



INDUSTRIAL TESTING LABORATORY

Report Number: 211026-02D

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TEST REPORT

Report Date: 20 December 2021

Test Component: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (WW3)
with additional 6X1 Directional Module Options (SAE W)
with One (1) Flash Pattern (Single Pulse 2.1Hz/38% D.C.)

Submitted by: ENGESIG INDÚSTRIA E COMÉRCIO LTDA
SÃO FRANCISCO - MOGI DAS CRUZES, SP. - CEP: 08735-285

Test Laboratory: Calcoast - ITL
San Leandro, CA 94577

Samples Tested: One (1) 43" Lightbar (Environmental/Mechanical Tests)
Three (3) 22" Endcaps (Photometry/Colorimetry Tests)
submitted 26 October 2021

SUMMARY

Specifications: SAE J595 AUG2021 and J845 AUG2021

Photometric Test -

SAE J845 AUG2021 Class 1 [SAE WS3-1(180)]

One (1) Red Endcap - Hemispherical Coverage 180°Passed
Intensity @ HV >500 Cd & Optical Power @ HV >12,000 Cd-Sec/Min

SAE J595 AUG2021 Class 1 (SAE W-1)

Red Endcap - Side & Diagonal DirectionsPassed
6X1 White, Amber, Red & Blue Modules - Front/Rear DirectionsPassed

Flash Characteristics -

SAE J595 & J845Passed

Environmental (Flash Rate) Tests - SAE J595 & J845.....Passed

Mechanical Tests - SAE J575 AUG18

(4.2 Vibration, 4.5 Warpage, 4.9 H₂O, 4.11 Dust, 4.12 NaCl)⁺Passed

Color Test - SAE J578 AUG2021.....Passed

Lens Material - SAE J576 AUG17 ⁺Unknown

Signature of Responsible Laboratory Official:

A handwritten signature in blue ink that reads "Mark A. Evans".

Mark A. Evans

Laboratory Director

DESCRIPTION SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

43" lightbar contained two (2) endcaps each with nine (9) 4X1 modules.
21.5" lightbar endcaps contained additional 6X1 modules.
The lightbars had one (1) mode - FP1 single pulse all modules simultaneous.

LAMP DESCRIPTION**MARKINGS:**

Top Cover:	None
Bottom Cover:	None
Module Lens:	"Diamond", "Diamond"
Reflector:	N/A
Housing/Base:	None

DESCRIPTION:**OUTER LENSES:**

Material:	Unknown PC, Clear or Red <i>Lens material formulation, pigment, and coating must comply with SAE J576 AUG17.</i>
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Method of Mounting:	Screwed to extruded aluminum base
Gasket:	Silicone

MODULE LENS:

Material:	Unknown Plastic, Clear <i>Lens material formulation, pigment, and coating must comply with SAE J576 AUG17.</i>
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Method of Mounting:	Unknown
Gasket:	None

HOUSING:

Material:	Extruded Aluminum
Method of Mounting:	Feet or Bolt mount to vehicle
Gasket:	None Submitted

LIGHT SOURCE:

Type:	LED
Quantity:	4/6 per module
Color:	4X1 Red, 6X1 White, Amber, Red or Blue
Voltage:	12V
Current:	0.67Apeak (4X1 Red) 0.81Apeak (6X1 Red) 0.85Apeak (6X1 White) 1.00Apeak (6X1 Amber) 1.07Apeak (6X1 Blue)

Material description provided by the manufacturer.

PHOTOMETRIC SUMMARY SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

PHOTOMETRIC TESTS

Specification(s): SAE J595 AUG2021 and J845 AUG2021

Tests performed by: MAE

Date: 28-29 October 2021

Meets requirements for:

SAE J845 AUG2021 Class 1 [SAE WS3-1(180)]

One (1) Red Endcap - Hemispherical Coverage 180°

SAE J595 AUG2021 Class 1 (SAE W-1)

4X1 Red - Front/Rear, Side & Diagonal Directions

6X1 White, Amber, Red & Blue Modules - Front/Rear Directions

Red Peak Intensity @ HV >500 Cd & Optical Power @ HV >12,000 Cd-Sec/Min

NIST Reference Detector: P181-2

Test distance: 100 feet

Device operated at 12.80V until 3% stabilization (SAE J595/J845 methodology).

Devices were tested in FP1 simultaneous 1-pulse mode for SAE compliance using one (1) front module as a SAE J595 single source or one (1) endcap as a SAE J845 single source. All other modules were masked off.

The sample was tested for SAE J595 in front, 45° forward diagonal, side, 45° rearward diagonal and rear directions.

The sample was tested for SAE J845 for 180° hemispherical coverage in front to rear directions.

**Lamp Operation (Simultaneous Flash)**

The modules are designed to have the equivalent peak current and peak luminous intensity (Candela) in each simultaneous flash pattern at start up. The peak intensity degradation is dependent on the relative power of the flash pattern mode (the greater the power the greater the degradation). Peak luminous intensity was determined with the lamps in FP1 1-Pulse flash pattern. These results were then compared to requirements for SAE Class determination. The Optical Power (Cd-sec/min) differs for each of the flash patterns and is proportional to the time degradation, flash pattern frequency and total activation time (sum of the pulses).

