

Photometric Test Report

Relevant Standards

- ☒ ANSI/IES LM-79-2019
- ☒ ANSI C82.77-2017

Prepared For

RAB Lighting Inc.

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Issue Date: 2024-12-25

Revised Date: N/A

1.0 Test Summary

DLC Technical Requirements V5.1

Architectural Flood and Spot Luminaires				
Requirement Category	Test Method	Requirements		Test Value
Luminaire Output (lm) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	1000		1234
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Standard	Premium	114.3
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		10.8
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2002 ANSI C82-77-10:2020	20.00%	1200V	13.59
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2002 ANSI C82-77-10:2020	0.9	120V	0.991
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	ANSI/IES LM-79:2019	7 steps	3985±275	3890
		4 steps	3985±154	
Minimum CRI (Integrating Sphere – Section 4.1)	ANSI/IES LM-79:2019 CIE13.3-1995	≥70		84.6
Minimum R9 (Integrating Sphere – Section 4.1)	ANSI/IES LM-79-2019 CIE13.3-1995	N/A		17
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		84
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		98
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-11%
Zonal Lumen Requirement (0°-90°) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	≥85%		100.0%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Cast		120.0
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Input Current (A)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		0.091
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		10.8
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A

2.0 Test List

Test Item	Test	Test Date	Model Number	Build Level	Sample No.
1	Integrating Sphere Test	2024-12-24	BULLET20 @10W4000K	ES 1st ES #3-2	241216013-S1
2	Goniophotometer Test	2024-12-24	BULLET20 @10W4000K	ES 1st ES #3-2	241216013-S1
3	THD and PF Test	2024-12-24	BULLET20 @10W4000K	ES 1st ES #3-2	241216013-S1

Remark (If any):

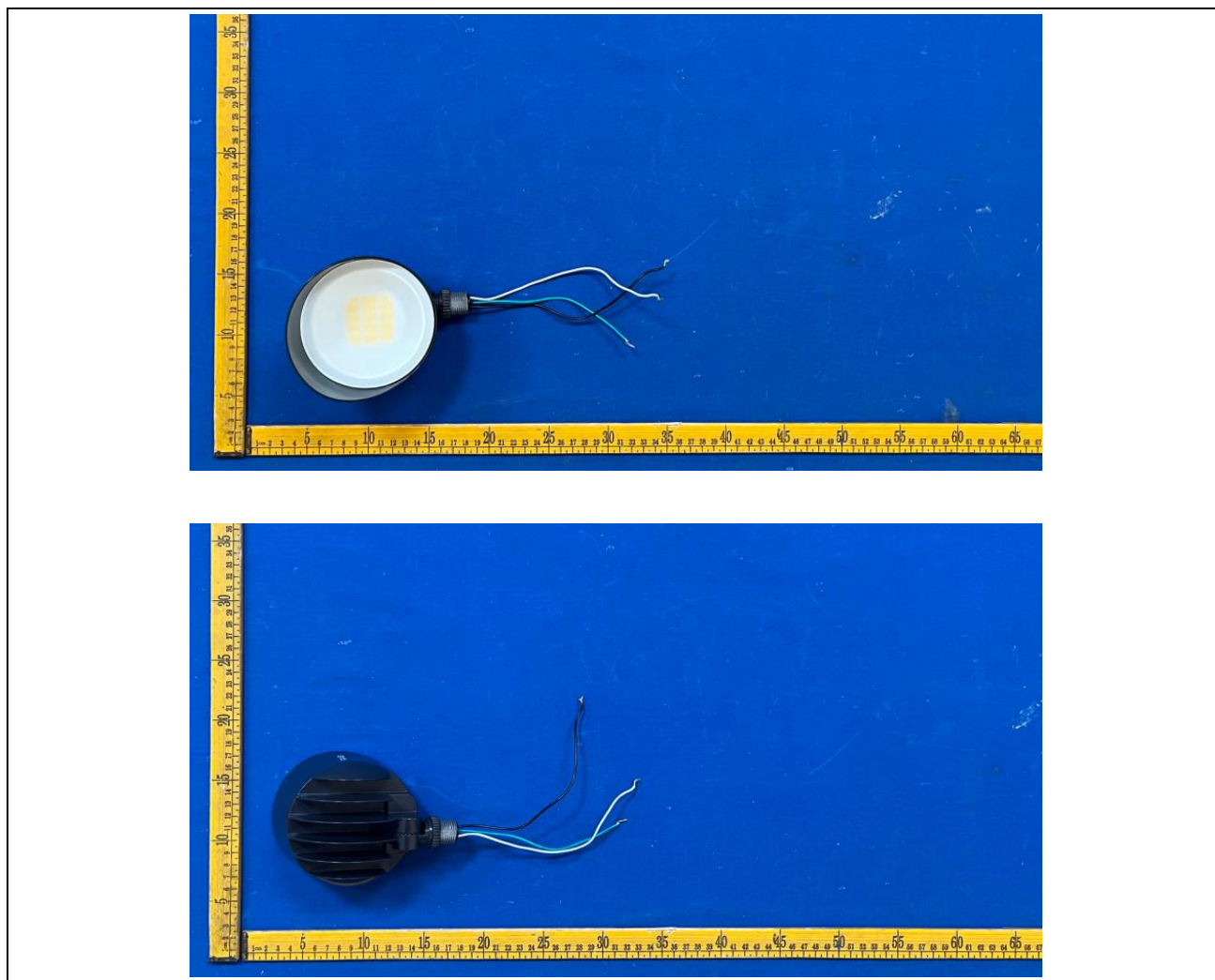
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

