10.0R	374.4	380.8	366.4	379.0	6.2	7.3	5.9	11.3	60.8	51.9	62.2	33.4	3
5.0D 20.0L	101.3	117.5	111.9	113.3	7.7	7.4	7.9	8.6	13.2	15.9	14.1	13.2	-
5.0D 10.0L	159.9	171.2	167.4	183.5	8.2	8.5	8.0	9.2	19.4	20.2	20.9	19.9	-
5.0D V	344.1	347.6	352.4	345.4	14.6	15.2	15.2	15.3	23.6	22.8	23.1	22.6	-
5.0D 10.0R	257.5	271.6	260.2	271.2	5.7	6.0	5.4	6.9	45.3	45.0	48.1	39.5	-
5.0D 20.0R	75.5	85.3	78.7	74.0	1.2	1.1	1.2	1.3	65.0	76.8	66.1	58.3	-
10.0D 5.0L	148.4	136.7	134.8	143.9	11.6	10.5	11.3	12.4	12.8	13.0	11.9	11.6	-
10.0D 5.0R	109.3	116.5	104.4	99.6	8.6	11.4	9.0	9.7	12.7	10.2	11.5	10.3	-

Samples meet test requirements at all points.

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with filament under test located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**EPLLA TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

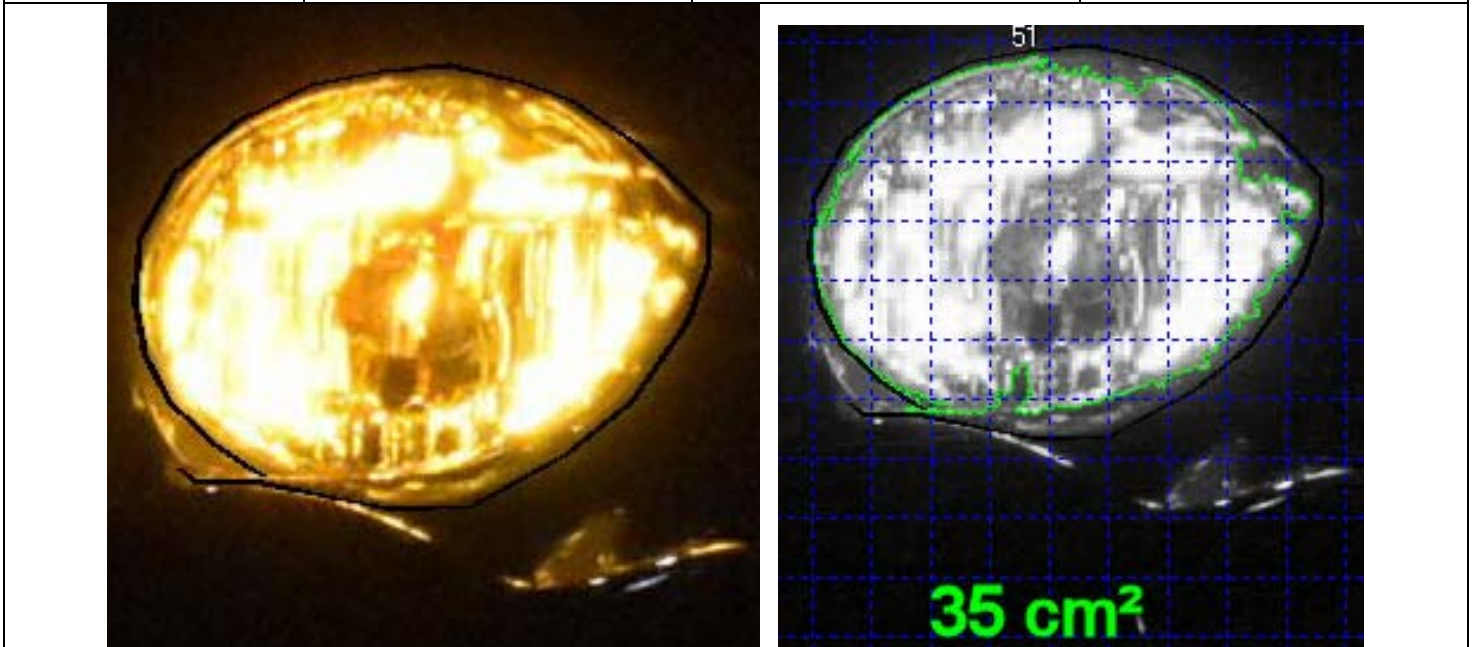
Sample Number: LH1

**LENS AREA**

Requirement: FMVSS 108 Table IV Effective Projected Luminous Lens Area

Test Method: CCITL Camera and image analysis

Function	Effective Projected Illuminated Area (cm <sup>2</sup> )		
	View	Measured	Minimum Required
Turn Signal	HV	~35 cm <sup>2</sup>	22 (vehicle <2032mm wide)

FMVSS 108 S4 Definitions

*Effective light-emitting surface* means that portion of a lamp that directs light to the PHOTOMETRY pattern, and does not include transparent lenses, mounting hole bosses, reflex reflector area, beads or rims that may glow or produce small areas of increased intensity as a result of uncontrolled light from an area of  $\frac{1}{2}^\circ$  radius around a test point.

*Effective projected luminous lens area* means the area of the orthogonal projection of the effective light-emitting surface of a lamp on a plane perpendicular to a defined direction relative to the axis of reference. Unless otherwise specified, the direction is coincident with the axis of reference.

FMVSS 108 does not define what constitutes "glow" used in the effective light emitting surface definition. FMVSS 108 does not specify how the EPLLA is to be measured nor what characteristics define it. Specifically, FMVSS 108 does not state what luminance value is permitted for EPLLA consideration.

