

108-ISOQA-15-094

SAFETY COMPLIANCE TESTING FOR FMVSS108

ISOQA
60, Yong Long Rd,
Da-Li, Taichung
Taiwan, ROC



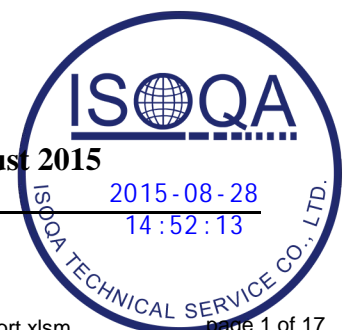
- Final Report -

Arthur Chang

Signature of Responsible Laboratory Official

28 August 2015

Approval Date



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Prepared By: Lisa Liu

Reviewed By: J.Y Pan



PRODUCT INFORMATION

Test Component	A0101
Manufacturer	Foshan Tuff Plus Auto Lighting Co., Ltd.
Report Number	108-ISOQA-15-094
Trade Mark	TUFFPLUS
Type of material from which lens is made	Bayer MAKROLON 2407 PC 550012 Clear #
Coating of of exterior lens	UVHC 3000
Type of material from which inner lens is made	-
Type of material from which reflex reflector is made	-
Applicable Vehicle	on Motor Vehicles
Rated Voltage	12 V
Marking on Lens	DOT SAE HL 15 LED VOL A0101 TUFFPLUS
Marking on Housing	12V
Method of Mounting to Vehicle	bolted

* Above-mentioned information is provided by the applicant

Functions	Headlamp Lower Beam	Headlamp Upper Beam
Additional requirements to FMVSS108	FMVSS 108	FMVSS 108
Lighting Identification Code	HR	HR
Color emitted	White	White
Number of lamp	1	1
Light Source Category	LED	LED
Calibrated Light Source(s) Lab. Control Number	LED - N/A	LED - N/A
Design Voltage	12.8 V	12.8 V
Rated Mean Spherical Candle Power	-	-
Effective Projected Luminous Lens Area (cm ²)	N/A	N/A
Method of determination	N/A	N/A
Light Source(s) Type and Trade Number	LED x 4	LED x 4
Bulb Socket Type	-	-

Test Item	Inspector	Date	Number of Passed
Physical Inspection	Aaron Lin	2015/7/24	2
Photometric Test	Aaron Lin	2015/7/24	2
Color Test	Aaron Lin	2015/7/24	2
Abrasion Test	Elton Li	2015/8/6	1
Chemical Resistance	Elton Li	2015/8/4	5
Temp. Cycle	Elton Li	2015/7/28	1
Internal Heat	Elton Li	2015/7/31	1
Humidity Test	Elton Li	2015/8/4	1
Dust Test	Elton Li	2015/7/29	1
Corrosion Test	Elton Li	2015/7/29	1
Vibration Test	Elton Li	2015/8/4	1



HEADLAMP TEST REPORT

Test Component : **A0101**
 Manufacturer : **Foshan Tuff Plus Auto Lighting Co., Ltd.**
 Test Laboratory : **ISOQA**
 Test Date : **July 24, 2015**
 Report Number : **108-ISOQA-15-094**
 Number of devices tested : **see summary**
 Light source Designation :
 Upper Beam: **LED x 4**
 Lower Beam: **LED x 4**

SUMMARY

Test Description	Test Result :	Number Passed	Number Failed
Physical Inspection		2	-
Photometric Test - Upper Beam to	FMVSS 108 UB2	2	-
Photometric Test - Lower Beam to	FMVSS 108 LB2V	2	-
Color Test		2	-
Vibration Test		1	-
Abrasion Test		1	-
Chemical Resistance		5	-
Corrosion		1	-
Dust Test		1	-
Temp. Cycle		1	-
Internal Heat		1	-
Humidity Test		1	-

