



REPORT No.: PC23010391

THIS REPORT CONTAINS THE RESULTS OF COLOR TEST, VIBRATION TEST, MOISTURE TEST, DUST TEST, CORROSION TEST, WARPAGE TEST OF THE BELOW AUXILIARY HIGH BEAM LAMPS TO DEMONSTRATE COMPLIANCE WITH THE APPLICABLE REQUIREMENTS OF SAE J581

Test component : ST4-B : ST4 EVOLUTION

Manufacturer : Lazer Lamps Ltd
Units 1 & 2 Harlow Mill Business Centre
River Way,
Harlow
CM20 2FD

Test Laboratory : IDIADA,
L'Albornar - Santa Oliva (Tarragona) Spain

Report date : 26/01/2023

Applus **IDIADA** Group is officially accredited by **AMECA**
(Automotive Manufacturers Equipment Compliance Agency, Inc)

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Performed by



Joan Fonts Sala
TEST ENGINEER

Revised by:



Ramon Santafè Guiu
DEPARTMENT MANAGER

IDIADA PC23010391



SUMMARY

TEST (SAE J581 FEB2011)
Auxiliary High Beam Lamp

Physical Inspection.....	PASSED
Color Tests	PASSED
- White	
Vibration Test.....	PASSED
Moisture Test	PASSED
Dust Test.....	PASSED
Corrosion Test.....	PASSED
Warping Test.....	PASSED

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PHYSICAL INSPECTION

MARKINGS

Lens: : TRIPLE-R
ELITE

Housing : LED MODULE AND VOLTAGE IDENTIFICATION

LENS

Material reflector : Covestro Makrolon Polycarbonate 3107 Clear

Shape : Rectangular

Dimensions : 56 x 192 mm

Method of attachment (lens with housing) : Adhesive

HOUSING

Material : Aluminium

Shape : Rectangular

Dimensions : 64 x 204 x 68 mm

Method of mounting : 2 x M6 Screws through steel side brackets

LIGHT SOURCE

Light source category	LED
Quantity	4
Voltage	12V/24V

SAMPLE IDENTIFICATION : HTC-2212/00092



COLOR TEST

Test performed by: Joan Fonts
Date: 03/01/2023
Test method: Tristimulus method
Test distance: 3.16 m. (10.4 ft)

AUXILIARY HIGH BEAM LAMP

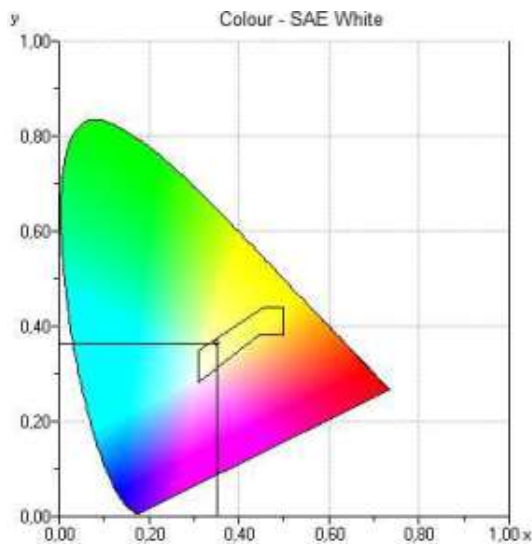
WHITE ZONE:

The color of light emitted must fall within the following boundaries:

- limit towards the blue: $x \geq 0.31$
- limit towards the yellow: $x \leq 0.50$
- limit towards the green: $y \leq 0.15 + 0.64x$
- limit towards the green: $y \leq 0.44$
- limit towards the purple: $y \geq 0.05 + 0.75x$
- limit towards the red: $y \geq 0.38$

Trichromatic co-ordinates	Sample A
x	0.352
y	0.362
z	0.286

The sample device has uniform spectral characteristics in all useful directions.



The samples tested FULFIL with the color test requirements.



PHYSICAL TESTS

Test performed by: Joan Fonts
Date: 02/01/2023 – 18/01/2023

VIBRATION TEST

The device completed the vibration test without evidence of material physical weakness, lens or reflector rotation, displacement or rupture of parts except bulb failures.

The sample tested FULFILS with the vibration test requirements.

MOISTURE TEST

At completion of test, the accumulation of moisture inside the device is less than 2cc and there is no visible moisture in the sealed reflex unit.

The sample tested FULFILS with the moisture test requirements.

DUST TEST

At completion of test, after external cleaning, the maximum candlepower readings of the device is not more than 10% less than the maximum photometric intensity of the same device after being cleaned both inside and outside.