Sample meets EPLLA requirements.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: Yellow, Front Turn Signal (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		4.59		0.30	-
15.0U 45.0R		43.19		0.30	-
15.0U 80.0L TO 45.0R	80.0L	4.58		0.30	-
10.0U 80.0L		4.29		0.30	-
10.0U 45.0R		20.35		0.30	-
10.0U 80.0L TO 45.0R	79.6L	4.28		0.30	-
5.0U 80.0L		5.60		0.30	-
5.0U 45.0R		16.31		0.30	-
5.0U 80.0L TO 45.0R	80.0L	5.59		0.30	-
H 80.0L		4.58		0.30	-
H 45.0R		46.33		0.30	-
H 80.0L TO 45.0R	79.8L	4.58		0.30	-
5.0D 80.0L		4.10		0.30	-
5.0D 45.0R		27.60		0.30	-
5.0D 80.0L TO 45.0R	80.0L	4.10		0.30	-
10.0D 80.0L		3.39		0.30	-
10.0D 45.0R		7.05		0.30	-
10.0D 80.0L TO 45.0R	80.0L	3.39		0.30	-
15.0D 80.0L		3.09		0.30	-
15.0D 45.0R		5.89		0.30	-
15.0D 80.0L TO 45.0R	75.4L	2.95		0.30	-
15.0U TO 15.0D 80.0L	14.3D	2.96		0.30	-
15.0U TO 15.0D 45.0R	15.0D	5.87		0.30	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.38V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: Yellow, Front Turn Signal (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		4.79		0.30	-
15.0U 45.0R		40.34		0.30	-
15.0U 80.0L TO 45.0R	79.3L	4.74		0.30	-
10.0U 80.0L		4.12		0.30	-
10.0U 45.0R		21.22		0.30	-
10.0U 80.0L TO 45.0R	80.0L	4.12		0.30	-
5.0U 80.0L		5.43		0.30	-
5.0U 45.0R		16.98		0.30	-
5.0U 80.0L TO 45.0R	78.8L	5.35		0.30	-
H 80.0L		4.28		0.30	-
H 45.0R		40.32		0.30	-
H 80.0L TO 45.0R	80.0L	4.28		0.30	-
5.0D 80.0L		3.82		0.30	-
5.0D 45.0R		23.01		0.30	-
5.0D 80.0L TO 45.0R	80.0L	3.82		0.30	-
10.0D 80.0L		3.55		0.30	-
10.0D 45.0R		7.62		0.30	-
10.0D 80.0L TO 45.0R	79.1L	3.49		0.30	-
15.0D 80.0L		3.24		0.30	-
15.0D 45.0R		6.79		0.30	-
15.0D 80.0L TO 45.0R	76.4L	2.91		0.30	-
15.0U TO 15.0D 80.0L	14.8D	3.12		0.30	-
15.0U TO 15.0D 45.0R	14.2D	6.65		0.30	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.31V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: Yellow, Front Turn Signal (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		4.42		0.30	-
