

## Photometric Test Report

### Relevant Standards

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

Prepared For

**RAB Lighting Inc.**

Address: 408 W 14th St New York, NY 10014

Prepared By

**Dongguan New Testing Centre Co., Ltd.**

Address: 3F No. 1 the 1st North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China

Prepare by:

*Alan Wang*

Engineer: Alan Wang

Date: 2024-12-25

Review by:

*Vincent Yuan*

Technical Lead: Vincent Yuan

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		1147
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Standard	Premium	108.2
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		10.6
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2002 ANSI C82-77-10:2020	20.00%	1200V	13.64
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	3045±175	3059
		4 steps	3045±100	
Minimum CRI (Integrating Sphere – Section 4.1)	ANSI/IES LM-79:2019 CIE13.3-1995	≥70		82.6
Minimum R9 (Integrating Sphere – Section 4.1)	ANSI/IES LM-79-2019 CIE13.3-1995	N/A		7
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		0.089
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		10.6
(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 @10W3000K	ES 1st ES #3-2	241216013-S1
2	Goniophotometer Test	2024-12-24	BULLET20 @10W3000K	ES 1st ES #3-2	241216013-S1
3	THD and PF Test	2024-12-24	BULLET20 @10W3000K	ES 1st ES #3-2	241216013-S1

### Remark (If any):

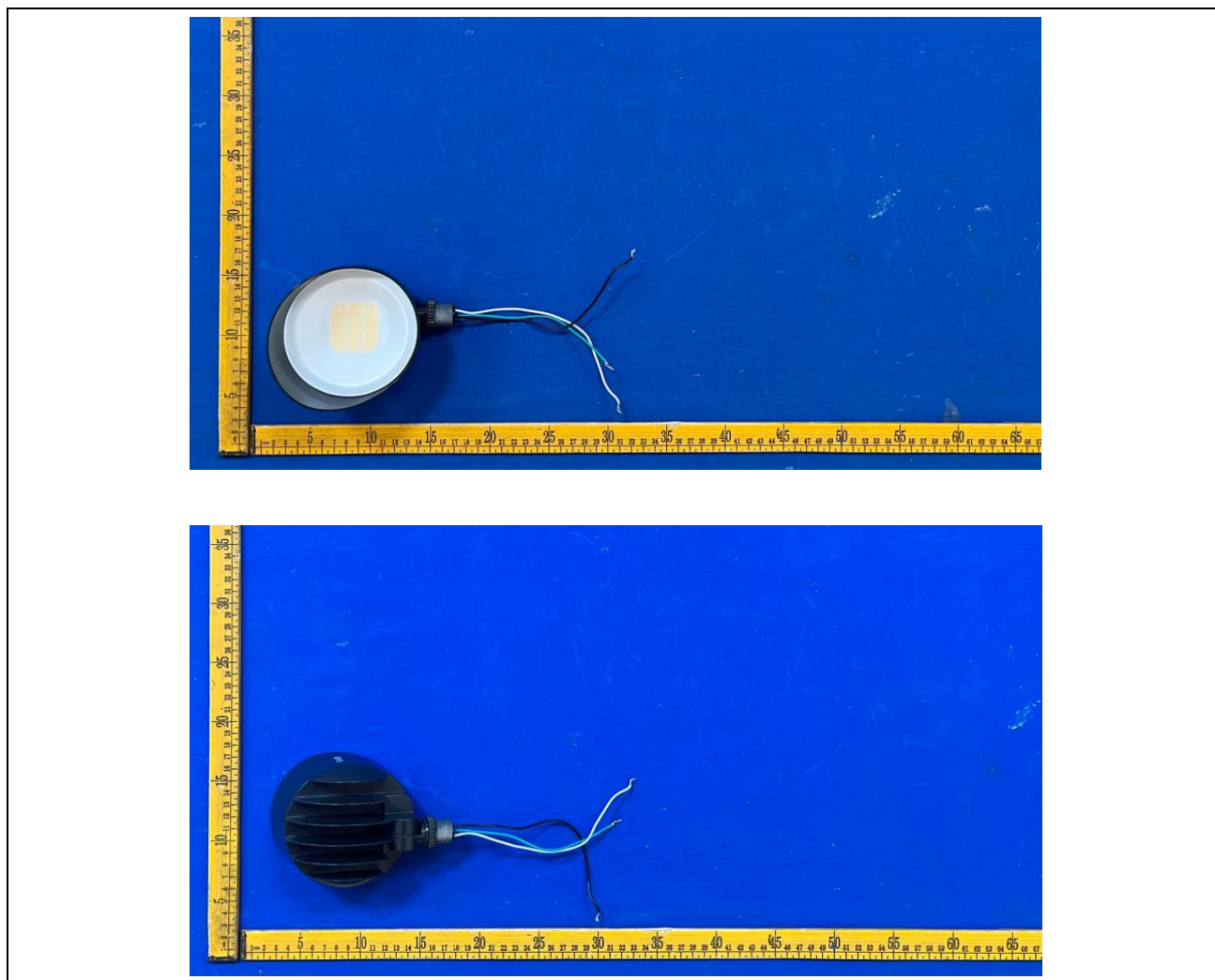
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3. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

