

LEOTEK Electronics USA LLC

TEST REPORT

SCOPE OF WORK

Intertek Traffic Signal ITE Program Certification Testing
of 15yr 8" Clear and Tinted Red Balls.

REPORT NUMBER

106115748CRT-001

ISSUE DATE

4-Apr-2025

PAGES

20

DOCUMENT CONTROL NUMBER

NA
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Test Report			
Company Name	LEOTEK Electronics USA LLC	Test Location	Intertek Testing Services NA
Address	1955 Lundy Avenue	Address	3933 US Rt 11
	San Jose, CA 95131		Cortland, NY 13045
			USA
Client Contact	Frank Saltani	Quote Number	Qu-01514894-1
Phone	408-380-1788 Ext. 202	Test Start Date	February 21, 2025
Email	frank@leotek.com	Completion Date	April 4, 2025

Standard(s)
ITE, Circular Signal Supplement, dated June 27, 2005.

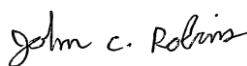
Spec.	Test name	Clause	Tinted	Clear
			Result	
ITE	Conditioning	6.4.2	Pass	Pass
ITE	Mechanical Vibration	6.4.3.1	Pass	Pass*
ITE	Temperature Cycling	6.4.3.2	Pass	Pass
ITE	Moisture Resistance	6.4.3.3	Pass**	
ITE	Luminous Intensity	6.4.4.1, 2,3,4	Pass	Pass
ITE	Luminance Uniformity	6.4.4.5	Pass	Pass
ITE	Chromaticity	6.4.4.6	Pass	Pass
ITE	Color Uniformity	6.4.4.7	Pass	Pass
ITE	Lens Abrasion	6.4.5.2	Pass	Pass
ITE	Current Consumption	6.4.6.1	Pass	Pass
ITE	Low Voltage Turn Off	6.4.6.2	Pass***	
ITE	Turn-on/Turn-off Times	6.4.6.3	Pass***	
ITE	Transient Voltage Immunity	6.4.6.4	Pass***	
ITE	Electronic Noise	6.4.6.5	Pass***	
ITE	Power Factor	6.4.6.6	Pass	Pass*
ITE	Total Harmonic Distortion	6.4.6.7	Pass	Pass*
ITE	Load Switch Compatibility	6.4.7.1	Pass***	
ITE	Off State Voltage Decay	6.4.7.2	Pass***	
ITE	Failed State Impedance	6.4.8	Pass***	

*The client states the clear lens model is exactly the same as the tinted model with the exception of the lens. As a result, the electrical testing for the clear is covered by the tinted results.

**Covered under test report 106115748CRT-001Y.

***Covered under Dialight test report 105587577CRT-002R.

Results Key	
Pass	Compliant
Fail	Non-compliant
TBD	Compliance not determined
NT	Not tested in this project
NA	Test not applicable



John C. Robins
Engineer
Lighting



Christopher W. Metcalf
Engineering Supervisor
Lighting

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Sample Information				
Date Rec.	Intertek ID	Description	Condition	Model No.
2/17/25	CRT2502170837-009	15yr 8" Red Tinted/Clear Ball	Engineering	See Below

Note: Clear lenses provided.

Further Sample Description

Intertek Sample Number	Description	Model Number	Serial Number
CRT2502170837-009-4	8" Red Ball Tinted	433-1110-003XL15	A2412011791
CRT2502170837-009-5	8" Red Ball Tinted	433-1110-003XL15	A2412011792
CRT2502170837-009-6	8" Red Ball Tinted	433-1110-003XL15	A2412011793
CRT2502170837-009-7	8" Red Ball Clear	433-1170-003XL15	A2412011794
CRT2502170837-009-8	8" Red Ball Clear	433-1170-003XL15	A2412011795
CRT2502170837-009-9	8" Red Ball Clear	433-1170-003XL15	A2412011796

General Requirements

Intertek Sample Number	ETL Cert. Number	Label Identification	Lens Orientation	Color Coded Wires
CRT2502170837-009-4	NA	Pass	Pass	Red/White
CRT2502170837-009-5	NA	Pass	Pass	Red/White
CRT2502170837-009-6	NA	Pass	Pass	Red/White
CRT2502170837-009-7	NA	Pass	Pass	Red/White
CRT2502170837-009-8	NA	Pass	Pass	Red/White
CRT2502170837-009-9	NA	Pass	Pass	Red/White

General Requirements

Intertek Sample Number	600V / 20 AWG Min.	Wire Length $\geq$ 39"	Service Rating +105°C
CRT2502170837-009-4	600V / 18 AWG	Pass	Pass
CRT2502170837-009-5	600V / 18 AWG	Pass	Pass
CRT2502170837-009-6	600V / 18 AWG	Pass	Pass
CRT2502170837-009-7	600V / 18 AWG	Pass	Pass
CRT2502170837-009-8	600V / 18 AWG	Pass	Pass
CRT2502170837-009-9	600V / 18 AWG	Pass	Pass

Sample Modification Log	
Date	Modification description
2/21/25	AC Cable: Red/White_C-G000000016
	Waterproof Cable Gland : NYLCGL-H203BM
	Back Cover: C-A000000098
	Heat Sink: C-A000000093
	Metal PCB: C-E000000013
	Connector: CNRP4-A2001WRBS04P
	LED: LEDLXR-NCSR219BT
	Thermistor: C-F000000023
	2nd Lens: C-F000000023
	SPS: _15y SPS_C-D000000001
	Power Clip_C-A000000092
	Fresnel Lens: PPCTSL-FL12C
	O-ring: 8" PRBTSL-LG0806
	Gasket: 8" Gasket_AF1040100001
	Front Cover Tinted: PPCTSL-FC08RN1Z
	Front Cover Clear: PPCTSL-FC08WN1Z

Picture(s)