15.0U 45.0R		41.78		0.30	-
15.0U 80.0L TO 45.0R	80.0L	4.40		0.30	-
10.0U 80.0L		4.12		0.30	-
10.0U 45.0R		22.19		0.30	-
10.0U 80.0L TO 45.0R	80.0L	4.11		0.30	-
5.0U 80.0L		5.69		0.30	-
5.0U 45.0R		16.91		0.30	-
5.0U 80.0L TO 45.0R	80.0L	5.65		0.30	-
H 80.0L		4.38		0.30	-
H 45.0R		44.94		0.30	-
H 80.0L TO 45.0R	80.0L	4.37		0.30	-
5.0D 80.0L		3.82		0.30	-
5.0D 45.0R		23.94		0.30	-
5.0D 80.0L TO 45.0R	80.0L	3.82		0.30	-
10.0D 80.0L		3.51		0.30	-
10.0D 45.0R		6.89		0.30	-
10.0D 80.0L TO 45.0R	79.1L	3.33		0.30	-
15.0D 80.0L		3.22		0.30	-
15.0D 45.0R		6.13		0.30	-
15.0D 80.0L TO 45.0R	76.7L	2.89		0.30	-
15.0U TO 15.0D 80.0L	14.8D	3.16		0.30	-
15.0U TO 15.0D 45.0R	15.0D	6.12		0.30	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.29V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: Yellow, Front Turn Signal (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		4.72		0.30	-
15.0U 45.0R		39.15		0.30	-
15.0U 80.0L TO 45.0R	79.6L	4.69		0.30	-
10.0U 80.0L		4.22		0.30	-
10.0U 45.0R		20.66		0.30	-
10.0U 80.0L TO 45.0R	80.0L	4.19		0.30	-
5.0U 80.0L		5.58		0.30	-
5.0U 45.0R		16.54		0.30	-
5.0U 80.0L TO 45.0R	79.3L	5.55		0.30	-
H 80.0L		4.64		0.30	-
H 45.0R		41.72		0.30	-
H 80.0L TO 45.0R	80.0L	4.63		0.30	-
5.0D 80.0L		4.02		0.30	-
5.0D 45.0R		23.11		0.30	-
5.0D 80.0L TO 45.0R	80.0L	4.01		0.30	-
10.0D 80.0L		3.38		0.30	-
10.0D 45.0R		7.19		0.30	-
10.0D 80.0L TO 45.0R	80.0L	3.38		0.30	-
15.0D 80.0L		3.07		0.30	-
15.0D 45.0R		6.19		0.30	-
15.0D 80.0L TO 45.0R	76.2L	3.00		0.30	-
15.0U TO 15.0D 80.0L	14.8D	3.04		0.30	-
15.0U TO 15.0D 45.0R	15.0D	6.14		0.30	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1360 (3457NA, LCL=1.097in) @ 14.27V / 2.392A / 30.0MSCd

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with 3457NA filaments located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH1