	Comparison of maximum intensity (pre and post dust exposure)			
	Max. photometric intensity (<i>prior to dust test</i>)	Max. photometric intensity after external cleaning (<i>after the dust test</i>)	Change (%)	
Auxiliary High Beam Lamp	67032	66373	99.0%	CORRECT

The sample tested FULFILS with the dust test requirements.

CORROSION TEST

At completion of test, there is no evidence of corrosion which would affect the proper function of the device.

The sample tested FULFILS with the corrosion test requirements.

WARPAGE TEST

At completion of test, there is no evidence of warpage of the plastic components which would affect the proper function of the device.

The sample tested FULFILS with the warpage test requirements.

PLASTIC OPTICAL MATERIAL TEST

Outdoor exposure test (3 years in Florida and Arizona) and Heat test are skipped out of this report. Nevertheless, all lens materials and pigments (Covestro Makrolon Polycarbonate 3107 Clear) are listed in the last version of "AMECA List of Acceptable Plastics for optical lenses and reflex reflectors used on motor vehicles".^o

* THE PRESENTED RESULTS REFER ONLY TO THE TESTED SAMPLE

* THE PARTIAL REPRODUCTION OF THIS REPORT WITHOUT THE PERMISSION OF IDIADA IS COMPLETELY FORBIDDEN



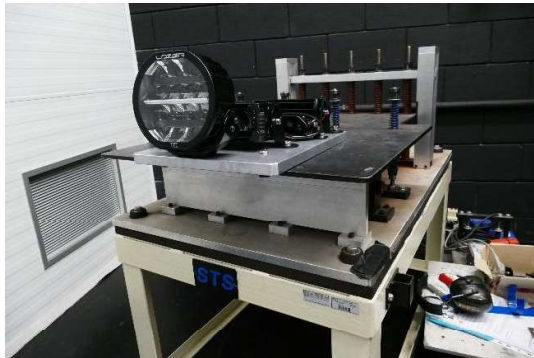
PHOTOGRAPHS



Sample after photometric test



Sample during warpage test



Sample after vibration test



Sample after corrosion test



Sample after dust test



Sample after moisture test

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TECHNICAL DOCUMENTATION

**ST4 EVOLUTION
SAE J581 / DOT APPROVAL DOC**



Triple-R Lights LLC
16192 Coastal Highway
Lewes Delaware
DE 19968

DATE: 05/05/2022
DOCUMENT VERSION: 1
TRADE NAME: TRIPLE-R LIGHTS LLC
DEVICE NAME: ST4 EVOLUTION
DEVICE PART NUMBER: ST4-B
TYPE: ST4-B : ST4 EVOLUTION

TESTED TO SAE J581 & DOT FMVSS108 COMPLIANT

REVISION TABLE

Revision #	Description	Date	Approved
N	First Draft	05/05/2022	BRS
1	Initial Release	22/11/2022	BRS

Manufacturers Office Address:

Lazer Lamps Ltd
Units 1 & 2 Harlow Mill Business Centre
River Way,
Harlow
CM20 2FD

Manufacture Address:

Lazer Lamps Ltd
Units 1 & 2 Harlow Mill Business Centre
River Way,
Harlow
CM20 2FD

Intended lens marking:
"SAE DOT H 22 HL LED"

Overview

The "ST4 EVOLUTION" is tested to SAE J581 as an auxiliary HIGH BEAM LAMP and is compliant with DOT FMVSS108 requirements. This document is intended to provide a detailed explanation for the device.

Device Technical Description

The Driving Light function is designed for both LH and RH traffic. The lamp is designed for fitment on the left or right-hand side of the vehicle. The headlamp does not contain an adjustable reflector. Alignment of the headlamp is controlled by adjustable mounts to the vehicle. The light source is LED. There are a total of four LEDs to create the High Beam Light function. The device is compatible with both 12V and 24V systems.

The lens is made from Covestro Makrolon (now re-named Exolon by the manufacturer) with UVHC3000K hard coat.

LED Module Technical Description

Input voltage is 12V / 24V. Total objective luminous flux for the LED module is 4,136 lumens.

The four LEDs used to meet SAE J581 are: Cree XPL-HD. drive current = 2.94 Amps
The LEDs are controlled by the LED driver "LED5000" as manufactured by "STMicroelectronics".

There is an analogue thermal control within the LED driver which monitors the temperature on the circuit board and adjusts the drive current through the LEDs when potentially damaging high temperatures are reached. This safety mechanism may engage in high ambient temperature environments and when the lamp has been switched on for around 30 minutes, without air flow.