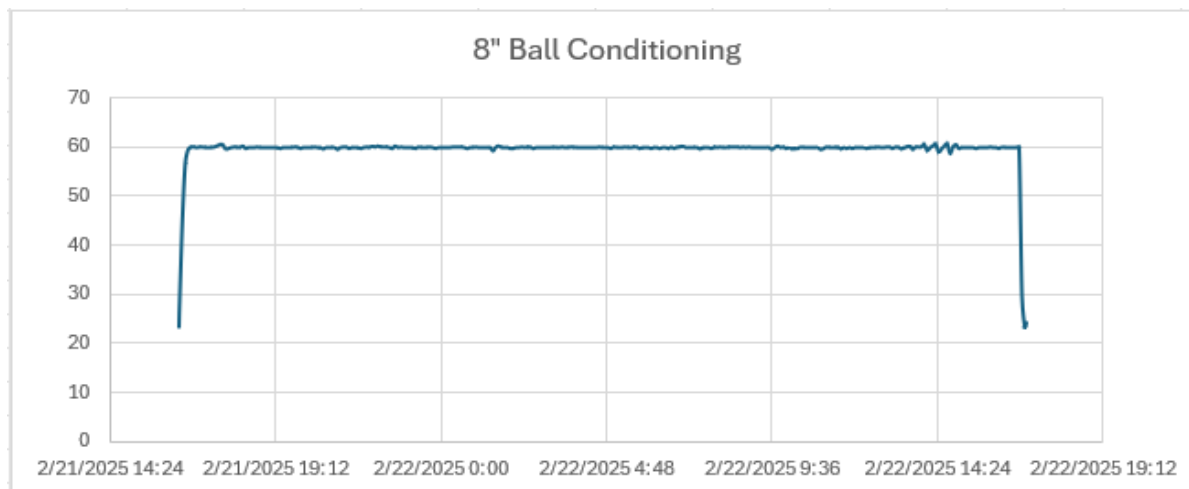
Note: The client supplied clear lenses for the modules, The clear lens model number is 433-1170-003XL15.

Conditioning 6.4.2

The submitted LED signal modules were subjected to conditioning prior to the environmental tests. The samples were energized for a minimum of 24 hours, at 100% duty cycle in an ambient temperature of +60°C (+140°F). At the conclusion of the test, the modules shall be visually inspected for damage and checked for proper operation.

Results

Intertek Sample Number	Description	Visual Inspection		Operational Check	
		Pre	Post	Pre	Post
CRT2502170837-009-4	8" Red Ball Tinted	Pass	Pass	Pass	Pass
CRT2502170837-009-5	8" Red Ball Tinted	Pass	Pass	Pass	Pass
CRT2502170837-009-6	8" Red Ball Tinted	Pass	Pass	Pass	Pass
CRT2502170837-009-7	8" Red Ball Clear	Pass	Pass	Pass	Pass
CRT2502170837-009-8	8" Red Ball Clear	Pass	Pass	Pass	Pass
CRT2502170837-009-9	8" Red Ball Clear	Pass	Pass	Pass	Pass



Measured Voltage: 120.1 Vac

Complies: ☒ YES ☐ NO

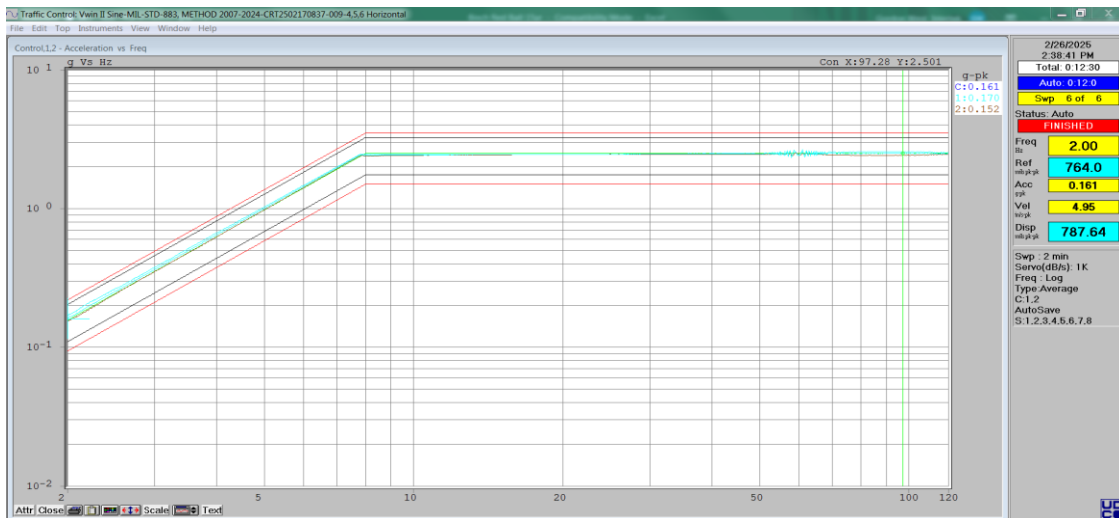
Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	13,14	Completion Date:	22-Feb-2025
Amb (°C):	NA	RH%	NA

Mechanical Vibration 6.4.3.1

The submitted LED signal modules were securely mounted in traffic signal housings and vibrated along each axes for three 4 minute sweep cycles at a displacement of 0.764" from 2 to 8 Hz and 2.5 Gs from 8 to 120 Hz. Testing was conducted in accordance with MIL-STD-883, method 2007. At the conclusion of the test, the modules shall be visually inspected for damage and checked for proper operation.

Results

Intertek Sample Number	Description	x-axis lateral	y-axis horizontal	z-axis vertical	Visual Inspection	Operational Check
CRT2502170837-009-4	8" Red Ball Tinted	X	X	X	Pass	Pass
CRT2502170837-009-5	8" Red Ball Tinted	X	X	X	Pass	Pass
CRT2502170837-009-6	8" Red Ball Tinted	X	X	X	Pass	Pass
CRT2502170837-009-7	8" Red Ball Clear	X	X	X	Pass	Pass
CRT2502170837-009-8	8" Red Ball Clear	X	X	X	Pass	Pass
CRT2502170837-009-9	8" Red Ball Clear	X	X	X	Pass	Pass



Complies: ☒ YES ☐ NO

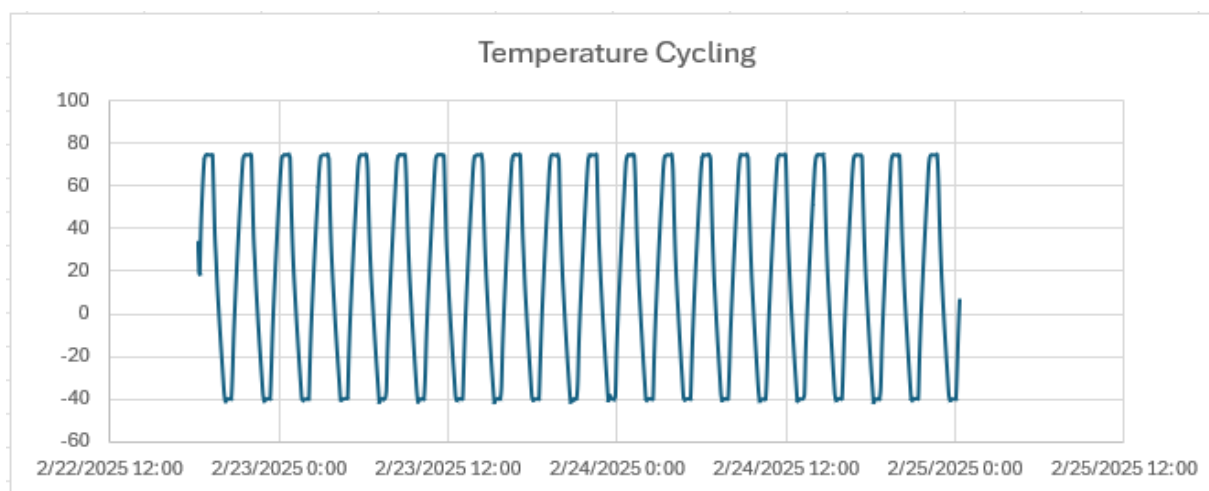
Tested By:	Gordon West	Signature or initials:	<i>Gordon West</i>
Engineer:	John Robins	Signature or initials:	<i>John Robins</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Equipment Used:	1,2,3,4,5	Completion Date:	27-Feb-2025
Amb (°C):	22.8	RH%	52