### 3.0 Product Description

Luminaire Description: Model No. BULLET20 @10W3000K, 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

<b>Model No.</b>	BULLET20 @10W3000K	<b>Sample ID</b>	241216013-S1
<b>Operate time (Min.)</b>	10	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

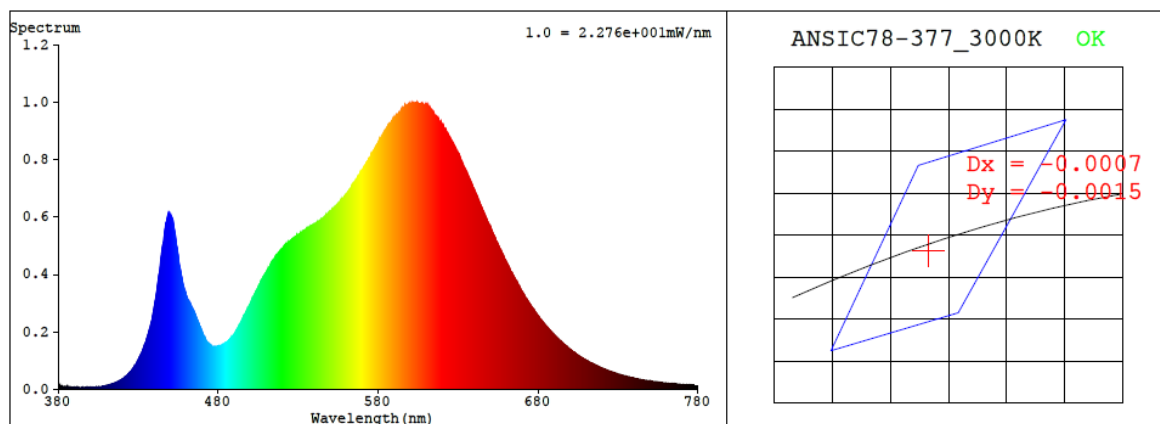
<b>Test Method</b>
<p>The Samples were tested according to the ANSI/IES LM-79:2019.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were 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

<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
120.0	60	0.089	10.6	0.991

<b>CCT (K)</b>	<b>CRI</b>	<b>R9</b>	<b>Duv</b>	<b>Rf</b>	<b>Rg</b>	<b>IES Rcs,h1</b>
3059	82.6	7	-0.0005	84	98	-11%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.4321$   $y = 0.4012$  /  $u' = 0.2487$   $v' = 0.5195$  ( $duv = -4.97e-04$ )

