LM-79-08 Test Report

For

Antec Lighting Inc

(Brand Name: AOK)

Uniy C, 3979 E Guasti Road, Ontario, CA 91761

High Bay Luminaires for Commercial and Industrial Buildings

Model name(s): AOK-100WoH-NV2-R3-XX-XX70-120-P

Remark: The first "XX" can be "00" =no sensor provided or "SN"=sensor provided, The last "XX" represents different CCT as below: 30=3000K, 35=3500K, 40=4000K, 45=4500K, 50=5000K, 57=5700K.Where "P" represents mounting bracket, can be "A"=mounting ring or "B"=mounting bracket (U type)

Representative (Tested) Model:
AOK-100WoH-NV2-R3-00-3070-120-A
AOK-100WoH-NV2-R3-00-5770-120-A

Model Different: All construction and rating are the same, except CCT and sensor option.

Test & Report By:

Don Tang

Engineer: Don Tang

Review By:

Manager: John-Li

Date: Dec.13,2018

Note: 1.The results contained in this report pertain only to the tested samples.

2. This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:

Organization Name	Antec Lighting Inc	
Brand Name	AOK	
Model Number	AOK-100WoH-NV2-R3-XX-XX70-120-P	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	High Bay Luminaires for Commercial and Industrial Buildings	
Rated Voltage / Frequency	100-277V ac, 50/60 Hz	
Nominal Power	100W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K, 3500K, 4000K, 4500K, 5000K, 5700K.	
LED Manufacturer	Shenzhen Refond Optoelectronic Co., Ltd..	
LED Model	3000K: RF-Q30RA30A-01-J2 5700K: RF-Q30RA57A-01-J2	
Sample Number	JAE180920-AA1(3000K), AA2(5700K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo

1.2 Test Specifications:

Date of Receipt	Dec.03,2018
Date of Test	Dec.04,2018
Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Color Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method:

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25 °C ±1 °C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1 °vertical intervals and 22.5 °horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 ºC ±1 ºC. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25 ºC ±1 ºC. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-12-04	Test Ambient:	25.2 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-100WoH-NV2-R3-00-3070-120-A		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JAE180920 -AA1	120.0	60	0.8837	105.4	0.9939	4.16
	277.0	60	0.4277	103.9	0.8770	22.68
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

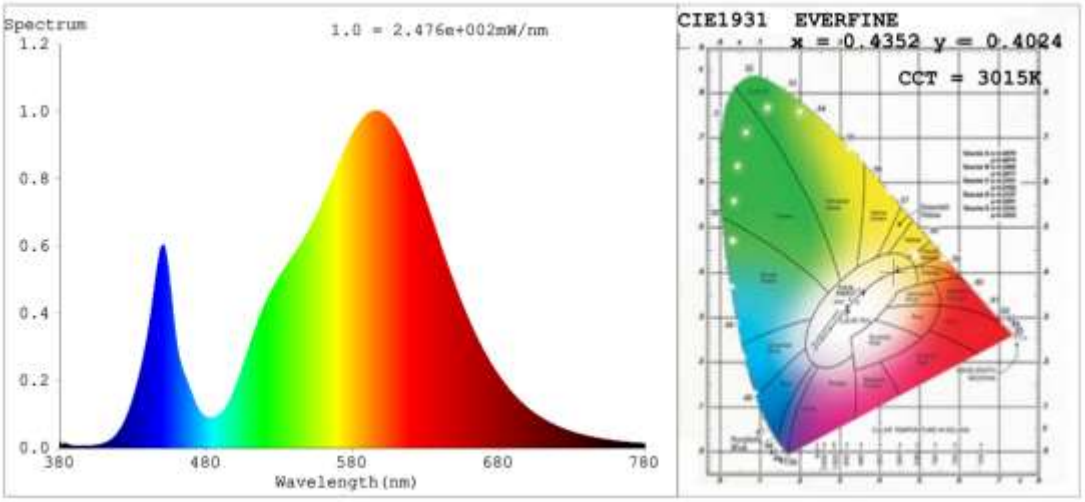
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3015
Duv	-0.0004
Chromaticity (x, y)	x=0.4352 y=0.4024
Chromaticity (u', v')	u'=0.2502 v'=0.5205
Color Rendering Index (CRI)	72.9
R9	0

