

LEOTEK ELECTRONICS USA LLC

TEST REPORT

SCOPE OF WORK

Certification traffic signal testing of 12" man/hand pedestrian signal model 430-6772-001X.

REPORT NUMBER

106110629CRT-001

ISSUE DATE

30-Apr-2025

PAGES

28



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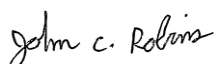
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Test Report			
Company Name	LEOTEK Electronics USA LLC	Test Location	Intertek Testing Services NA
Address	1955 Lundy Avenue	Lundy Avenue	3933 US Rt 11
	San Jose, CA 95131		Cortland, NY 13045
	USA		USA
Client Contact	Frank Saltani	Quote Number	Qu-01514896
Phone	408-380-1788 Ext. 202	Test Start Date	February 26, 2025
Email	frank@leotek.com	Completion Date	April 30, 2025

Standard(s)
ITE Pedestrian Traffic Control Signal Indicators Dated August 4, 2010.

Spec	Test name	Clause	Result
ITE	Conditioning	6.4.2	Pass
ITE	Mechanical Vibration	6.4.3.1	Pass
ITE	Temperature Cycling	6.4.3.2	Pass
ITE	Moisture Resistance	6.4.3.3	Pass
ITE	Luminance & Luminance Uniformity	6.4.4.2 - 6.4.4.6	Pass
ITE	Chromaticity	6.4.4.7	Pass
ITE	Color Uniformity	6.4.4.8	Pass
ITE	Luminous Intensity On-Axis	6.4.4.9	Pass
ITE	Luminous Intensity Off-Axis	6.4.4.10	Pass
ITE	Current Consumption	6.4.6.2	Pass
ITE	Power Consumption	6.4.6.3	Pass
ITE	Low Voltage Turn Off	6.4.6.4	Pass
ITE	Turn-On/Turn-Off Times	6.4.6.5	Pass
ITE	Default Condition	6.4.6.6	Pass
ITE	Transient Voltage Immunity	6.4.6.7	Pass
ITE	Ring Wave Immunity	6.4.6.7.1	Pass
ITE	Electronic Noise	6.4.6.8	Pass
ITE	Power Factor & Total Harmonic Distortion	6.4.6.9, 10	Pass
ITE	Load Switch Compatibility	6.4.7.2	Pass
ITE	Off State Voltage Decay	6.4.7.3	Pass

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 Sample Number	Description	Condition	Model	Serial Number
2/17/2025	CRT2502170837-011-1	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002143
2/17/2025	CRT2502170837-011-2	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002144
2/17/2025	CRT2502170837-011-3	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002145
2/17/2025	CRT2502170837-011-4	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002146
2/17/2025	CRT2502170837-011-5	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002147
2/17/2025	CRT2502170837-011-6	12" Man/Hand Overlay	Engineering	430-6772-001X	A2501002148

Further Sample Description

General Requirements

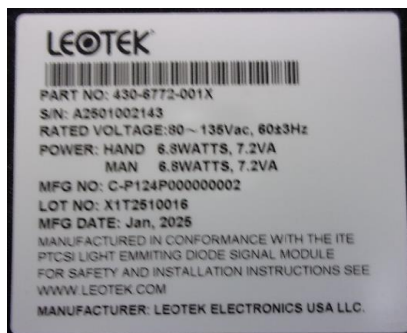
Intertek Sample Number	ETL Cert. Number	Label Identification	Lens Orientation	Color Coded Wires
CRT2502170837-011-1	NA	Pass	Pass	Orange/Blue/White
CRT2502170837-011-2	NA	Pass	Pass	Orange/Blue/White
CRT2502170837-011-3	NA	Pass	Pass	Orange/Blue/White
CRT2502170837-011-4	NA	Pass	Pass	Orange/Blue/White
CRT2502170837-011-5	NA	Pass	Pass	Orange/Blue/White
CRT2502170837-011-6	NA	Pass	Pass	Orange/Blue/White

General Requirements

Intertek Sample Number	600V / 20 AWG Min.	Wire Length $\geq$ 39"	Service Rating +105°C	Clear/Frosted or Blacked Out Lens
CRT2502170837-011-1	600V / 18 AWG	Pass	Pass	Clear/Frosted
CRT2502170837-011-2	600V / 18 AWG	Pass	Pass	Clear/Frosted
CRT2502170837-011-3	600V / 18 AWG	Pass	Pass	Clear/Frosted
CRT2502170837-011-4	600V / 18 AWG	Pass	Pass	Clear/Frosted
CRT2502170837-011-5	600V / 18 AWG	Pass	Pass	Clear/Frosted
CRT2502170837-011-6	600V / 18 AWG	Pass	Pass	Clear/Frosted

Sample Modification Log	
Date	Modification description
2/21/25	Front Cover: 4798431002600
	Low Cover: C-A000000112
	SPS: PT-LXC118700
	Barrier: 1100430000500
	LED: C115E0000001*126, C115W0000001*68
	PCB: C-E000000010

Sample Information
Picture(s)