CCT= 3059K Prcp WL: Ld=582.8nm Purity=50.1%

Peak WL: Lp=604nm FWHM: =133.8nm Ratio:R=22.6% G=75.0% B=2.3%

Render Index: Ra = 82.6 AvgR = 76.6 TM30:Rf=83 Rg=97

EEL: 0.12627 A+

R1 =81 R2 =90 R3 =96 R4 =82 R5 =81 R6 =87 R7 =84

R8 =60 R9 =7 R10=76 R11=82 R12=69 R13=83 R14=98 R15=74

## 4.1 Integrating Sphere Test

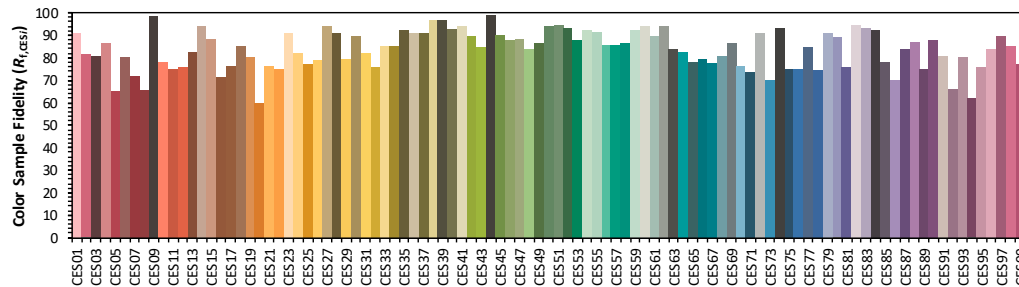
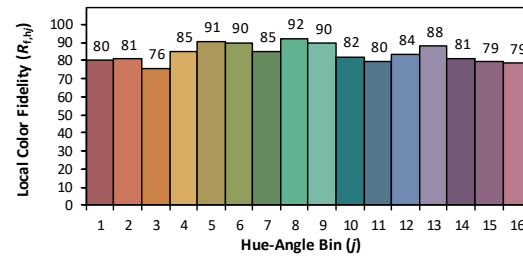
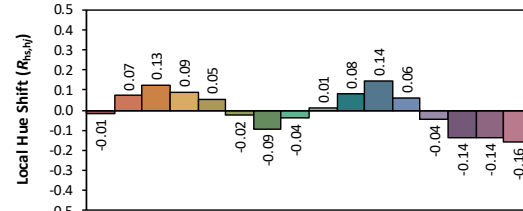
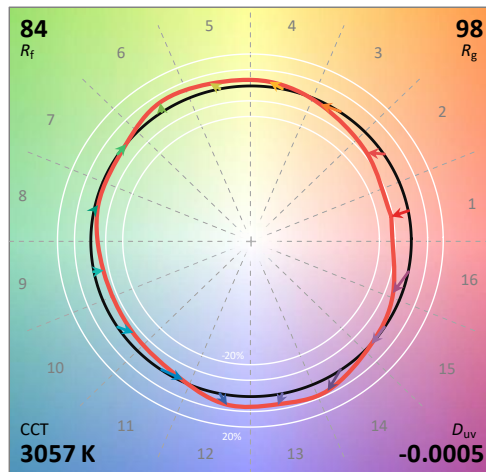
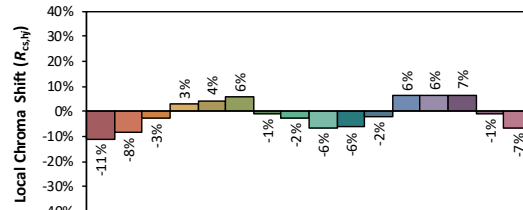
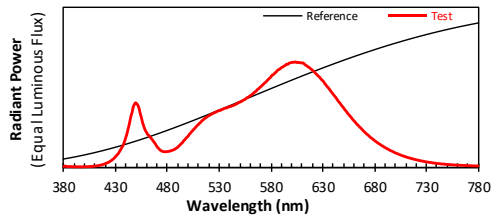
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2024/12/25