Archer Chang

Signature of Responsible Laboratory Official

Title: Lab Manager
 Date: 2015/8/28



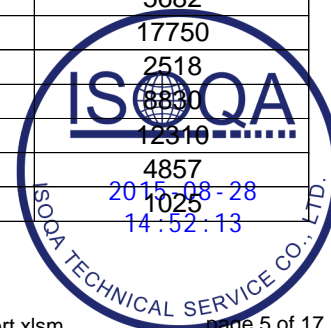
PHOTOMETRY TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)	S2 (RH)
H - V (1min)	40,000	75,000	43810	48550
H - V (30min)	40,000	75,000	43520	47600
2U - V	1,500	-	49450	58480
1U - 3L	5,000	-	32180	27580
1U - 3R	5,000	-	28210	40770
H - 3L	15,000	-	28920	25790
H - 3R	15,000	-	26480	35730
H - 6L	5,000	-	14220	13580
H - 6R	5,000	-	15630	20120
H - 9L	3,000	-	7801	7860
H - 9R	3,000	-	9240	11820
H - 12L	1,500	-	4006	4209
H - 12R	1,500	-	5084	6575
1.5D - V	5,000	-	26340	28380
1.5D - 9L	2,000	-	7050	6770
1.5D - 9R	2,000	-	7581	9840
2.5D - V	2,500	-	18670	19880
2.5D - 12L	1,000	-	3923	3852
2.5D - 12R	1,000	-	4295	5415
4D - V	-	12,000	11520	11570

LB2V - Lower Beam Photometric Test Point Values

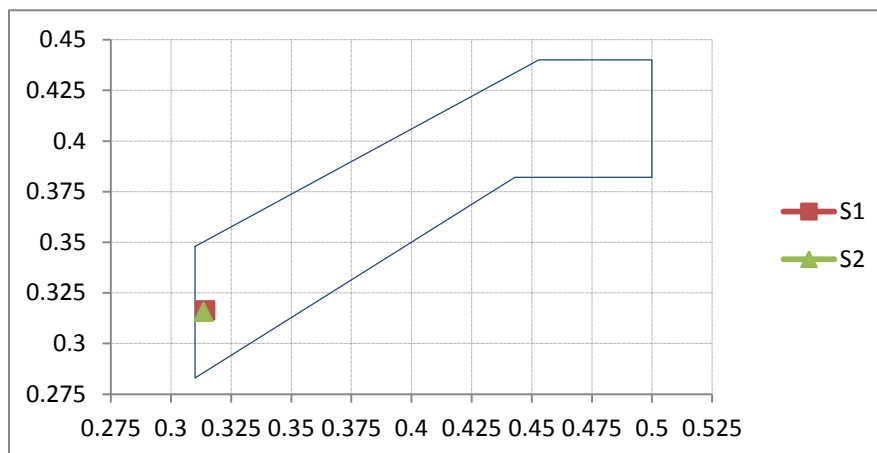
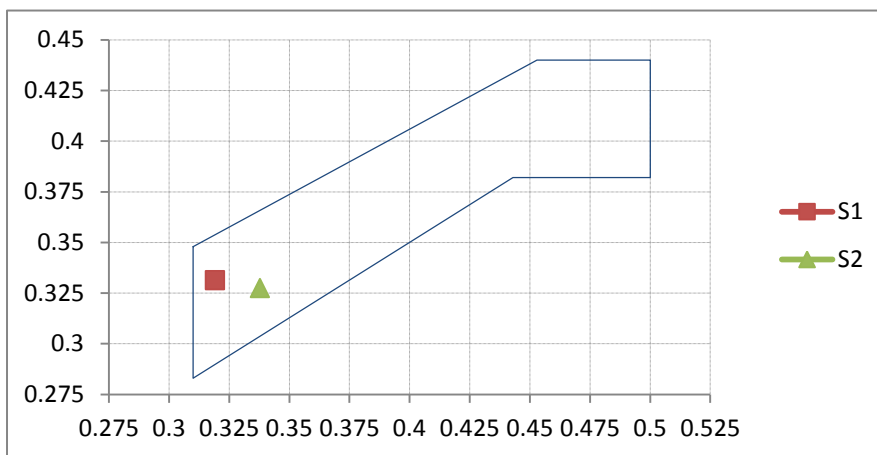
Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)	S2 (RH)
1.5D - 2R (1min)	15,000	-	20040	17260
1.5D - 2R (30min)	15,000	-	20110	17280
10U to 90U	-	125	109.6	118.194
4U - 8L	64	-	247	221.5
4U - 8R	64	-	392.8	317.4
2U - 4L	135	-	515.4	363.4
1.5U - 1R to 3R	200	-	570	530.678
1.5U - 1R to R	-	1,400	586.85	1182.176
1U - 1.5L to L	-	700	537.198	601.354
0.5U - 1.5L to	-	1,000	679.71	905.85
0.5U - 1R to 3R	500	2,700	(1044.130) 2618.510	(1351.268) 2115.748
H - 4L	135	-	1552	5632
H - 8L	64	-	809	3108
0.6D - 1.3R	10,000	-	17020	14470
0.86D - V	4,500	-	15090	14500
0.86D - 3.5L	1,800	12,000	10210	10460
2D - 9L	1,250	-	7593	5682
2D - 9R	1,250	-	11540	17750
2D - 15L	1,000	-	2636	2518
2D - 15R	1,000	-	4423	8830
4D - 4R	-	12,500	11640	12310
4D - 20R	300	-	3858	4857
4D - 20L	300	-	1745	1025