3.0 Product Description

Luminaire Description: Model No. BULLET20 @10W4000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120Vac, 60Hz

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	BULLET20 @10W4000K	Sample ID	241216013-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

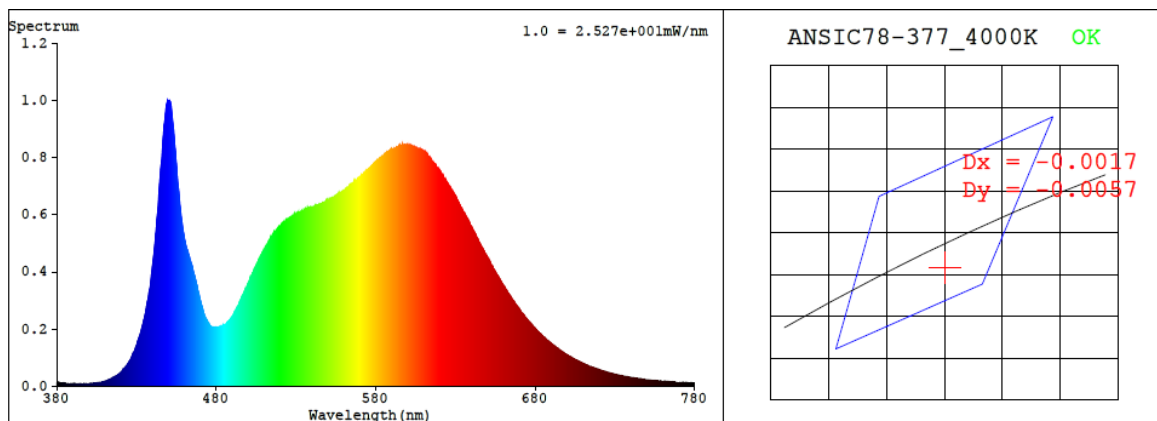
Test Method
<p>The Samples were tested according to the ANSI/IES LM-79:2019.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780nm.</p>

Test Result

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.091	10.8	0.991

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3890	84.6	17	-0.0022	84	98	-11%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.3838$ $y = 0.3742$ / $u' = 0.2284$ $v' = 0.5009$ ($duv = -2.18e-03$)