Model: BULLET20 @10W3000K



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

$x$  0.4322  
 $y$  0.4010  
 $u'$  0.2488  
 $v'$  0.5195

CIE 13.3-1995  
(CRI)  
 $R_a$  83  
 $R_g$  7



## 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	9.30E-06	447	5.74E-04	514	4.48E-04	581	8.73E-04	648	5.91E-04	715	8.63E-05
381	1.43E-05	448	5.94E-04	515	4.54E-04	582	8.77E-04	649	5.78E-04	716	8.39E-05
382	1.12E-05	449	6.11E-04	516	4.64E-04	583	8.86E-04	650	5.67E-04	717	8.15E-05
383	8.20E-06	450	6.08E-04	517	4.69E-04	584	8.96E-04	651	5.53E-04	718	7.84E-05
384	8.30E-06	451	5.96E-04	518	4.77E-04	585	9.04E-04	652	5.41E-04	719	7.60E-05
385	6.80E-06	452	5.78E-04	519	4.85E-04	586	9.16E-04	653	5.30E-04	720	7.36E-05
386	8.90E-06	453	5.44E-04	520	4.90E-04	587	9.25E-04	654	5.14E-04	721	7.14E-05
387	7.60E-06	454	5.02E-04	521	4.96E-04	588	9.29E-04	655	5.04E-04	722	6.94E-05
388	7.80E-06	455	4.67E-04	522	5.01E-04	589	9.36E-04	656	4.92E-04	723	6.71E-05
389	6.80E-06	456	4.26E-04	523	5.07E-04	590	9.45E-04	657	4.81E-04	724	6.43E-05
390	7.40E-06	457	3.96E-04	524	5.13E-04	591	9.50E-04	658	4.69E-04	725	6.27E-05
391	6.50E-06	458	3.68E-04	525	5.17E-04	592	9.55E-04	659	4.55E-04	726	6.11E-05
392	7.70E-06	459	3.45E-04	526	5.21E-04	593	9.63E-04	660	4.45E-04	727	5.90E-05
393	6.20E-06	460	3.30E-04	527	5.26E-04	594	9.68E-04	661	4.34E-04	728	5.68E-05
394	5.80E-06	461	3.12E-04	528	5.31E-04	595	9.78E-04	662	4.23E-04	729	5.48E-05
395	7.30E-06	462	3.04E-04	529	5.36E-04	596	9.77E-04	663	4.10E-04	730	5.31E-05
396	6.10E-06	463	2.91E-04	530	5.38E-04	597	9.84E-04	664	4.02E-04	731	5.13E-05
397	5.90E-06	464	2.80E-04	531	5.41E-04	598	9.89E-04	665	3.91E-04	732	5.02E-05
398	6.70E-06	465	2.69E-04	532	5.45E-04	599	9.92E-04	666	3.81E-04	733	4.82E-05
399	6.30E-06	466	2.54E-04	533	5.51E-04	600	9.95E-04	667	3.72E-04	734	4.69E-05
400	6.90E-06	467	2.41E-04	534	5.53E-04	601	9.97E-04	668	3.60E-04	735	4.55E-05
401	7.50E-06	468	2.29E-04	535	5.59E-04	602	9.96E-04	669	3.50E-04	736	4.40E-05
402	8.00E-06	469	2.12E-04	536	5.62E-04	603	9.97E-04	670	3.40E-04	737	4.30E-05
403	7.70E-06	470	1.97E-04	537	5.63E-04	604	1.00E-03	671	3.32E-04	738	4.07E-05
404	8.50E-06	471	1.85E-04	538	5.68E-04	605	9.95E-04	672	3.20E-04	739	4.03E-05
405	8.60E-06	472	1.75E-04	539	5.72E-04	606	9.93E-04	673	3.13E-04	740	3.85E-05
406	9.70E-06	473	1.64E-04	540	5.75E-04	607	9.96E-04	674	3.05E-04	741	3.73E-05
407	1.02E-05	474	1.59E-04	541	5.78E-04	608	9.92E-04	675	2.96E-04	742	3.64E-05
408	1.01E-05	475	1.54E-04	542	5.82E-04	609	9.92E-04	676	2.86E-04	743	3.53E-05
409	1.17E-05	476	1.50E-04	543	5.86E-04	610	9.90E-04	677	2.79E-04	744	3.43E-05
410	1.34E-05	477	1.49E-04	544	5.88E-04	611	9.90E-04	678	2.72E-04	745	3.31E-05
411	1.45E-05	478	1.50E-04	545	5.94E-04	612	9.84E-04	679	2.63E-04	746	3.24E-05
412	1.61E-05	479	1.49E-04	546	5.99E-04	613	9.73E-04	680	2.56E-04	747	3.17E-05
413	1.78E-05	480	1.51E-04	547	6.02E-04	614	9.67E-04	681	2.48E-04	748	3.05E-05
414	1.94E-05	481	1.52E-04	548	6.09E-04	615	9.60E-04	682	2.41E-04	749	2.98E-05
415	2.17E-05	482	1.53E-04	549	6.15E-04	616	9.53E-04	683	2.34E-04	750	2.93E-05
416	2.36E-05	483	1.57E-04	550	6.19E-04	617	9.47E-04	684	2.27E-04	751	2.81E-05
417	2.59E-05	484	1.61E-04	551	6.24E-04	618	9.38E-04	685	2.21E-04	752	2.72E-05
418	2.89E-05	485	1.64E-04	552	6.28E-04	619	9.30E-04	686	2.15E-04	753	2.66E-05
419	3.25E-05	486	1.67E-04	553	6.36E-04	620	9.23E-04	687	2.08E-04	754	2.59E-05
420	3.59E-05	487	1.72E-04	554	6.40E-04	621	9.14E-04	688	2.03E-04	755	2.51E-05
421	4.10E-05	488	1.79E-04	555	6.46E-04	622	9.06E-04	689	1.96E-04	756	2.46E-05
422	4.38E-05	489	1.85E-04	556	6.53E-04	623	8.93E-04	690	1.90E-04	757	2.38E-05
423	4.85E-05	490	1.92E-04	557	6.62E-04	624	8.84E-04	691	1.84E-04	758	2.33E-05
424	5.41E-05	491	2.03E-04	558	6.65E-04	625	8.73E-04	692	1.79E-04	759	2.27E-05
425	6.00E-05	492	2.11E-04	559	6.73E-04	626	8.64E-04	693	1.73E-04	760	2.22E-05
426	6.71E-05	493	2.22E-04	560	6.79E-04	627	8.55E-04	694	1.68E-04	761	2.15E-05
427	7.50E-05	494	2.31E-04	561	6.86E-04	628	8.43E-04	695	1.63E-04	762	2.11E-05
428	8.20E-05	495	2.43E-04	562	6.95E-04	629	8.31E-04	696	1.58E-04	763	2.07E-05
429	9.21E-05	496	2.56E-04	563	7.00E-04	630	8.23E-04	697	1.54E-04	764	2.01E-05
430	1.03E-04	497	2.64E-04	564	7.13E-04	631	8.10E-04	698	1.49E-04	765	1.97E-05
431	1.15E-04	498	2.78E-04	565	7.17E-04	632	7.95E-04	699	1.43E-04	766	1.91E-05
432	1.25E-04	499	2.87E-04	566	7.27E-04	633	7.84E-04	700	1.39E-04	767	1.87E-05
433	1.38E-04	500	2.97E-04	567	7.38E-04	634	7.70E-04	701	1.35E-04	768	1.83E-05
434	1.55E-04	501	3.12E-04	568	7.45E-04	635	7.60E-04	702	1.31E-04	769	1.77E-05
435	1.72E-04	502	3.22E-04	569	7.55E-04	636	7.48E-04	703	1.27E-04	770	1.75E-05
436	1.89E-04	503	3.34E-04	570	7.63E-04	637	7.34E-04	704	1.23E-04	771	1.70E-05
437	2.06E-04	504	3.45E-04	571	7.73E-04	638	7.21E-04	705	1.19E-04	772	1.66E-05
438	2.30E-04	505	3.56E-04	572	7.82E-04	639	7.08E-04	706	1.15E-04	773	1.63E-05
439	2.58E-04	506	3.67E-04	573	7.91E-04	640	6.96E-04	707	1.11E-04	774	1.59E-05
440	2.90E-04	507	3.77E-04	574	8.01E-04	641	6.83E-04	708	1.08E-04	775	1.51E-05
441	3.22E-04	508	3.89E-04	575	8.08E-04	642	6.71E-04	709	1.05E-04	776	1.50E-05
442	3.63E-04	509	3.99E-04	576	8.19E-04	643	6.58E-04	710	1.01E-04	777	1.51E-05
443	4.02E-04	510	4.08E-04	577	8.29E-04	644	6.43E-04	711	9.84E-05	778	1.45E-05
444	4.49E-04	511	4.20E-04	578	8.39E-04	645	6.29E-04	712	9.48E-05	779	1.46E-05
445	4.93E-04	512	4.26E-04	579	8.49E-04	646	6.17E-04	713	9.18E-05	780	1.46E-05
446	5.25E-04	513	4.38E-04	580	8.58E-04	647	6.06E-04	714	8.99E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	BULLET20 @10W3000K	<b>Sample ID</b>	241216013-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	24.8	<b>Humidity (%RH)</b>	41.3