FP#	Description	f (Hz)	Active (Sec)	Duty Cycle	O.P. Rank [†]
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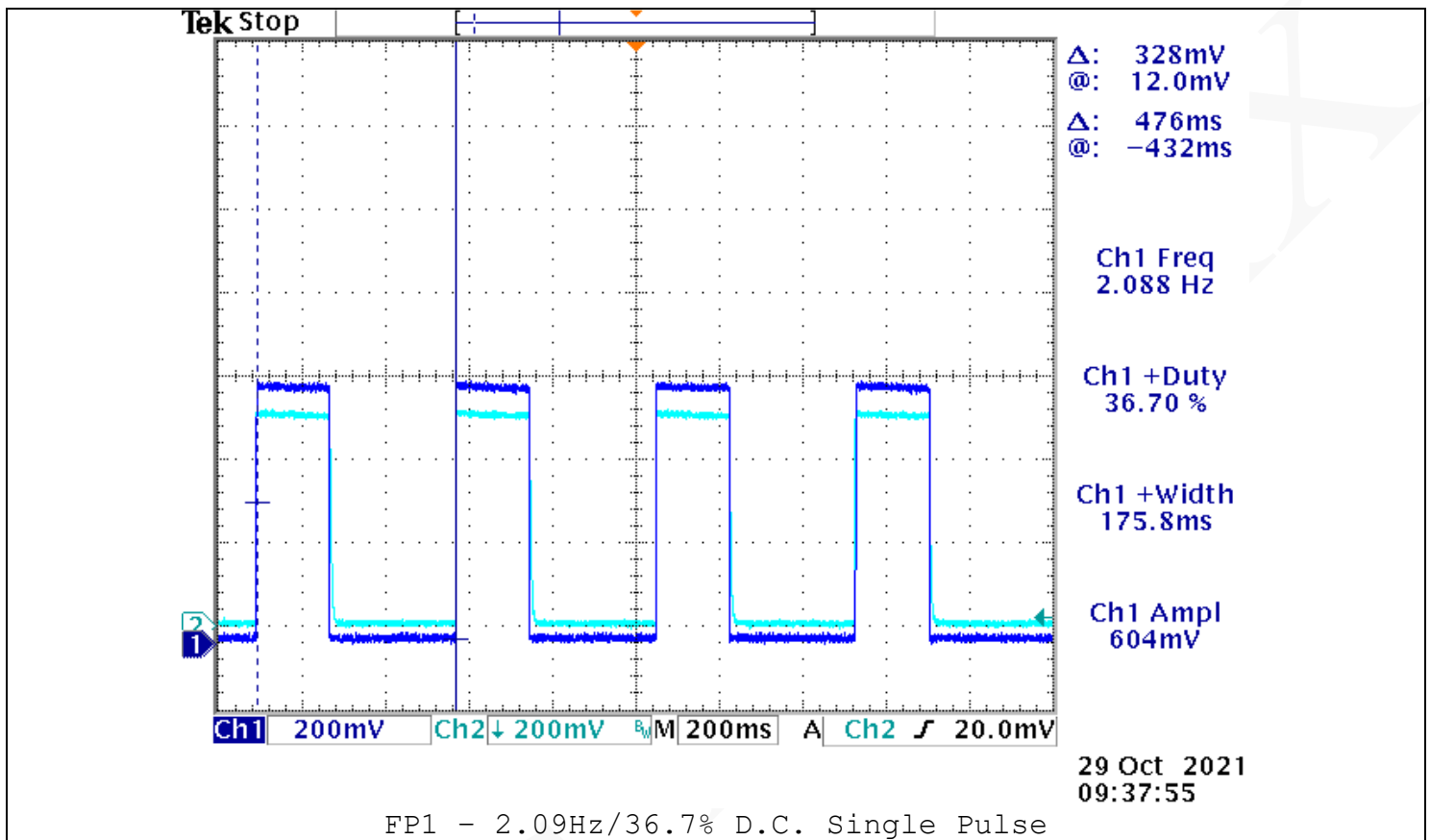
1	Single	2.08	0.178	36.9%	1.000
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Sirius D-MAX

FLASH PATTERN DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 21.5" Lightbar