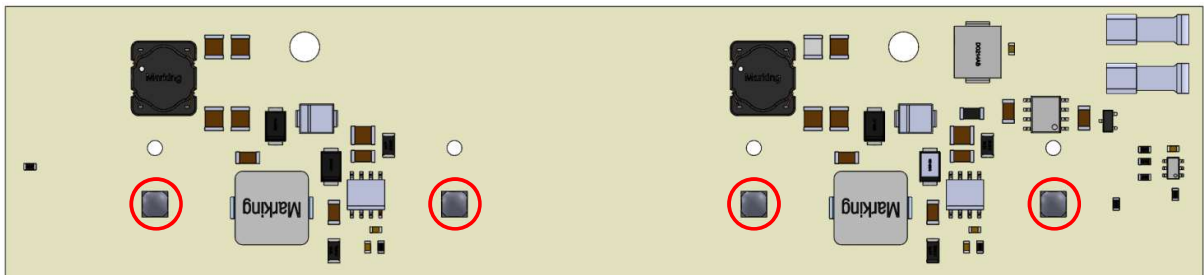


FIGURE 1 – Assembled Board layout

Triple-R Lights LLC
16192 Coastal Highway
Lewes Delaware
DE 19968

Conformity of Production

The manufacturing site is approved to ISO 9001, 2015, with specific conformity procedures having been established to monitor the Lazer product quality and ensure that conformity requirements are achieved.

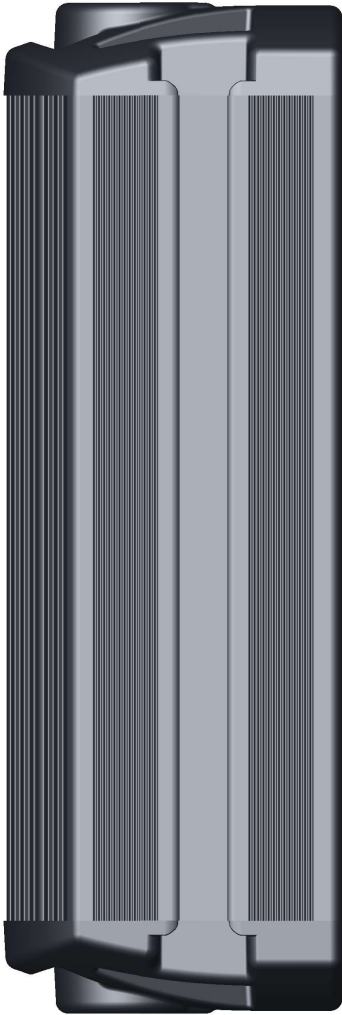
A dedicated dark room with 10m light measurement area and light measurement equipment has been established in order to monitor Driving beam performance. Lazer uses the candela readings to confirm that production lamps remain within Conformity of Production requirements.

The manufacturing site was successfully audited by the Spanish Ministry in May 2020.

SIGNED: Ben Russell-Smith
Director – Lazer Lamps Ltd

IDIADA PC23010391

CN	REV	CREATED	APP	DATE	DETAILS



LENS BRANDING MAY VARY



CENTRE OF REFERENCE



LOCATION OF LED
MODULE AND VOLTAGE
IDENTIFICATION

ST4 EVOLUTION LAMP SPECIFICATION

1. OPERATING VOLTAGE 12V/24V (WORKING RANGE 10V-32V)
2. POWER CONSUMPTION = 47W
3. LENS MATERIAL: COVESTRO MAKROLON WITH UVHC3000K HARD COAT
4. WEIGHT = 0.69 KG
5. DUST AND WATER RESISTANT TO IP68
6. TEMPERATURE OPERATING RANGE = -40°C TO +80°C
7. DRIVING BEAM LED'S: 4 X CREE XPL-HD, MAX 9.2W

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	INSP CHK BY	DATE	WEIGHT		
GENERAL NOTES: 1. IF IN DOUBT - ASK ALL DIMENSIONS IN MM 2. ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED 3. BREAK ALL SHARP EDGES 0.2mm 5. ALL MOULDED PARTS TO BE FREE FROM MOULD FLASH	QC CHK BY	DATE	FINISH	CLEAN	DESCRIPTION ST4 EVOLUTION (US)
	ENG CHK BY	DATE	MATERIAL		
TOLERANCES- UNLESS STATED OTHERWISE: 1. ANGLES - X.X = ±1.0° X.XX = ±0.5° X.XXX ±0.1° 2. DECIMALS - X.X = ±0.4 X.XX = ±0.2 X.XXX ±0.05 3. ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED 4. ALL HOLES $\frac{H}{T}$ 3/2 5. MACHINED SURFACES $\frac{3}{2}$	APVD BY	DATE			PART NUMBER ST4-B
					REV
					SIZE A3
					SCALE 1:1
					SHEET 1 OF 1