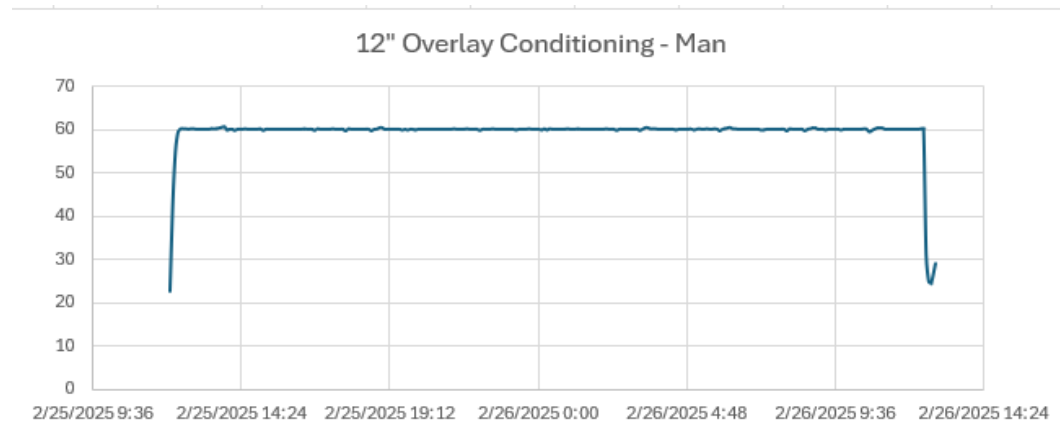
Conditioning

The pedestrian signal modules were conditioned before all other testing. The samples were placed in an environmental chamber and operated at nominal voltage for 24 hours at a temperature of 60 degrees C. Each indication was subjected to the 24 hour test. At the conclusion of the test, the modules shall be visually inspected for damage and checked for proper operation.

Results

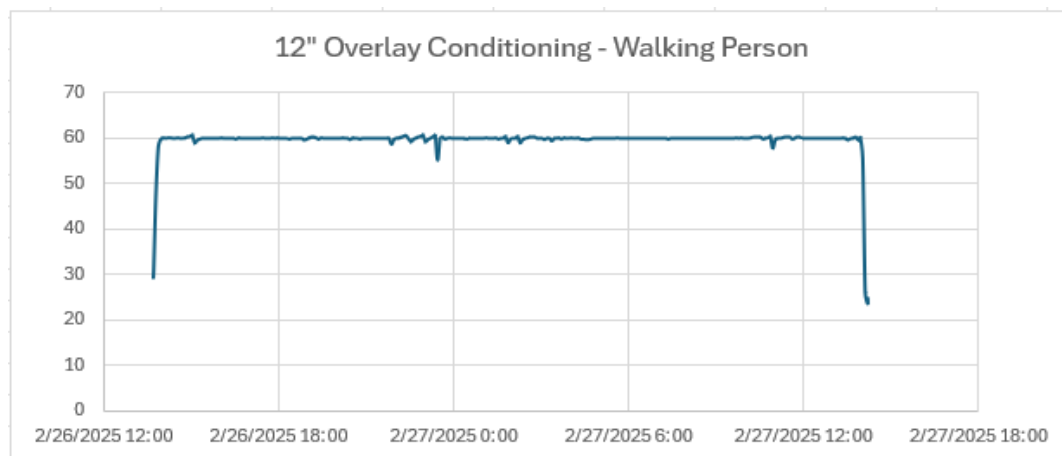
Intertek Sample Number	Indication	Visual Inspection		Operational Check	
		Pre	Post	Pre	Post
CRT2502170837-011-1	Walking Person	Pass	Pass	Pass	Pass
CRT2502170837-011-2	Walking Person	Pass	Pass	Pass	Pass
CRT2502170837-011-3	Walking Person	Pass	Pass	Pass	Pass
CRT2502170837-011-4	Walking Person	Pass	Pass	Pass	Pass
CRT2502170837-011-5	Walking Person	Pass	Pass	Pass	Pass
CRT2502170837-011-6	Walking Person	Pass	Pass	Pass	Pass

Intertek Sample Number	Indication	Visual Inspection		Operational Check	
		Pre	Post	Pre	Post
CRT2502170837-011-1	Hand	Pass	Pass	Pass	Pass
CRT2502170837-011-2	Hand	Pass	Pass	Pass	Pass
CRT2502170837-011-3	Hand	Pass	Pass	Pass	Pass
CRT2502170837-011-4	Hand	Pass	Pass	Pass	Pass
CRT2502170837-011-5	Hand	Pass	Pass	Pass	Pass
CRT2502170837-011-6	Hand	Pass	Pass	Pass	Pass



Measured Voltage:	120 -122	Vac
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Results



Measured Voltage: 120 -122 Vac

Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	6,7	Completion Date:	27-Feb-2025
Amb (°C):	NA	RH%	NA

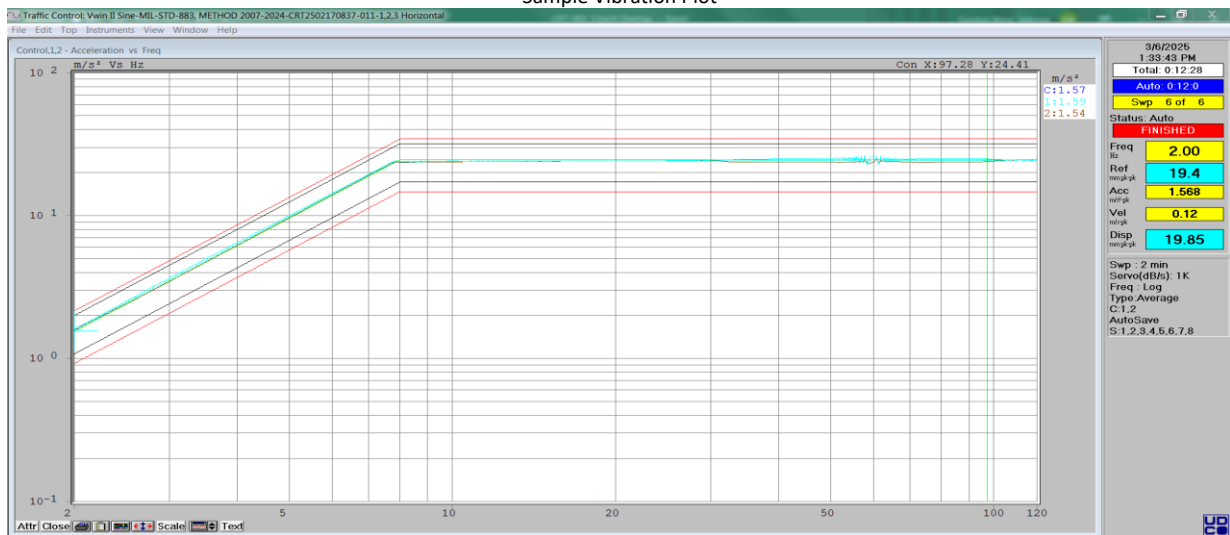
Mechanical Vibration

The submitted pedestrian 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. The modules were energized before and after each axis sweep. The modules were visually inspected after testing. Testing was conducted in accordance with MIL-STD-883, method 2007. At the conclusion of the test, the module shall be free of damage and fully operational.