Special Color Rendering Indices			
R1	70	R9	0
R2	82	R10	58
R3	93	R11	64
R4	69	R12	49
R5	69	R13	72
R6	75	R14	96
R7	79	R15	63
R8	47	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	13313	13298	>=10000 (-10%)	
Luminous Efficacy (lm/W)	126.31	127.99	Standard: >= 105(-3%)	Premium: >= 130(-3%)
Most Worst Luminous/Highest Watts	126.17			
Zonal lumens in the 20-50 °zone (%)	58.4	--	>= 30(-10)	
Beam Angle ( )	121.4	--	--	
Center Beam Candle Power (cd)	4456	--	--	

Spectral Power Distribution & Chromaticity Diagram

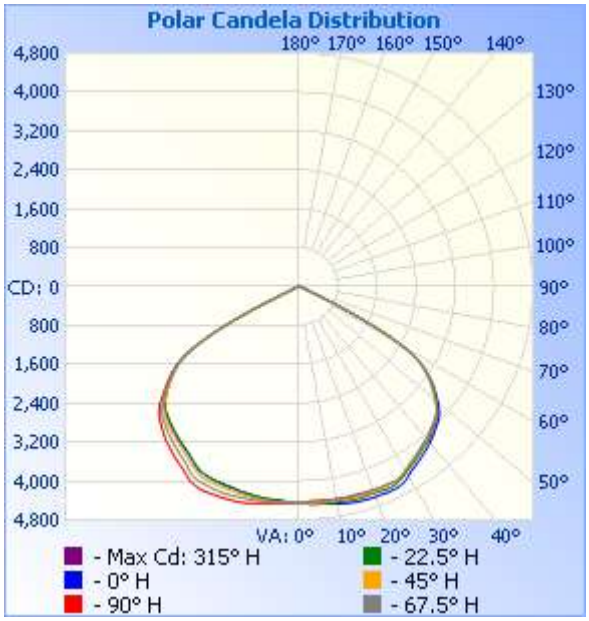


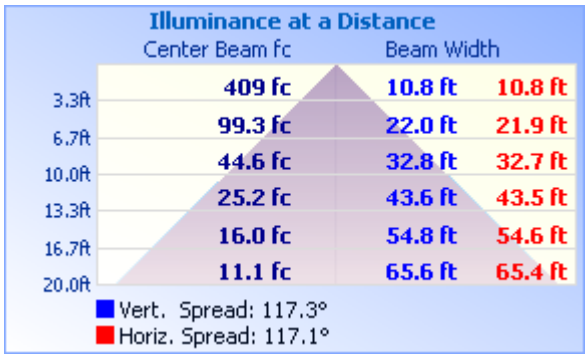
Zonal Lumen Tabulation

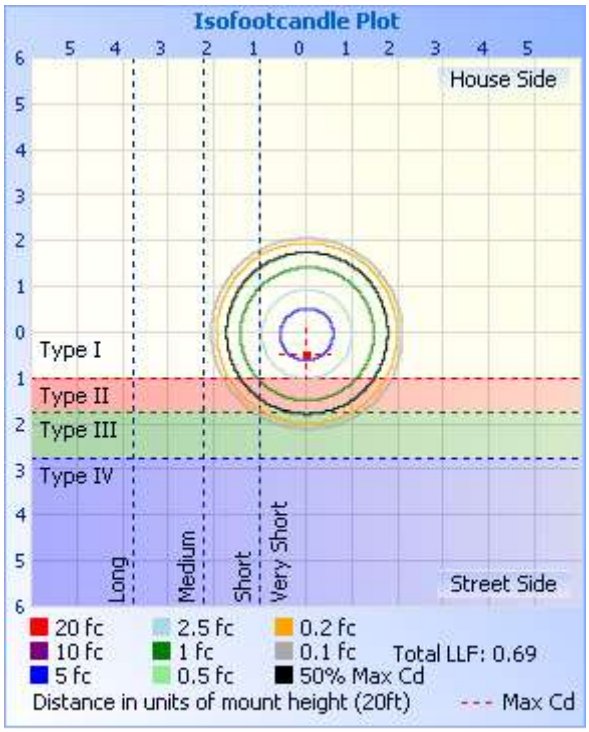
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	3,781.5	28.4%
0-40	6,446.3	48.4%
0-60	12,331.7	92.6%
60-90	939.4	7.1%
70-100	87.8	0.7%
90-120	8.6	0.1%
0-90	13,271.0	99.7%
90-180	40.1	0.3%
0-180	13,311.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	426.2	3.2%	90-100	0.5	0%
10-20	1,274.8	9.6%	100-110	2.6	0%
20-30	2,080.5	15.6%	110-120	5.5	0%
30-40	2,664.8	20.0%	120-130	7.7	0.1%
40-50	3,032.2	22.8%	130-140	7.8	0.1%
50-60	2,853.2	21.4%	140-150	6.6	0%
60-70	852.0	6.4%	150-160	5.0	0%