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: White, Parking (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		0.40		0.05	-
15.0U 45.0R		0.73		0.05	-
15.0U 80.0L TO 45.0R	80.0L	0.40		0.05	-
10.0U 80.0L		0.17		0.05	-
10.0U 45.0R		0.32		0.05	-
10.0U 80.0L TO 45.0R	80.0L	0.17		0.05	-
5.0U 80.0L		0.40		0.05	-
5.0U 45.0R		0.26		0.05	-
5.0U 80.0L TO 45.0R	44.0R	0.25		0.05	-
H 80.0L		0.61		0.05	-
H 45.0R		0.20		0.05	-
H 80.0L TO 45.0R	45.0R	0.20		0.05	-
5.0D 80.0L		0.93		0.05	-
5.0D 45.0R		0.38		0.05	-
5.0D 80.0L TO 45.0R	45.0R	0.38		0.05	-
10.0D 80.0L		1.09		0.05	-
10.0D 45.0R		0.25		0.05	-
10.0D 80.0L TO 45.0R	45.0R	0.25		0.05	-
15.0D 80.0L		1.02		0.05	-
15.0D 45.0R		0.13		0.05	-
15.0D 80.0L TO 45.0R	45.0R	0.13		0.05	-
15.0U TO 15.0D 80.0L	9.0U	0.16		0.05	-
15.0U TO 15.0D 45.0R	15.0D	0.13		0.05	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.86V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.



**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH2

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: White, Parking (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		0.43		0.05	-
15.0U 45.0R		0.84		0.05	-
15.0U 80.0L TO 45.0R	80.0L	0.42		0.05	-
10.0U 80.0L		0.20		0.05	-
10.0U 45.0R		0.33		0.05	-
10.0U 80.0L TO 45.0R	79.6L	0.20		0.05	-
5.0U 80.0L		0.42		0.05	-
5.0U 45.0R		0.22		0.05	-
5.0U 80.0L TO 45.0R	45.0R	0.22		0.05	-
H 80.0L		0.60		0.05	-
H 45.0R		0.22		0.05	-
H 80.0L TO 45.0R	45.0R	0.22		0.05	-
5.0D 80.0L		0.97		0.05	-
5.0D 45.0R		0.39		0.05	-
5.0D 80.0L TO 45.0R	45.0R	0.39		0.05	-
10.0D 80.0L		1.14		0.05	-
10.0D 45.0R		0.26		0.05	-
10.0D 80.0L TO 45.0R	45.0R	0.25		0.05	-
15.0D 80.0L		1.17		0.05	-
15.0D 45.0R		0.14		0.05	-
15.0D 80.0L TO 45.0R	45.0R	0.14		0.05	-
15.0U TO 15.0D 80.0L	9.4U	0.16		0.05	-
15.0U TO 15.0D 45.0R	15.0D	0.14		0.05	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.80V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH3

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: White, Parking (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		0.36		0.05	-
15.0U 45.0R		0.71		0.05	-
15.0U 80.0L TO 45.0R	79.8L	0.35		0.05	-
10.0U 80.0L		0.19		0.05	-
10.0U 45.0R		0.25		0.05	-
10.0U 80.0L TO 45.0R	80.0L	0.19		0.05	-
5.0U 80.0L		0.35		0.05	-
5.0U 45.0R		0.20		0.05	-
5.0U 80.0L TO 45.0R	44.9R	0.20		0.05	-
H 80.0L		0.59		0.05	-
H 45.0R		0.18		0.05	-
H 80.0L TO 45.0R	45.0R	0.18		0.05	-
5.0D 80.0L		1.00		0.05	-
5.0D 45.0R		0.30		0.05	-
5.0D 80.0L TO 45.0R	45.0R	0.30		0.05	-
10.0D 80.0L		1.24		0.05	-
10.0D 45.0R		0.22		0.05	-
10.0D 80.0L TO 45.0R	45.0R	0.22		0.05	-
15.0D 80.0L		0.97		0.05	-
15.0D 45.0R		0.12		0.05	-
15.0D 80.0L TO 45.0R	45.0R	0.12		0.05	-
15.0U TO 15.0D 80.0L	8.8U	0.17		0.05	-
15.0U TO 15.0D 45.0R	15.0D	0.11		0.05	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.81V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**VISIBILITY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf VOR Combination (LED/H9) Headlamp (LH)

Sample Number: LH4

Specification: FMVSS 108 Table V-c: Visibility - Luminous Intensity Option

Color: White, Parking (LH)