Results

Intertek Sample Number	Description	x-axis lateral	y-axis horizontal	z-axis vertical	Visual Inspection	Operational Check
CRT2502170837-011-1	12" Man/Hand Overlay	X	X	X	Pass	Pass
CRT2502170837-011-2	12" Man/Hand Overlay	X	X	X	Pass	Pass
CRT2502170837-011-3	12" Man/Hand Overlay	X	X	X	Pass	Pass
CRT2502170837-011-4	12" Man/Hand Overlay	X	X	X	Pass	Pass
CRT2502170837-011-5	12" Man/Hand Overlay	X	X	X	Pass	Pass
CRT2502170837-011-6	12" Man/Hand Overlay	X	X	X	Pass	Pass

Sample Vibration Plot



Complies: ☒ YES ☐ NO

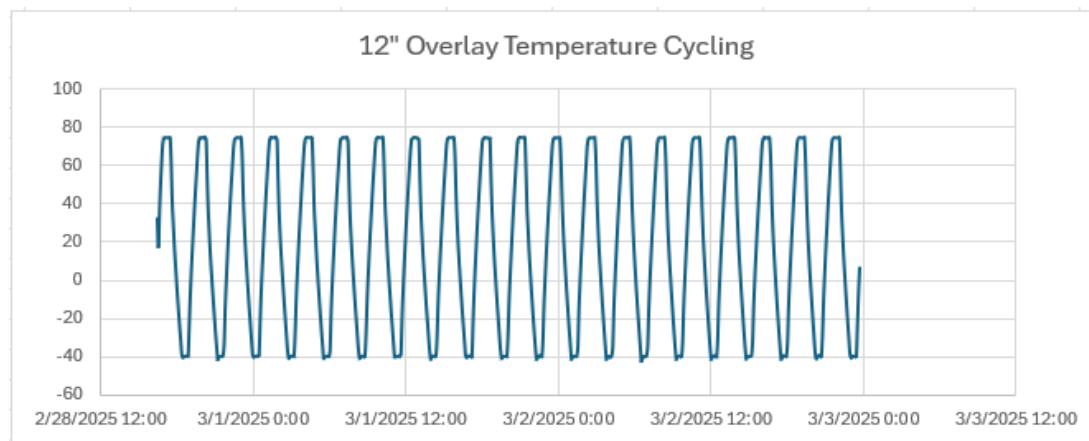
Tested By:	Gordon West	Signature or initials:	<i>Gordon West</i>
Engineer:	John Robins	Signature or initials:	<i>John Robins</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	1,2,3,4,5	Completion Date:	7-Mar-2025
Amb (°C):	22.3	RH%	43

Temperature Cycling

The submitted pedestrian 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
CRT2502170837-011-1	12" Man/Hand Overlay	Pass	Pass
CRT2502170837-011-2	12" Man/Hand Overlay	Pass	Pass
CRT2502170837-011-3	12" Man/Hand Overlay	Pass	Pass
CRT2502170837-011-4	12" Man/Hand Overlay	Pass	Pass
CRT2502170837-011-5	12" Man/Hand Overlay	Pass	Pass
CRT2502170837-011-6	12" Man/Hand Overlay	Pass	Pass



Complies:			
☒	YES	☐	NO
Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	6	Completion Date:	3-Mar-2025
Amb (°C):	NA	RH%	NA

Moisture Resistance 6.4.3.3

The submitted tinted and clear LED signal modules were subjected to the rain and blowing rain test per MIL-STD-810F, Test Method 506.4, Procedure I. The test was performed on standalone modules without a protective housing. The rainfall rate was 1.7 mm/min (4in/hr) and the droplet size shall predominantly be between 0.5mm and 4.5mm (0.02 to 0.18 in). The samples were oriented such that the lens is directed towards the wind source when at a zero rotation angle. The samples were rotated at a rate of 4 degrees per minute along the vertical axis, from an orientation of -60 to +60 degrees during the test. The duration of the test is 30 minutes, and the samples were energized throughout the test. The water temperature was $25^{\circ} \pm 5^{\circ}\text{C}$ ($77^{\circ} \pm 9^{\circ}\text{F}$) and the wind velocity was 80 km/hr (50 mph). 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
CRT2502170837-011-1	12" Man/Hand Overlay	No moisture or damage	Operates as expected
CRT2502170837-011-2	12" Man/Hand Overlay	No moisture or damage	Operates as expected
CRT2502170837-011-3	12" Man/Hand Overlay	No moisture or damage	Operates as expected
CRT2502170837-011-4	12" Man/Hand Overlay	No moisture or damage	Operates as expected
CRT2502170837-011-5	12" Man/Hand Overlay	No moisture or damage	Operates as expected
CRT2502170837-011-6	12" Man/Hand Overlay	No moisture or damage	Operates as expected

Requirement: Signal Still Operational and No Moisture In The Housing

Intertek Sample Number	Sample Temp. at start (°C)	Water Temperature 25C +/- 5C			
		Start	10 minutes	20 minutes	30 minutes
CRT2502170837-011-1	38.2	24.8	25.0	25.1	23.4
CRT2502170837-011-2	39.6	23.8	22.9	22.7	22.7
CRT2502170837-011-3	39.6	23.8	22.9	22.7	22.7
CRT2502170837-011-4	38.3	25.6	25.7	25.7	26.5
CRT2502170837-011-5	38.3	25.6	25.7	25.7	26.5
CRT2502170837-011-6	40.7	22.1	22.6	22.8	23.4

* Water temperature is °C

Recorded rainfall rate:	4.3	in/hr
Recorded wind velocity:	48-52	mph

Complies: ☒ YES ☐ NO

Tested By:	Brittany James	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Equipment Used:	20, 21, 22, 23, 24	Completion Dates:	18-Apr-2025
Amb (°C):	N/A	RH%:	N/A
			23-Apr-2025

Luminance & Luminance Uniformity 6.4.4.2 - 6.4.4.5 & 6.4.4.6

Three pedestrian signal modules were operated at 120 Vac in ambient conditions. The luminance was measured using a direct viewing module calibrated with a NIST traceable luminance standard. Measurements were taken at nine locations on each signal, after a 60 minute warm up. A spot size of 12mm (0.5 inch) was used for the measurements.

