

LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT FMVSS-108

**NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry
Toyota P/Ns 81130-06201 (RH) / 81170-06201 (LH)**

CALCOAST - ITL
Lighting Technology
4072 Watts Street
Emeryville, CA 94608



20 April 2007

FINAL REPORT

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-CCITL-08-01

Prepared By:



Approved By:



Approval Date: 20 April 2008

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:



Acceptance Date: April 25, 2008

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 108-CCITL-08-01	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle Test Series NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps for 2007 Toyota Camry Toyota P/Ns 81130-06201 (RH) / 81170-06201 (LH)		5. Report Date 20 April 2008	
7. Author(s) Mark A. Evans Photometric Engineer		6. Performing Organization Code N/A	
9. Performing Organization Name and Address Calcoast - ITL 4072 Watts Street Emeryville, CA 94608		8. Performing Organization Report No. 080402-03H	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 1200 New Jersey Avenue SE West Building - 4 th Floor - NVS222 Washington, D.C. 20590		10. Work Unit No. N/A	
15. Supplementary Notes		11. Contract or Grant No.	
16. Abstract The scope of this testing was limited to certain photometry and color tests as indicated. Test failures identified were as follows: None		13. Type of Report and Period Covered	
17. Key Words Federal Motor Vehicle Safety Standard 108 Lamps, Reflective Devices and Associated Equipment		14. Sponsoring Agency Code	
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INDUSTRIAL TESTING LABORATORY

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TEST REPORT

Report Date: 20 April 2008

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps for 2007 Toyota Camry

Manufactured By: NAL
Toyota P/Ns 81130-06201 (RH) / 81170-06201 (LH)

Submitted By: CCITL purchased for NHTSA

NHTSA Report No.: 108-CCITL-08-01

Test Laboratory: Calcoast - ITL
Emeryville, CA 94608

Devices Tested: Four (4) Pair

SUMMARY

Specifications: FMVSS 108

Photometric Tests - Replaceable Bulb Headlamp

S7.8.5.3 Visual/optical aiming.....	8 of 8 Passed
Figure 17-2 Lower Beam.....	8 of 8 Passed
Figure 17-2 Upper Beam.....	8 of 8 Passed

Color Tests - SAE J578c FEB77 8 of 8 Passed

Signature of Responsible Laboratory Official:

Mark A. Evans
Photometric Engineer

DESCRIPTION SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

GENERAL DESCRIPTION:

MARKINGS: LENS: "H11 VOL NAL 06-93 DOT HB3", "SAE HRAI5PP2Y2 04",
optical axis markings

HOUSING: "USA", "Housing:>PP-TD20", "Lens:>PC<",
"Extension:>PC-HT<", "HB3 12V60W", "H11 12V55W",
"Reflector:>UP-(MD60+GF20)", "3457NA",
"Inner Lens:>PMMA<", "Inner Lens:>PC-HT<", "R" or "L",
"9TY 945 040-44" - On Sticker

No production markings

LENS: MATERIAL: Polycarbonate (Clear)
COATING: Unknown
METHOD OF ATTACHMENT: Clips and Adhesive to Housing

HOUSING: MATERIAL: Plastic
METHOD OF MOUNTING: Three (3) screws

BULBS USED:

FUNCTION	QUANTITY	TRADE NO.	VOLTS	DESIGN FLUX
Lower Beam & Upper Beam	One (1)	H11	12.8V	1250 Lumens
Upper Beam	One (1)	HB3	12.8V	1700 Lumens

PHOTOMETRIC TEST SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

SUMMARY OF PHOTOMETRIC TESTS

Tests performed by: Mark Evans

Date: 14 April 2008

Reference calibration detector number: NIST P181-2

Test distance: 100 feet

Aim: Sample mounted on NAL 044L "25MB-4" RH or LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).

Note: The Lower Beam "step" was visually confirmed to be at or near the V-V line unless otherwise noted.

Manufacturer stated that the Lower Beam was active with Upper Beam.

Bulbs: Samples tested using bulbs purchased at Toyota Dealership at design voltage.

<u>Test</u>	<u>Equipment</u>
Photometry	Custom Goniometer (Aerotech Rotary Tables, Stepper Motors, Driver) Hoffman TSP-7501 Detector IOTech DaqBoard/2000 16-bit, 200kHz DAC HP 6652A Power Supply Data Precision 2480R DMM (Current) Keithley 197A DMM (Voltage) HP 6010A Power Supply Fluke 23 DMM (Voltage) Keithley 197A (Current)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