Temperature Cycling 6.4.3.2

The submitted tinted and clear LED signal modules were subjected to temperature cycling according to MIL-STD-883, Method 1010. Twenty cycles were performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at the extremes. The temperature cycled between -40°C and +74°C. The samples were non-operating. At the conclusion of the test, the module shall be free of damage and moisture and be fully operational.

Results

Intertek Sample Number	Description	Visual Inspection	Operational Check
CRT2502170837-009-4	8" Red Ball Tinted	Pass	Pass
CRT2502170837-009-5	8" Red Ball Tinted	Pass	Pass
CRT2502170837-009-6	8" Red Ball Tinted	Pass	Pass
CRT2502170837-009-7	8" Red Ball Clear	Pass	Pass
CRT2502170837-009-8	8" Red Ball Clear	Pass	Pass
CRT2502170837-009-9	8" Red Ball Clear	Pass	Pass



Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	10	Completion Date:	25-Feb-2025
Amb (°C):	NA	RH%	NA

Luminous Intensity 6.4.4.1 through 6.4.4.4

The intensity distribution tests on the submitted LED traffic signal modules were performed with the Intertek 25 meter Gonio photometer. The Gonio photometer was in accordance with the goniometer described in Section 11.02 (Test Apparatus) of the Institute of Transportation Engineers' Vehicle Traffic Control Signal Heads Standard Test Method. The calibration of the Gonio photometer is traceable to the National Institute of Standards and Technology. The LED modules were operated at 120 volts AC. The alignment of the LED module was performed in accordance with Section 11.03 (Alignment of Optical Unit for Test) of the Institute of Transportation Engineers' Vehicle Traffic Control Signal Heads Standard Test Method. The submitted LED signal modules were tested for maintained minimum luminous intensity at each of 78 points indicated in Table 1, of the referenced specification. These measurements were recorded at an ambient temperature of 25°C. The green LED signal modules were energized at nominal operating voltage, at a 100% duty cycle for 60 minutes.

A relative luminous intensity measurement is taken in a region from 0 to 7.5° down, and from 7.5° left to 7.5° right. The measurement is taken at 80 Vac, 120 Vac and 135 Vac. When the 80 Vac and 135 Vac factors are applied to the photometric data the units shall still meet the photometric requirements of each model.

A diminution factor was measured by using the submitted samples. The modules were mounted in a dual compartment temperature chamber with the lensed portion in one compartment and all portions behind the lens within the other compartment. At room ambient temperature (both inside and outside the chamber) and in calm air outside the chamber, the modules were energized per the conditions described above and a single on-axis reading (IA) taken and recorded. With the modules off, the chamber was heated to 74°C behind the lens and 49°C in front of the lens, and allowed to stabilize. Following stabilization, the modules were energized per the above cycle and the single on-axis reading (IH) taken and recorded. A diminution factor was calculated (IH/IA). The readings recorded initially were factored by the diminution factor.

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample	CRT2502170837-009-4					Target Input voltage		Measured Input Voltage		H, V Lum. Intensity		Vac Variation Factor		MMLI Factor
Module	8" Ball					80Vac		80.0	Vac	311.6	Candela	0.967		0.727
Color:	Red					120Vac		120.1	Vac	322.3	Candela	1.000		
Lens Type:	Tinted					135Vac		135.1	Vac	319.3	Candela	0.991		
Photometric Test Distance: 25 meters														
Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C		
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela
12.5U	2.5	68	71	70	73	69	72	49	51	51	53	50	53	17
12.5U	7.5	56	60	58	62	57	61	41	44	42	45	42	45	13
7.5U	2.5	130	133	134	138	133	136	94	97	97	100	96	99	31
7.5U	7.5	107	116	110	120	109	119	78	84	80	87	79	86	25
7.5U	12.5	78	89	81	92	80	91	57	64	59	67	58	66	18
2.5U	2.5	277	284	287	294	284	291	202	207	209	214	207	212	68
2.5U	7.5	224	245	232	254	229	251	163	178	168	184	167	183	56
2.5U	12.5	157	184	162	190	161	189	114	134	118	138	117	137	38
2.5U	17.5	99	120	103	124	102	123	72	87	75	90	74	89	21
2.5U	22.5	47	62	49	64	49	64	34	45	36	47	35	46	12
2.5D	2.5	342	348	354	360	351	357	249	253	257	262	255	259	162
2.5D	7.5	295	320	305	331	302	328	214	233	222	241	219	238	132
2.5D	12.5	213	253	220	262	218	259	155	184	160	190	159	189	91
2.5D	17.5	132	172	137	178	135	176	96	125	99	129	98	128	53
2.5D	22.5	76	111	79	115	78	114	55	81	57	84	57	83	28
2.5D	27.5	34	55	35	57	35	56	25	40	26	41	25	41	15
7.5D	2.5	349	344	361	356	358	353	254	250	263	259	260	256	127
7.5D	7.5	322	307	333	317	330	314	234	223	242	230	239	228	106
7.5D	12.5	254	251	263	260	261	258	185	183	191	189	189	187	71
7.5D	17.5	179	173	185	179	184	177	130	126	135	130	133	129	41
7.5D	22.5	116	113	120	117	119	116	84	82	87	85	87	84	21
7.5D	27.5	55	57	57	59	56	59	40	42	41	43	41	43	12
12.5D	2.5	168	163	174	169	172	167	122	119	126	123	125	121	50
12.5D	7.5	158	145	164	150	162	149	115	105	119	109	118	108	40
12.5D	12.5	131	114	136	118	134	117	95	83	99	86	98	85	28
12.5D	17.5	93	76	97	78	96	77	68	55	70	57	70	56	17
12.5D	22.5	58	48	60	49	60	49	42	35	44	36	43	35	8
12.5D	27.5	31	27	32	28	32	28	22	20	23	20	23	20	5
17.5D	2.5	73	72	76	74	75	74	53	52	55	54	55	54	23
17.5D	7.5	65	67	68	69	67	68	48	48	49	50	49	50	18
17.5D	12.5	54	55	55	57	55	57	39	40	40	42	40	41	13
17.5D	17.5	40	42	42	43	41	43	29	30	30	31	30	31	7
17.5D	22.5	28	30	29	31	29	31	20	22	21	23	21	22	3
22.5D	2.5	53	53	55	54	54	54	38	38	40	40	39	39	17
22.5D	7.5	49	50	51	51	51	51	36	36	37	37	37	37	13
22.5D	12.5	42	42	43	44	43	43	30	31	31	32	31	31	10
22.5D	17.5	30	31	31	32	31	32	22	23	23	23	22	23	5
27.5D	2.5	29	29	30	30	30	29	21	21	22	22	22	21	12
27.5D	7.5	27	27	28	28	28	28	20	20	20	20	20	20	8