COLOR TEST

Test performed by : **Aaron Lin** Date : **July 24, 2015**

Color emitted from HV point		S1 (LH)	S2 (RH)
upper beam	x=	0.3192	0.3378
	y=	0.3313	0.3273
lower beam	x=	0.3143	0.3136
	y=	0.3163	0.3155



Color of device is : **White**
 sample(s) passed : **2** samples(s) failed : **-**
 Reference Light Source control number : **N/A**

Remarks : _____



VIBRATION TEST

Test performed by **Elton Li** Date : **August 4, 2015**
sample(s) passed : **1** samples(s) failed : **-**

After completion of the vibration test, there must be no evidence of loose or broken parts, other than filaments, visible without magnification.

Yes No

.....
 Yes No

Necessary to rephotometer test

.....
 Yes No

Additional photometric data sheet added to report.

Remarks : _____

CORROSION TEST

Test performed by **Elton Li** Date : **July 29, 2015**
sample(s) passed : **1** samples(s) failed : **-**

After completion of the corrosion test, the sample headlamp must not have any observed corrosion which would result in the failure of any other applicable tests contained in S14.6 and no corrosion of the headlamp mounting and aiming mechanism that would result in the failure of the aiming adjustment tests, inward force test, or torque deflection test of S14.6.

Yes No

Necessary to rephotometer test

.....
 Yes No

Additional photometric data sheet added to report

.....
 Yes No

Remarks : _____



ABRASION TEST

Test performed by **Elton Li** Date : **August 6, 2015**
sample(s) passed : **1** samples(s) failed : **-**

After completion of the abrasion test the sample headlamp must meet the requirements of the applicable photometry tests. Yes No

Necessary to rephotometer test Yes No

Additional photometric data sheet added to report. Yes No

Remarks : _____

CHEMICAL RESISTANCE TEST

Test performed by **Elton Li** Date : **August 4, 2015**
sample(s) passed : **5** samples(s) failed : **-**

After completion of the chemical resistance test, the sample headlamp must have no surface deterioration, coating delamination, fractures, deterioration of bonding or sealing materials, color bleeding, or color pickup visible without magnification and the headlamp must meet the requirements of the applicable photometry tests. Yes No

Necessary to rephotometer test Yes No

Additional photometric data sheet added to report. Yes No

Remarks : _____



DUST TEST

Test performed by **Elton Li**Date : **July 29, 2015**sample(s) passed : **1**samples(s) failed : **-**

After completion of the dust test, the sample headlamp must meet the requirements of the applicable photometry tests.t.