CCT= 3890K Prcp WL: Ld=580.7nm Purity=27.5%

Peak WL: Lp=449nm FWHM: =19.1nm Ratio: R=19.2% G=77.5% B=3.3%

Render Index: Ra = 84.6 AvgR = 78.6 TM30: Rf=84 Rg=98

EEI: 0.12099 A+

R1 =84 R2 =90 R3 =94 R4 =85 R5 =84 R6 =86 R7 =87

R8 =68 R9 =17 R10=75 R11=84 R12=64 R13=86 R14=96 R15=79

4.1 Integrating Sphere Test

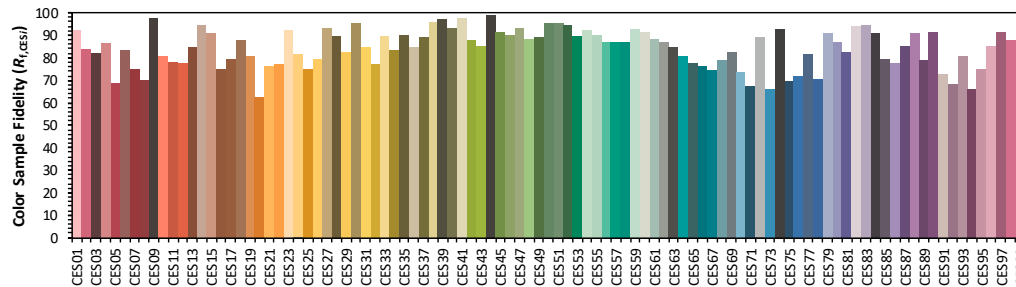
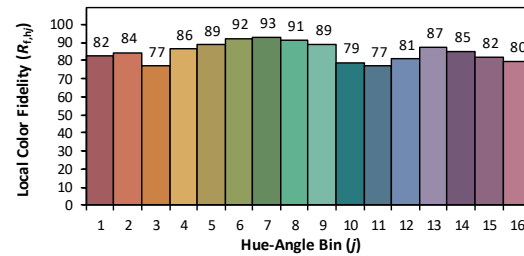
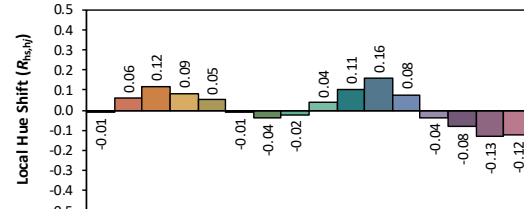
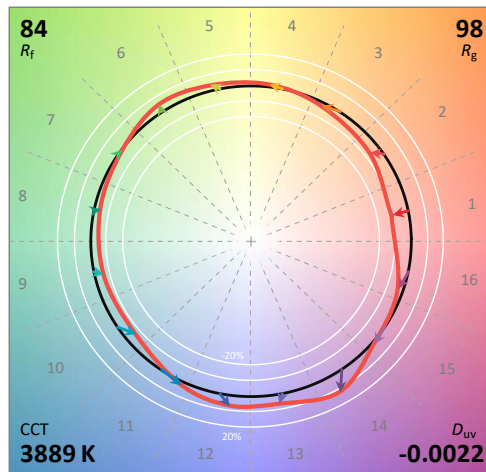
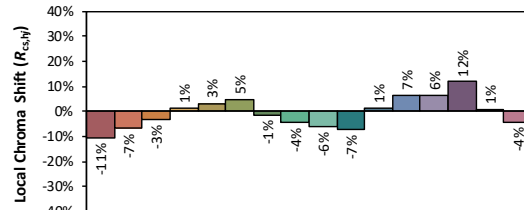
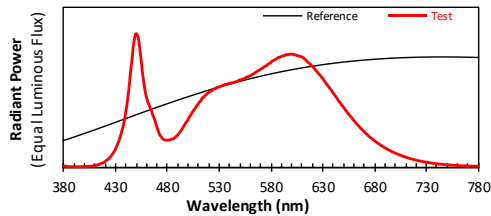
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2024/12/25

Model: BULLET20 @10W4000K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3838
 y 0.3740
 u' 0.2284
 v' 0.5009