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample:	CRT2502170837-009-5				Target Input voltage		Measured Input Voltage			H, V Lum. Intensity		Vac Variation Factor		MMLI Factor	
Module	8" Ball				80Vac		79.95		Vac		308.4		Candela	0.972	0.712
Color:	Red				120Vac		120.02		Vac		317.3		Candela	1.000	
Lens Type:	Tinted				135Vac		135.05		Vac		320.3		Candela	1.009	
Photometric Test Distance: 25 meters															
Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C			
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1	
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum	
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela	
12.5U	2.5	67	69	69	71	70	72	48	49	49	51	50	51	17	
12.5U	7.5	56	59	57	60	58	61	40	42	41	43	41	43	13	
7.5U	2.5	128	131	132	134	133	136	91	93	94	96	95	97	31	
7.5U	7.5	106	114	109	117	110	118	75	81	78	83	78	84	25	
7.5U	12.5	78	85	80	88	81	89	55	61	57	63	57	63	18	
2.5U	2.5	274	280	282	288	285	291	195	199	201	205	203	207	68	
2.5U	7.5	221	240	228	247	230	250	158	171	162	176	164	178	56	
2.5U	12.5	158	179	163	184	164	186	112	128	116	131	117	133	38	
2.5U	17.5	100	118	103	121	104	122	71	84	73	86	74	87	21	
2.5U	22.5	48	60	50	62	50	63	34	43	35	44	36	45	12	
2.5D	2.5	338	343	348	353	351	357	241	244	248	251	250	254	162	
2.5D	7.5	295	314	303	323	306	326	210	223	216	230	218	232	132	
2.5D	12.5	214	243	221	250	223	253	153	173	157	178	159	180	91	
2.5D	17.5	134	164	138	169	139	170	95	117	98	120	99	121	53	
2.5D	22.5	78	103	80	106	81	107	56	73	57	75	58	76	28	
2.5D	27.5	35	50	36	51	36	52	25	36	26	37	26	37	15	
7.5D	2.5	345	342	355	352	359	355	246	243	253	250	255	253	127	
7.5D	7.5	315	306	324	314	327	317	224	218	231	224	233	226	106	
7.5D	12.5	249	251	256	258	259	261	177	179	183	184	184	186	71	
7.5D	17.5	172	175	177	180	179	182	123	125	126	128	127	130	41	
7.5D	22.5	112	114	115	117	116	118	80	81	82	83	83	84	21	
7.5D	27.5	52	58	54	60	54	60	37	41	38	42	38	43	12	
12.5D	2.5	164	162	169	166	171	168	117	115	120	118	122	120	50	
12.5D	7.5	152	145	157	149	158	151	109	103	112	106	113	107	40	
12.5D	12.5	125	116	129	119	130	121	89	83	92	85	93	86	28	
12.5D	17.5	87	77	89	79	90	80	62	55	64	57	64	57	17	
12.5D	22.5	54	49	55	51	56	51	38	35	39	36	40	36	8	
12.5D	27.5	29	28	30	28	30	29	21	20	21	20	22	20	5	
17.5D	2.5	72	71	74	73	75	74	51	50	53	52	53	52	23	
17.5D	7.5	65	65	67	67	67	68	46	46	47	48	48	48	18	
17.5D	12.5	53	54	54	55	55	56	38	38	39	39	39	40	13	
17.5D	17.5	40	40	41	41	41	42	28	29	29	29	29	30	7	
17.5D	22.5	27	29	28	30	29	30	20	21	20	21	20	21	3	
22.5D	2.5	52	52	54	53	54	54	37	37	38	38	39	38	17	
22.5D	7.5	49	49	50	50	51	51	35	35	36	36	36	36	13	
22.5D	12.5	41	41	43	42	43	43	29	29	30	30	31	31	10	
22.5D	17.5	29	31	30	31	31	32	21	22	22	22	22	23	5	
27.5D	2.5	28	28	29	29	29	29	20	20	21	20	21	21	12	
27.5D	7.5	27	26	27	27	28	27	19	19	19	19	20	20	8	

