

108-ISOQA-15-093

SAFETY COMPLIANCE TESTING FOR FMVSS108

ISOQA
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Taiwan, ROC



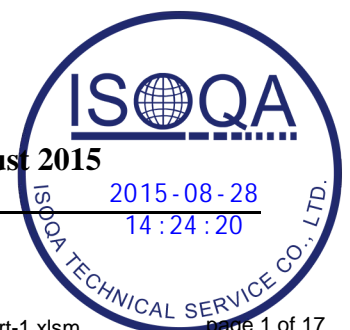
- Final Report -

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	A0102
Manufacturer	Foshan Tuff Plus Auto Lighting Co., Ltd.
Report Number	108-ISOQA-15-093
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	TUFFPLUS A0102 DOT SAE HL 15 LED VOL
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 × 4	LED × 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 : **A0102**
 Manufacturer : **Foshan Tuff Plus Auto Lighting Co., Ltd.**
 Test Laboratory : **ISOQA**
 Test Date : **July 24, 2015**
 Report Number : **108-ISOQA-15-093**
 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	-



Signature of Responsible Laboratory Official

Title: Lab Manager

Date: 2015/8/28



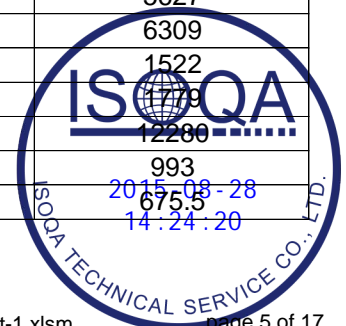
PHOTOMETRY TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)	S2 (RH)
H - V (1min)	40,000	75,000	40220	44150
H - V (30min)	40,000	75,000	40090	42790
2U - V	1,500	-	48750	50780
1U - 3L	5,000	-	33120	31750
1U - 3R	5,000	-	32110	32460
H - 3L	15,000	-	29360	28100
H - 3R	15,000	-	29190	28340
H - 6L	5,000	-	12710	13030
H - 6R	5,000	-	13370	12170
H - 9L	3,000	-	4981	5136
H - 9R	3,000	-	5381	4658
H - 12L	1,500	-	2066	2323
H - 12R	1,500	-	2511	1900
1.5D - V	5,000	-	25710	27830
1.5D - 9L	2,000	-	3949	3916
1.5D - 9R	2,000	-	4203	3556
2.5D - V	2,500	-	19740	19300
2.5D - 12L	1,000	-	1746	1612
2.5D - 12R	1,000	-	1830	1289
4D - V	-	12,000	11840	3282