CIE 13.3-1995
(CRI)
 R_a 85
 R_g 17

4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	1.28E-05	447	9.02E-04	514	5.21E-04	581	7.92E-04	648	4.71E-04	715	6.82E-05
381	1.46E-05	448	9.48E-04	515	5.26E-04	582	7.95E-04	649	4.61E-04	716	6.60E-05
382	1.15E-05	449	9.89E-04	516	5.35E-04	583	8.00E-04	650	4.51E-04	717	6.37E-05
383	9.40E-06	450	9.97E-04	517	5.40E-04	584	8.04E-04	651	4.41E-04	718	6.19E-05
384	1.14E-05	451	9.83E-04	518	5.48E-04	585	8.06E-04	652	4.29E-04	719	6.01E-05
385	9.00E-06	452	9.62E-04	519	5.55E-04	586	8.14E-04	653	4.20E-04	720	5.77E-05
386	7.40E-06	453	9.09E-04	520	5.59E-04	587	8.20E-04	654	4.08E-04	721	5.60E-05
387	8.30E-06	454	8.41E-04	521	5.66E-04	588	8.21E-04	655	4.00E-04	722	5.43E-05
388	7.80E-06	455	7.75E-04	522	5.70E-04	589	8.24E-04	656	3.90E-04	723	5.25E-05
389	7.70E-06	456	7.02E-04	523	5.75E-04	590	8.27E-04	657	3.81E-04	724	5.09E-05
390	7.80E-06	457	6.45E-04	524	5.82E-04	591	8.30E-04	658	3.72E-04	725	4.91E-05
391	8.70E-06	458	5.95E-04	525	5.86E-04	592	8.31E-04	659	3.62E-04	726	4.79E-05
392	7.70E-06	459	5.51E-04	526	5.88E-04	593	8.35E-04	660	3.53E-04	727	4.63E-05
393	8.30E-06	460	5.19E-04	527	5.91E-04	594	8.37E-04	661	3.44E-04	728	4.47E-05
394	8.30E-06	461	4.90E-04	528	5.98E-04	595	8.43E-04	662	3.35E-04	729	4.33E-05
395	8.20E-06	462	4.73E-04	529	6.00E-04	596	8.39E-04	663	3.25E-04	730	4.16E-05
396	7.70E-06	463	4.55E-04	530	6.01E-04	597	8.41E-04	664	3.18E-04	731	4.10E-05
397	8.70E-06	464	4.34E-04	531	6.04E-04	598	8.44E-04	665	3.09E-04	732	3.92E-05
398	8.30E-06	465	4.16E-04	532	6.07E-04	599	8.44E-04	666	3.01E-04	733	3.83E-05
399	8.20E-06	466	3.91E-04	533	6.10E-04	600	8.45E-04	667	2.93E-04	734	3.70E-05
400	8.80E-06	467	3.72E-04	534	6.14E-04	601	8.44E-04	668	2.85E-04	735	3.57E-05
401	9.80E-06	468	3.50E-04	535	6.18E-04	602	8.42E-04	669	2.77E-04	736	3.46E-05
402	1.03E-05	469	3.24E-04	536	6.20E-04	603	8.39E-04	670	2.70E-04	737	3.36E-05
403	1.08E-05	470	2.99E-04	537	6.18E-04	604	8.39E-04	671	2.62E-04	738	3.25E-05
404	1.08E-05	471	2.78E-04	538	6.22E-04	605	8.35E-04	672	2.54E-04	739	3.15E-05
405	1.18E-05	472	2.57E-04	539	6.26E-04	606	8.33E-04	673	2.48E-04	740	3.04E-05
406	1.28E-05	473	2.41E-04	540	6.26E-04	607	8.31E-04	674	2.39E-04	741	2.95E-05
407	1.35E-05	474	2.31E-04	541	6.27E-04	608	8.28E-04	675	2.33E-04	742	2.87E-05
408	1.45E-05	475	2.20E-04	542	6.32E-04	609	8.27E-04	676	2.25E-04	743	2.76E-05
409	1.57E-05	476	2.13E-04	543	6.33E-04	610	8.22E-04	677	2.21E-04	744	2.75E-05
410	1.71E-05	477	2.08E-04	544	6.33E-04	611	8.19E-04	678	2.14E-04	745	2.64E-05
411	1.92E-05	478	2.06E-04	545	6.37E-04	612	8.14E-04	679	2.08E-04	746	2.59E-05
412	2.11E-05	479	2.06E-04	546	6.39E-04	613	8.05E-04	680	2.02E-04	747	2.50E-05
413	2.35E-05	480	2.06E-04	547	6.42E-04	614	7.99E-04	681	1.95E-04	748	2.41E-05
414	2.58E-05	481	2.07E-04	548	6.44E-04	615	7.90E-04	682	1.90E-04	749	2.34E-05
415	2.94E-05	482	2.07E-04	549	6.50E-04	616	7.83E-04	683	1.84E-04	750	2.28E-05
416	3.26E-05	483	2.09E-04	550	6.53E-04	617	7.78E-04	684	1.80E-04	751	2.22E-05
417	3.53E-05	484	2.14E-04	551	6.55E-04	618	7.68E-04	685	1.74E-04	752	2.16E-05
418	3.87E-05	485	2.15E-04	552	6.57E-04	619	7.60E-04	686	1.69E-04	753	2.09E-05
419	4.29E-05	486	2.17E-04	553	6.61E-04	620	7.54E-04	687	1.63E-04	754	2.03E-05
420	4.78E-05	487	2.24E-04	554	6.64E-04	621	7.45E-04	688	1.59E-04	755	2.03E-05
421	5.53E-05	488	2.30E-04	555	6.67E-04	622	7.38E-04	689	1.54E-04	756	1.94E-05
422	5.97E-05	489	2.36E-04	556	6.71E-04	623	7.26E-04	690	1.50E-04	757	1.91E-05
423	6.56E-05	490	2.44E-04	557	6.77E-04	624	7.20E-04	691	1.45E-04	758	1.85E-05
424	7.36E-05	491	2.55E-04	558	6.77E-04	625	7.10E-04	692	1.41E-04	759	1.82E-05
425	8.19E-05	492	2.63E-04	559	6.81E-04	626	7.00E-04	693	1.36E-04	760	1.75E-05
426	9.12E-05	493	2.75E-04	560	6.84E-04	627	6.93E-04	694	1.33E-04	761	1.72E-05
427	1.03E-04	494	2.85E-04	561	6.88E-04	628	6.83E-04	695	1.28E-04	762	1.66E-05
428	1.14E-04	495	2.99E-04	562	6.94E-04	629	6.74E-04	696	1.24E-04	763	1.64E-05
429	1.28E-04	496	3.13E-04	563	6.96E-04	630	6.66E-04	697	1.20E-04	764	1.60E-05
430	1.42E-04	497	3.23E-04	564	7.04E-04	631	6.53E-04	698	1.17E-04	765	1.56E-05
431	1.62E-04	498	3.38E-04	565	7.07E-04	632	6.42E-04	699	1.13E-04	766	1.55E-05
432	1.78E-04	499	3.46E-04	566	7.13E-04	633	6.31E-04	700	1.09E-04	767	1.51E-05
433	1.97E-04	500	3.60E-04	567	7.19E-04	634	6.20E-04	701	1.06E-04	768	1.46E-05
434	2.20E-04	501	3.75E-04	568	7.21E-04	635	6.10E-04	702	1.03E-04	769	1.41E-05
435	2.45E-04	502	3.86E-04	569	7.27E-04	636	6.00E-04	703	9.99E-05	770	1.39E-05
436	2.72E-04	503	3.98E-04	570	7.32E-04	637	5.89E-04	704	9.67E-05	771	1.39E-05
437	3.01E-04	504	4.11E-04	571	7.38E-04	638	5.80E-04	705	9.32E-05	772	1.35E-05
438	3.35E-04	505	4.23E-04	572	7.42E-04	639	5.68E-04	706	9.11E-05	773	1.34E-05
439	3.75E-04	506	4.34E-04	573	7.48E-04	640	5.58E-04	707	8.79E-05	774	1.29E-05
440	4.25E-04	507	4.44E-04	574	7.53E-04	641	5.46E-04	708	8.52E-05	775	1.29E-05
441	4.74E-04	508	4.57E-04	575	7.56E-04	642	5.36E-04	709	8.27E-05	776	1.25E-05
442	5.35E-04	509	4.68E-04	576	7.60E-04	643	5.25E-04	710	8.03E-05	777	1.22E-05
443	6.00E-04	510	4.78E-04	577	7.68E-04	644	5.14E-04	711	7.71E-05	778	1.19E-05
444	6.79E-04	511	4.90E-04	578	7.73E-04	645	5.01E-04	712	7.45E-05	779	1.19E-05
445	7.52E-04	512	4.96E-04	579	7.78E-04	646	4.91E-04	713	7.25E-05	780	1.19E-05
446	8.14E-04	513	5.08E-04	580	7.83E-04	647	4.82E-04	714	6.96E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	BULLET20 @10W4000K	Sample ID	241216013-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	24.8	Humidity (%RH)	41.3