VOL Aim

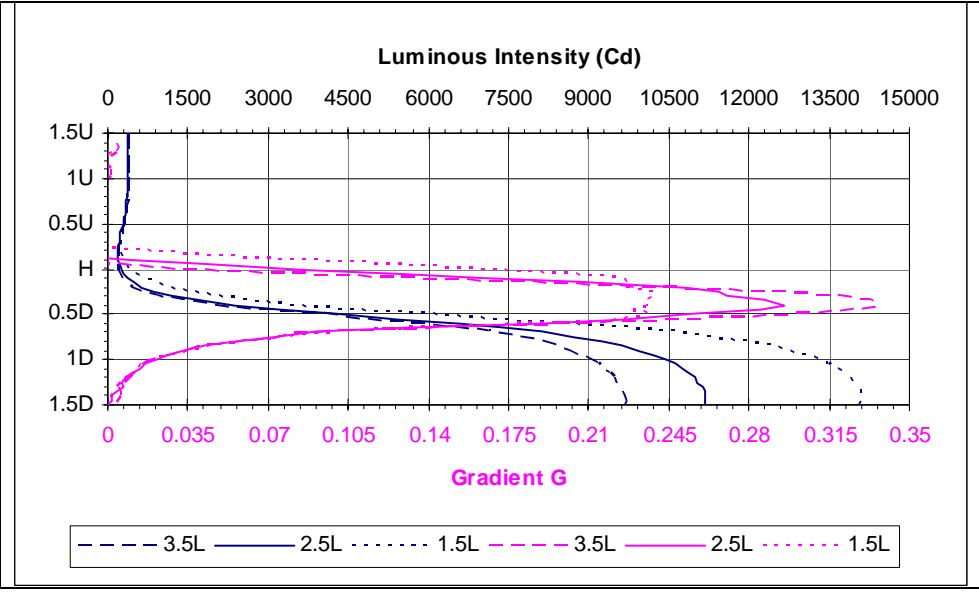
RH1

Maximum Vertical Gradient

Location	Value	Required
0.4D/3.5L	0.336	-
0.4D/2.5L	0.295	> 0.13
0.4D/1.5L	0.239	-

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

Maximum inclination of cutoff is within ±0.2°.



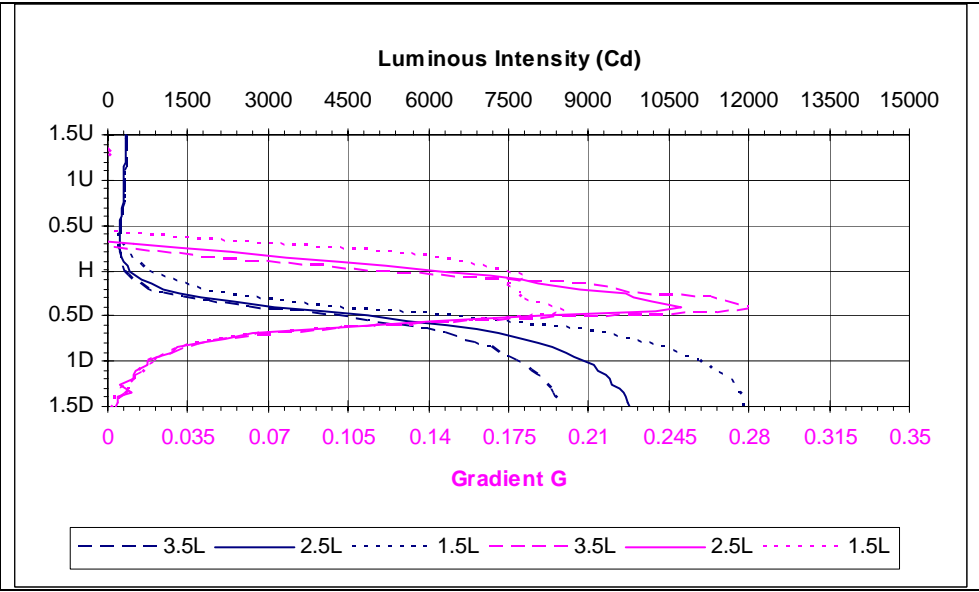
RH2

Maximum Vertical Gradient

Location	Value	Required
0.4U/3.5L	0.279	-
0.4D/2.5L	0.250	> 0.13
0.5D/1.5L	0.199	-

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

Maximum inclination of cutoff is within ±0.2°.



PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH1

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		3261.03		-	-
4.0U 8.0L		104.73		64	-
4.0U 8.0R		139.17		64	-
2.0U 4.0L		328.35		135	-
1.5U 1.0R TO 3.0R	1.3R	335.30		200	-
1.5U 1.0R TO R	5.6R	405.26		-	1400
1.0U 1.5L TO L	3.5L	383.17		-	700
0.5U 1.5L TO L	3.5L	325.88		-	1000
0.5U 1.0R TO 3.0R	3.0R	1832.67		500	-
0.5U 1.0R TO 3.0R	1.8R	2305.41		-	2700
H 8.0L		198.71		64	-
H 4.0L		225.95		135	-
H V		3236.98		-	-
0.6D 1.3R		19594.02		10000	-
0.9D 3.5L		7898.03		1800	12000
0.9D V		17207.77		4500	-
1.5D 2.0R		19876.91		15000	-
2.0D 15.0L		1565.15		1000	-
2.0D 9.0L		3938.87		1250	-
2.0D 9.0R		5547.33		1250	-
2.0D 15.0R		2433.90		1000	-
4.0D 20.0L		571.49		300	-
4.0D V		8468.83		-	-
4.0D 4.0R		6891.65		-	12500
4.0D 20.0R		1006.21		300	-

MAXIMUM	1.2D 1.2R	20702.44		-	-
MX(10U-90U/90L-90R)	20.2U 89.0R	86.88		-	125
H V		3085.74		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.481A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.295 (>= 0.13 required)

Note: Sample received with beam approximately 0.5° up.
Cutoff "step" located at v-v line.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH1

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		56527.32		40000	75000
2.0U V		34047.82		1500	-
1.0U 3.0L		26567.01		5000	-
1.0U 3.0R		25538.87		5000	-
H 12.0L		3196.23		1500	-
H 9.0L		5186.81		3000	-
H 6.0L		9929.02		5000	-
H 3.0L		29336.90		15000	-
H V		56896.75		40000	75000
H 3.0R		32455.33		15000	-
H 6.0R		18307.09		5000	-
H 9.0R		16149.99		3000	-
H 12.0R		9266.10		1500	-
1.5D 9.0L		8086.23		2000	-
1.5D V		43749.90		5000	-
1.5D 9.0R		9658.22		2000	-
2.5D 12.0L		2680.13		1000	-
2.5D V		23879.50		2500	-
2.5D 12.0R		3630.12		1000	-
4.0D V		10816.35		-	12000
MAXIMUM	0.3D 0.3R	66052.11		-	-
H V		57312.10		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.482A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.120A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.295 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH2