A relative luminance measurement is taken at the lowered voltage of 80vac and again at the elevated voltage of 135vac and the resulting normalized factors are applied to the luminance data taken at 25°C. When the factors are applied to the photometric data, the units shall still meet the photometric requirements for each model.

A diminution factor was measured by using the submitted samples three pedestrian signal modules of each model 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 (I_A) 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 (I_H) taken and recorded. A diminution factor was calculated (I_H/I_A).

The readings were factored by the diminution factor to generate the 74°C/49°C data.

The luminance values taken are then used to verify luminance uniformity, the ratio between maximum and minimum luminance shall be less than 5:1.

Results - Walking Person

The data at 25°C and 74°C/49°C complies with the luminance and uniformity requirements of the referenced specification. See tables below.

Sample	CRT2502170837-011-4			CRT2502170837-011-5			CRT2502170837-011-6		
Walking Person	Luminance: Candela/Meter^2								
Position	80.4	120.3	135.3	80.4	120.3	135.3	80.4	120.2	135.2
1	7260	7307	7382	9029	8985	8967	8037	7962	8087
2	4444	4473	4519	4206	4186	4178	4101	4063	4127
3	4358	4386	4431	4105	4085	4077	4137	4098	4162
4	4102	4128	4170	3715	3697	3690	3526	3493	3548
5	5779	5816	5876	5700	5672	5661	5300	5250	5333
6	3677	3701	3739	3865	3846	3838	3779	3744	3803
7	3399	3421	3456	3097	3082	3076	2778	2752	2795
8	3502	3524	3560	3506	3489	3482	3588	3554	3610
9	3514	3537	3573	3823	3805	3797	3734	3699	3757
25°C Average	4448	4477	4523	4561	4539	4529	4331	4291	4358
74°C/49°C Average	4157	4184	4227	4334	4313	4304	4059	4021	4084
Luminance Uniformity Ratio	2.1 to 1.0			2.9 to 1.0			2.9 to 1.0		
Max. Average Lum. 6,600 cd/m^2	Pass			Pass			Pass		
Min. Average Lum. 2,200 cd/m^2	Pass			Pass			Pass		
Luminance Uniformity Ratio ≤ 5:1	Pass			Pass			Pass		

Results - Hand

The data at 25°C and 74°C/49°C complies with the luminance and uniformity requirements of the referenced specification. See

Sample	CRT2502170837-011-4			CRT2502170837-011-5			CRT2502170837-011-6		
Hand	Luminance: Candela/Meter^2								
Position	80.2	120.3	135	80	120.3	135	80.2	120.2	135.2
1	2749	2772	2746	3140	2919	2984	2816	2787	2774
2	3449	3478	3446	3561	3311	3384	3095	3063	3049
7	2313	2332	2310	2515	2338	2390	2205	2182	2172
4	2443	2463	2440	2622	2438	2492	2589	2562	2550
5	3280	3307	3276	3376	3139	3209	3196	3163	3148
6	4156	4190	4151	3288	3057	3125	3751	3712	3695
7	3217	3244	3214	3035	2822	2885	3231	3198	3183
8	3597	3627	3594	4163	3870	3956	4293	4249	4229
9	4835	4875	4830	4806	4468	4567	5152	5099	5075
25°C Average	3338	3365	3334	3390	3151	3221	3370	3335	3319
74°C/49°C Average	1954	1970	1952	1968	1830	1870	2042	2021	2011
Luminance Uniformity Ratio	2.1 to 1.0			1.9 to 1.0			2.3 to 1.0		
Max. Average Lum: 4,200 cd/m^2	Pass			Pass			Pass		
Min. Average Lum. 1,400 cd/m^2	Pass			Pass			Pass		
Luminance Uniformity Ratio ≤ 5:1	Pass			Pass			Pass		

Luminance measurements are in cd/m2

60 minute warm-up

Test distance is 9.5 feet with 1/4 degree aperture using the PR 740

Complies: ☒ YES ☐ NO

Tested By:	Brittany James			Signature or initials:	
Engineer:	John Robins			Signature or initials:	
Reviewed By:	cwm			Signature or initials:	
Test Equipment Used:	29, 30,31,32			Completion Date:	23-Apr-2025
Amb (°C):	26.8	RH%	24		

Chromaticity 6.4.4.7

The chromaticity measurements were performed on the submitted Pedestrian Signal Module with the spectroradiometer. The samples were operated at nominal input voltage and ambient temperature for 60 minutes before measurements were taken. Measurements were taken at 9 locations across the signal face for the hand and person and 14 locations for the countdown using a ½ inch spot size. The measurements were taken from 380-780nm utilizing a 2.0nm bandwidth.

Results

The walking person and hand are compliant with the chromaticity requirements.