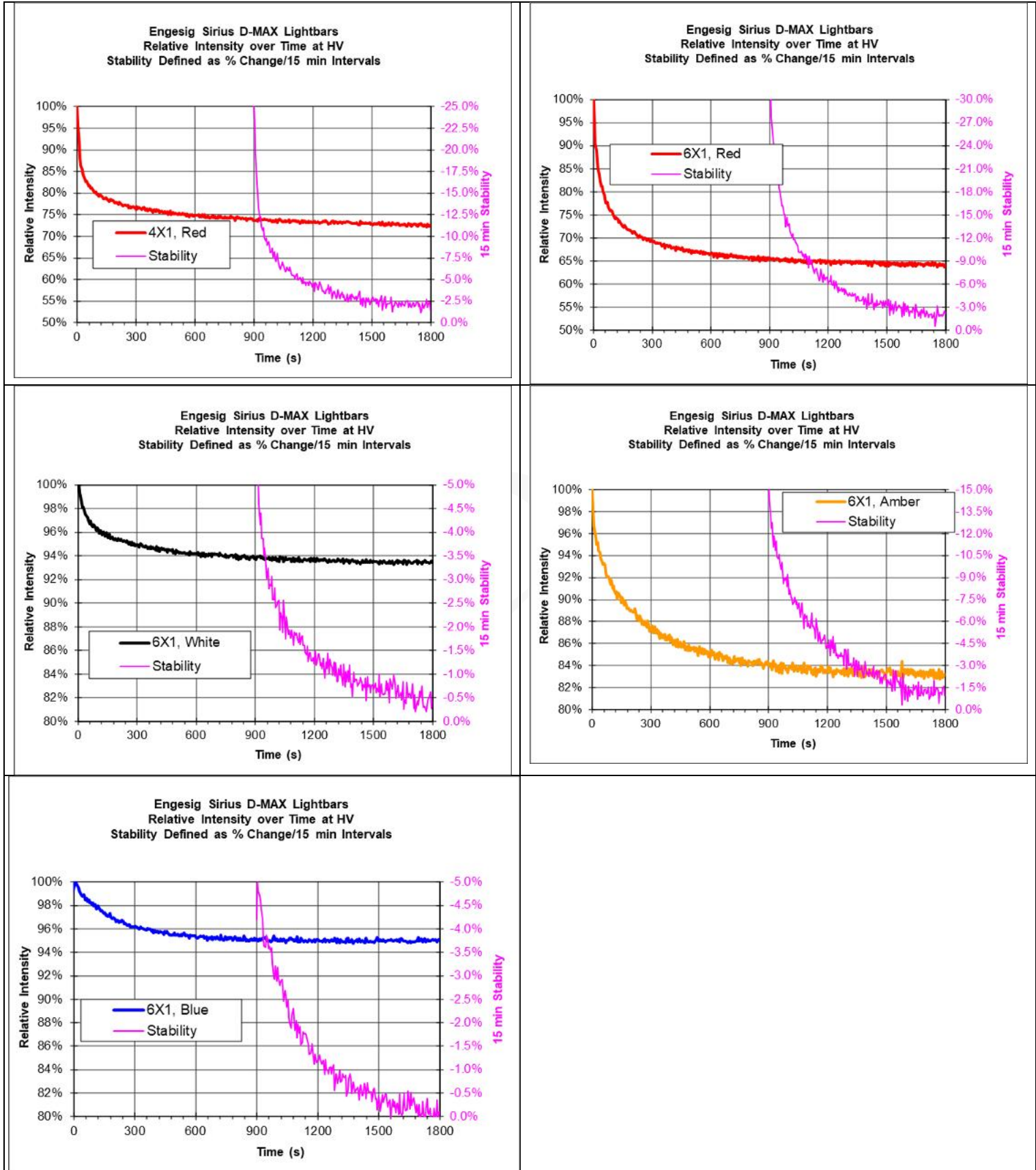


Required
SAE J595 & SAE J845
Flash rate = 1-4 Hz
Period = 250 - 1000ms
On-Time = N/A
Off-Time ≥ 160ms
Pulse Separations ≤ 100ms

TIMELOG DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Timelog:



Reached 3% stabilization prior to testing.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 4X1 Red Front Module, 0° Direction

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Red)

4X1 Red		Orientation:	Front/Rear	Power:	High
Color:	Red		Flash Mode:	FP1 Single	
Frequency:	2.08		On Time:	0.178 s	
	J595 (Class 1)				
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	270.8	48.2	6009	20	480
10U/V	288.1	51.2	6392	50	1200
10U/5R	277.1	49.3	6149	20	480
5U/20L	165.2	29.4	3665	20	480
5U/10L	439.0	78.1	9741	50	1200
5U/5L	596.7	106.1	13241	100	2400
5U/V	603.6	107.3	13394	150	3600
5U/5R	554.2	98.5	12298	100	2400
5U/10R	459.6	81.7	10197	50	1200
5U/20R	206.0	36.6	4571	20	480
H/20L	198.1	35.2	4395	30	720
H/10L	647.5	115.1	14367	75	1800
H/5L	858.7	152.7	19054	200	4800
H/V	838.1	149.0	18598	300	7200
H/5R	769.6	136.8	17076	200	4800
H/10R	625.5	111.2	13880	75	1800
H/20R	242.0	43.0	5369	30	720
5D/20L	192.5	34.2	4271	20	480
5D/10L	648.9	115.4	14398	50	1200
5D/5L	878.0	156.1	19481	100	2400
5D/V	834.0	148.3	18507	150	3600
5D/5R	683.1	121.5	15158	100	2400
5D/10R	547.4	97.3	12146	50	1200
5D/20R	225.3	40.1	4998	20	480
10D/5L	548.7	97.6	12175	20	480
10D/V	541.8	96.3	12023	50	1200
10D/5R	419.7	74.6	9314	20	480
Zone 1	1643.5	292.2	36469	170	4080
2	835.9	148.6	18549	90	2160
3	2122.2	377.3	47090	275	6600
4	3904.1	694.2	86630	1000	24000
5	1862.9	331.2	41336	275	6600
6	1510.3	268.5	33514	90	2160
7	1680.1	298.7	37282	170	4080

Meets requirements for SAE J595 Class 1 red.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: Nine (9) 4X1 Red Passenger Endcap, 45° Direction (Diagonal)

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Red)

4X1 Red		Orientation:	45° Diag	Power:	High
Color:	Red		Flash Mode:	FP1 Single	
Frequency:	2.08		On Time:	0.178 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	330.4	58.7	7331	20	480
10U/V	377.4	67.1	8374	50	1200
10U/5R	399.2	71.0	8857	20	480
5U/20L	386.4	68.7	8575	20	480
5U/10L	384.6	68.4	8535	50	1200
5U/5L	508.0	90.3	11272	100	2400
5U/V	546.1	97.1	12118	150	3600
5U/5R	576.9	102.6	12802	100	2400
5U/10R	598.7	106.5	13285	50	1200
5U/20R	518.9	92.3	11514	20	480
H/20L	415.5	73.9	9219	30	720
H/10L	431.8	76.8	9581	75	1800
H/5L	589.7	104.8	13084	200	4800
H/V	676.7	120.3	15016	300	7200
H/5R	743.9	132.3	16506	200	4800
H/10R	723.9	128.7	16063	75	1800
H/20R	573.3	101.9	12722	30	720
5D/20L	382.8	68.1	8494	20	480
5D/10L	395.5	70.3	8776	50	1200
5D/5L	497.1	88.4	11031	100	2400
5D/V	616.9	109.7	13688	150	3600
5D/5R	694.9	123.6	15419	100	2400
5D/10R	680.4	121.0	15097	50	1200
5D/20R	513.4	91.3	11393	20	480
10D/5L	318.4	56.6	7065	20	480
10D/V	406.4	72.3	9018	50	1200
10D/5R	473.5	84.2	10507	20	480
Zone 1	1964.8	349.4	43599	170	4080
2	1106.9	196.8	24562	90	2160
3	1436.9	255.5	31884	275	6600
4	3173.2	564.2	70411	1000	24000
5	1995.7	354.8	44284	275	6600
6	1198.3	213.1	26590	90	2160
7	2884.7	512.9	64010	170	4080

Meets requirements for SAE J595 Class 1 red.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: Nine (9) 4X1 Red Passenger Endcap, 90° Direction (Side)

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Red)