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			6616.87		-	-
4.0U	8.0L			131.02		64	-
4.0U	8.0R			159.32		64	-
2.0U	4.0L			326.26		135	-
1.5U	1.0R	TO	3.0R	1.0R		200	-
1.5U	1.0R	TO		R	7.8R	-	1400
1.0U	1.5L	TO		L	5.9L	-	700
0.5U	1.5L	TO		L	6.2L	-	1000
0.5U	1.0R	TO	3.0R	3.0R		500	-
0.5U	1.0R	TO	3.0R	2.2R	1540.05	-	2700
H	8.0L			266.56		64	-
H	4.0L			266.77		135	-
H	V			6364.21		-	-
0.6D	1.3R			17697.16		10000	-
0.9D	3.5L			7103.66		1800	12000
0.9D	V			16163.77		4500	-
1.5D	2.0R			18007.53		15000	-
2.0D	15.0L			1840.74		1000	-
2.0D	9.0L			4054.21		1250	-
2.0D	9.0R			6241.88		1250	-
2.0D	15.0R			2792.45		1000	-
4.0D	20.0L			592.16		300	-
4.0D	V			8872.96		-	-
4.0D	4.0R			6915.86		-	12500
4.0D	20.0R			943.22		300	-
MAXIMUM		1.1D	1.3R	18500.87		-	-
MX(10U-90U/90L-90R)		19.9U	89.9R	96.00		-	125
H	V			7137.33		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.494A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.250 (>= 0.13 required)

Note: Sample received with beam approximately 0.4° up.
Cutoff "step" located at 0.2°R.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH2

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		58629.72		40000	75000
2.0U V		27759.58		1500	-
1.0U 3.0L		23404.50		5000	-
1.0U 3.0R		25303.02		5000	-
H 12.0L		1999.93		1500	-
H 9.0L		3813.43		3000	-
H 6.0L		8082.56		5000	-
H 3.0L		27434.25		15000	-
H V		57163.37		40000	75000
H 3.0R		37283.33		15000	-
H 6.0R		18931.04		5000	-
H 9.0R		14336.14		3000	-
H 12.0R		9806.24		1500	-
1.5D 9.0L		8952.66		2000	-
1.5D V		54040.95		5000	-
1.5D 9.0R		14415.06		2000	-
2.5D 12.0L		3066.83		1000	-
2.5D V		28334.77		2500	-
2.5D 12.0R		4268.97		1000	-
4.0D V		12061.21	10696.58	-	12000
MAXIMUM	0.7D 0.2R	66459.12		-	-
H V		58042.93		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.494A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.133A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.250 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

VOL Aim

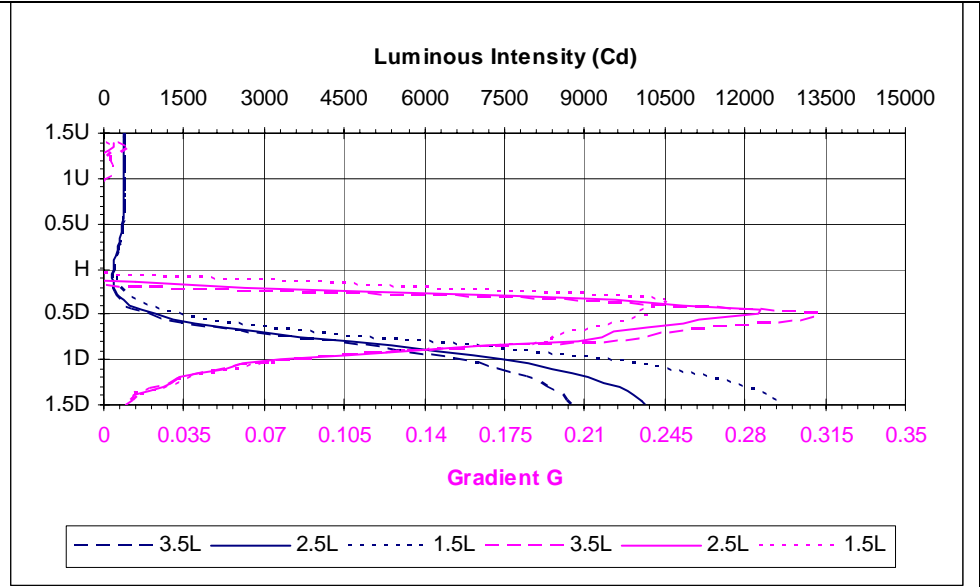
RH3

Maximum Vertical Gradient

Location	Value	Required
0.5D/3.5L	0.312	-
0.4D/2.5L	0.287	> 0.13
0.4D/1.5L	0.245	-

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

Maximum inclination of cutoff is within ±0.2°.