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
15.0U 80.0L		0.40		0.05	-
15.0U 45.0R		0.75		0.05	-
15.0U 80.0L TO 45.0R	79.6L	0.40		0.05	-
10.0U 80.0L		0.21		0.05	-
10.0U 45.0R		0.33		0.05	-
10.0U 80.0L TO 45.0R	80.0L	0.21		0.05	-
5.0U 80.0L		0.38		0.05	-
5.0U 45.0R		0.21		0.05	-
5.0U 80.0L TO 45.0R	45.0R	0.20		0.05	-
H 80.0L		0.68		0.05	-
H 45.0R		0.18		0.05	-
H 80.0L TO 45.0R	45.0R	0.18		0.05	-
5.0D 80.0L		1.12		0.05	-
5.0D 45.0R		0.32		0.05	-
5.0D 80.0L TO 45.0R	45.0R	0.32		0.05	-
10.0D 80.0L		1.27		0.05	-
10.0D 45.0R		0.26		0.05	-
10.0D 80.0L TO 45.0R	45.0R	0.26		0.05	-
15.0D 80.0L		0.97		0.05	-
15.0D 45.0R		0.15		0.05	-
15.0D 80.0L TO 45.0R	45.0R	0.15		0.05	-
15.0U TO 15.0D 80.0L	9.4U	0.17		0.05	-
15.0U TO 15.0D 45.0R	2.4U	0.14		0.05	-

Sample meets test requirements at all points.

Calibrated Bulb: ITL-1381 (W5W, LCL=12.73mm) @ 13.91V / 0.389A / 50.0Lm

Aim: Sample mounted on fixture provided by Ichikoh. Fixture mounted on level goniometer with W5W filament located at goniometer center of rotation and tilt with fixture markings aligned parallel and perpendicular to detector axis at HV.

**COLORIMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH1-LH4

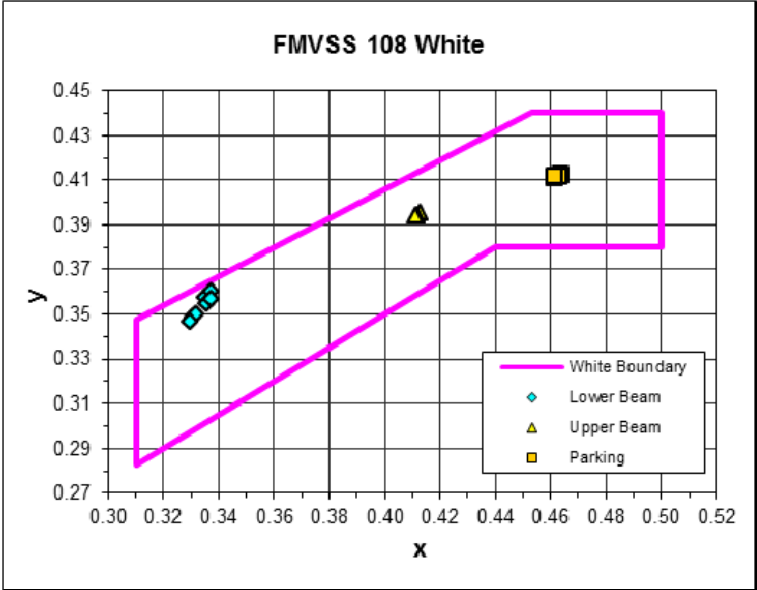
Requirement: FMVSS 108 S14.4.1 Color Test

Test Method: FMVSS 108 S14.4.1.4 Tristimulus Method (Average of 3 reads)

Instrument: Photo Research PR-655 Spectroradiometer with SRS-3 Target

Location: 1.5D/2.0R (LB); HV (UB, P)

Voltage: 12.8V (LB, UB), 13.5V (P)