4X1 Red		Orientation:	90° Side	Power:	High
Color:	Red		Flash Mode:	FP1 Single	
Frequency:	2.08		On Time:	0.178 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	355.2	63.2	7882	20	480
10U/V	349.8	62.2	7761	50	1200
10U/5R	326.4	58.0	7242	20	480
5U/20L	448.1	79.7	9944	20	480
5U/10L	595.1	105.8	13205	50	1200
5U/5L	627.7	111.6	13929	100	2400
5U/V	566.1	100.7	12561	150	3600
5U/5R	533.4	94.8	11836	100	2400
5U/10R	448.1	79.7	9944	50	1200
5U/20R	399.2	71.0	8857	20	480
H/20L	488.0	86.8	10829	30	720
H/10L	818.2	145.5	18156	75	1800
H/5L	867.2	154.2	19243	200	4800
H/V	747.5	132.9	16586	300	7200
H/5R	631.4	112.3	14010	200	4800
H/10R	522.5	92.9	11594	75	1800
H/20R	444.5	79.0	9863	30	720
5D/20L	462.7	82.3	10266	20	480
5D/10L	834.6	148.4	18519	50	1200
5D/5L	889.0	158.1	19726	100	2400
5D/V	738.4	131.3	16385	150	3600
5D/5R	584.2	103.9	12963	100	2400
5D/10R	469.9	83.6	10427	50	1200
5D/20R	422.7	75.2	9380	20	480
10D/5L	586.0	104.2	13003	20	480
10D/V	515.2	91.6	11433	50	1200
10D/5R	395.5	70.3	8776	20	480
Zone 1	2828.5	502.9	62762	170	4080
2	1031.4	183.4	22887	90	2160
3	2335.0	415.2	51812	275	6600
4	3550.6	631.3	78785	1000	24000
5	1640.1	291.6	36393	275	6600
6	1496.8	266.1	33213	90	2160
7	2184.4	388.4	48471	170	4080

Meets requirements for SAE J595 Class 1 red.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: Nine (9) 4X1 Red Passenger Endcap, 135° Direction (Diagonal)

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Red)

4X1 Red		Orientation:	135° Diag	Power:	High
Color:	Red		Flash Mode:	FP1 Single	
Frequency:	2.08		On Time:	0.178 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	440.9	78.4	9783	20	480
10U/V	402.8	71.6	8937	50	1200
10U/5R	310.1	55.1	6880	20	480
5U/20L	451.7	80.3	10024	20	480
5U/10L	602.4	107.1	13366	50	1200
5U/5L	671.3	119.4	14895	100	2400
5U/V	658.6	117.1	14614	150	3600
5U/5R	508.0	90.3	11272	100	2400
5U/10R	373.7	66.5	8293	50	1200
5U/20R	419.1	74.5	9300	20	480
H/20L	533.4	94.8	11836	30	720
H/10L	754.7	134.2	16747	75	1800
H/5L	832.7	148.1	18478	200	4800
H/V	814.6	144.8	18076	300	7200
H/5R	602.4	107.1	13366	200	4800
H/10R	430.0	76.5	9541	75	1800
H/20R	446.3	79.4	9903	30	720
5D/20L	482.6	85.8	10709	20	480
5D/10L	649.5	115.5	14412	50	1200
5D/5L	714.8	127.1	15862	100	2400
5D/V	664.0	118.1	14734	150	3600
5D/5R	504.4	89.7	11192	100	2400
5D/10R	388.2	69.0	8615	50	1200
5D/20R	402.8	71.6	8937	20	480
10D/5L	426.4	75.8	9461	20	480
10D/V	386.4	68.7	8575	50	1200
10D/5R	326.9	58.1	7255	20	480
Zone 1	2719.6	483.6	60347	170	4080
2	1153.7	205.1	25600	90	2160
3	2140.9	380.7	47505	275	6600
4	3572.3	635.2	79268	1000	24000
5	1442.4	256.5	32005	275	6600
6	1139.8	202.7	25291	90	2160
7	2030.2	361.0	45049	170	4080

Meets requirements for SAE J595 Class 1 red.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 6X1 White Front Module, 0° Direction

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - White)

6X1 White		Orientation:	Front/Rear	Power:	High
Color:	White		Flash Mode:	FP1 Single	
Frequency:	2.07		On Time:	0.177 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	1403.6	248.3	30838	80	1920
10U/V	1679.3	297.1	36896	200	4800
10U/5R	1566.3	277.1	34412	80	1920
5U/20L	774.8	137.1	17024	80	1920
5U/10L	1709.7	302.4	37563	200	4800
5U/5L	1973.0	349.0	43348	400	9600
5U/V	2335.6	413.2	51316	600	14400
5U/5R	2290.1	405.1	50316	400	9600
5U/10R	1603.5	283.7	35231	200	4800
5U/20R	463.3	82.0	10178	80	1920
H/20L	803.8	142.2	17661	120	2880
H/10L	1842.0	325.9	40471	300	7200
H/5L	2145.3	379.5	47135	800	19200
H/V	2451.4	433.7	53861	1200	28800
H/5R	2313.6	409.3	50831	800	19200
H/10R	1631.1	288.5	35837	300	7200
H/20R	463.3	82.0	10178	120	2880
5D/20L	663.2	117.3	14571	80	1920
5D/10L	1362.2	241.0	29930	200	4800
5D/5L	1562.1	276.3	34321	400	9600
5D/V	1746.9	309.0	38380	600	14400
5D/5R	1598.0	282.7	35109	400	9600
5D/10R	1069.9	189.3	23507	200	4800
5D/20R	406.7	72.0	8936	80	1920
10D/5L	765.2	135.4	16813	80	1920
10D/V	816.2	144.4	17933	200	4800
10D/5R	741.8	131.2	16298	80	1920
Zone 1	5313.7	940.0	116748	680	16320
2	4649.2	822.4	102147	360	8640
3	5377.2	951.2	118142	1100	26400
4	10992.8	1944.6	241523	4000	96000
5	5519.2	976.3	121261	1100	26400
6	2323.2	411.0	51044	360	8640
7	4006.7	708.8	88030	680	16320