LB2V - Lower Beam Photometric Test Point Values

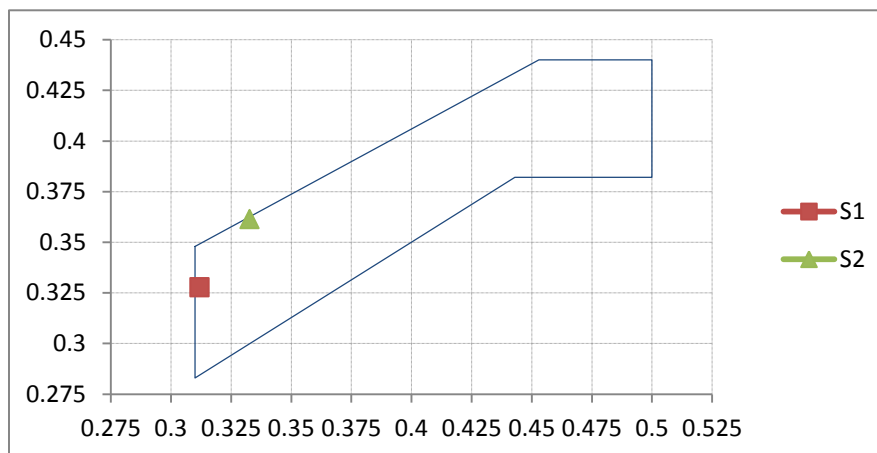
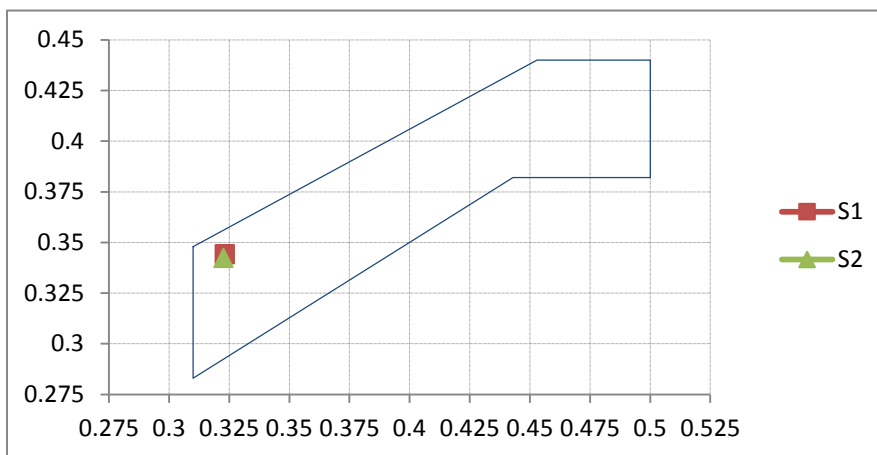
Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)	S2 (RH)
1.5D - 2R (1min)	15,000	-	22010	15360
1.5D - 2R (30min)	15,000	-	21310	15910
10U to 90U	-	125	115	117.735
4U - 8L	64	-	417.9	261.7
4U - 8R	64	-	547.6	309.4
2U - 4L	135	-	1104	1086
1.5U - 1R to 3R	200	-	3029.621	1557.107
1.5U - 1R to R	-	1,400	1350	1323.324
1U - 1.5L to L	-	700	665	637.102
0.5U - 1.5L to	-	1,000	961	911.003
0.5U - 1R to 3R	500	2,700	(486.000)2585.846	(1858.632)2433.237
H - 4L	135	-	7344	1620
H - 8L	64	-	4721	579.5
0.6D - 1.3R	10,000	-	18820	16405
0.86D - V	4,500	-	18410	7205
0.86D - 3.5L	1,800	12,000	11880	5046
2D - 9L	1,250	-	5732	5627
2D - 9R	1,250	-	7673	6309
2D - 15L	1,000	-	1899	1522
2D - 15R	1,000	-	3539	1779
4D - 4R	-	12,500	11780	12280
4D - 20R	300	-	2053	993
4D - 20L	300	-	804	675.5



COLOR TEST

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

Color emitted from HV point		S1 (LH)	S2 (RH)
upper beam	x=	0.3232	0.3227
	y=	0.3441	0.3423
lower beam	x=	0.3119	0.3327
	y=	0.3276	0.3613



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

Necessary to rephotometer test

Yes No

Additional photometric data sheet added to report.

Yes No

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 : _____



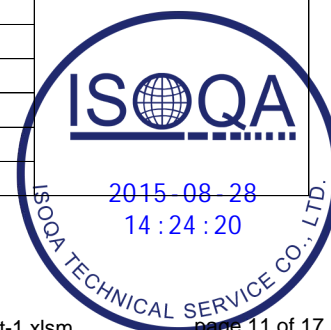
PHOTOMETRY AFTER ABRASION TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	41010
H - V (30min)	40,000	75,000	40210
2U - V	1,500	-	42471
1U - 3L	5,000	-	32841
1U - 3R	5,000	-	36710
H - 3L	15,000	-	25930
H - 3R	15,000	-	27190
H - 6L	5,000	-	10576
H - 6R	5,000	-	11957
H - 9L	3,000	-	4512
H - 9R	3,000	-	5103
H - 12L	1,500	-	1812
H - 12R	1,500	-	2571
1.5D - V	5,000	-	21000
1.5D - 9L	2,000	-	2321
1.5D - 9R	2,000	-	4211
2.5D - V	2,500	-	14582
2.5D - 12L	1,000	-	2684.5
2.5D - 12R	1,000	-	2121
4D - V	-	12,000	10120