Sample	Indication	Chromaticity Coordinates	
		x	y
CRT2502170837-011-4	Walking Person	0.330	0.348
	Hand	0.649	0.350
CRT2502170837-011-5	Walking Person	0.330	0.349
	Hand	0.650	0.349
CRT2502170837-011-6	Walking Person	0.331	0.350
	Hand	0.650	0.349

Measured Voltage 120VAC: See 6.4.4.2

Complies: ☒ YES ☐ NO

Tested By:	Brittany James	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	29, 30,31,32	Completion Date:	23-Apr-2025
Amb (°C):	26.8	RH%	24

Color Uniformity 6.4.4.8

Nine color measurements were taken across the signal face for the hand and person and fourteen measurements were taken for the countdown across the signal face using a ½" spot diameter. The data was then calculated using the following equation to verify uniformity for the walking person.

$$\sqrt{(\Delta x)^2 + (\Delta y)^2} \leq 0.04$$

For the hand and countdown, the dominant wavelength of each color measurement taken must be within ± 3nm of the average.

Results: Walking Person

The walking person is compliant with the uniformity requirements.

Sample	CRT2502170837-011-4		CRT2502170837-011-5		CRT2502170837-011-6	
	Walking Person					
Location	x	y	x	y	x	y
1	0.334	0.355	0.324	0.340	0.332	0.352
2	0.326	0.341	0.334	0.355	0.329	0.346
3	0.331	0.349	0.331	0.349	0.333	0.353
4	0.327	0.345	0.326	0.345	0.327	0.346
5	0.329	0.348	0.332	0.353	0.330	0.349
6	0.331	0.352	0.329	0.347	0.329	0.348
7	0.328	0.347	0.333	0.354	0.332	0.353
8	0.332	0.352	0.327	0.345	0.332	0.352
9	0.329	0.348	0.332	0.354	0.331	0.351
Average	0.330	0.348	0.329	0.348	0.331	0.350

Results: Hand

The hand is compliant with the uniformity requirements.

Sample	CRT2502170837-011-4			CRT2502170837-011-5			CRT2502170837-011-6		
	Hand								
Location	x	y	Dominant	x	y	Dominant	x	y	Dominant
1	0.651	0.349	606	0.651	0.348	606	0.651	0.349	606
2	0.650	0.349	606	0.652	0.347	606	0.652	0.348	606
3	0.651	0.349	606	0.652	0.348	606	0.651	0.349	606
4	0.651	0.349	606	0.652	0.348	606	0.652	0.347	606
5	0.649	0.351	605	0.650	0.349	606	0.651	0.348	606
6	0.648	0.352	605	0.649	0.351	605	0.649	0.351	605
7	0.648	0.351	605	0.649	0.350	605	0.649	0.351	605
8	0.648	0.352	605	0.649	0.350	605	0.648	0.351	605
9	0.647	0.353	605	0.648	0.352	605	0.649	0.351	605
Average	0.649	0.350	605	0.650	0.349	606	0.650	0.349	606

Measured Voltage 120VAC:	see 6.4.4.2	Vac
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Complies:	☒ YES	☐ NO
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Tested By:	Brittany James	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	34, 35,36,37	Completion Date:	23-Apr-2025
Amb (°C):	26.8	RH%	24

Luminous Intensity On-Axis 6.4.4.9

On axis Luminous Intensity measurement shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 100 percent duty cycle. The single point measurement shall be made using a photometer located on and normal to the physical axis of the module lens at a distance of at least 9 meters from the lens surface.

Results

Class 2							
Sample	CRT2502170837-011-4			CRT2502170837-011-5		CRT2502170837-011-6	
Indication	Walking Person						
Location	HV						
Candela	90			96		91	
Measured Voltage:	120.1	Vac	120.1	Vac	120.1	Vac	

Class 2							
Sample	CRT2502170837-011-4			CRT2502170837-011-5		CRT2502170837-011-6	
Indication	Hand						
Location	HV						
Candela	94			92		95	
Measured Voltage:	120.1	Vac		120.1	Vac	120.1	Vac

Requirements

Class	Size
1	(9" x 9")
2	(12" x 12")
3	(16" x 18")

On-Axis Minimum Luminous Intensity - PTCSI LED Pedestrian Traffic Signal			
Class	Luminous Intensity (candela)		
	Walking Person	Hand	Countdown "88"
1	12	11	--
2	28	26	27
3	42	38	27

Maximum Permissible Luminous Intensity - PTCSI LED Pedestrian Traffic Signal			
Class	Luminous Intensity (candela)		
	Walking Person	Hand	Countdown "88"
1	36	33	--
2	126	114	81
3	126	114	81

Complies: ☒ YES ☐ NO

Tested By:	Matthew Benninger	Signature or initials:	<i>MB</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	25,26,27,28	Completion Date:	19-Apr-2025
Amb (°C):	20	RH%	33

Luminous Intensity Off-Axis 6.4.4.10

Off axis Luminous Intensity measurement shall be made after the module has been operated under the test conditions for a minimum of 60 minutes at a 100 percent duty cycle. Three separate measurements shall be made using a photometer located (1) 15 degrees left, (2) 15 degrees right and (3) 15 degrees below the physical axis of the module lens at a distance of at least 9 meters from the lens surface. The photometer shall be oriented so that it is directed at the center of the modules lens.

Results

Class 2							
Sample	CRT2502170837-011-4			CRT2502170837-011-5		CRT2502170837-011-6	
Indication	Walking Person						
Angle	Candela						
15° Left	55			60		60	
15° Right	56			58		60	
15° Down	64			66		64	
Measured Voltage:	120.05	Vac		120.05	Vac	120.05	Vac

Class 2							
Sample	CRT2502170837-011-4			CRT2502170837-011-5		CRT2502170837-011-6	
Indication	Hand						
Angle	Candela						
15° Left	49			47		51	
15° Right	58			52		60	
15° Down	56			54		62	
Measured Voltage:	120.07	Vac		120.07	Vac		
						120.07	Vac

Requirements

Class	Size
1	(9" x 9")
2	(12" x 12")
3	(16" x 18")

Off-Axis Minimum Luminous Intensity - PTCSI LED Pedestrian Traffic Signal			
Class	Luminous Intensity (candela)		
	Walking Person	Hand	Countdown "88"
1	6	5.5	--
2	14	13	13.5
3	23	19	13.5