Meets requirements for SAE J595 Class 1 white.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 6X1 Amber Front Module, 0° Direction

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Amber)

6X1 Amber		Orientation:	Front/Rear	Power:	High
Color:	Amber		Flash Mode:	FP1 Single	
Frequency:	2.07		On Time:	0.177 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	795.5	140.7	17479	40	960
10U/V	790.1	139.8	17358	100	2400
10U/5R	765.2	135.4	16813	40	960
5U/20L	482.6	85.4	10603	40	960
5U/10L	1147.1	202.9	25204	100	2400
5U/5L	1315.3	232.7	28899	200	4800
5U/V	1165.1	206.1	25598	300	7200
5U/5R	1092.0	193.2	23992	200	4800
5U/10R	916.9	162.2	20145	100	2400
5U/20R	444.0	78.5	9755	40	960
H/20L	550.1	97.3	12087	60	1440
H/10L	1497.3	264.9	32898	150	3600
H/5L	1467.0	259.5	32231	400	9600
H/V	1203.7	212.9	26446	600	14400
H/5R	1148.5	203.2	25234	400	9600
H/10R	1041.0	184.2	22871	150	3600
H/20R	497.7	88.1	10936	60	1440
5D/20L	577.7	102.2	12693	40	960
5D/10L	1553.9	274.9	34140	100	2400
5D/5L	1563.5	276.6	34352	200	4800
5D/V	1387.1	245.4	30475	300	7200
5D/5R	1256.1	222.2	27597	200	4800
5D/10R	1009.3	178.5	22175	100	2400
5D/20R	485.3	85.9	10663	40	960
10D/5L	1336.0	236.3	29353	40	960
10D/V	1245.0	220.2	27354	100	2400
10D/5R	1041.0	184.2	22871	40	960
Zone 1	4311.4	762.7	94725	340	8160
2	2350.8	415.9	51649	180	4320
3	4376.2	774.2	96149	550	13200
4	6371.2	1127.1	139982	2000	48000
5	3389.0	599.5	74459	550	13200
6	3622.0	640.7	79579	180	4320
7	3353.1	593.2	73672	340	8160

Meets requirements for SAE J595 Class 1 amber.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 6X1 Red Front Module, 0° Direction

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Red)

6X1 Red		Orientation:	Front/Rear	Power:	High
Color:	Red		Flash Mode:	FP1 Single	
Frequency:	2.08		On Time:	0.176 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	459.3	81.0	10105	20	480
10U/V	556.2	98.1	12238	50	1200
10U/5R	567.2	100.0	12480	20	480
5U/20L	244.8	43.2	5386	20	480
5U/10L	528.8	93.2	11635	50	1200
5U/5L	735.6	129.7	16184	100	2400
5U/V	902.0	159.0	19847	150	3600
5U/5R	1013.7	178.7	22303	100	2400
5U/10R	779.5	137.4	17150	50	1200
5U/20R	243.7	43.0	5363	20	480
H/20L	280.7	49.5	6175	30	720
H/10L	680.7	120.0	14976	75	1800
H/5L	872.8	153.9	19203	200	4800
H/V	1028.3	181.3	22625	300	7200
H/5R	1125.3	198.4	24759	200	4800
H/10R	883.8	155.8	19445	75	1800
H/20R	265.1	46.7	5833	30	720
5D/20L	272.3	48.0	5990	20	480
5D/10L	598.3	105.5	13164	50	1200
5D/5L	757.5	133.6	16667	100	2400
5D/V	898.4	158.4	19767	150	3600
5D/5R	927.7	163.6	20411	100	2400
5D/10R	708.1	124.8	15580	50	1200
5D/20R	250.9	44.2	5520	20	480
10D/5L	479.4	84.5	10548	20	480
10D/V	503.2	88.7	11071	50	1200
10D/5R	494.0	87.1	10870	20	480
Zone 1	1924.8	339.4	42351	170	4080
2	1582.7	279.0	34823	90	2160
3	2173.7	383.2	47827	275	6600
4	4826.8	851.0	106201	1000	24000
5	2825.1	498.1	62158	275	6600
6	1476.6	260.3	32488	90	2160
7	2247.2	396.2	49445	170	4080

Meets requirements for SAE J595 Class 1 red.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: 6X1 Blue Front Module, 0° Direction

Specification: SAE J595 AUG2021 (Directional LED Warning Lamp - Blue)

6X1 Blue		Orientation:	Front/Rear	Power:	High
Color:	Blue		Flash Mode:	FP1 Single	
Frequency:	2.07		On Time:	0.177 s	
				J595 (Class 1)	
	Cd	Cd-Sec	Cd-Sec/Min	Cd	Cd-Sec/Min
10U/5L	561.2	99.3	12329	20	480
10U/V	521.2	92.2	11451	50	1200
10U/5R	433.0	76.6	9512	20	480
5U/20L	204.7	36.2	4499	20	480
5U/10L	677.0	119.8	14874	50	1200
5U/5L	792.8	140.2	17418	100	2400
5U/V	717.0	126.8	15752	150	3600
5U/5R	620.5	109.8	13632	100	2400
5U/10R	477.0	84.4	10481	50	1200
5U/20R	210.8	37.3	4631	20	480
H/20L	207.5	36.7	4559	30	720
H/10L	751.4	132.9	16510	75	1800
H/5L	904.5	160.0	19872	200	4800
H/V	728.0	128.8	15994	300	7200
H/5R	645.3	114.2	14177	200	4800
H/10R	482.6	85.4	10603	75	1800
H/20R	199.9	35.4	4393	30	720
5D/20L	175.8	31.1	3863	20	480
5D/10L	552.9	97.8	12147	50	1200
5D/5L	685.2	121.2	15056	100	2400
5D/V	605.3	107.1	13298	150	3600
5D/5R	492.2	87.1	10814	100	2400
5D/10R	336.4	59.5	7391	50	1200
5D/20R	163.9	29.0	3602	20	480
10D/5L	322.6	57.1	7088	20	480
10D/V	292.3	51.7	6422	50	1200
10D/5R	241.4	42.7	5305	20	480
Zone 1	1817.9	321.6	39941	170	4080
2	1515.3	268.1	33292	90	2160
3	2229.5	394.4	48983	275	6600
4	3599.9	636.8	79094	1000	24000
5	1595.3	282.2	35049	275	6600
6	856.4	151.5	18815	90	2160
7	1388.1	245.6	30499	170	4080