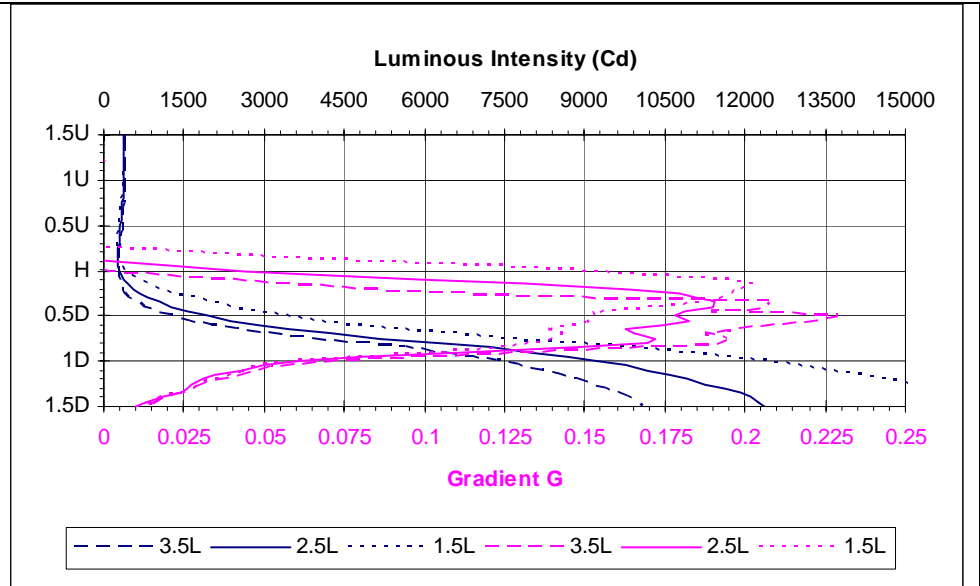
RH4

Maximum Vertical Gradient

Location	Value	Required
0.5D/3.5L	0.229	-
0.4D/2.5L	0.190	> 0.13
0.2D/1.5L	0.202	-

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

Maximum inclination of cutoff is within ±0.2°.



PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH3

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			1865.30		-	-
4.0U	8.0L			98.64		64	-
4.0U	8.0R			138.94		64	-
2.0U	4.0L			311.10		135	-
1.5U	1.0R	TO	3.0R	1.4R		200	-
1.5U	1.0R	TO		R	5.6R	-	1400
1.0U	1.5L	TO		L	3.2L	-	700
0.5U	1.5L	TO		L	3.1L	-	1000
0.5U	1.0R	TO	3.0R	1.0R		500	-
0.5U	1.0R	TO	3.0R	2.5R		-	2700
H	8.0L			184.41		64	-
H	4.0L			190.27		135	-
H	V			1654.53		-	-
0.6D	1.3R			18699.39		10000	-
0.9D	3.5L			5559.19		1800	12000
0.9D	V			13846.48		4500	-
1.5D	2.0R			20927.57		15000	-
2.0D	15.0L			1763.40		1000	-
2.0D	9.0L			4308.50		1250	-
2.0D	9.0R			6224.33		1250	-
2.0D	15.0R			2758.32		1000	-
4.0D	20.0L			530.04		300	-
4.0D	V			9244.60		-	-
4.0D	4.0R			7655.81		-	12500
4.0D	20.0R			1063.46		300	-

MAXIMUM 1.3D 1.6R 21204.93 - -

MX(10U-90U/90L-90R) 20.5U 89.8R 90.51 - 125

H V 2006.43 - -

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.498A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.287 (>= 0.13 required)

Note: Sample received with beam approximately 0.8° up.
Cutoff "step" located at 0.3°R.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH3

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		55241.93		40000	75000
2.0U V		35888.47		1500	-
1.0U 3.0L		22313.05		5000	-
1.0U 3.0R		30973.83		5000	-
H 12.0L		2960.77		1500	-
H 9.0L		5070.99		3000	-
H 6.0L		9076.98		5000	-
H 3.0L		24438.35		15000	-
H V		54884.00		40000	75000
H 3.0R		34012.21		15000	-
H 6.0R		17705.17		5000	-
H 9.0R		15313.55		3000	-
H 12.0R		8784.03		1500	-
1.5D 9.0L		6784.83		2000	-
1.5D V		40917.45		5000	-
1.5D 9.0R		9763.02		2000	-
2.5D 12.0L		2762.89		1000	-
2.5D V		23070.84		2500	-
2.5D 12.0R		4013.46		1000	-
4.0D V		11189.15		-	12000
MAXIMUM	0.3D 0.8R	62528.74		-	-
H V		54795.49		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.498A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.133A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.287 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH4

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			5120.61		-	-
4.0U	8.0L			107.70		64	-
4.0U	8.0R			107.24		64	-
2.0U	4.0L			371.59		135	-
1.5U	1.0R TO	3.0R	1.0R	331.34		200	-
1.5U	1.0R TO		R	6.1R	418.36	-	1400
1.0U	1.5L TO		L	3.2L	375.20	-	700
0.5U	1.5L TO		L	4.9L	358.00	-	1000
0.5U	1.0R TO	3.0R	3.0R	630.55		500	-
0.5U	1.0R TO	3.0R	1.3R	1373.09		-	2700
H	8.0L			229.60		64	-
H	4.0L			262.77		135	-
H	V			4946.43		-	-
0.6D	1.3R			16339.63		10000	-
0.9D	3.5L			5579.27		1800	12000
0.9D	V			17599.11		4500	-
1.5D	2.0R			18040.08		15000	-
2.0D	15.0L			1874.44		1000	-
2.0D	9.0L			4547.24		1250	-
2.0D	9.0R			5338.26		1250	-
2.0D	15.0R			2397.13		1000	-
4.0D	20.0L			602.15		300	-
4.0D	V			9997.25		-	-
4.0D	4.0R			6555.67		-	12500
4.0D	20.0R			954.71		300	-
MAXIMUM		1.5D	0.7R	20392.10		-	-
MX(10U-90U/90L-90R)		19.7U	89.7R	98.19		-	125
H	V			5171.23		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.502A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.190 (>= 0.13 required)

Note: Sample received with beam approximately 1.4° up.
Cutoff "step" located at 0.3°L.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: RH4