<b>Test Method</b>
<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 <math>25 \pm 1^\circ\text{C}</math>, 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 <math>\pm 0.2</math> 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 <math>1.0^\circ</math> vertical intervals and <math>15^\circ</math> horizontal intervals.</p>

### Test Conditions

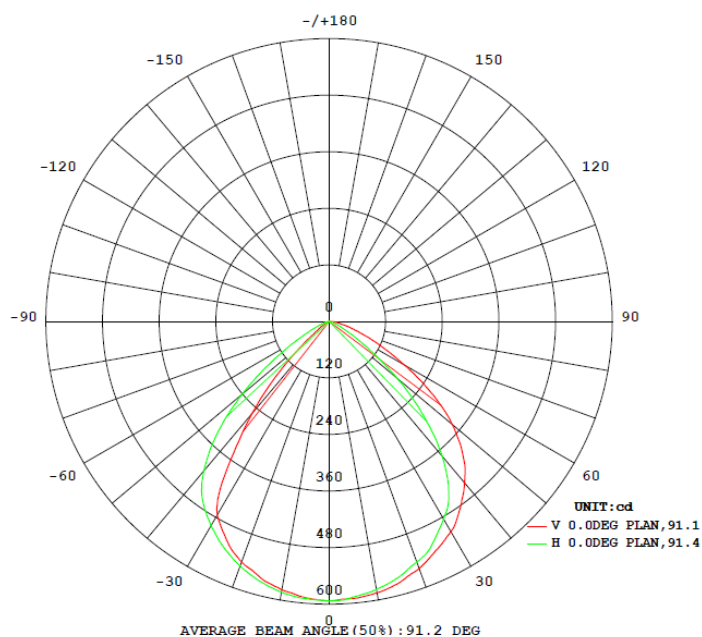
Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
<b>WORST CASE</b>	120.0	60	0.089	10.6	0.991
<b>NON-WORST CASE</b>	N/A	N/A	N/A	N/A	N/A

### Test Result

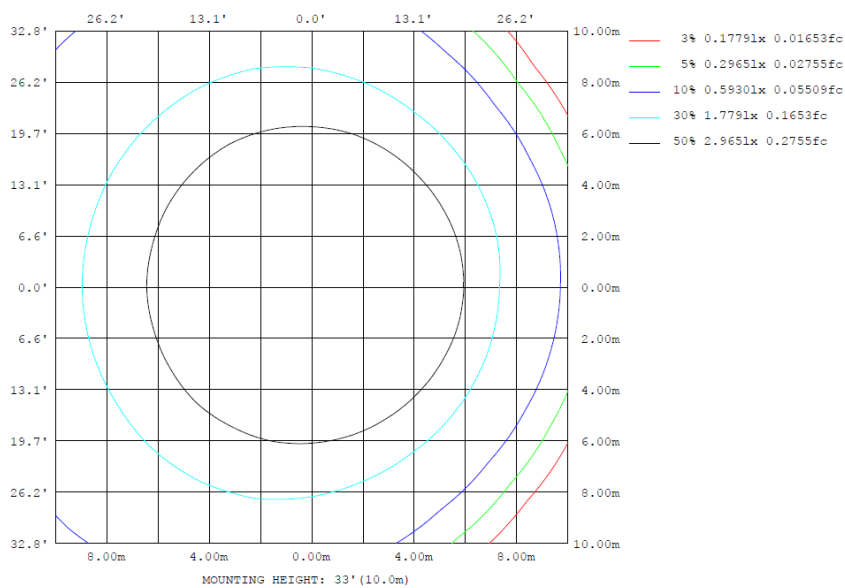
Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	NEMA Type
	C0-180	C90-270	C0-180	C90-270		(0°-90°)	
1147	123.5	123.7	90.8	91.4	108.2	100.0%	6H x 6V