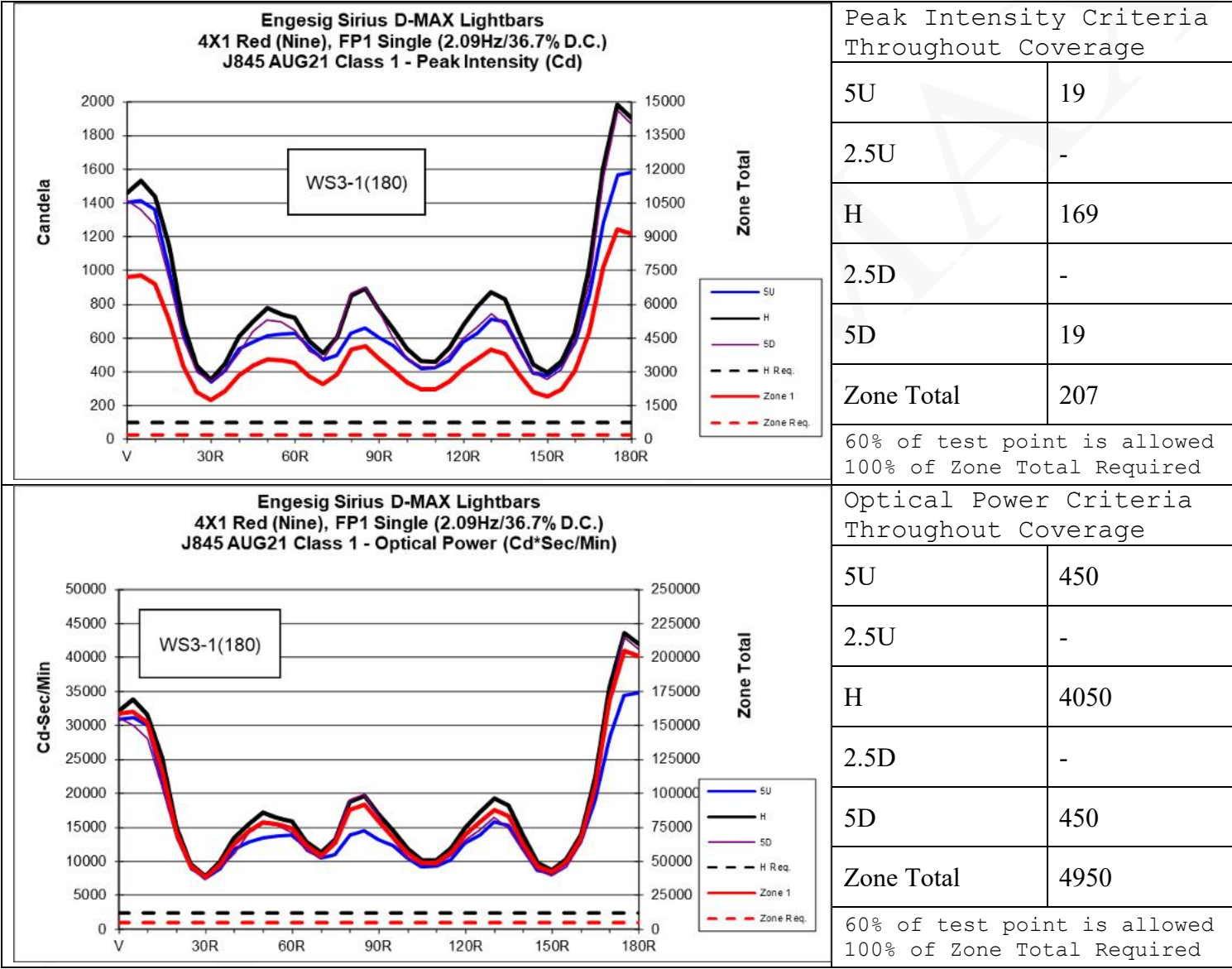
Meets requirements for SAE J595 Class 1 blue.

PHOTOMETRIC TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

Sample Number: Nine (9) 4X1 Red Passenger Endcap, 0° is front / 180° is rear

Specification: SAE J845 AUG2021 (Hemispherical Coverage - Front to Rear)
Color: Red, Class 1



Meets SAE J845 Class 1 Red test requirements at all points.

Supplied Voltage: 12.80V after 30 min stabilization warmup per SAE J845

Aim: Lightbar mounted level and scanned through the passenger side coverage.

ENVIRONMENTAL (FLASH RATE) DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

ADDITIONAL TESTS (SAE J595 and J845)

Tests performed by: MAE

Date: 09 November - 11 December 2021

High Temperature Flash Rate Passed
At a temperature of 50°C for six hours.
One hour "off" - Five hours "on"

Sample	43" Lightbar
0 hour	2.08 Hz
1 hour	2.09 Hz
6 hours	2.08 Hz
SAE Required 1 - 4 Hz, $\Delta f \leq 20\%$	

Low Temperature Flash Rate Passed
At a temperature of -30°C for six
hours. Five hours "off" - One hour
"on"

Sample	43" Lightbar
0 hour	2.08 Hz
5 hours	2.01 Hz
6 hours	2.03 Hz
Start Time	0 sec
SAE Required 1 - 4 Hz, $\Delta f \leq 20\%$	
Start Time ≤ 5 Sec	

Durability Passed
At an ambient temperature of 23°C for two
hundred hours. Cycled at 50 minutes "on"
ten minutes "off"

Sample	43" Lightbar
0 hour	2.07 Hz
100 hours	2.07 Hz
200 hours	2.07 Hz
SAE Required 1 - 4 Hz, $\Delta f \leq 20\%$	

Devices meet all flash rate test requirements.