 Yes No

Necessary to rephotometer test

 Yes No

Additional photometric data sheet added to report

 Yes No

Remarks : _____

TEMPERATURE CYCLE TEST

Test performed by **Elton Li**Date : **July 28, 2015**sample(s) passed : **1**samples(s) failed : **-**

After completion of the temperature cycle test, the sample headlamp must: (a) show no evidence of delamination, fractures, entry of moisture, or deterioration of bonding material, color bleeding, warp or deformation visible without magnification; (b) show no lens warpage greater than 3 mm when measured parallel to the optical axis at the point of intersection of the axis of each light source with the exterior surface of the lens; and (c) meet the requirements of the applicable photometry tests.

 Yes No

Necessary to rephotometer test

 Yes No

Additional photometric data sheet added to report

 Yes No

Remarks : _____



INTERNAL HEAT TEST

Test performed by **Elton Li** Date : **July 31, 2015**
sample(s) passed : **1** samples(s) failed : **-**

After completion of the temperature cycle test and meeting its requirements, and completion of the internal heat test, the sample headlamp must: (a) have no lens warpage greater than 3 mm when measured parallel to the optical axis at the point of intersection of the axis of each light source with the exterior surface of the lens, and (b) meet the requirements of the applicable photometry tests

Yes No

Necessary to rephotometer test

Yes No

Additional photometric data sheet added to report

Yes No

Remarks : _____

HUMIDITY TEST

Test performed by **Elton Li** Date : **August 4, 2015**
sample(s) passed : **1** samples(s) failed : **-**

After completion of the humidity test, the sample headlamp must show no evidence of interior delamination or moisture, fogging or condensation visible without magnification.

Yes No

Necessary to rephotometer test

Yes No

Additional photometric data sheet added to report

Yes No

Remarks : _____



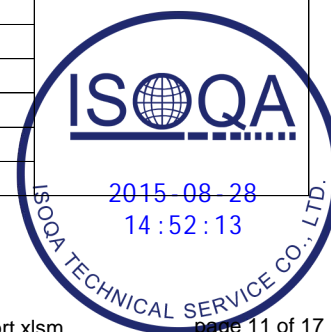
PHOTOMETRY AFTER ABRASION TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	42789
H - V (30min)	40,000	75,000	41521
2U - V	1,500	-	44279
1U - 3L	5,000	-	28240
1U - 3R	5,000	-	24821
H - 3L	15,000	-	27584
H - 3R	15,000	-	26810
H - 6L	5,000	-	12476
H - 6R	5,000	-	13127
H - 9L	3,000	-	6244
H - 9R	3,000	-	5847
H - 12L	1,500	-	3487
H - 12R	1,500	-	4358
1.5D - V	5,000	-	25789
1.5D - 9L	2,000	-	6627
1.5D - 9R	2,000	-	7627
2.5D - V	2,500	-	14823
2.5D - 12L	1,000	-	3647
2.5D - 12R	1,000	-	3727
4D - V	-	12,000	10290

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	17921
1.5D - 2R (30min)	15,000	-	16511
10U to 90U	-	125	151.142
4U - 8L	64	-	248
4U - 8R	64	-	378.6
2U - 4L	135	-	458.6
1.5U - 1R to 3R	200	-	512.3
1.5U - 1R to R	-	1,400	1126.55
1U - 1.5L to L	-	700	527.357
0.5U - 1.5L to	-	1,000	811.145
0.5U - 1R to 3R	500	2,700	(2112.180) 2517.280
H - 4L	135	-	792
H - 8L	64	-	812
0.6D - 1.3R	10,000	-	15120
0.86D - V	4,500	-	14921
0.86D - 3.5L	1,800	12,000	11121
2D - 9L	1,250	-	4924
2D - 9R	1,250	-	12940
2D - 15L	1,000	-	2849
2D - 15R	1,000	-	4219
4D - 4R	-	12,500	11130
4D - 20R	300	-	2688
4D - 20L	300	-	2278