## 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	φ zone	φ total	%lum, lamp
10	577.7	577.6	577.2	584.0	584.5	584.7	583.2	581.3	0- 10	55.99	55.99	4.88,4.88
20	543.2	541.1	543.2	556.3	558.0	558.0	552.4	546.2	10- 20	160.4	216.4	18.9,18.9
30	474.1	465.6	484.9	509.9	515.3	520.6	500.5	481.7	20- 30	241.9	458.3	39.9,39.9
40	253.3	263.0	372.5	438.0	446.4	447.7	413.1	305.0	30- 40	272.8	731.1	63.7,63.7
50	57.87	64.42	189.7	326.0	341.0	342.9	241.3	79.90	40- 50	218.9	950.0	82.8,82.8
60	11.19	15.13	51.90	163.8	183.0	184.0	76.41	18.72	50- 60	126.2	1076	93.8,93.8
70	0.0111	0.3864	12.29	52.49	69.07	64.56	16.82	0.9200	60- 70	52.47	1129	98.4,98.4
80	0.0108	0.0111	2.121	11.35	19.17	15.25	3.052	0.0209	70- 80	15.41	1144	99.7,99.7
90	0	0	0	0	0	0	0	0	80- 90	3.126	1147	100,100
100	0	0	0	0	0	0	0	0	90-100	0	1147	100,100
110	0	0	0	0	0	0	0	0	100-110	0	1147	100,100
120	0	0	0	0	0	0	0	0	110-120	0	1147	100,100
130	0	0	0	0	0	0	0	0	120-130	0	1147	100,100
140	0	0	0	0	0	0	0	0	130-140	0	1147	100,100
150	0	0	0	0	0	0	0	0	140-150	0	1147	100,100
160	0	0	0	0	0	0	0	0	150-160	0	1147	100,100
170	0	0	0	0	0	0	0	0	160-170	0	1147	100,100
180	0	0	0	0	0	0	0	0	170-180	0	1147	100,100
DEG	LUMINOUS INTENSITY: cd									UNIT: lm		

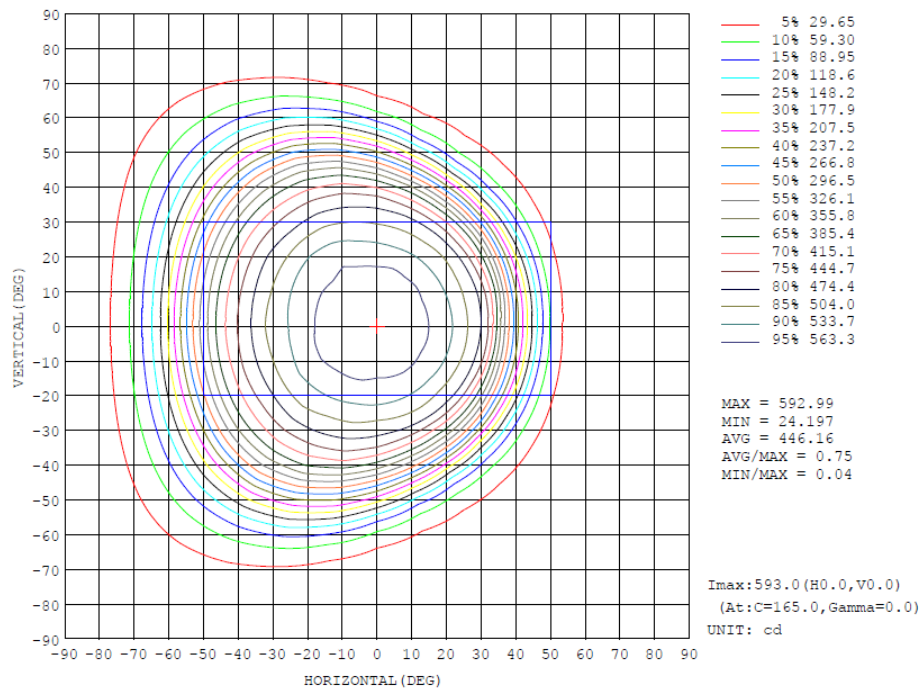
	Zonal (lm)		Total (lm)	Percent
0-10	55.99	0-10	55.99	4.88%
10-20	160.37	0-20	216.36	18.86%
20-30	241.94	0-30	458.30	39.95%
30-40	272.80	0-40	731.10	63.73%
40-50	218.90	0-50	950.00	82.81%
50-60	126.23	0-60	1076.23	93.81%
60-70	52.47	0-70	1128.70	98.38%
70-80	15.41	0-80	1144.11	99.73%
80-90	3.13	0-90	1147.24	100.00%
90-100	0.00	0-100	1147.24	100.00%
100-110	0.00	0-110	1147.24	100.00%
110-120	0.00	0-120	1147.24	100.00%
120-130	0.00	0-130	1147.24	100.00%
130-140	0.00	0-140	1147.24	100.00%
140-150	0.00	0-150	1147.24	100.00%
150-160	0.00	0-160	1147.24	100.00%
160-170	0.00	0-170	1147.24	100.00%
170-180	0.00	0-180	1147.24	100.00%