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	18917
1.5D - 2R (30min)	15,000	-	18470
10U to 90U	-	125	111.7
4U - 8L	64	-	512
4U - 8R	64	-	601.2
2U - 4L	135	-	725
1.5U - 1R to 3R	200	-	1826.271
1.5U - 1R to R	-	1,400	1247.214
1U - 1.5L to L	-	700	576.798
0.5U - 1.5L to	-	1,000	869.513
0.5U - 1R to 3R	500	2,700	(1127.578)
H - 4L	135	-	5027
H - 8L	64	-	3122
0.6D - 1.3R	10,000	-	16171
0.86D - V	4,500	-	14789
0.86D - 3.5L	1,800	12,000	10120
2D - 9L	1,250	-	4379
2D - 9R	1,250	-	4410
2D - 15L	1,000	-	1464
2D - 15R	1,000	-	2826
4D - 4R	-	12,500	10176
4D - 20R	300	-	1700
4D - 20L	300	-	1157



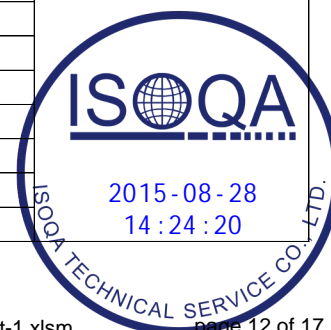
PHOTOMETRY AFTER CHEMICAL RESISTANCE TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	43817
H - V (30min)	40,000	75,000	42110
2U - V	1,500	-	49270
1U - 3L	5,000	-	38770
1U - 3R	5,000	-	36710
H - 3L	15,000	-	27160
H - 3R	15,000	-	24720
H - 6L	5,000	-	12910
H - 6R	5,000	-	11820
H - 9L	3,000	-	5297
H - 9R	3,000	-	4217
H - 12L	1,500	-	2173
H - 12R	1,500	-	1617
1.5D - V	5,000	-	27891
1.5D - 9L	2,000	-	3278
1.5D - 9R	2,000	-	3279
2.5D - V	2,500	-	12788
2.5D - 12L	1,000	-	1824
2.5D - 12R	1,000	-	1627
4D - V	-	12,000	3679

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	15840
1.5D - 2R (30min)	15,000	-	15010
10U to 90U	-	125	112.754
4U - 8L	64	-	237.8
4U - 8R	64	-	317.2
2U - 4L	135	-	957
1.5U - 1R to 3R	200	-	1492.916
1.5U - 1R to R	-	1,400	1224
1U - 1.5L to L	-	700	524.284
0.5U - 1.5L to	-	1,000	834.157
0.5U - 1R to 3R	500	2,700	(1917.281) 2516.277
H - 4L	135	-	1710
H - 8L	64	-	567.2
0.6D - 1.3R	10,000	-	11295
0.86D - V	4,500	-	6924
0.86D - 3.5L	1,800	12,000	5827
2D - 9L	1,250	-	5172
2D - 9R	1,250	-	6395
2D - 15L	1,000	-	1157
2D - 15R	1,000	-	1687
4D - 4R	-	12,500	11240
4D - 20R	300	-	1021
4D - 20L	300	-	727.5



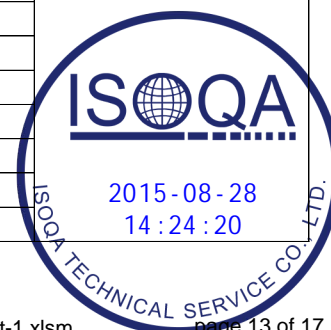
PHOTOMETRY AFTER TEMPERATURE CYCLE TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	43921
H - V (30min)	40,000	75,000	41927
2U - V	1,500	-	49310
1U - 3L	5,000	-	30827
1U - 3R	5,000	-	33210
H - 3L	15,000	-	27580
H - 3R	15,000	-	27287
H - 6L	5,000	-	12814
H - 6R	5,000	-	11927
H - 9L	3,000	-	5281
H - 9R	3,000	-	4451
H - 12L	1,500	-	2272
H - 12R	1,500	-	1681
1.5D - V	5,000	-	25921
1.5D - 9L	2,000	-	3824
1.5D - 9R	2,000	-	3492
2.5D - V	2,500	-	18151
2.5D - 12L	1,000	-	1539
2.5D - 12R	1,000	-	1183
4D - V	-	12,000	3121