Maximum Permissible Luminous Intensity - PTCSI LED Pedestrian Traffic Signal			
Class	Luminous Intensity (candela)		
	Walking Person	Hand	Countdown "88"
1	36	33	--
2	126	114	81
3	126	114	81

Complies: ☒ YES ☐ NO

Tested By:	Matthew Benninger	Signature or initials:	<i>MB</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	25,26,27,28	Completion Date:	19-Apr-2025
Amb (°C):	20	RH%	33

Current Consumption - 6.4.6.2

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)

TP12H-HM				
Sample	Indication	-40°C	25°C	74°C
CRT2502170837-011-1	Walking Person	66.0	58.2	58.3
	Hand	65.8	57.7	60.6
CRT2502170837-011-2	Walking Person	65.5	57.7	57.7
	Hand	67.2	59.1	64.6
CRT2502170837-011-3	Walking Person	65.9	58.1	58.1
	Hand	65.0	57.1	60.2

Hand lists 7.2 VA

measurements in mA

Walking Person lists 7.2VA

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

Measured Voltage 120VAC:	120.0-120.3	Vac
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Complies:	☒ YES	☐ NO
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Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	6,8,10	Completion Date:	27-Mar-2025
Amb (°C):	N/A	RH%	N/A

Power Consumption 6.4.6.3

Three samples were measured for power consumption in watts. The measured power values are supplied for comparison of Product Quality Assurance power measurements on production modules. Measurements are in watts, taken after a minimum 60 minute warmup.

Results

Measurements are in (watts)

TP12H-HM		
Sample	Indication	25°C
CRT2502170837-011-1	Walking Person	6.8
	Hand	6.7
CRT2502170837-011-2	Walking Person	6.7
	Hand	6.9
CRT2502170837-011-3	Walking Person	6.8
	Hand	6.6

Hand lists 6.8 Watts

Walking Person lists 6.8 Watts

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

Measured Voltage 120VAC:	120.0 - 120.3	Vac
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Complies:	☒ YES	☐ NO
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Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	6,8,10	Completion Date:	27-Mar-2025
Amb (°C):	N/A	RH%	N/A

Low Voltage Turn Off 6.4.6.4

Three samples were measured to ensure compliance with the low voltage turn-off requirement. Each sample was fully illuminated at the nominal operating voltage. The applied voltage was then reduced to the point where there was no visible illumination.

Results

There was no visible illumination when the applied voltage was less than 35Vac RMS.

Sample	Low Voltage Turn "Off" (Vac RMS)	
	Walking Person	Hand
CRT2502170837-011-1	69	69
CRT2502170837-011-2	69	69
CRT2502170837-011-3	69	71

Complies:		☒ YES	☐ NO
Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	7,9	Completion Date:	10-Apr-2025
Amb (°C):	27	RH%	18.8

Turn-On/Turn-Off Times 6.4.6.5

Three pedestrian signal modules were measured to ensure compliance with the turn-on and turn-off requirements. The measurements were conducted using a two channel oscilloscope to measure the time delay between when the samples are energized at 120 Vac RMS and when the light output reaches 90% of full output. The same apparatus was used to measure the time delay between when the sample is de-energized and when the light output reaches 0% of full output.

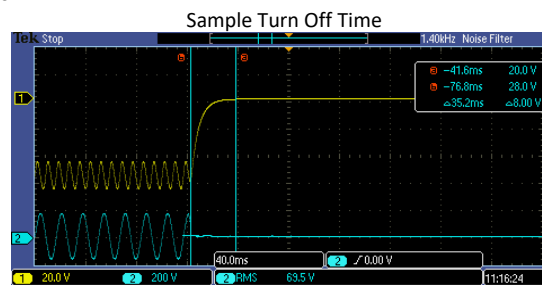
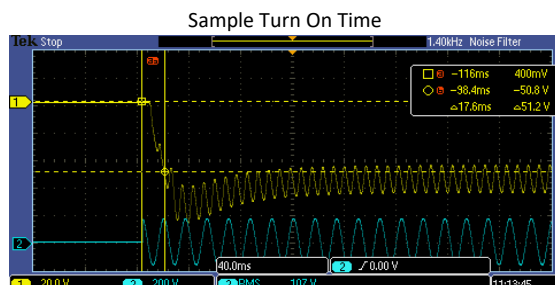
Results

Sample	Turn "On"	Turn "Off"	Turn "On"	Turn "Off"
	Walking Person		Hand	
CRT2502170837-011-1	17.6	35.2	17.6	23.2
CRT2502170837-011-2	17.6	27.2	18.4	17.6
CRT2502170837-011-3	17.6	35.2	24.0	23.2

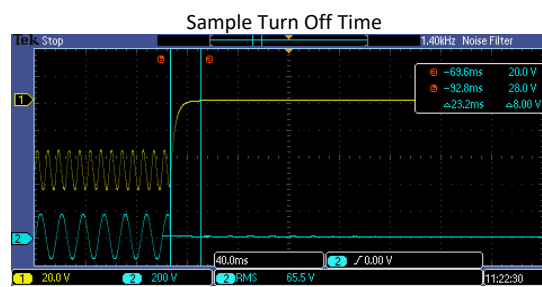
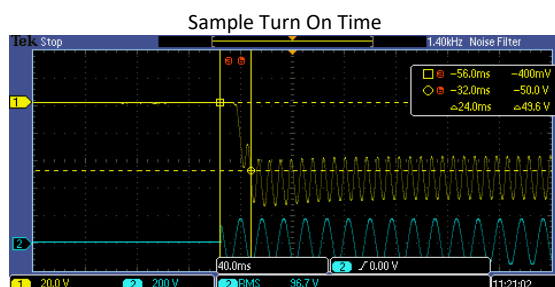
Measurements are in milliseconds.

The "on" time and "off" time were within the 75ms requirement on all samples tested.