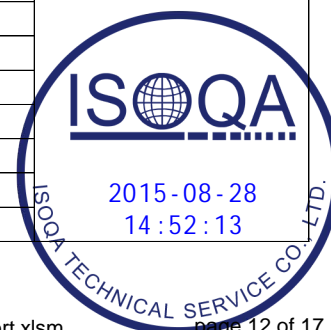
PHOTOMETRY AFTER CHEMICAL RESISTANCE TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	47350
H - V (30min)	40,000	75,000	47210
2U - V	1,500	-	57580
1U - 3L	5,000	-	28680
1U - 3R	5,000	-	39770
H - 3L	15,000	-	24790
H - 3R	15,000	-	36330
H - 6L	5,000	-	13280
H - 6R	5,000	-	21020
H - 9L	3,000	-	7960
H - 9R	3,000	-	11825
H - 12L	1,500	-	4219
H - 12R	1,500	-	6565
1.5D - V	5,000	-	28382
1.5D - 9L	2,000	-	6775
1.5D - 9R	2,000	-	9845
2.5D - V	2,500	-	19780
2.5D - 12L	1,000	-	3842
2.5D - 12R	1,000	-	5425
4D - V	-	12,000	11670

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	17140
1.5D - 2R (30min)	15,000	-	17090
10U to 90U	-	125	119.51
4U - 8L	64	-	208.1
4U - 8R	64	-	310.25
2U - 4L	135	-	351.2
1.5U - 1R to 3R	200	-	510.57
1.5U - 1R to R	-	1,400	2754.65
1U - 1.5L to L	-	700	1195.27
0.5U - 1.5L to	-	1,000	988.2
0.5U - 1R to 3R	500	2,700	(1255.254) 2655.210
H - 4L	135	-	4515
H - 8L	64	-	3055
0.6D - 1.3R	10,000	-	14157
0.86D - V	4,500	-	14050
0.86D - 3.5L	1,800	12,000	10120
2D - 9L	1,250	-	5588
2D - 9R	1,250	-	17146
2D - 15L	1,000	-	2451
2D - 15R	1,000	-	8655
4D - 4R	-	12,500	11255
4D - 20R	300	-	4650
4D - 20L	300	-	1011



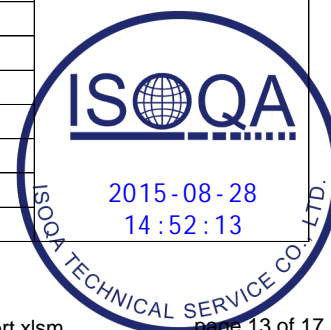
PHOTOMETRY AFTER TEMPERATURE CYCLE TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	47920
H - V (30min)	40,000	75,000	49810
2U - V	1,500	-	57510
1U - 3L	5,000	-	26920
1U - 3R	5,000	-	39270
H - 3L	15,000	-	24280
H - 3R	15,000	-	34970
H - 6L	5,000	-	14270
H - 6R	5,000	-	19270
H - 9L	3,000	-	7510
H - 9R	3,000	-	10270
H - 12L	1,500	-	4122
H - 12R	1,500	-	6421
1.5D - V	5,000	-	26272
1.5D - 9L	2,000	-	6620
1.5D - 9R	2,000	-	9721
2.5D - V	2,500	-	17289
2.5D - 12L	1,000	-	3727
2.5D - 12R	1,000	-	5321
4D - V	-	12,000	10219