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		56927.19		40000	75000
2.0U V		29331.27		1500	-
1.0U 3.0L		25928.55		5000	-
1.0U 3.0R		23642.94		5000	-
H 12.0L		2029.09		1500	-
H 9.0L		4029.87		3000	-
H 6.0L		8735.84		5000	-
H 3.0L		29373.65		15000	-
H V		56773.81		40000	75000
H 3.0R		28681.23		15000	-
H 6.0R		15811.35		5000	-
H 9.0R		13544.57		3000	-
H 12.0R		8687.47		1500	-
1.5D 9.0L		9512.05		2000	-
1.5D V		54184.56		5000	-
1.5D 9.0R		12468.04		2000	-
2.5D 12.0L		3327.43		1000	-
2.5D V		30052.10		2500	-
2.5D 12.0R		3525.56		1000	-
4.0D V		12863.88	11425.09	-	12000
MAXIMUM	0.8D 0.2R	66074.66		-	-
H V		56846.91		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.501A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.139A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" RH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.190 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

VOL Aim

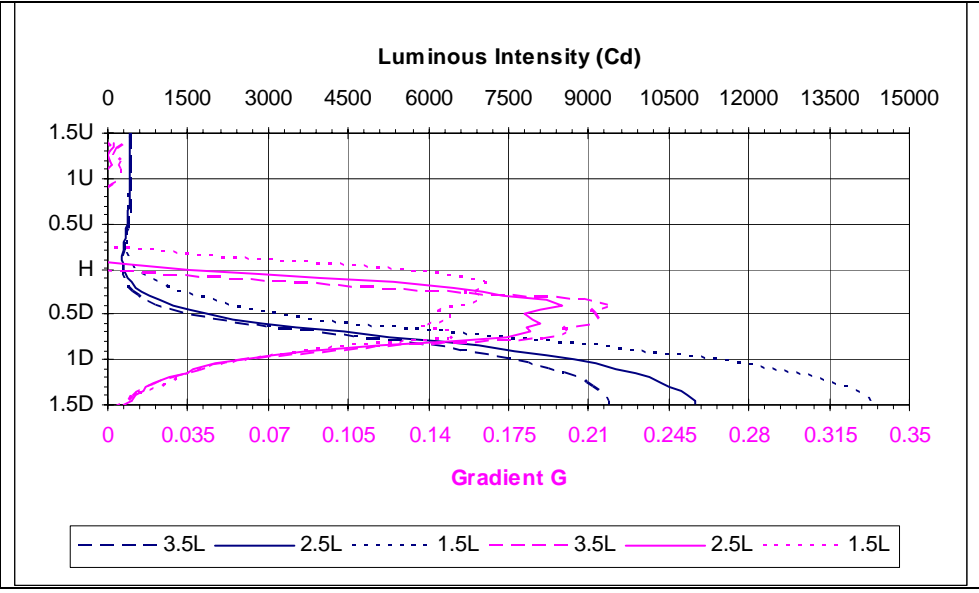
LH1

Maximum Vertical Gradient

Location	Value	Required
0.4D/3.5L	0.218	-
0.4D/2.5L	0.198	> 0.13
0.2D/1.5L	0.165	-

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

Maximum inclination of cutoff is within ±0.2°.



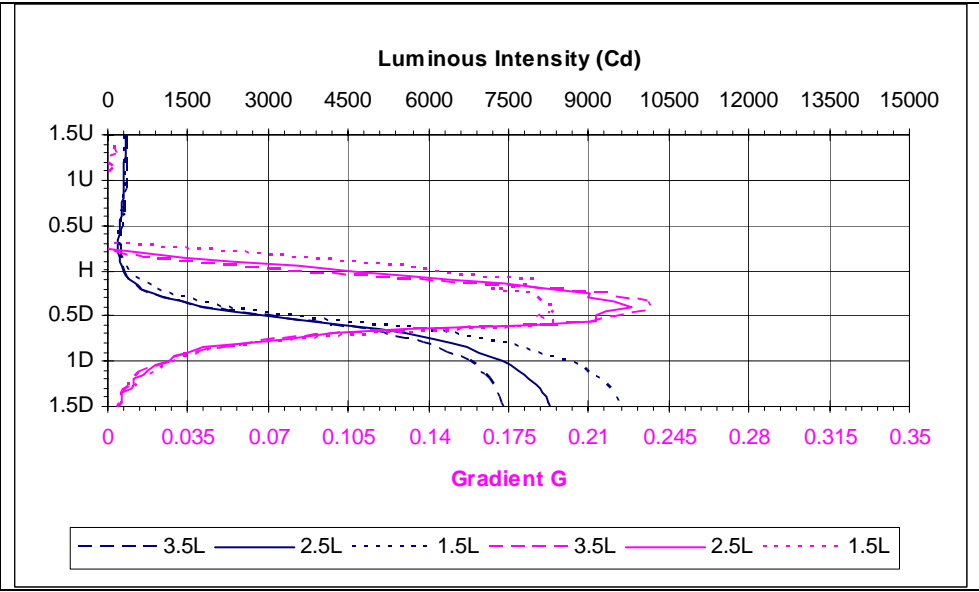
LH2

Maximum Vertical Gradient

Location	Value	Required
0.4D/3.5L	0.238	-
0.4D/2.5L	0.229	> 0.13
0.4D/1.5L	0.196	-

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

Maximum inclination of cutoff is within ±0.2°.



PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH1

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			3469.92		-	-
4.0U	8.0L			103.96		64	-
4.0U	8.0R			106.14		64	-
2.0U	4.0L			334.86		135	-
1.5U	1.0R TO	3.0R	1.1R	360.56		200	-
1.5U	1.0R TO		R	5.8R		-	1400
1.0U	1.5L TO		L	3.0L		-	700
0.5U	1.5L TO		L	3.8L		-	1000
0.5U	1.0R TO	3.0R	3.0R	1488.52		500	-
0.5U	1.0R TO	3.0R	1.7R	2027.50		-	2700
H	8.0L			193.89		64	-
H	4.0L			275.14		135	-
H	V			3251.01		-	-
0.6D	1.3R			17839.43		10000	-
0.9D	3.5L			5745.76		1800	12000
0.9D	V			14918.30		4500	-
1.5D	2.0R			20236.80		15000	-
2.0D	15.0L			1665.75		1000	-
2.0D	9.0L			3862.49		1250	-
2.0D	9.0R			5888.70		1250	-
2.0D	15.0R			2619.99		1000	-
4.0D	20.0L			580.31		300	-
4.0D	V			8395.39		-	-
4.0D	4.0R			7011.05		-	12500
4.0D	20.0R			969.16		300	-

MAXIMUM 1.3D 1.2R 20928.72 - -

MX(10U-90U/90L-90R) 20.0U 88.9L 86.74 - 125

H V 3009.96 - -

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.466A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.198 (>= 0.13 required)

Note: Sample received with beam approximately 1.2° up.

Cutoff "step" located at v-v line.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH1

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		44522.17		40000	75000
2.0U V		26328.75		1500	-
1.0U 3.0L		26030.57		5000	-
1.0U 3.0R		24030.22		5000	-
H 12.0L		7735.39		1500	-
H 9.0L		10737.95		3000	-
H 6.0L		13540.93		5000	-
H 3.0L		27178.40		15000	-
H V		44175.07		40000	75000
H 3.0R		31739.16		15000	-
H 6.0R		10245.74		5000	-
H 9.0R		4755.99		3000	-
H 12.0R		3183.84		1500	-
1.5D 9.0L		10940.84		2000	-
1.5D V		47967.40		5000	-
1.5D 9.0R		11046.56		2000	-
2.5D 12.0L		2854.55		1000	-
2.5D V		27319.70		2500	-
2.5D 12.0R		3926.89		1000	-
4.0D V		11141.34		-	12000
MAXIMUM	0.8D 0.8R	56798.85		-	-
H V		44311.60		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.466A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.093A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.198 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH2

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			1167.34		-	-
4.0U	8.0L			101.24		64	-
4.0U	8.0R			127.45		64	-
2.0U	4.0L			309.17		135	-
1.5U	1.0R	TO	3.0R	1.0R		200	-
1.5U	1.0R	TO	R	5.5R		-	1400
1.0U	1.5L	TO	L	4.8L		-	700
0.5U	1.5L	TO	L	5.5L		-	1000
0.5U	1.0R	TO	3.0R	1.0R		500	-
0.5U	1.0R	TO	3.0R	3.0R	1837.88	-	2700
H	8.0L			248.04		64	-
H	4.0L			282.98		135	-
H	V			1106.06		-	-
0.6D	1.3R			16524.22		10000	-
0.9D	3.5L			5959.92		1800	12000
0.9D	V			10744.22		4500	-
1.5D	2.0R			19493.59		15000	-
2.0D	15.0L			1371.75		1000	-
2.0D	9.0L			3175.47		1250	-
2.0D	9.0R			7151.91		1250	-
2.0D	15.0R			3358.61		1000	-
4.0D	20.0L			507.96		300	-
4.0D	V			7356.71		-	-
4.0D	4.0R			8178.12		-	12500
4.0D	20.0R			1089.02		300	-
MAXIMUM		1.3D	2.5R	19837.17		-	-
MX(10U-90U/90L-90R)		20.2U	89.9L	58.67		-	125
H	V			1166.82		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.473A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.229 (>= 0.13 required)

Note: Sample received with beam approximately 1.0° up.
Cutoff "step" located at 0.6°R.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH2

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		41595.12		40000	75000
2.0U V		36667.42		1500	-
1.0U 3.0L		23086.52		5000	-
1.0U 3.0R		32015.84		5000	-
H 12.0L		6207.78		1500	-
H 9.0L		9376.08		3000	-
H 6.0L		11757.99		5000	-
H 3.0L		20614.54		15000	-
H V		41406.75		40000	75000
H 3.0R		40586.79		15000	-
H 6.0R		16681.56		5000	-
H 9.0R		8182.60		3000	-
H 12.0R		4580.30		1500	-
1.5D 9.0L		5865.80		2000	-
1.5D V		26829.51		5000	-
1.5D 9.0R		9313.15		2000	-
2.5D 12.0L		2232.40		1000	-
2.5D V		16938.51		2500	-
2.5D 12.0R		4689.91		1000	-
4.0D V		9151.84		-	12000
MAXIMUM	0.2D 1.3R	50522.44		-	-
H V		41589.47		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.473A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.090A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.229 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps for 2007 Toyota Camry