Walking Person



Hand



Measured Voltage:	120.0	Vac
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Complies:	☒ YES	☐ NO
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Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	7,9,14,16,17	Completion Date:	9-Apr-2025
Amb (°C):	26.9	RH%	15.9

Default Condition 6.4.6.6

Three samples were tested to verify the presence of the default condition. The module shall be connected such that the supply phase wire and neutral are connected to the phase wire of one indication and the phase wire of the other indication. The pedestrian signal shall default to the upraised hand. The supply phase and neutral wires are then switched, The pedestrian signal shall again default to the upraised hand.

Results

Sample	Default Condition	Result
CRT2502170837-011-1	Hand	Pass
CRT2502170837-011-2	Hand	Pass
CRT2502170837-011-3	Hand	Pass

Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	9	Completion Date:	10-Apr-2025
Amb (°C):	27	RH%	18.8

Transient Voltage Immunity 6.4.6.7

Three pedestrian signal modules were subjected to 3 positive and 3 negative 1000V 7.5 joule pulses across their input leads at a rate of 0.5 pps in accordance with NEMA TS 2-2003 section 2.1.8. The pulses were the discharge from a 15µF capacitor. The devices were then energized with rated voltage to verify proper operation.

Results

The signal modules withstood the applications of the transient voltage without damage or operational deterioration.

Pedestrian Signal - Walking Person			
Sample	3 Positive Pulses	3 Negative Pulses	Results
CRT2502170837-011-1	x	x	Pass
CRT2502170837-011-2	x	x	Pass
CRT2502170837-011-3	x	x	Pass

Pedestrian Signal - Hand			
Sample	3 Positive Pulses	3 Negative Pulses	Results
CRT2502170837-011-1	x	x	Pass
CRT2502170837-011-2	x	x	Pass
CRT2502170837-011-3	x	x	Pass

Measured Voltage:	1000	Vdc
Measured Capacitance:	15.8 - 16.6	µF

Complies:	☒ YES	☐ NO
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Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	7,9,18,19	Completion Date:	10-Apr-2025
Amb (°C):	27.3	RH%	18

Ring Wave Immunity 6.4.6.7.1

Three pedestrian signal modules were energized and a ring wave with a peak of 3KV was applied. Five negative and five positive surges were applied at phase angles 0°, 90°, 180° and 270° for a total of 40 pulses. A pulse was applied every 20 seconds. The sample was operating throughout the test. The surge generator produced a 100 kHz ring wave. The short circuit current was 100A.

Results

Phase Angle	0°		90°		180°		270°		
Indication	5 Neg.	5 Pos.	5 Neg.	5 Pos.	5 Neg.	5 Pos.	5 Neg.	5 Pos.	Result
CRT2502170837-011-1									
Walking Person	✓	✓	✓	✓	✓	✓	✓	✓	Pass
Hand	✓	✓	✓	✓	✓	✓	✓	✓	Pass
CRT2502170837-011-2									
Walking Person	✓	✓	✓	✓	✓	✓	✓	✓	Pass
Hand	✓	✓	✓	✓	✓	✓	✓	✓	Pass
CRT2502170837-011-3									
Walking Person	✓	✓	✓	✓	✓	✓	✓	✓	Pass
Hand	✓	✓	✓	✓	✓	✓	✓	✓	Pass

Complies: ☒ YES ☐ NO

Tested By:	Brittany James	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	11, 12, 13, 14, 15	Completion Date:	9-Apr-2025
Amb (°C):	24.7	RH%	17.1

Electronic Noise 6.4.6.8

Three LED traffic signal modules were operated at 120 VAC/60Hz throughout the test. Emissions measurements were taken to compare values to applicable requirements.

Results

The emissions complied with the requirements of the referenced specification. The testing was performed at our Fridley, MN office. See report: 106110629MIN-014.

Complies: ☒ YES ☐ NO

Tested By:	Jayden Alstad	Signature or Initials:	See Report
Engineer:	Jayden Alstad	Signature or Initials:	See Report
Reviewed By:	Uri Spector	Signature or Initials:	See Report
Test Equipment Used:	See Report	Completion Date:	See Report
Amb (°C):	See Report	RH%	See Report

Power Factor & Total Harmonic Distortion 6.4.6.9 & 6.4.6.10

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

Results

Indication	Voltage	Current (mA)	Power (W)	Power Factor	THD(V)(%)	THD(I)(%)
CRT2502170837-011-1						
Walking Person	120.0	56.9	6.6	0.97	0.72	14.9
Hand	120.0	56.3	6.5	0.97	0.77	14.5
CRT2502170837-011-2						
Walking Person	120.0	56.0	6.7	0.97	0.78	14.8
Hand	120.0	58.2	6.8	0.97	0.82	14.2
CRT2502170837-011-3						
Walking Person	120.0	56.5	6.6	0.97	0.80	15.0
Hand	120.0	56.0	6.5	0.97	0.87	14.4
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:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	8,9,10	Completion Date:	4-Apr-2025
Amb (°C):	25.3	RH%	29.4

Load Switch Compatibility 6.4.7.2

Three samples were connected to a variable AC voltage supply. The sample was monitored for sufficient current draw to ensure proper load switch operation while the voltage is varied from 80V rms to 135 V rms.

Results

The load switch data is provided to the client to determine if the current draw is acceptable. The referenced ITE specification does not list a minimum current draw requirement. As a result, the Caltrans Standard Specifications dated 2010, Section 86-4.01D(2)(a) must be followed listing a minimum power consumption requirement of 5 watts for pedestrian traffic signal modules.