Test Method
<p>The Samples were tested according to the ANSI/IES LM-79:2019.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at $25 \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.</p> <p>The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1.0° vertical intervals and 15° horizontal intervals.</p>

Test Conditions

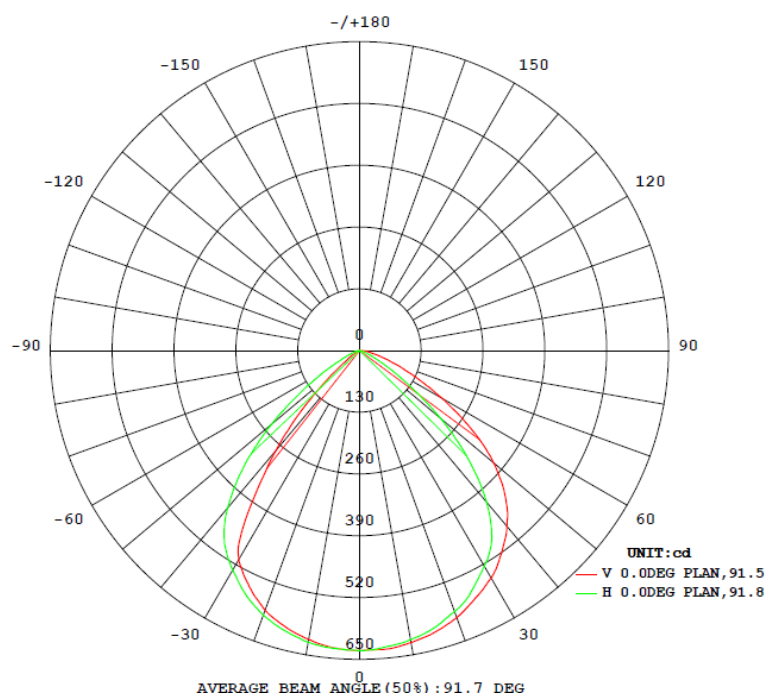
Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	120.0	60	0.091	10.8	0.991
NON-WORST CASE	N/A	N/A	N/A	N/A	N/A

Test Result

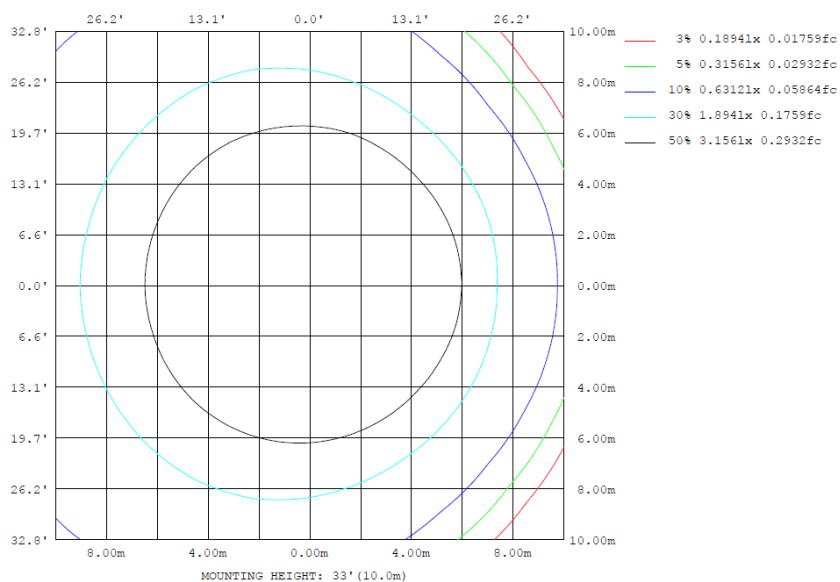
Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	NEMA Type
	C0-180	C90-270	C0-180	C90-270		(0°-90°)	
1234	123.7	123.9	91.3	91.3	114.3	100.0%	6H x 6V