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample:	CRT2502170837-009-6				Target Input voltage		Measured Input Voltage			H, V Lum. Intensity		Vac Variation Factor		MMLI Factor
Module	8" Ball				80Vac		79.95		Vac		304.1	Candela	0.972	0.729
Color:	Red				120Vac		120.11		Vac		312.7	Candela	1.000	
Lens Type:	Tinted				135Vac		135.11		Vac		316.3	Candela	1.012	
Photometric Test Distance: 25 meters														
Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C		
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela
12.5U	2.5	66	68	68	70	68	70	48	49	49	51	50	51	17
12.5U	7.5	55	58	56	59	57	60	40	42	41	43	41	44	13
7.5U	2.5	126	129	129	133	131	134	92	94	94	97	95	98	31
7.5U	7.5	104	112	107	115	108	116	75	81	78	84	79	85	25
7.5U	12.5	76	85	79	87	79	88	56	62	57	64	58	64	18
2.5U	2.5	273	280	281	288	284	291	199	204	204	210	207	212	68
2.5U	7.5	218	239	225	246	227	249	159	174	164	179	165	181	56
2.5U	12.5	158	178	162	183	164	186	115	130	118	134	120	135	38
2.5U	17.5	98	116	101	119	102	120	72	84	74	87	74	88	21
2.5U	22.5	48	59	49	61	50	62	35	43	36	44	36	45	12
2.5D	2.5	336	339	345	349	349	353	245	247	252	254	255	257	162
2.5D	7.5	290	309	298	318	302	322	211	225	217	232	220	234	132
2.5D	12.5	212	241	218	248	220	250	154	175	159	180	161	182	91
2.5D	17.5	132	161	136	165	137	167	96	117	99	120	100	122	53
2.5D	22.5	77	102	79	104	80	106	56	74	58	76	58	77	28
2.5D	27.5	35	49	35	50	36	51	25	36	26	37	26	37	15
7.5D	2.5	340	336	349	346	353	350	248	245	255	252	258	255	127
7.5D	7.5	312	300	321	309	325	312	227	219	234	225	237	228	106
7.5D	12.5	246	246	253	253	256	256	179	179	184	184	186	186	71
7.5D	17.5	169	170	174	175	176	177	123	124	127	127	128	129	41
7.5D	22.5	110	111	114	114	115	115	80	81	83	83	84	84	21
7.5D	27.5	51	55	52	57	53	57	37	40	38	41	39	42	12
12.5D	2.5	160	160	165	165	167	166	117	117	120	120	122	121	50
12.5D	7.5	150	142	154	146	156	148	109	104	113	107	114	108	40
12.5D	12.5	122	113	125	117	126	118	89	83	91	85	92	86	28
12.5D	17.5	86	75	88	78	89	79	62	55	64	57	65	57	17
12.5D	22.5	53	48	55	49	55	50	39	35	40	36	40	36	8
12.5D	27.5	28	27	29	27	30	28	21	19	21	20	22	20	5
17.5D	2.5	71	70	73	72	74	72	52	51	53	52	54	53	23
17.5D	7.5	63	64	65	66	66	66	46	46	48	48	48	48	18
17.5D	12.5	52	53	53	54	54	55	38	39	39	40	39	40	13
17.5D	17.5	39	39	40	40	40	41	28	29	29	29	29	30	7
17.5D	22.5	27	28	28	29	28	30	20	21	20	21	20	22	3
22.5D	2.5	51	51	53	53	53	53	37	37	38	38	39	39	17
22.5D	7.5	48	48	49	49	50	50	35	35	36	36	36	36	13
22.5D	12.5	41	41	42	42	42	42	30	30	30	30	31	31	10
22.5D	17.5	29	30	29	31	30	31	21	22	21	22	22	23	5
27.5D	2.5	28	28	29	28	29	29	20	20	21	21	21	21	12
27.5D	7.5	26	26	27	27	27	27	19	19	20	19	20	20	8

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample:	CRT2502170837-009-7					Target Input voltage		Measured Input Voltage		H, V Lum. Intensity		Vac Variation Factor		MMLI Factor	
Module	8" Ball					80Vac		80.03		Vac		314.1 Candela		0.980	0.718
Color:	Red					120Vac		120.05		Vac		320.4 Candela		1.000	
Lens Type:	Clear					135Vac		135.1		Vac		322.3 Candela		1.006	
Photometric Test Distance: 25 meters															
Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C			
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1	
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum	
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela	
12.5U	2.5	68	70	69	71	69	72	49	50	50	51	50	51	17	
12.5U	7.5	57	60	58	61	58	61	41	43	41	44	42	44	13	
7.5U	2.5	130	132	133	135	134	135	94	95	95	97	96	97	31	
7.5U	7.5	108	114	110	116	110	117	77	82	79	83	79	84	25	
7.5U	12.5	79	87	81	88	81	89	57	62	58	63	58	64	18	
2.5U	2.5	283	287	288	293	290	294	203	206	207	210	208	211	68	
2.5U	7.5	227	244	231	249	233	250	163	175	166	179	167	180	56	
2.5U	12.5	163	183	166	186	167	187	117	131	119	134	120	135	38	
2.5U	17.5	103	120	105	122	106	123	74	86	76	88	76	88	21	
2.5U	22.5	50	62	51	63	51	63	36	44	37	45	37	45	12	
2.5D	2.5	349	350	356	358	358	360	251	252	256	257	257	258	162	
2.5D	7.5	299	319	306	325	307	327	215	229	219	233	221	235	132	
2.5D	12.5	220	246	224	251	226	252	158	176	161	180	162	181	91	
2.5D	17.5	138	164	141	168	142	168	99	118	101	120	102	121	53	
2.5D	22.5	81	101	82	104	83	104	58	73	59	74	59	75	28	
2.5D	27.5	36	50	37	51	37	51	26	36	27	36	27	37	15	
7.5D	2.5	356	353	363	360	365	362	256	254	261	259	262	260	127	
7.5D	7.5	326	317	333	323	335	325	234	228	239	232	240	234	106	
7.5D	12.5	254	261	259	266	260	268	182	187	186	191	187	192	71	
7.5D	17.5	175	182	179	186	180	187	126	131	129	133	129	134	41	
7.5D	22.5	114	119	117	121	117	122	82	85	84	87	84	88	21	
7.5D	27.5	53	61	54	62	55	62	38	44	39	44	39	45	12	
12.5D	2.5	172	170	175	173	176	174	123	122	126	124	127	125	50	
12.5D	7.5	158	152	161	156	162	156	113	109	116	112	116	112	40	
12.5D	12.5	128	123	131	125	132	126	92	88	94	90	95	90	28	
12.5D	17.5	88	82	90	84	91	84	63	59	65	60	65	60	17	
12.5D	22.5	55	53	56	54	56	54	39	38	40	39	41	39	8	
12.5D	27.5	29	30	30	30	30	30	21	21	22	22	22	22	5	
17.5D	2.5	75	73	76	75	77	75	54	52	55	54	55	54	23	
17.5D	7.5	67	68	68	69	68	69	48	48	49	49	49	50	18	
17.5D	12.5	54	56	55	57	56	58	39	40	40	41	40	41	13	
17.5D	17.5	40	42	41	42	41	43	29	30	30	30	30	31	7	
17.5D	22.5	28	30	29	31	29	31	20	22	20	22	21	22	3	
22.5D	2.5	54	54	55	55	56	55	39	39	40	40	40	40	17	
22.5D	7.5	51	52	52	53	52	53	37	37	37	38	37	38	13	
22.5D	12.5	43	44	43	45	44	45	31	32	31	32	31	32	10	
22.5D	17.5	30	33	31	33	31	33	22	23	22	24	22	24	5	
27.5D	2.5	30	29	30	30	31	30	21	21	22	22	22	22	12	
27.5D	7.5	28	28	28	28	28	29	20	20	20	20	20	20	8	