Function	Sample	Time	x	y	WHITE Requirement & Chart
Lower Beam	LH1	1min	0.3307	0.3488	<p>0.31 ≤ x ≤ 0.50                      0.38 ≤ y ≤ 0.44                      y ≥ 0.75x + 0.05                      y ≤ 0.64x + 0.15</p> 
		30min	0.3318	0.3502	
	LH2	1min	0.3352	0.3578	
		30min	0.3371	0.3602	
	LH3	1min	0.3355	0.3546	
		30min	0.3371	0.3568	
	LH4	1min	0.3299	0.3465	
		30min	0.3286	0.3447	
Upper Beam	LH1		0.4126	0.3953	
	LH2		0.4115	0.3943	
	LH3		0.4115	0.3941	
	LH4		0.4114	0.3941	
Parking	LH1		0.4639	0.4120	
	LH2		0.4631	0.4116	
	LH3		0.4618	0.4112	
	LH4		0.4616	0.4114	

Samples meet Color requirements for White.

**COLORIMETRY TEST DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

Sample Number: LH1-LH4

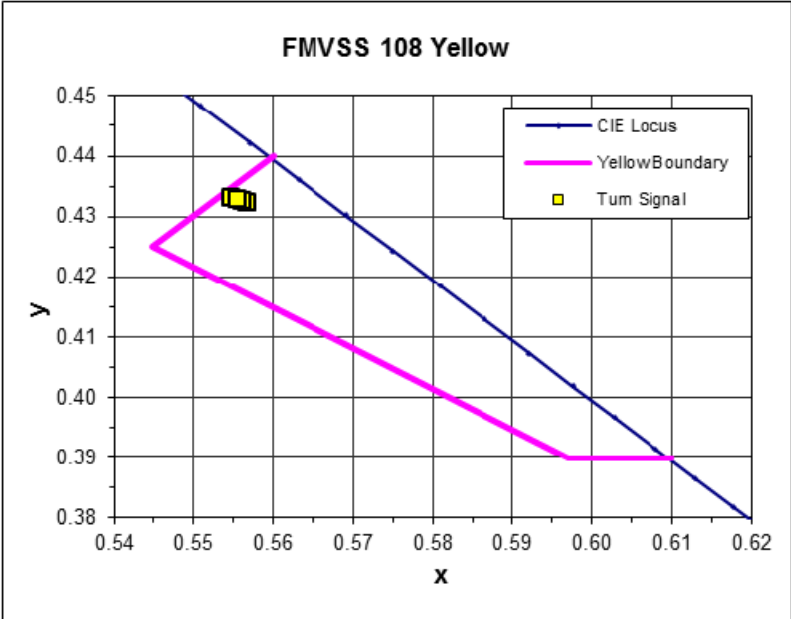
Requirement: FMVSS 108 S14.4.1 Color Test

Test Method: FMVSS 108 S14.4.1.4 Tristimulus Method (Average of 3 reads)