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	15927
1.5D - 2R (30min)	15,000	-	15010
10U to 90U	-	125	121.921
4U - 8L	64	-	239.8
4U - 8R	64	-	296.3
2U - 4L	135	-	1172
1.5U - 1R to 3R	200	-	1481.291
1.5U - 1R to R	-	1,400	1283.841
1U - 1.5L to L	-	700	628.218
0.5U - 1.5L to	-	1,000	987.182
0.5U - 1R to 3R	500	2,700	(1728.672) 2582.183
H - 4L	135	-	1593
H - 8L	64	-	557.5
0.6D - 1.3R	10,000	-	12183
0.86D - V	4,500	-	6827
0.86D - 3.5L	1,800	12,000	5816
2D - 9L	1,250	-	4892
2D - 9R	1,250	-	5182
2D - 15L	1,000	-	1489
2D - 15R	1,000	-	1627
4D - 4R	-	12,500	11272
4D - 20R	300	-	1021
4D - 20L	300	-	967.2



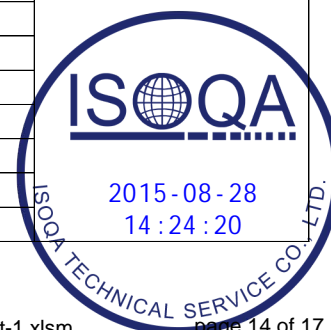
PHOTOMETRY AFTER INTERNAL HEAT TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	40841
H - V (30min)	40,000	75,000	40127
2U - V	1,500	-	46278
1U - 3L	5,000	-	31670
1U - 3R	5,000	-	30910
H - 3L	15,000	-	27167
H - 3R	15,000	-	26817
H - 6L	5,000	-	11672
H - 6R	5,000	-	11297
H - 9L	3,000	-	3927
H - 9R	3,000	-	4395
H - 12L	1,500	-	2189
H - 12R	1,500	-	2267
1.5D - V	5,000	-	26371
1.5D - 9L	2,000	-	3678
1.5D - 9R	2,000	-	3927
2.5D - V	2,500	-	17581
2.5D - 12L	1,000	-	1591
2.5D - 12R	1,000	-	1681
4D - V	-	12,000	11287

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	19678
1.5D - 2R (30min)	15,000	-	19110
10U to 90U	-	125	102.164
4U - 8L	64	-	432.9
4U - 8R	64	-	461.6
2U - 4L	135	-	1011
1.5U - 1R to 3R	200	-	991.126
1.5U - 1R to R	-	1,400	1283.127
1U - 1.5L to L	-	700	592.157
0.5U - 1.5L to	-	1,000	706.712
0.5U - 1R to 3R	500	2,700	(502.172) 2612.312
H - 4L	135	-	4952
H - 8L	64	-	3151
0.6D - 1.3R	10,000	-	16724
0.86D - V	4,500	-	15317
0.86D - 3.5L	1,800	12,000	11129
2D - 9L	1,250	-	3951
2D - 9R	1,250	-	4271
2D - 15L	1,000	-	1423
2D - 15R	1,000	-	2671
4D - 4R	-	12,500	11109
4D - 20R	300	-	1517
4D - 20L	300	-	1813



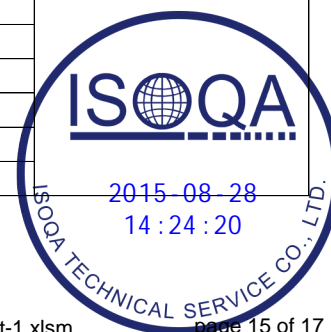
PHOTOMETRY AFTER HUMIDITY TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	41540
H - V (30min)	40,000	75,000	40770
2U - V	1,500	-	47210
1U - 3L	5,000	-	32940
1U - 3R	5,000	-	38130
H - 3L	15,000	-	28120
H - 3R	15,000	-	28210
H - 6L	5,000	-	11870
H - 6R	5,000	-	12672
H - 9L	3,000	-	4826
H - 9R	3,000	-	5217
H - 12L	1,500	-	1921
H - 12R	1,500	-	2627
1.5D - V	5,000	-	22740
1.5D - 9L	2,000	-	2446
1.5D - 9R	2,000	-	4273
2.5D - V	2,500	-	18470
2.5D - 12L	1,000	-	1689
2.5D - 12R	1,000	-	1767
4D - V	-	12,000	10150