VOL Aim

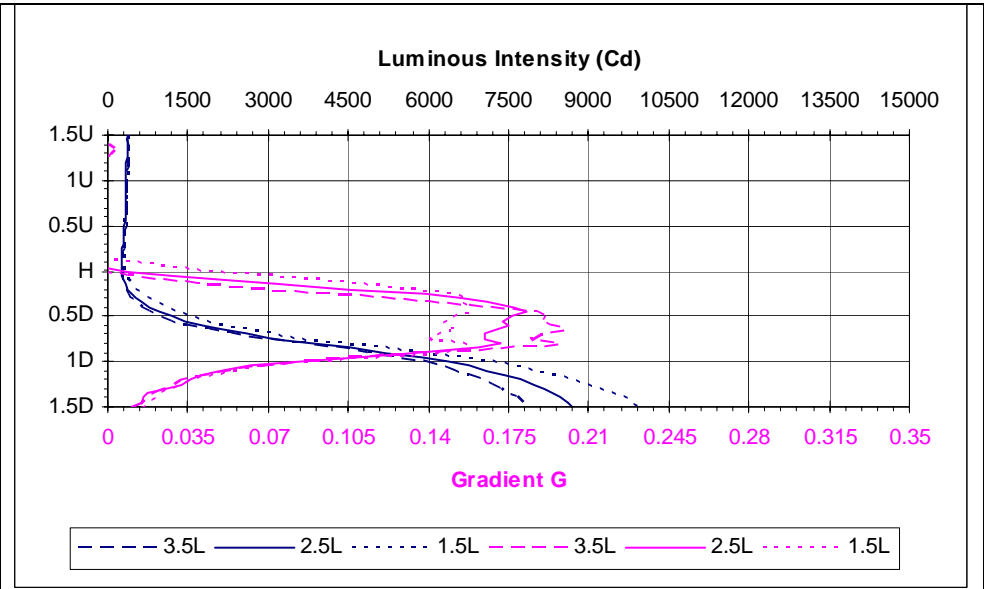
LH3

Maximum Vertical Gradient

Location	Value	Required
0.6D/3.5L	0.200	-
0.4D/2.5L	0.183	> 0.13
0.4D/1.5L	0.158	-

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

Maximum inclination of cutoff is within ±0.2°.



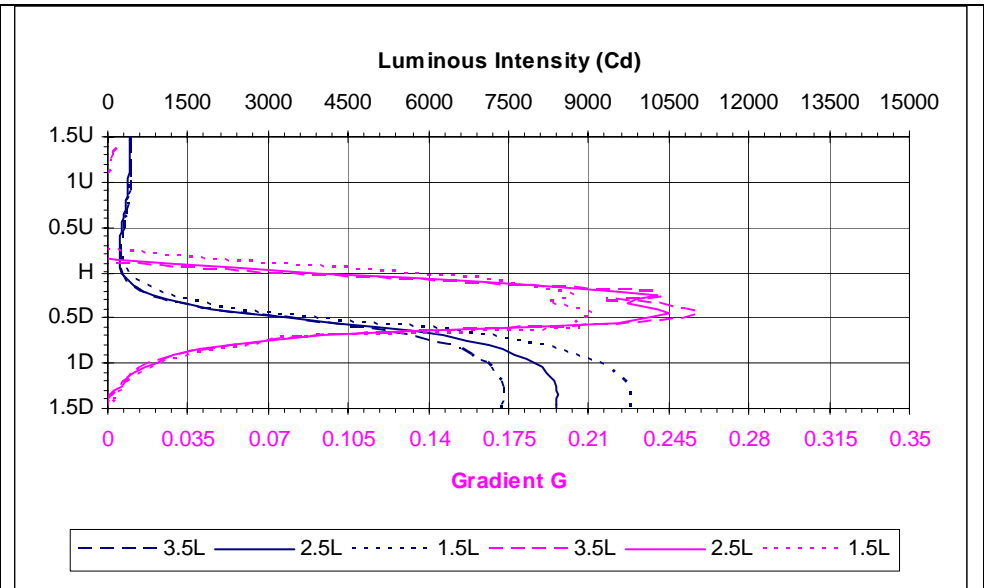
LH4

Maximum Vertical Gradient

Location	Value	Required
0.4D/3.5L	0.258	-
0.4D/2.5L	0.245	> 0.13
0.4D/1.5L	0.212	-

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

Maximum inclination of cutoff is within ±0.2°.



PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH3

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		1769.70		-	-
4.0U 8.0L		91.21		64	-
4.0U 8.0R		98.86		64	-
2.0U 4.0L		329.81		135	-
1.5U 1.0R TO 3.0R	1.4R	353.79		200	-
1.5U 1.0R TO R	5.1R	428.14		-	1400
1.0U 1.5L TO L	4.9L	380.33		-	700
0.5U 1.5L TO L	4.9L	365.79		-	1000
0.5U 1.0R TO 3.0R	1.0R	1771.70		500	-
0.5U 1.0R TO 3.0R	2.8R	2210.85		-	2700
H 8.0L		260.73		64	-
H 4.0L		286.15		135	-
H V		1645.29		-	-
0.6D 1.3R		15610.45		10000	-
0.9D 3.5L		3965.19		1800	12000
0.9D V		9765.18		4500	-
1.5D 2.0R		20481.23		15000	-
2.0D 15.0L		1576.47		1000	-
2.0D 9.0L		3649.39		1250	-
2.0D 9.0R		7212.50		1250	-
2.0D 15.0R		3318.32		1000	-
4.0D 20.0L		570.26		300	-
4.0D V		8693.18		-	-
4.0D 4.0R		8404.27		-	12500
4.0D 20.0R		1084.24		300	-
MAXIMUM	1.5D 1.9R	20507.66		-	-
MX(10U-90U/90L-90R)	19.6U 87.9L	94.36		-	125
H V		1691.41		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.478A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.183 (>= 0.13 required)

Note: Sample received with beam approximately 1.0° up.
Cutoff "step" located at v-v line.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH3