4.2 Goniophotometer Test

Lighting Distribution Curve



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	zone	total	lum, lamp
10	617.3	617.9	617.9	623.8	623.9	625.2	623.1	621.4	0- 10	59.79	59.79	4.84, 4.84
20	581.2	579.9	584.3	596.9	598.0	598.5	592.2	585.0	10- 20	171.6	231.4	18.7, 18.7
30	508.8	504.3	524.6	549.0	552.9	556.6	533.6	513.0	20- 30	259.5	490.9	39.8, 39.8
40	272.6	303.3	415.6	474.1	482.6	479.2	431.5	310.7	30- 40	293.6	784.5	63.5, 63.5
50	63.26	77.08	223.7	359.4	368.4	363.9	243.1	80.28	40- 50	236.5	1021	82.7, 82.7
60	12.25	16.96	64.70	186.8	198.8	191.6	75.28	20.00	50- 60	136.6	1158	93.8, 93.8
70	0.0111	0.4272	14.15	61.00	74.45	65.65	17.68	0.9799	60- 70	56.81	1214	98.4, 98.4
80	0.0125	0.0122	2.366	13.17	20.67	15.48	3.207	0.0237	70- 80	16.65	1231	99.7, 99.7
90	0	0	0	0	0	0	0	0	80- 90	3.365	1234	100, 100
100	0	0	0	0	0	0	0	0	90-100	0	1234	100, 100
110	0	0	0	0	0	0	0	0	100-110	0	1234	100, 100
120	0	0	0	0	0	0	0	0	110-120	0	1234	100, 100
130	0	0	0	0	0	0	0	0	120-130	0	1234	100, 100
140	0	0	0	0	0	0	0	0	130-140	0	1234	100, 100
150	0	0	0	0	0	0	0	0	140-150	0	1234	100, 100
160	0	0	0	0	0	0	0	0	150-160	0	1234	100, 100
170	0	0	0	0	0	0	0	0	160-170	0	1234	100, 100
180	0	0	0	0	0	0	0	0	170-180	0	1234	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

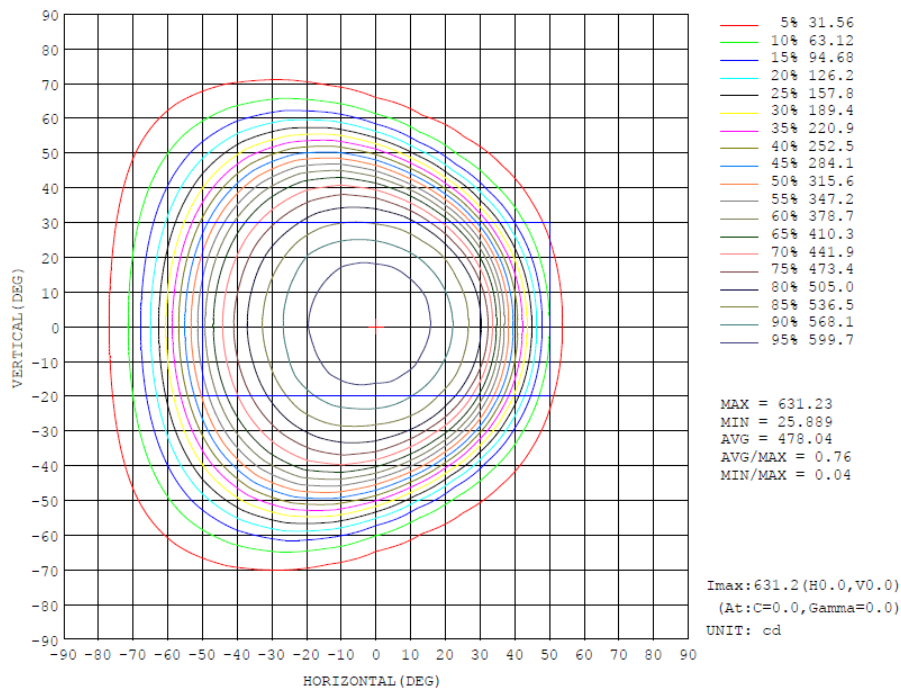
	Zonal (lm)		Total (lm)	Percent
0-10	59.79	0-10	59.79	4.84%
10-20	171.64	0-20	231.43	18.75%
20-30	259.49	0-30	490.92	39.77%
30-40	293.55	0-40	784.47	63.55%
40-50	236.52	0-50	1020.99	82.71%
50-60	136.64	0-60	1157.63	93.78%
60-70	56.81	0-70	1214.44	98.38%
70-80	16.65	0-80	1231.09	99.73%
80-90	3.36	0-90	1234.45	100.00%
90-100	0.00	0-100	1234.45	100.00%
100-110	0.00	0-110	1234.45	100.00%
110-120	0.00	0-120	1234.45	100.00%
120-130	0.00	0-130	1234.45	100.00%
130-140	0.00	0-140	1234.45	100.00%
140-150	0.00	0-150	1234.45	100.00%
150-160	0.00	0-160	1234.45	100.00%
160-170	0.00	0-170	1234.45	100.00%
170-180	0.00	0-180	1234.45	100.00%