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	19272
1.5D - 2R (30min)	15,000	-	19110
10U to 90U	-	125	112.183
4U - 8L	64	-	481.2
4U - 8R	64	-	512.3
2U - 4L	135	-	896
1.5U - 1R to 3R	200	-	1127.357
1.5U - 1R to R	-	1,400	1310.112
1U - 1.5L to L	-	700	597.357
0.5U - 1.5L to	-	1,000	887.371
0.5U - 1R to 3R	500	2,700	(526.724) 2517.281
H - 4L	135	-	5934
H - 8L	64	-	3273
0.6D - 1.3R	10,000	-	17211
0.86D - V	4,500	-	15827
0.86D - 3.5L	1,800	12,000	10240
2D - 9L	1,250	-	4271
2D - 9R	1,250	-	4573
2D - 15L	1,000	-	1673
2D - 15R	1,000	-	2812
4D - 4R	-	12,500	11272
4D - 20R	300	-	1867
4D - 20L	300	-	1274



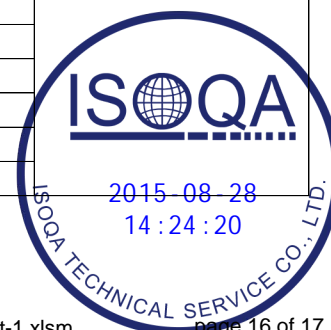
PHOTOMETRY AFTER DUST TEST

UB2 - Upper Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
H - V (1min)	40,000	75,000	41988
H - V (30min)	40,000	75,000	40970
2U - V	1,500	-	47150
1U - 3L	5,000	-	32910
1U - 3R	5,000	-	31320
H - 3L	15,000	-	28941
H - 3R	15,000	-	27810
H - 6L	5,000	-	11390
H - 6R	5,000	-	12510
H - 9L	3,000	-	3879
H - 9R	3,000	-	4517
H - 12L	1,500	-	2617
H - 12R	1,500	-	2629
1.5D - V	5,000	-	24924
1.5D - 9L	2,000	-	3819
1.5D - 9R	2,000	-	4021
2.5D - V	2,500	-	18610
2.5D - 12L	1,000	-	1621
2.5D - 12R	1,000	-	1710
4D - V	-	12,000	11810

LB2V - Lower Beam Photometric Test Point Values

Test Points	Minimum (cd)	Maximum (cd)	S1 (LH)
1.5D - 2R (1min)	15,000	-	21689
1.5D - 2R (30min)	15,000	-	20710
10U to 90U	-	125	91.164
4U - 8L	64	-	461.9
4U - 8R	64	-	499.6
2U - 4L	135	-	904
1.5U - 1R to 3R	200	-	1010.621
1.5U - 1R to R	-	1,400	1291.097
1U - 1.5L to L	-	700	632.798
0.5U - 1.5L to	-	1,000	913.436
0.5U - 1R to 3R	500	2,700	(512.599) 2195.603
H - 4L	135	-	6513
H - 8L	64	-	3214
0.6D - 1.3R	10,000	-	17789
0.86D - V	4,500	-	16912
0.86D - 3.5L	1,800	12,000	11610
2D - 9L	1,250	-	4211
2D - 9R	1,250	-	4713
2D - 15L	1,000	-	1581
2D - 15R	1,000	-	2951
4D - 4R	-	12,500	10991
4D - 20R	300	-	1950
4D - 20L	300	-	1001





Front View



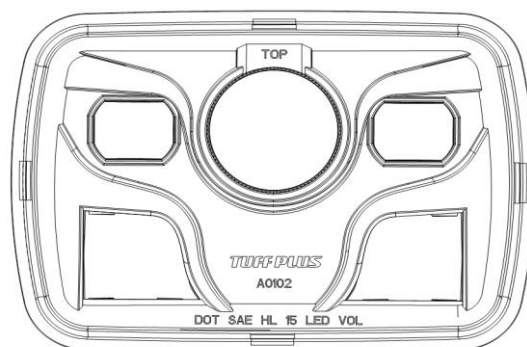
Side View



Top View



Rear View



TUFFPLUS A0102 DOT SAE HL 15 LED VOL
Marking on Lens