MECHANICAL TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

MECHANICAL TESTS (SAE J575 APR2021)

Tests performed by: MAE/DGC

Date: 28 October - 12 December 2021

4.2 Vibration Test (J577 6hr Random): Passed
Test Sample: 43" Full Lightbar

Sample vibrated on electrodynamic vibration machine for 6 hours using the SAE J575 Figure 2 - G-load PSD profile for passenger cars and light trucks.

There was no observed rotation, displacement, cracking, or rupture of parts of the device which would result in failure of any other tests contained in this document.

There was no looseness of parts as evidenced by rattling heard when the part assembly is shaken.

There was no cracking or rupture of parts of the device affecting its mounting.



Some powder observed from rubbing components.

Device was tested to confirm continued photometric compliance.

4.5 Lens Warpage Test: Passed
Test Sample: All Photometry Samples

Light sources were operated at design voltage in a flashing mode while in the highest wattage flash pattern for one hour.

There was no observed warpage of plastic components that would cause the device to fail any other requirements.

4.9 Moisture Test: Passed
Test Sample: 43" Full Lightbar

Sample subjected to a solid cone of precipitation of 0.1 in/min at a delivery angle of 45° while rotating about their vertical axis at a rate of 4 rpm for 12 hours. After a 1 hour drain period, samples were examined for moisture accumulation.

There was 0cc of water collected at the end of the test.
(≤ 2cc Required)

MECHANICAL TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

MECHANICAL TESTS (SAE J575 APR2021)

Tests performed by: MAE/DGC

Date: 28 October - 12 December 2021

4.11 Dust Test: Passed
Test Sample: 43" Full Lightbar

Sample mounted in dust chamber and subjected to Portland Cement powder agitated by a 2 second period projected blast of compressed air every 15 minutes for 5 hours. Exterior surface of samples then cleaned.

No visible dust penetration.

4.12 Corrosion Test (240 hrs): Passed
Test Sample: 43" Full Lightbar

Sample subjected to a 5% NaCl fog solution per ASTM B117 consisting of 10 periods of 23 hours exposure followed by 1 hour drying time.

There was no observed corrosion which would cause the device to fail any other requirements.
Minor corrosion at mounting bolts.

Devices meet all mechanical test requirements.

TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

COLOR TEST: SAE J578 APR2020 (Modified White)
Spectroradiometric method using Photo Research PR650
Test Performed By: MAE
Test Distance: 15ft
Voltage: 12.80V
Location: HV
Mode: FP1 - Single Flash

Color	Measured (x, y)	Required	Chart
White	6X1 Module t = 0min (0.3291, 0.3515) t = 30min (0.3259, 0.3502)	$0.30 \leq x \leq 0.50$ $0.38 \leq y \leq 0.44$ $y \geq 0.75x + 0.05$ $y \leq 0.64x + 0.15$	SAE J578 White & W.L. White The chart displays the CIE color space for white light. The x-axis ranges from 0.28 to 0.52, and the y-axis ranges from 0.25 to 0.45. A solid magenta line represents the White Boundary, and a dashed magenta line represents the W.L. White Boundary. A small square symbol indicates the 6X1 White data point, which falls within the defined boundaries.
Yellow (Amber)	6X1 Module t = 0min (0.5698, 0.4257) t = 30min (0.5670, 0.4261)	$y \geq 0.39$ $y \geq 0.79 - 0.67x$ $y \leq x - 0.12$	SAE J578 Yellow The chart displays the CIE color space for yellow light. The x-axis ranges from 0.54 to 0.62, and the y-axis ranges from 0.38 to 0.45. A solid blue line represents the CIE Locus, and a solid magenta line represents the Yellow Boundary. Two diamond symbols indicate the 6X1 Amber data points, which fall within the defined boundaries.

White - The color of the light emitted through the lens falls within the acceptable limits for white.

Yellow - The color of the light emitted through the lens falls within the acceptable limits for yellow (amber).

TEST DATA SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)

COLOR TEST: SAE J578 APR2020

Spectroradiometric method using Photo Research PR650

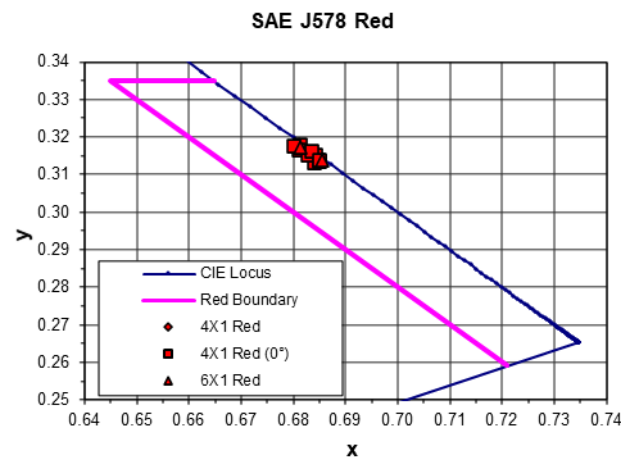
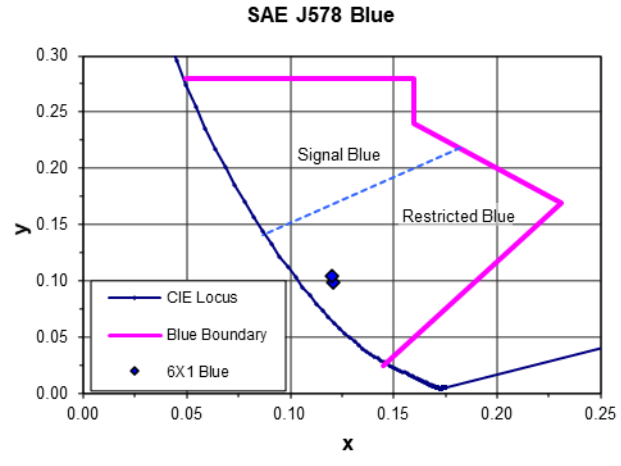
Test Performed By: MAE