## 4.2 Goniophotometer Test

### Area Flux Diagram

		AREA FLUX DIAGRAM																		UNIT:lm		Φ t	Φ a
		0.00	0.03	0.06	0.08	0.10	0.11	0.10	0.07	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	
VERTICAL (DEG)	90	0.01	0.06	0.14	0.25	0.38	0.49	0.52	0.45	0.33	0.21	0.11	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	
	80	0.02	0.09	0.26	0.57	1.04	1.57	1.96	1.95	1.54	0.98	0.53	0.26	0.08	0.01	0.00	0.00	0.00	0.00	0.00	10.8	5.08	
	70	0.02	0.13	0.45	1.13	2.28	3.77	5.14	5.75	5.23	3.77	2.02	0.91	0.39	0.10	0.00	0.00	0.00	0.00	0.00	31.1	28.2	
	60	0.02	0.18	0.69	1.90	4.04	6.73	9.11	10.5	10.5	9.10	6.24	2.99	1.06	0.35	0.05	0.00	0.00	0.00	0.00	63.5	61.5	
	50	0.03	0.23	0.97	2.80	5.88	9.17	11.8	13.5	14.2	13.6	11.4	7.29	2.89	0.75	0.17	0.01	0.00	0.00	0.00	94.6	93.3	
	40	0.03	0.28	1.24	3.66	7.30	10.7	13.4	15.3	16.1	15.8	14.4	11.2	5.79	1.54	0.30	0.02	0.00	0.00	0.00	117	116	
	30	0.03	0.31	1.45	4.30	8.16	11.6	14.4	16.3	17.3	17.1	15.8	13.3	8.16	2.55	0.41	0.04	0.00	0.00	0.00	131	130	
	20	0.03	0.33	1.57	4.62	8.55	12.0	14.7	16.7	17.8	17.7	16.4	14.0	9.23	3.15	0.48	0.05	0.00	0.00	0.00	137	137	
	10	0.03	0.33	1.56	4.58	8.51	12.0	14.7	16.7	17.7	17.7	16.4	14.0	9.01	3.06	0.47	0.05	0.00	0.00	0.00	137	136	
	0	0.03	0.30	1.42	4.19	8.04	11.4	14.2	16.2	17.0	16.9	15.7	13.0	7.59	2.34	0.39	0.03	0.00	0.00	0.00	129	128	
	-10	0.03	0.26	1.19	3.52	7.11	10.5	13.2	14.9	15.7	15.5	14.0	10.4	5.08	1.35	0.27	0.02	0.00	0.00	0.00	113	112	
	-20	0.02	0.21	0.91	2.65	5.62	8.84	11.4	13.0	13.5	12.6	10.1	6.13	2.37	0.65	0.14	0.00	0.00	0.00	0.00	88.2	86.8	
	-30	0.02	0.16	0.63	1.75	3.72	6.21	8.29	9.37	9.17	7.58	4.90	2.28	0.86	0.30	0.04	0.00	0.00	0.00	0.00	55.3	53.2	
	-40	0.02	0.12	0.39	0.98	1.99	3.25	4.31	4.63	4.00	2.72	1.46	0.71	0.31	0.07	0.00	0.00	0.00	0.00	0.00	25.0	21.6	
	-50	0.01	0.08	0.22	0.47	0.84	1.24	1.50	1.41	1.08	0.69	0.40	0.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00	8.20	2.29	
	-60	0.01	0.05	0.11	0.20	0.29	0.35	0.37	0.32	0.24	0.15	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.19	0.00	
	-70	0.00	0.02	0.04	0.06	0.07	0.07	0.07	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	
	-80	0.00	0.02	0.04	0.06	0.07	0.07	0.07	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	
	-90	0.00	0.02	0.04	0.06	0.07	0.07	0.07	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	
			-90	-80	-70	-60	-50	-40	-30	-20	HORIZONTAL (DEG)	20	30	40	50	60	70	80	90				
Φ t		0.37	3.18	13.3	37.7	73.9	110	139	157	161	152	130	96.7	52.9	16.2	2.71	0.21	0.00	0.00	1147	---		
Φ a		0.00	0.21	10.3	35.2	71.6	108	137	155	159	150	127	94.0	50.2	12.9	0.00	0.00	0.00	0.00	---	1110		