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample:	CRT2502170837-009-8				Target Input voltage		Measured Input Voltage			H, V Lum. Intensity		Vac Variation Factor		MMLI Factor
Module	8" Ball				80Vac		79.96	Vac		316.4	Candela	0.977		0.737
Color:	Red				120Vac		120.11	Vac		323.8	Candela	1.000		
Lens Type:	Clear				135Vac		135.06	Vac		328.0	Candela	1.013		
Photometric Test Distance: 25 meters														
Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C		
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela
12.5U	2.5	70	71	72	73	73	74	52	52	53	54	54	54	17
12.5U	7.5	58	61	60	62	60	63	43	45	44	46	44	46	13
7.5U	2.5	132	134	135	137	137	139	97	99	99	101	101	102	31
7.5U	7.5	110	117	113	120	114	122	81	86	83	89	84	90	25
7.5U	12.5	80	89	82	91	83	92	59	66	61	67	61	68	18
2.5U	2.5	281	286	287	292	291	296	207	210	212	215	214	218	68
2.5U	7.5	227	247	233	253	236	256	167	182	171	186	174	189	56
2.5U	12.5	165	183	169	188	171	190	121	135	124	138	126	140	38
2.5U	17.5	105	122	107	125	109	126	77	90	79	92	80	93	21
2.5U	22.5	52	63	54	64	54	65	39	46	40	48	40	48	12
2.5D	2.5	352	353	360	362	364	366	259	260	265	267	269	270	162
2.5D	7.5	307	323	314	331	318	335	226	238	232	244	235	247	132
2.5D	12.5	226	249	231	255	234	258	166	184	170	188	172	190	91
2.5D	17.5	142	167	146	171	148	173	105	123	107	126	109	128	53
2.5D	22.5	84	105	86	107	87	109	62	77	64	79	64	80	28
2.5D	27.5	38	51	39	52	39	53	28	38	29	39	29	39	15
7.5D	2.5	355	352	363	360	368	364	261	259	267	265	271	269	127
7.5D	7.5	323	317	330	325	334	329	238	234	243	239	247	242	106
7.5D	12.5	255	261	261	267	264	271	188	192	192	197	195	199	71
7.5D	17.5	175	184	179	189	182	191	129	136	132	139	134	141	41
7.5D	22.5	113	121	116	124	118	125	84	89	86	91	87	92	21
7.5D	27.5	52	62	54	64	54	64	39	46	39	47	40	47	12
12.5D	2.5	168	167	172	171	175	173	124	123	127	126	129	127	50
12.5D	7.5	153	151	157	155	159	157	113	112	115	114	117	116	40
12.5D	12.5	124	122	126	125	128	126	91	90	93	92	94	93	28
12.5D	17.5	86	82	88	84	89	85	64	61	65	62	66	63	17
12.5D	22.5	53	54	55	55	55	55	39	39	40	40	41	41	8
12.5D	27.5	29	30	30	31	30	31	21	22	22	23	22	23	5
17.5D	2.5	75	74	77	76	78	77	55	55	57	56	57	57	23
17.5D	7.5	67	68	69	70	70	71	49	50	51	51	51	52	18
17.5D	12.5	55	57	56	58	57	59	40	42	41	43	42	43	13
17.5D	17.5	41	42	42	43	43	44	30	31	31	32	32	32	7
17.5D	22.5	29	30	29	31	30	32	21	22	22	23	22	23	3
22.5D	2.5	55	55	56	56	57	57	40	40	41	41	42	42	17
22.5D	7.5	51	52	52	53	53	54	38	38	38	39	39	40	13
22.5D	12.5	43	44	44	45	45	46	32	32	33	33	33	34	10
22.5D	17.5	30	33	31	33	32	34	22	24	23	25	23	25	5
27.5D	2.5	30	30	31	30	31	31	22	22	23	22	23	23	12
27.5D	7.5	28	28	28	29	29	29	20	21	21	21	21	21	8

Luminous Intensity 6.4.4.1 through 6.4.4.4

Sample:	CRT2502170837-009-9	Target Input voltage	Measured Input Voltage		H, V Lum. Intensity		Vac Variation Factor	MMLI Factor
Module	8" Ball	80Vac	79.98	Vac	319.8	Candela	0.977	0.722
Color:	Red	120Vac	120.08	Vac	327.3	Candela	1.000	
Lens Type:	Clear	135Vac	135.11	Vac	326.4	Candela	0.997	

Photometric Test Distance: 25 meters

Max	495	25°C		25°C		25°C		74°C/49°C		74°C/49°C		74°C/49°C		
Vertical	Horizontal	Rated 80Vac		Measured 120Vac		Rated 135Vac		Rated 80Vac		Measured 120Vac		Rated 135Vac		Table 1
Angle	Angle	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Candela	Minimum
Up/Down	Left/Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Candela
12.5U	2.5	69	71	70	73	70	72	50	51	51	52	51	52	17
12.5U	7.5	57	60	58	62	58	62	41	44	42	45	42	45	13
7.5U	2.5	131	134	134	137	134	137	95	97	97	99	96	99	31
7.5U	7.5	109	117	112	120	111	120	79	85	81	87	80	86	25
7.5U	12.5	80	89	82	91	81	90	58	64	59	66	59	65	18
2.5U	2.5	285	291	292	298	291	297	206	210	211	215	210	214	68
2.5U	7.5	229	248	234	254	234	253	165	179	169	183	169	183	56
2.5U	12.5	164	186	168	190	168	189	119	134	121	137	121	137	38
2.5U	17.5	103	123	106	126	106	125	75	89	77	91	76	90	21
2.5U	22.5	50	63	52	64	51	64	36	45	37	46	37	46	12
2.5D	2.5	349	355	357	363	356	362	252	256	258	262	257	262	162
2.5D	7.5	306	324	313	332	312	331	221	234	226	240	225	239	132
2.5D	12.5	222	251	227	257	226	256	160	181	164	185	164	185	91
2.5D	17.5	138	168	141	172	141	172	100	121	102	124	102	124	53
2.5D	22.5	81	106	83	108	82	108	58	76	60	78	60	78	28
2.5D	27.5	36	51	37	53	37	52	26	37	27	38	27	38	15
7.5D	2.5	357	355	366	363	364	362	258	256	264	262	263	262	127
7.5D	7.5	329	318	337	326	336	325	238	230	243	235	243	235	106
7.5D	12.5	259	261	265	267	264	267	187	189	191	193	191	193	71
7.5D	17.5	179	181	183	185	183	185	129	131	132	134	132	134	41
7.5D	22.5	116	117	119	120	119	120	84	85	86	87	86	87	21
7.5D	27.5	54	60	56	61	56	61	39	43	40	44	40	44	12
12.5D	2.5	173	169	177	173	176	173	125	122	128	125	127	125	50
12.5D	7.5	159	152	163	156	163	155	115	110	118	112	117	112	40
12.5D	12.5	130	122	133	125	132	124	94	88	96	90	96	90	28
12.5D	17.5	91	81	94	83	93	82	66	58	68	60	67	60	17
12.5D	22.5	57	52	58	53	58	53	41	38	42	38	42	38	8
12.5D	27.5	30	29	31	30	31	29	22	21	22	21	22	21	5
17.5D	2.5	75	74	77	76	77	76	54	53	56	55	55	55	23
17.5D	7.5	67	68	69	70	68	70	48	49	50	50	49	50	18
17.5D	12.5	55	56	56	58	56	58	40	41	40	42	40	42	13
17.5D	17.5	41	42	42	43	42	43	30	30	30	31	30	31	7
17.5D	22.5	29	30	29	31	29	31	21	22	21	22	21	22	3
22.5D	2.5	55	54	56	56	56	56	39	39	40	40	40	40	17
22.5D	7.5	51	52	52	53	52	53	37	37	38	38	38	38	13
22.5D	12.5	44	44	45	45	44	45	31	32	32	32	32	32	10
22.5D	17.5	31	32	32	33	32	33	22	23	23	24	23	24	5
27.5D	2.5	30	30	30	30	30	30	21	21	22	22	22	22	12
27.5D	7.5	28	28	29	29	29	29	20	20	21	21	21	21	8