Test Distance: 15ft

Voltage: 12.80V

Location: HV

Mode: FP1 - Single Flash

Color	Measured (x, y)	Required	Chart
Red	4X1 Module t = 0min (0.6811, 0.3178) t = 30min (0.6833, 0.3154)	$y < 0.335$ $y > 0.98 - x$	 SAE J578 Red Additional 4X1 test angles shown on graph
	6X1 Module t = 0min (0.6813, 0.3172) t = 30min (0.6855, 0.3137)		
Blue	6X1 Module t = 0min (0.1209, 0.0984) t = 30min (0.1202, 0.1039)	$y \leq 0.280$ $x \leq 0.160†$ $x \leq 0.400 - y$ $x \geq 0.60y + 0.130$ $† \text{ if } y > 0.24$	 SAE J578 Blue

Red - The color of the light emitted through the lens falls within the acceptable limits for red.

Blue - The color of the light emitted through the lens falls within the acceptable limits for signal blue.

Note: The SAE Emergency Warning Lamps & Devices Committee is intending to limit the allowable blue color to the Restricted Blue boundary in future SAE J595 and SAE J845 specifications.

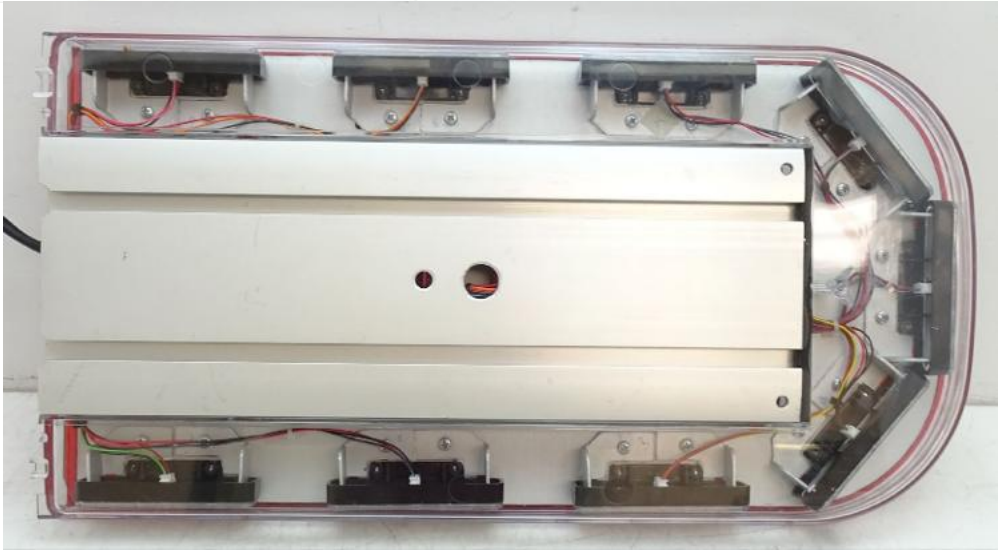
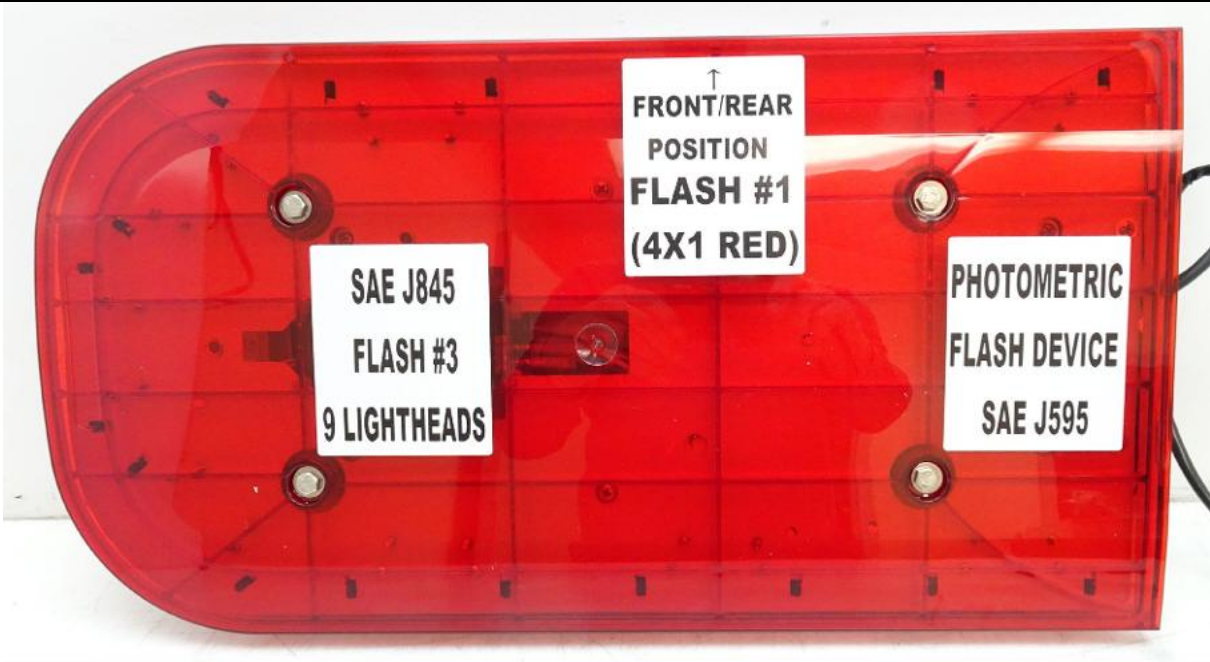
PHOTOGRAPH SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)



PHOTOGRAPH SHEET

Device Name: Engesig Sirius D-MAX Red Lightbar with 4X1 Modules (SAE WW3)
with additional 6X1 Directional Module Options (SAE W)



4X1 Photometry Sample



6X1 Photometry Samples