Pedestrian Signal				
Sample	Indication	80 Vrms	120 Vrms	135 Vrms
CRT2502170837-011-1	Walking Person	78.1	56.9	52.9
	Hand	76.9	56.3	52.7
CRT2502170837-011-2	Walking Person	76.6	56.0	52.3
	Hand	79.8	58.2	54.2
CRT2502170837-011-3	Walking Person	77.5	56.5	52.8
	Hand	76.2	56.0	52.3

Current measurements are in mA

Pedestrian Signal				
Sample	Indication	80 Vrms	120 Vrms	135 Vrms
CRT2502170837-011-1	Walking Person	6.2	6.6	6.9
	Hand	6.1	6.5	6.8
CRT2502170837-011-2	Walking Person	6.1	6.5	6.8
	Hand	6.3	6.8	7.0
CRT2502170837-011-3	Walking Person	6.1	6.6	6.8
	Hand	6.0	6.5	6.8

Power measurements are in watts.

Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	
Engineer:	John Robins	Signature or initials:	
Reviewed By:	cwm	Signature or initials:	
Test Equipment Used:	8,9,10	Completion Date:	4-Apr-2025
Amb (°C):	25.2	RH%	26.3

Off State Voltage Decay 6.4.7.3

Three samples were operated from a 135V AC voltage supply. A 19.5 k-ohm resistor was wired in series in the hot line between the LED signal monitor and the AC power supply. A single-pole-single-throw switch was wired in parallel across the 19.5 k-ohm resistor. A 220 k-ohm shunt resistor was wired between the hot line connection and the neutral line connection on the LED signal module. The single-pole-single-throw switch was closed, shorting out the 19.5 k-ohm resistor, allowing the AC power supply to illuminate the LED signal module. Next the switch was opened and the voltage across the 220 k-ohm shunt resistor was measured for a decay to a value equal to or less than 10V rms within a time period equal to or less than 100 milliseconds. The test was repeated a sufficient number of times to ensure testing occurs at the peak of the AC line voltage cycle.

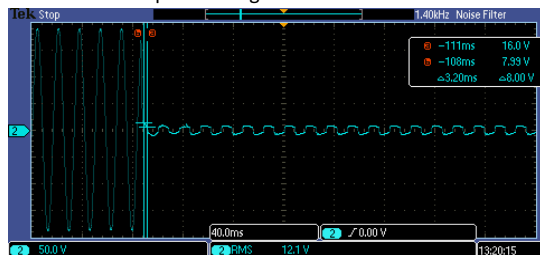
Results

Pedestrian Signal		
Sample	Indication	Decay Time (mS)
CRT2502170837-011-1	Walking Person	Less than 5
	Hand	Less than 5

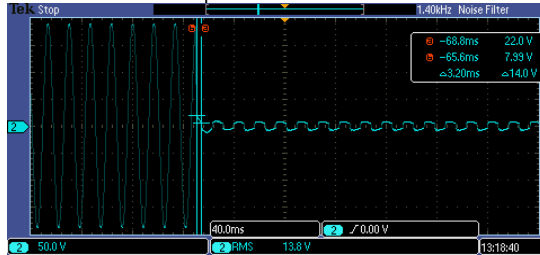
Pedestrian Signal		
Sample	Indication	Decay Time (mS)
CRT2502170837-011-2	Walking Person	Less than 5
	Hand	Less than 5

Pedestrian Signal		
Sample	Indication	Decay Time (mS)
CRT2502170837-011-3	Walking Person	Less than 5
	Hand	Less than 5

Sample Walking Person Screen Shot



Sample Hand Screen Shot



Measured Voltage: 135.0 Vac

Complies: ☒ YES ☐ NO

Tested By:	John Robins	Signature or initials:	<i>JR</i>
Engineer:	John Robins	Signature or initials:	<i>JR</i>
Reviewed By:	cwm	Signature or initials:	<i>cwm</i>
Test Equipment Used:	9,14,17	Completion Date:	9-Apr-2025
Amb (°C):	27.3	RH%	18

Equipment list				
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	M359	Digit Hygro-Thermometer	Testo	12-Aug-2025
2	L250	Signal Conditioner	PCB Piezotronics	16-Dec-2025
3	V393	Vibration Controller	Unholtz-Dickie	28-May-2025
4	L221	Accelerometer	PCB Piezotronics	29-Jan-2026
5	L222	Accelerometer	PCB Piezotronics	29-Jan-2026
6	H204	Thermal Chamber	Thermotron	12-Jun-2025
7	M207	Multimeter	Fluke	14-Oct-2025
8	A206	Current Transformer	Pearson	1-Jun-2025
9	L176	Thermometer	Testo	19-Jul-2025
10	M297	Power Analyzer	Yokogawa	29-May-2025
11	W149	Surge Control Center	ECAT	21-Aug-2025
12	W147	Ring Wave Surge Network	ECAT	21-Aug-2025
13	W148	Mains Coupler/Decoupler	ECAT	21-Aug-2025
14	E480	Oscilloscope	Tektronix	19-Mar-2026
15	L285	Hygro-Thermometer	Testo	22-Apr-2025
16	NA	PMT Module	Optronic Laboratories Inc	VBU
17	V244	High Voltage Probe	Tektronix	25-Apr-2025
18	NA	Power Supply	Northeast Scientific Inc	VBU
19	NA	Capacitor	unknown	VBU
20	T937	Thermometer	Fluke	16-Jan-2026
21	Y255	Anemometer	Pacer Instruments	20-Sep-2025
22	N1154	Rain Gauge	Cole Parmer	14-Feb-2026
23	M296	Stopwatch	Traceable	22-Jan-2026
24	L224	IR Thermometer	Fluke	10-Oct-2025
25	O109	Goniometer	Optroniks	4-Mar-2026
26	L235	25M Detector	Instrument Systems	19-Apr-2026
27	O091	Power Analyzer	Yokogawa	11-Jun-2025
28	L252	Hygrothermometer	Testo	3-Jun-2025
29	L254	Hygro-Thermometer	Testo	3-Jun-2025
30	0757	PR740 Spectrometer	Photo Research	30-Apr-2025
31	M207	Multimeter	Fluke	14-Oct-2025
32	L268	Tape Measure	Crescent	9-Dec-2027
Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files				