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	16910
1.5D - 2R (30min)	15,000	-	16120
10U to 90U	-	125	112.247
4U - 8L	64	-	212.2
4U - 8R	64	-	331.2
2U - 4L	135	-	351.2
1.5U - 1R to 3R	200	-	510.217
1.5U - 1R to R	-	1,400	1218.183
1U - 1.5L to L	-	700	509.271
0.5U - 1.5L to	-	1,000	912.241
0.5U - 1R to 3R	500	2,700	(517.002) 2617.126
H - 4L	135	-	5284
H - 8L	64	-	3092
0.6D - 1.3R	10,000	-	13225
0.86D - V	4,500	-	12830
0.86D - 3.5L	1,800	12,000	11321
2D - 9L	1,250	-	2382
2D - 9R	1,250	-	2681
2D - 15L	1,000	-	2291
2D - 15R	1,000	-	7210
4D - 4R	-	12,500	11247
4D - 20R	300	-	4349
4D - 20L	300	-	1816



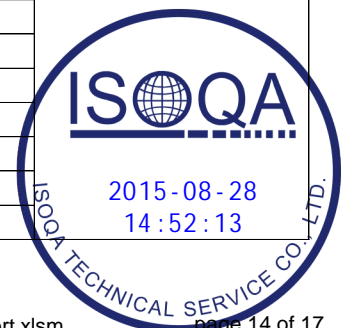
PHOTOMETRY AFTER INTERNAL HEAT TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	41573
H - V (30min)	40,000	75,000	40291
2U - V	1,500	-	46812
1U - 3L	5,000	-	31571
1U - 3R	5,000	-	25317
H - 3L	15,000	-	26172
H - 3R	15,000	-	25123
H - 6L	5,000	-	12967
H - 6R	5,000	-	12712
H - 9L	3,000	-	6129
H - 9R	3,000	-	8029
H - 12L	1,500	-	3524
H - 12R	1,500	-	4273
1.5D - V	5,000	-	24279
1.5D - 9L	2,000	-	6437
1.5D - 9R	2,000	-	6951
2.5D - V	2,500	-	15921
2.5D - 12L	1,000	-	3537
2.5D - 12R	1,000	-	3572
4D - V	-	12,000	10819

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	18175
1.5D - 2R (30min)	15,000	-	18015
10U to 90U	-	125	112.1
4U - 8L	64	-	281
4U - 8R	64	-	391.8
2U - 4L	135	-	417.4
1.5U - 1R to 3R	200	-	581
1.5U - 1R to R	-	1,400	624.28
1U - 1.5L to L	-	700	572.921
0.5U - 1.5L to	-	1,000	713.82
0.5U - 1R to 3R	500	2,700	(892.612) 2428.180
H - 4L	135	-	1021
H - 8L	64	-	753
0.6D - 1.3R	10,000	-	14919
0.86D - V	4,500	-	11917
0.86D - 3.5L	1,800	12,000	10291
2D - 9L	1,250	-	5137
2D - 9R	1,250	-	11726
2D - 15L	1,000	-	2271
2D - 15R	1,000	-	3951
4D - 4R	-	12,500	10951
4D - 20R	300	-	3318
4D - 20L	300	-	2181



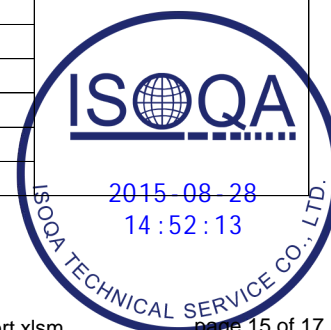
PHOTOMETRY AFTER HUMIDITY TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	41875
H - V (30min)	40,000	75,000	40387
2U - V	1,500	-	45720
1U - 3L	5,000	-	29220
1U - 3R	5,000	-	25830
H - 3L	15,000	-	26724
H - 3R	15,000	-	25920
H - 6L	5,000	-	12943
H - 6R	5,000	-	12724
H - 9L	3,000	-	6157
H - 9R	3,000	-	8047
H - 12L	1,500	-	3423
H - 12R	1,500	-	4427
1.5D - V	5,000	-	24272
1.5D - 9L	2,000	-	6537
1.5D - 9R	2,000	-	7276
2.5D - V	2,500	-	15720
2.5D - 12L	1,000	-	3521
2.5D - 12R	1,000	-	3824
4D - V	-	12,000	11210