Complies:	☒ YES	☐ NO
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Tested By:	Matthew Benninger	Signature or initials:	WP
Engineer:	John Robins	Signature or initials:	JR
Reviewed By:	cwm	Signature or initials:	AM
Test Equipment Used:	15,16,17,18,20,21,22	Completion Date:	4-Apr-2025
Amb (°C):	21	RH%	44

Luminance Uniformity

Luminance measurements were taken at nine locations across the signal face. A spot size of one inch was used. The luminance meter was translated from side to side and up and down remaining normal to the sample surface. The measurements were used to determine luminance uniformity. The measurements were taken after operating on the same duty cycle used during the photometric test.

Results

The ratio between the maximum and the minimum luminance was less than 10 to 1. Data follows.

8" Red Ball Tinted			
Sample	CRT2502170837-009-4	CRT2502170837-009-5	CRT2502170837-009-6
Location	Luminance	Luminance	Luminance
1	10339	10095	9113
2	12510	16169	13798
3	17291	14725	15370
4	13872	13741	12509
5	9272	9058	9109
6	11021	11453	10978
7	13436	12142	11909
8	13357	13481	12571
9	8131	9112	8300
Average	12137	12220	11517
Intensity Ratio	2.1	1.8	1.9

8" Red Ball Clear			
Sample	CRT2502170837-009-7	CRT2502170837-009-8	CRT2502170837-009-9
Location	Luminance	Luminance	Luminance
1	9716	10265	10871
2	14605	14636	16697
3	17231	16348	16720
4	11168	12259	13202
5	8179	9046	9982
6	11720	10635	11951
7	11705	11796	12870
8	13738	11326	12931
9	9217	7632	8099
Average	11920	11549	12591
Intensity Ratio	2.1	2.1	2.1

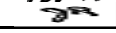
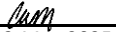
Luminance measurements are in cd/m2

Same 60 minute warm-up used for luminous intensity

Test distance is 19 feet with ¼ degree aperture using the PR 740

Measured Voltage:	120.0 - 120.3	Vac
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Complies:	☒ YES	☐ NO
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Tested By:	Rex Williams	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	6-9	Completion Date:	3-Mar-2025
Amb (°C):	25.4	RH%	12.3

Chromaticity 6.4.4.6

The chromaticity measurements were performed on the submitted LED Traffic Signal Modules with the spectroradiometer. The samples were operated at nominal input voltage and ambient temperature during the measurements. The measurements were taken from 380-780nm in 2nm increments.

The chromaticity measurements were taken at nine locations across the signal face. A spot size of one inch was used with the samples operating on the same duty cycle used during the photometric test. The spectro-radiometer was translated from side to side and up and down remaining normal to the sample surface. The average of the measurements are recorded.

Results

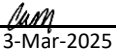
		Chromaticity Coordinates	
Color	Sample	x	y
Red (Tinted)	CRT2502170837-009-4	0.701	0.299
	CRT2502170837-009-5	0.701	0.299
	CRT2502170837-009-6	0.701	0.299

		Chromaticity Coordinates	
Color	Sample	x	y
Red (Clear)	CRT2502170837-009-7	0.700	0.299
	CRT2502170837-009-8	0.700	0.300
	CRT2502170837-009-9	0.700	0.300

The chromaticity measurements meet the requirements of the referenced specification.

Measured Voltage:	120.0 - 120.3	Vac
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Complies: ☒ YES ☐ NO

Tested By:	Rex Williams	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	6-9	Completion Date:	3-Mar-2025
Amb (°C):	25.4	RH%	12.3

Color Uniformity 6.4.4.7

Three samples of each model were tested. Nine color measurements were taken at different locations on the traffic signal face. The measurements were taken after operating on the same duty cycle used during the photometric test.

Results

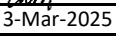
8" Red Ball Tinted									
Sample	CRT2502170837-009-4			CRT2502170837-009-5			CRT2502170837-009-6		
Location	x	y	Dominant	x	y	Dominant	x	y	Dominant
1	0.701	0.299	625	0.701	0.299	626	0.701	0.299	625
2	0.701	0.299	625	0.702	0.298	626	0.701	0.298	626
3	0.701	0.299	625	0.701	0.299	625	0.701	0.299	625
4	0.701	0.299	625	0.701	0.298	626	0.701	0.299	626
5	0.701	0.299	626	0.701	0.298	626	0.701	0.299	926
6	0.701	0.299	625	0.701	0.298	626	0.701	0.299	626
7	0.700	0.299	625	0.701	0.299	625	0.701	0.299	625
8	0.701	0.299	625	0.701	0.299	625	0.701	0.299	625
9	0.700	0.300	625	0.700	0.300	625	0.700	0.300	625
Average	0.701	0.299	625	0.701	0.299	626	0.701	0.299	659

8" Red Ball Clear									
Sample	CRT2502170837-009-7			CRT2502170837-009-8			CRT2502170837-009-9		
Location	x	y	Dominant	x	y	Dominant	x	y	Dominant
1	0.701	0.299	625	0.700	0.299	625	0.701	0.299	625
2	0.701	0.299	626	0.700	0.299	625	0.701	0.299	625
3	0.700	0.299	625	0.700	0.300	625	0.700	0.300	625
4	0.701	0.299	625	0.700	0.299	625	0.700	0.300	625
5	0.701	0.299	625	0.700	0.299	625	0.700	0.299	625
6	0.701	0.299	625	0.700	0.299	625	0.700	0.299	625
7	0.700	0.300	625	0.700	0.300	625	0.700	0.300	625
8	0.700	0.300	625	0.700	0.300	625	0.700	0.300	625
9	0.699	0.300	625	0.699	0.301	624	0.699	0.301	624
Average	0.700	0.299	625	0.700	0.300	625	0.700	0.300	625

The color uniformity measurements meet the requirements of the referenced specification.