4.2 Goniophotometer Test

Area Flux Diagram

VERTICAL (DEG)	AREA FLUX DIAGRAM																		UNIT: lm	Φ _t	Φ _a
	0.01	0.03	0.06	0.09	0.11	0.11	0.10	0.08	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00
90	0.01	0.06	0.14	0.26	0.39	0.49	0.52	0.45	0.34	0.21	0.11	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	3.05	0.00
80	0.02	0.10	0.27	0.59	1.06	1.58	1.96	1.93	1.53	0.98	0.55	0.27	0.09	0.01	0.00	0.00	0.00	0.00	0.00	10.9	4.61
70	0.02	0.14	0.47	1.17	2.35	3.87	5.22	5.81	5.23	3.73	2.02	0.94	0.42	0.10	0.00	0.00	0.00	0.00	0.00	31.5	28.3
60	0.02	0.19	0.73	2.00	4.23	7.07	9.55	10.9	10.9	9.27	6.24	2.97	1.08	0.38	0.05	0.00	0.00	0.00	0.00	65.6	63.5
50	0.03	0.24	1.03	2.96	6.24	9.78	12.6	14.4	15.0	14.3	11.8	7.38	2.91	0.79	0.18	0.01	0.00	0.00	0.00	99.6	98.2
40	0.03	0.29	1.32	3.89	7.81	11.5	14.3	16.4	17.2	16.9	15.4	11.7	5.92	1.60	0.32	0.02	0.00	0.00	0.00	125	123
30	0.03	0.33	1.56	4.60	8.78	12.5	15.4	17.5	18.5	18.3	16.9	14.2	8.56	2.68	0.44	0.04	0.00	0.00	0.00	140	139
20	0.03	0.36	1.69	4.98	9.22	12.9	15.8	17.9	19.0	18.9	17.6	15.0	9.86	3.37	0.52	0.05	0.00	0.00	0.00	147	146
10	0.03	0.36	1.69	4.97	9.21	12.9	15.8	17.9	18.9	18.9	17.5	15.0	9.78	3.36	0.51	0.05	0.00	0.00	0.00	147	146
0	0.03	0.33	1.55	4.58	8.72	12.4	15.3	17.3	18.3	18.1	16.8	14.0	8.41	2.64	0.43	0.04	0.00	0.00	0.00	139	138
-10	0.03	0.29	1.31	3.88	7.76	11.4	14.2	16.1	16.9	16.7	15.1	11.5	5.83	1.54	0.30	0.02	0.00	0.00	0.00	123	122
-20	0.03	0.23	1.01	2.95	6.21	9.67	12.4	14.1	14.7	13.9	11.4	7.14	2.80	0.74	0.16	0.00	0.00	0.00	0.00	97.5	96.0
-30	0.02	0.18	0.70	1.97	4.19	6.96	9.28	10.5	10.4	8.74	5.81	2.74	1.00	0.33	0.04	0.00	0.00	0.00	0.00	62.9	60.7
-40	0.02	0.13	0.44	1.12	2.28	3.73	4.98	5.41	4.75	3.29	1.75	0.82	0.35	0.08	0.00	0.00	0.00	0.00	0.00	29.1	25.8
-50	0.02	0.09	0.24	0.54	0.98	1.46	1.78	1.71	1.31	0.82	0.45	0.21	0.06	0.00	0.00	0.00	0.00	0.00	0.00	9.66	3.48
-60	0.01	0.06	0.13	0.22	0.33	0.42	0.44	0.38	0.28	0.17	0.08	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	2.55	0.00
-70	0.00	0.02	0.05	0.07	0.08	0.09	0.08	0.06	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00
-80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Φ _t	0.40	3.43	14.4	40.8	79.9	119	150	169	173	163	140	104	57.1	17.6	2.96	0.24	0.00	0.00	0.00	1234	---
Φ _a	0.00	0.23	11.2	38.2	77.4	116	147	167	171	161	137	101	54.2	14.1	0.00	0.00	0.00	0.00	0.00	---	1195