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	18781
1.5D - 2R (30min)	15,000	-	17924
10U to 90U	-	125	104.7
4U - 8L	64	-	237
4U - 8R	64	-	356.2
2U - 4L	135	-	437.5
1.5U - 1R to 3R	200	-	499.2
1.5U - 1R to R	-	1,400	623.55
1U - 1.5L to L	-	700	581.573
0.5U - 1.5L to	-	1,000	782.31
0.5U - 1R to 3R	500	2,700	(1022.280) 2424.290
H - 4L	135	-	817
H - 8L	64	-	701
0.6D - 1.3R	10,000	-	14970
0.86D - V	4,500	-	13952
0.86D - 3.5L	1,800	12,000	10293
2D - 9L	1,250	-	5964
2D - 9R	1,250	-	11720
2D - 15L	1,000	-	2199
2D - 15R	1,000	-	4127
4D - 4R	-	12,500	11740
4D - 20R	300	-	3079
4D - 20L	300	-	2017



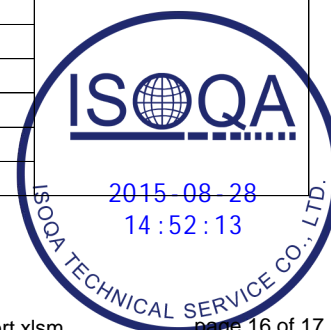
PHOTOMETRY AFTER DUST TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	42997
H - V (30min)	40,000	75,000	42670
2U - V	1,500	-	47680
1U - 3L	5,000	-	30920
1U - 3R	5,000	-	26170
H - 3L	15,000	-	27247
H - 3R	15,000	-	26210
H - 6L	5,000	-	13111
H - 6R	5,000	-	13970
H - 9L	3,000	-	6271
H - 9R	3,000	-	8181
H - 12L	1,500	-	3596
H - 12R	1,500	-	4513
1.5D - V	5,000	-	25120
1.5D - 9L	2,000	-	6678
1.5D - 9R	2,000	-	7378
2.5D - V	2,500	-	16870
2.5D - 12L	1,000	-	3681
2.5D - 12R	1,000	-	3921
4D - V	-	12,000	10132

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	19621
1.5D - 2R (30min)	15,000	-	19091
10U to 90U	-	125	99.1
4U - 8L	64	-	215
4U - 8R	64	-	365.8
2U - 4L	135	-	491.4
1.5U - 1R to 3R	200	-	510
1.5U - 1R to R	-	1,400	517.85
1U - 1.5L to L	-	700	691.582
0.5U - 1.5L to	-	1,000	688.71
0.5U - 1R to 3R	500	2,700	(912.130) 2538.510
H - 4L	135	-	952
H - 8L	64	-	699
0.6D - 1.3R	10,000	-	15120
0.86D - V	4,500	-	12222
0.86D - 3.5L	1,800	12,000	9123
2D - 9L	1,250	-	6274
2D - 9R	1,250	-	12490
2D - 15L	1,000	-	2167
2D - 15R	1,000	-	4312
4D - 4R	-	12,500	11819
4D - 20R	300	-	3116
4D - 20L	300	-	1672





Front View



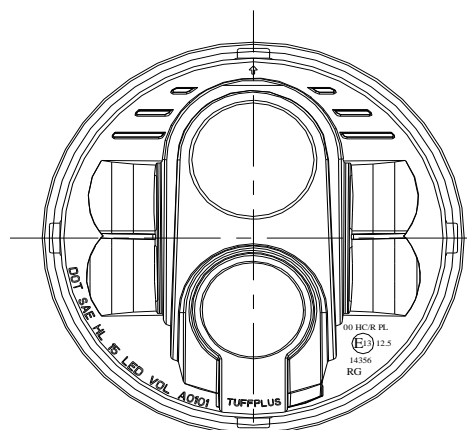
Side View



Top View



Rear View



DOT SAE HL 15 LED VOL A0101 TUFFPLUS
Marking on Lens