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		44858.36		40000	75000
2.0U V		28248.46		1500	-
1.0U 3.0L		28413.26		5000	-
1.0U 3.0R		24551.65		5000	-
H 12.0L		8199.65		1500	-
H 9.0L		11323.20		3000	-
H 6.0L		14076.27		5000	-
H 3.0L		28244.48		15000	-
H V		44422.47		40000	75000
H 3.0R		32309.08		15000	-
H 6.0R		10820.80		5000	-
H 9.0R		5125.01		3000	-
H 12.0R		3159.00		1500	-
1.5D 9.0L		10156.22		2000	-
1.5D V		42509.50		5000	-
1.5D 9.0R		11138.07		2000	-
2.5D 12.0L		2711.50		1000	-
2.5D V		25293.70		2500	-
2.5D 12.0R		4993.20		1000	-
4.0D V		11318.59		-	12000
MAXIMUM	0.7D 1.0R	53782.74		-	-
H V		44463.29		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.478A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.086A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.183 (>= 0.13 required)

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH4

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point		Location		Measured	Reaim	Minimum	Maximum
H	V			1371.06		-	-
4.0U	8.0L			117.81		64	-
4.0U	8.0R			143.93		64	-
2.0U	4.0L			380.45		135	-
1.5U	1.0R TO	3.0R	1.0R	397.64		200	-
1.5U	1.0R TO		R	4.9R		-	1400
1.0U	1.5L TO		L	4.6L		-	700
0.5U	1.5L TO		L	5.5L		-	1000
0.5U	1.0R TO	3.0R	1.0R	2226.15		500	-
0.5U	1.0R TO	3.0R	2.8R	3148.63	1520.37	-	2700
H	8.0L			232.28		64	-
H	4.0L			243.20		135	-
H	V			1221.87		-	-
0.6D	1.3R			17718.35		10000	-
0.9D	3.5L			6174.09		1800	12000
0.9D	V			12617.49		4500	-
1.5D	2.0R			19874.40		15000	-
2.0D	15.0L			1288.46		1000	-
2.0D	9.0L			3006.27		1250	-
2.0D	9.0R			6474.03		1250	-
2.0D	15.0R			2763.05		1000	-
4.0D	20.0L			535.74		300	-
4.0D	V			7175.34		-	-
4.0D	4.0R			7314.88		-	12500
4.0D	20.0R			981.89		300	-
MAXIMUM		1.3D	2.3R	20255.80		-	-
MX(10U-90U/90L-90R)		20.1U	87.9L	97.77		-	125
H	V			1259.29		-	-

Sample meets test requirements at all points.

Bulb: H11 purchased from dealership @ 12.80V / 4.484A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.245 (>= 0.13 required)

Note: Sample received with beam approximately 1.3° up.
Cutoff "step" located at 0.3°R.

PHOTOMETRIC TEST DATA SHEET

Project Name: NAL 06-93 VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

Sample Number: LH4

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		52000.31		40000	75000
2.0U V		38408.56		1500	-
1.0U 3.0L		28599.56		5000	-
1.0U 3.0R		25634.18		5000	-
H 12.0L		7330.62		1500	-
H 9.0L		12607.06		3000	-
H 6.0L		15249.41		5000	-
H 3.0L		25936.94		15000	-
H V		51939.80		40000	75000
H 3.0R		36290.17		15000	-
H 6.0R		13662.57		5000	-
H 9.0R		8039.70		3000	-
H 12.0R		4406.68		1500	-
1.5D 9.0L		6076.23		2000	-
1.5D V		32433.75		5000	-
1.5D 9.0R		9085.06		2000	-
2.5D 12.0L		2213.46		1000	-
2.5D V		17499.07		2500	-
2.5D 12.0R		4045.77		1000	-
4.0D V		8840.27		-	12000
MAXIMUM	0.4D 1.0R	56325.08		-	-
H V		51762.28		40000	75000

Sample meets test requirements at all points.

Bulb 1: H11 purchased from dealership @ 12.80V / 4.484A / Flux not measured

Bulb 2: HB3 purchased from dealership @ 12.80V / 5.085A / Flux not measured

Aim: Sample mounted on NAL 044L "25MB-4" LH fixture. Fixture mounted on level platform with H11 (LB) bulb at center of rotation and tilt with fixture markings aligned to laser-aligned goniometer platform markings. Aim screw then adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).
Gmax = 0.245 (>= 0.13 required)

TEST DATA SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

COLOR TEST: SAE J578c

Test Method: Tristimulus Method using Minolta CL100

Test Performed by: Mark A. Evans

Date: 14 April 2008

Lamp Voltage: 12.80V

Test Distance: 50 Feet

Test Location: 1.5D/2.0R (Lower Beam) or HV (Upper Beam)

	Measured (x, y)	Required	Chart
White	<u>Lower Beam</u>		
	RH1: (0.432, 0.405)		
	RH2: (0.432, 0.406)		
	RH3: (0.432, 0.404)		
	RH4: (0.432, 0.406)		
	LH1: (0.432, 0.405)		
	LH2: (0.433, 0.404)		
	LH3: (0.433, 0.406)		
	LH4: (0.434, 0.405)		
	<u>Upper Beam</u>		
	RH1: (0.422, 0.400)		
	RH2: (0.422, 0.400)		
	RH3: (0.423, 0.399)		
	RH4: (0.424, 0.402)		
	LH1: (0.426, 0.401)		
	LH2: (0.424, 0.400)		
LH3: (0.424, 0.401)			
LH4: (0.422, 0.401)			
		$0.31 \leq x \leq 0.50$ $0.38 \leq y \leq 0.44$ $y \geq 0.75x + 0.05$ $y \leq 0.64x + 0.15$	

Samples comply with color requirements.

PHOTOGRAPH SHEET

Project Name: NAL 06-93 "044L" VOL Replaceable Bulb (H11/HB3) Headlamps
for 2007 Toyota Camry