Isocandela



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

H (DBG)		UNIT: cd																	
V (DEG)	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
-180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-80	0.00	2.93	4.42	5.14	5.90	6.55	7.20	7.55	7.78	7.95	7.78	7.47	7.09	6.52	5.70	4.67	3.98	3.21	2.37
-70	0.00	4.42	6.58	8.71	10.18	13.33	16.3	19.5	22.8	26.2	29.0	30.8	31.9	31.4	29.3	25.8	22.2	18.7	14.1
-60	0.00	5.57	8.98	12.7	17.8	24.7	33.4	43.8	55.6	69.8	83.7	94.9	105	112	111	106	96.8	82.6	64.7
-50	0.00	6.61	11.2	17.9	27.7	41.4	59.8	84.4	113	145	180	212	239	262	272	274	268	249	224
-40	0.00	7.51	13.7	23.8	39.6	62.6	94.8	137	188	242	296	343	377	405	426	433	439	430	416
-30	0.00	8.27	16.3	29.9	52.1	86.3	133	193	262	330	395	428	462	487	508	521	528	528	525
-20	0.00	8.86	18.5	35.3	63.3	106	166	241	320	387	440	481	513	540	561	574	582	586	584
-10	0.00	9.25	20.0	39.1	71.5	121	190	274	356	421	471	508	542	568	588	602	614	619	618
0	0.00	9.41	20.7	40.7	74.4	126	199	286	368	433	483	520	553	576	598	614	624	631	631
10	0.00	9.30	20.2	39.5	71.8	121	190	274	357	423	472	512	544	570	590	605	618	622	623
20	0.00	8.97	18.9	36.0	64.4	107	166	242	322	391	444	485	519	544	565	582	590	592	592
30	0.00	8.42	16.8	30.9	53.7	87.4	133	194	263	331	389	433	467	493	514	529	535	537	534
40	0.00	7.69	14.2	25.0	41.6	65.0	96.9	138	188	243	298	347	384	413	435	444	451	444	432
50	0.00	6.82	11.9	19.4	29.8	44.1	62.8	86.8	115	148	184	218	246	271	284	289	284	267	242
60	0.00	5.79	9.43	13.8	19.9	26.9	36.4	47.4	59.5	73.5	88.3	100	112	120	120	118	109	93.9	75.3
70	0.00	4.62	7.10	9.62	12.1	15.0	18.8	22.3	25.8	29.6	32.7	34.9	36.5	36.1	33.9	30.2	26.8	22.6	17.7
80	0.00	3.29	4.64	6.59	8.86	11.72	15.8	19.5	23.3	26.9	29.6	30.7	8.47	7.80	6.93	5.84	5.25	4.17	3.21
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

H (DEG)																UNIT: cd			
Y (DEG)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
-180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
-80	1.80	1.21	0.65	0.43	0.23	0.07	0.04	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.00	
-70	11.7	8.99	6.34	4.30	2.43	1.08	0.51	0.17	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.00	
-60	51.8	38.2	27.6	21.3	15.3	10.2	5.71	2.10	0.55	0.09	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.00	
-50	188	145	107	74.6	47.2	33.6	23.4	15.0	7.98	2.54	0.54	0.26	0.01	0.01	0.01	0.01	0.01	0.02	
-40	388	351	300	234	167	104	61.7	35.9	22.5	12.1	4.50	0.87	0.01	0.01	0.01	0.01	0.01	0.02	
-30	517	500	466	419	350	260	166	88.7	43.3	24.3	12.2	3.72	0.17	0.01	0.01	0.01	0.01	0.02	
-20	581	569	551	525	480	399	291	181	87.9	36.9	19.7	7.72	0.99	0.01	0.01	0.01	0.01	0.02	
-10	615	605	590	565	535	486	371	252	136	53.7	24.9	11.1	2.09	0.01	0.01	0.01	0.01	0.02	
0	628	617	602	581	549	509	401	273	155	63.3	26.6	12.3	2.47	0.01	0.01	0.01	0.01	0.02	
10	620	610	595	569	537	490	380	252	137	54.8	25.5	11.4	2.12	0.01	0.01	0.01	0.01	0.02	
20	587	575	556	534	488	409	295	183	91.5	38.5	20.8	8.27	1.08	0.01	0.01	0.02	0.02	0.00	
30	527	512	479	431	359	265	169	93.5	45.5	25.9	13.3	3.91	0.24	0.01	0.01	0.02	0.02	0.00	
40	404	366	313	246	176	112	64.6	38.1	24.7	13.7	5.18	0.75	0.01	0.01	0.02	0.02	0.02	0.00	
50	206	163	121	83.2	53.2	37.2	26.5	17.7	9.58	3.35	0.46	0.02	0.01	0.02	0.02	0.02	0.02	0.00	
60	60.8	45.2	32.7	25.4	18.7	12.8	7.57	3.13	1.01	0.23	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.00	
70	14.6	11.4	8.28	5.87	3.59	1.83	0.91	0.31	0.05	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.00	
80	2.48	1.74	1.01	0.68	0.38	0.14	0.09	0.05	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.00	
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	BULLET20 @10W4000K	Sample ID	241216013-S1
Temperature (°C)	25.4	Humidity (%RH)	41.0

Test Method
<p>The samples were tested according to the and Ansi C82.77: 2002 and ANSI C82.77-10:2020</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at $25 \pm 1^{\circ}\text{C}$. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion was calculated.</p>

Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.091	10.8	0.991	13.59

5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2024-11-07	2025-11-06
NTC-F01-006	2.0 meter Integrating Sphere	2024-11-07	2025-11-06
NTC-F01-012	Standard Lamp	2024-10-28	2025-10-27
NTC-F01-013	Standard Lamp	2024-10-28	2025-10-27
NTC-F01-031	Digital Power Meter	2024-08-06	2025-08-05
NTC-F01-019	Temperature & Humidity Meter	2024-10-29	2025-10-28

*****End of Report*****