Instrument: Photo Research PR-655 Spectroradiometer with SRS-3 Target

Location: HV

Voltage: 12.8V

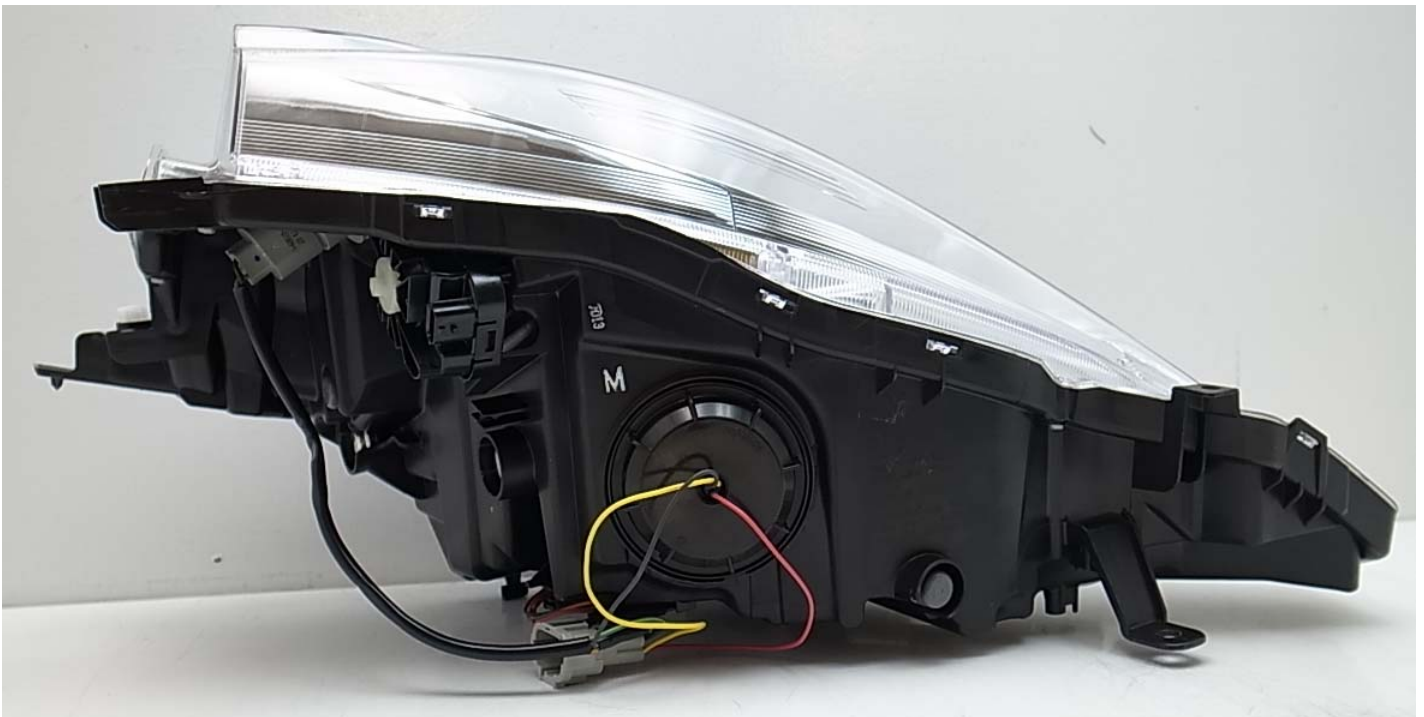
Function	Sample	x	y	YELLOW (AMBER) Requirement & Chart
Turn Signal	LH1	0.5547	0.4331	$y \geq 0.39$ $y \geq 0.79 - 0.67x$ $y \leq x - 0.12$ 
	LH2	0.5568	0.4324	
	LH3	0.5562	0.4325	
	LH4	0.5555	0.4327	

Samples meet Color requirements for Yellow (Amber).

Note: Devices tested with bulb that came with each lamp.