Measured Voltage:	120.0 - 120.3	Vac
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Complies:	☒ YES ☐ NO
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Tested By:	Rex Williams	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	6-9	Completion Date:	3-Mar-2025
Amb (°C):	25.4	RH%	12.3

Lens Abrasion Resistance 6.4.5.2

A lens was mounted in the abrasion test fixture with the lens facing upwards. An abrading pad was cycled back and forth (1 cycle) for twelve cycles at $10\text{cm} \pm 2\text{cm}$ per second over the test surface of the lens. The abrading pad shall not be less than $2.5\text{cm} \pm 0.1\text{cm}$ square, constructed of 0000 steel wool rubber cemented to a rigid base shaped to the contour of the lens. The "grain" of the pad was perpendicular to the direction of motion. The abrading pad support was equal in size to the pad and the center of the support surface was within $\pm 2\text{mm}$ of parallel to the lens surface. The density of the abrading pad was such that when the pad was mounted to its support and is resting unweight on the lens, the base of the pad was no closer than 3.2mm to the lens at its closest point. When mounted on its support and resting on the lens, the abrading pad was weighted such that a pad pressure of $14\text{kPa} \pm 1\text{kPa}$ exists at the center and perpendicular to the face of the lens. A pivot was used to follow the contour of the lens.

Results

A single intensity point was measured before and after the abrasion. In all samples tested the abraded lens intensity measurement was at least 90% of the un-abraded lens intensity measurement.

8" Red Ball Tinted			
Sample	Pre Abrasion	Post Abrasion	Percentage
CRT2502170837-009-4	322.3	308.4	0.96
CRT2502170837-009-5	317.3	297.4	0.94
CRT2502170837-009-6	312.7	295.4	0.94

measurements in cd

8" Red Ball Clear			
Sample	Pre Abrasion	Post Abrasion	Percentage
CRT2502170837-009-7	320.4	311.1	0.97
CRT2502170837-009-8	323.8	302.4	0.93
CRT2502170837-009-9	327.3	319.4	0.98

measurements in cd

Measured Voltage:	120.05	Vac		
Measured Weight:	8	lbs		
Abrasion Pad	4	Sq. In		
Pad Pressure	2.1	psi	14.5	Kpa

Complies: ☒ YES ☐ NO

Tested By:	Matthew Benninger	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	15,16,17,18,19	Completion Date:	4-Apr-2025
Amb (°C):	21	RH%	46

Current Consumption 6.4.6.1

Three samples were measured for current flow in amperes. The measured current values are supplied for comparison of Product Quality Assurance current measurements on production modules. Current measurements were taken at start up.

Results

Measurements are in (mA)

8" Red Ball			
Sample	-40°C	25°C	74°C
CRT2502170837-009-4	51.1	49.1	54.7
CRT2502170837-009-5	49.3	47.7	50.8
CRT2502170837-009-6	49.9	48.5	52.1

Label lists 6.4VA

The current consumption was not in excess of 120% of the design qualification current values for an ambient temperature of 25°C.

Measured Voltage:	120.0 - 120.3	Vac
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Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	10,12,13	Completion Date:	27-Mar-2025
Amb (°C):	NA	RH%:	NA
		Completion Date:	

Power Factor & Total Harmonic Distortion 6.4.6.6 & 6.4.6.7

Three tinted samples were measured for power factor and total harmonic distortion. A commercially available power analyzer was used to perform these measurements.

Results

8" Red Ball						
Sample	Voltage	Current (mA)	Power (W)	Power Factor	THD V%	THD I%
CRT2502170837-009-4	120.0	51.9	6.1	0.97	1.18	8.9
CRT2502170837-009-5	120.1	49.8	5.8	0.97	1.10	9.1
CRT2502170837-009-6	120.0	50.8	5.9	0.96	1.04	9.0
Requirement	NA	NA	NA	≥ 0.90	≤ 20%	≤ 20%

Measurements taken after a minimum 60 minute warmup.

Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	10,11,12	Completion Date:	5-Mar-2025
Amb (°C):	24.9	RH%	27.2

Equipment list					
#	Intertek ID No.		Description	Manufacturer	Calibration Due
1	M359	--	Digit Hygro-Thermometer	Testo 608-H1	12-Aug-2025
2	V393	--	Shaker Controller	Unholtz-Dickie 100291109	28-May-2025
3	L195	CH1-4	Signal Conditioner	PCB Piezotronics 482C	25-Apr-2025
4	L221	CH1A	Accelerometer	PCB Piezotronics M35A60/ACS	29-Jan-2026
5	L222	CH2A	Accelerometer	PCB Piezotronics M35A60/ACS	29-Jan-2026
6	O757		Spectra Scan PR740	Photo Research	30-Apr-2025
7	D589		Digital Multimeter	Fluke	22-Apr-2025
8	L282		Hygro-Thermometer	Testo	5-Apr-2025
9	L268		Tape Measure	Crescent	9-Dec-2027
10	A206		Current Transformer	Pearson	01-Jun-2025
11	L176		Thermometer	Testo	19-Jul-2025
12	M297		Power Analyzer	Yokogawa	29-May-2025
13	H204		Thermal Chamber	Thermotron	12-Jun-2025
14	M207		Multimeter	Fluke	14-Oct-2025
15	O109		Goniometer	Optroniks	04-Mar-2026
16	L235		25M Photometer	Instrument Systems	17-Apr-2025
17	L254		Hygrometer	Testo	03-Jun-2025
18	O091		Power Analyzer	Yokogawa	11-Jun-2025
19	F363A		Push-Pull Meter	Imada	08-May-2025
20	H138		Thermal Chamber	Despatch	Used with cal'd Equip.
21	T1546		Digital Thermometer	Dickson	09-May-2025
22	O756		Flex Optometer	UDT	29-Mar-2025
Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files.					