### Isocandela



## 4.2 Goniophotometer Test

### Luminous Distribution Intensity Data

Table--1

UNIT: cd

H (DEG)	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
V (DEG)	-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	0.00	2.73	3.88	4.67	5.31	5.84	6.30	6.64	6.85	7.02	6.86	6.46	5.92	5.44	4.85	4.06	3.48	2.83
	-70	0.00	4.10	6.01	7.89	9.76	11.9	14.5	17.1	19.8	22.7	24.8	26.1	26.7	26.2	24.4	21.3	18.8	15.8
	-60	0.00	5.16	8.13	11.6	16.1	22.1	29.6	38.6	48.5	60.1	72.6	81.7	90.1	95.1	94.0	88.5	79.9	67.5
	-50	0.00	6.11	10.3	16.3	25.1	37.2	53.2	75.0	99.6	128	158	186	210	229	238	239	232	214
	-40	0.00	6.94	12.6	21.8	35.9	56.4	85.0	123	168	217	266	311	343	368	387	393	398	389
	-30	0.00	7.66	14.8	27.4	47.5	77.5	120	174	237	301	353	394	426	451	469	481	488	485
	-20	0.00	8.22	16.9	32.5	58.0	97.2	151	220	292	357	405	444	473	501	521	532	540	543
	-10	0.00	8.59	18.4	36.1	65.7	111	174	251	328	390	436	473	503	529	550	564	573	577
	0	0.00	8.76	19.2	37.8	69.1	117	183	265	341	401	446	484	515	536	558	574	585	590
	10	0.00	8.66	18.7	36.8	66.9	113	176	256	332	393	438	476	506	532	551	565	575	583
	20	0.00	8.36	17.4	33.7	60.3	100	156	227	302	364	414	452	484	508	531	546	555	551
	30	0.00	7.85	15.5	29.0	50.5	82.3	126	182	248	311	363	405	436	460	479	495	503	504
	40	0.00	7.18	13.3	23.7	39.3	61.6	92.0	131	179	231	282	327	362	388	408	419	426	422
	50	0.00	6.38	11.1	18.1	28.1	41.9	60.0	83.2	111	143	177	210	238	264	277	282	279	263
	60	0.00	5.43	8.86	13.0	18.8	25.7	34.9	45.7	57.7	71.7	86.7	99.1	111	119	120	118	110	94.9
	70	0.00	4.34	6.68	9.09	11.5	14.3	18.1	21.7	25.2	29.1	32.4	34.7	36.6	36.3	34.2	30.6	26.9	22.3
	80	0.00	2.91	4.39	5.59	6.53	7.39	8.23	8.76	9.15	9.46	9.35	8.99	8.45	7.75	6.86	5.72	4.91	4.02
	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

H (DEG)																		UNIT: cd	
V (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	1.61	1.09	0.59	0.39	0.21	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	10.2	7.92	5.68	3.87	2.20	0.98	0.47	0.15	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00	
-60	42.4	32.2	24.0	18.7	13.6	9.18	5.12	1.90	0.50	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	
-50	158	121	88.6	61.0	40.3	29.3	20.7	13.4	7.29	2.29	0.23	0.01	0.01	0.01	0.01	0.01	0.01	0.00	
-40	345	308	259	197	138	87.3	50.7	31.5	20.1	10.9	3.97	0.52	0.01	0.01	0.01	0.01	0.01	0.00	
-30	477	459	425	377	309	223	141	76.2	38.2	21.8	11.0	3.12	0.15	0.01	0.01	0.01	0.01	0.00	
-20	542	531	512	486	441	359	258	158	77.1	33.3	17.8	7.05	0.90	0.01	0.01	0.01	0.01	0.00	
-10	575	566	553	529	498	450	337	228	121	48.4	22.7	10.1	1.84	0.01	0.01	0.01	0.01	0.00	
0	588	578	563	543	513	474	371	253	142	57.9	24.3	11.2	2.24	0.01	0.01	0.01	0.01	0.00	
10	580	570	555	530	501	459	361	237	130	50.9	23.4	10.5	1.95	0.01	0.01	0.01	0.01	0.00	
20	548	537	520	499	460	390	286	177	88.4	35.9	19.2	7.62	1.01	0.01	0.01	0.01	0.01	0.00	
30	494	481	456	414	350	262	168	91.9	43.5	24.2	12.4	3.65	0.23	0.01	0.01	0.01	0.02	0.00	
40	390	358	309	246	177	112	64.1	36.4	23.2	12.9	4.84	0.70	0.01	0.01	0.02	0.02	0.02	0.00	
50	207	165	123	83.6	52.4	35.9	25.1	16.5	8.97	3.14	0.43	0.02	0.01	0.02	0.02	0.02	0.02	0.00	
60	61.2	44.8	31.9	24.4	17.5	12.0	7.08	2.92	0.94	0.22	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.00	
70	13.9	10.8	7.79	5.51	3.36	1.71	0.85	0.29	0.05	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.00	
80	2.36	1.64	0.94	0.63	0.35	0.13	0.08	0.04	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.03	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

<b>Model No.</b>	BULLET20 @10W3000K	<b>Sample ID</b>	241216013-S1
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

<b>Test Method</b>
<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 <math>25 \pm 1^\circ\text{C}</math>. 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	0.089	10.6	0.991	13.64

## 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\*\*\*\*\*