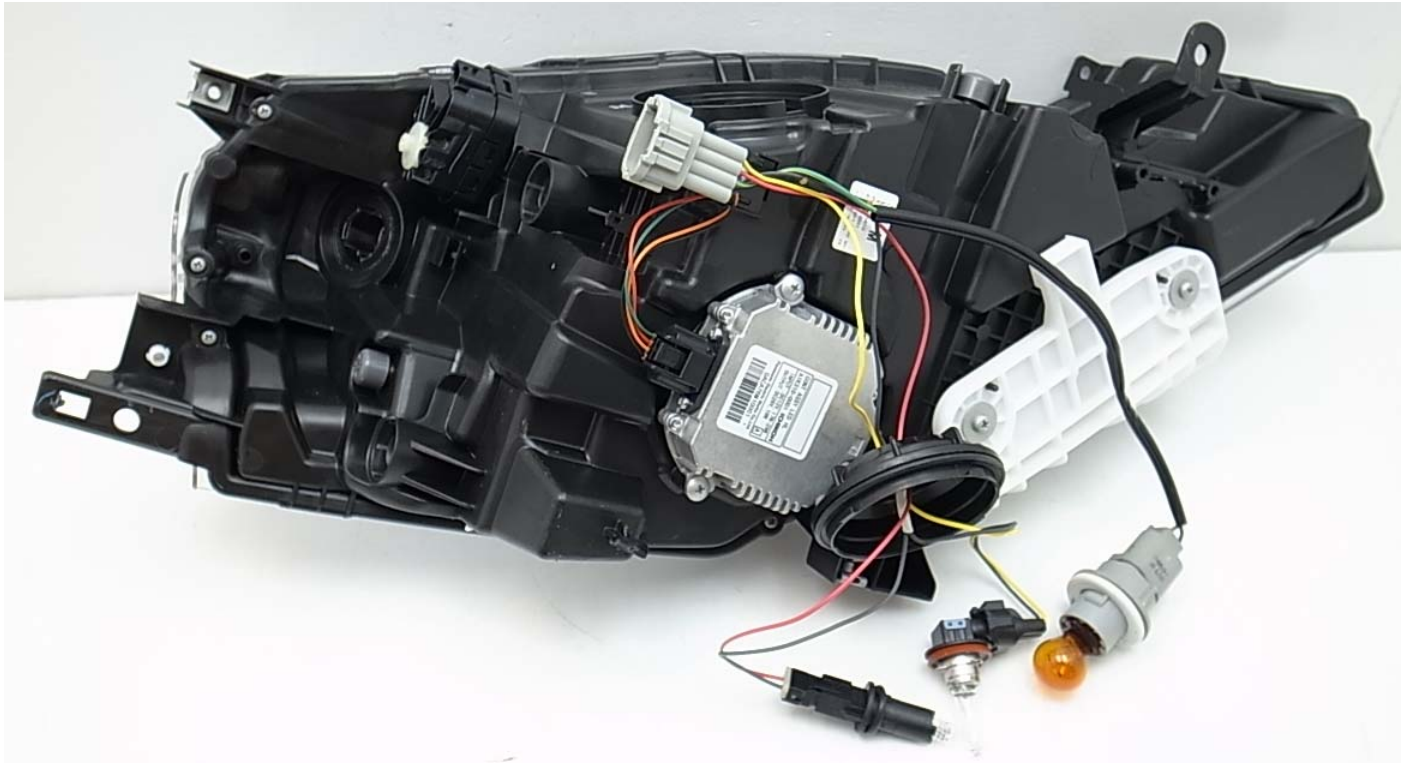
**PHOTOGRAPH SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp



**PHOTOGRAPH SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp



**CALIBRATION DATA SHEET**

Project Name: 2012 Nissan Leaf LH VOR Combination (LED/H9) Headlamp

## PHOTOMETRY / COLOR

Last Calibrated

## Goniometer

ITL Custom with Aerotech ART-330, 320 Stepper Motors .....07 Jan 2015  
 [resolution 0.001°, accuracy ±0.01°(±0.05%)] .....[due every 5 years]

## Luminous Intensity

Hoffman TSP-7501(HG), S/N 1060 .....15 Jan 2018  
 [0.1 Cd to 600 kCd, ±0.01 Cd, accuracy ±2.0%] ..... [due every 12 months]

## Color - Spectroradiometric

Photoresearch PR-655 w/MS-75 lens & SRS-3 target,  
 S/N 65160706 ..... 20 June 2018  
 [resolution ±2nm, (x, y) ±0.001, ±4% luminance] ..... [due every 12 months]

## Reflex Projector

Hoffman GPS-102, S/N 1006 .....before every test  
 [~1 fc (10 Lx) at 2856K (Illuminant A)] .....[due as needed]

## Accurate Rated Bulbs

ITL-1360 (3457NA, 30.0 MSCd) .....5 June 2018  
 ITL-1381 (W5W, 50 Lm) .....5 June 2018

## ELECTRICAL

Last Calibrated

## DC Power Supply

HP6652A, S/N 3347A-01634 .....N/A  
 [500W, 0-20V, 0-25A] ..... [use DMMS for measurement]

## Voltage

Fluke 45 (#1), S/N 7934019 .....15 Jan 2018  
 [resolution 0.01V, accuracy ±0.02%] ..... [due every 12 months]

## Current

Keithley 197A (#1), S/N 741430 .....15 Jan 2018  
 [resolution 0.001A, accuracy ±0.02%] ..... [due every 12 months]