70-80	79.0	0.6%	160-170	3.1	0%
80-90	8.3	0.1%	170-180	1.2	0%

Photometric Data







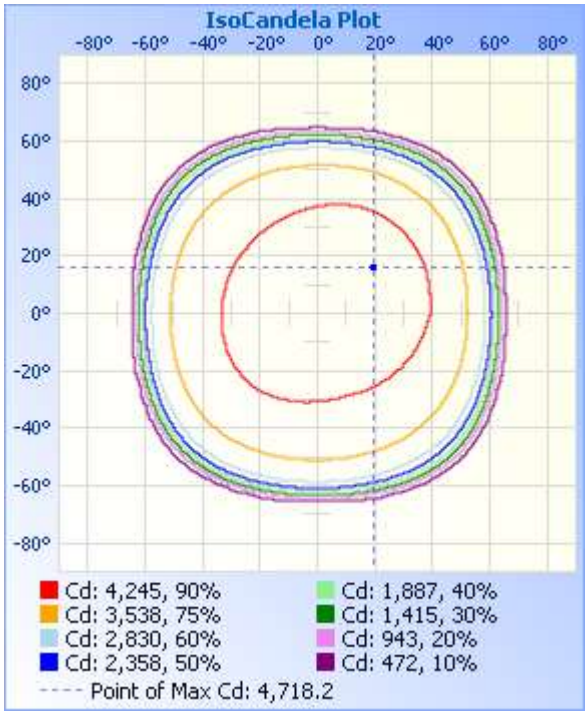


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456	4456
5	4486	4500	4506	4518	4488	4485	4467	4443	4419	4431	4410	4429	4412	4425	4452	4464
10	4517	4580	4580	4577	4532	4499	4463	4447	4429	4430	4410	4409	4409	4408	4444	4475
15	4593	4649	4652	4643	4583	4519	4486	4457	4435	4450	4425	4407	4381	4382	4432	4493
20	4615	4678	4702	4656	4599	4518	4489	4450	4450	4456	4430	4405	4350	4360	4419	4518
25	4632	4713	4718	4699	4603	4535	4466	4463	4459	4471	4433	4392	4334	4337	4403	4506
30	4549	4624	4631	4591	4494	4406	4366	4370	4390	4415	4383	4313	4255	4238	4311	4434
35	4373	4434	4434	4409	4326	4256	4215	4206	4210	4218	4191	4140	4077	4063	4132	4238
40	4208	4256	4258	4239	4181	4121	4080	4072	4072	4088	4058	4015	3946	3943	3999	4083
45	4011	4052	4052	4051	4003	3950	3925	3927	3916	3926	3890	3863	3813	3808	3855	3927
50	3726	3743	3746	3745	3720	3679	3657	3659	3669	3669	3643	3605	3589	3575	3589	3655
55	3240	3264	3268	3284	3279	3269	3244	3254	3236	3233	3235	3221	3203	3169	3175	3193
60	2449	2410	2471	2466	2475	2472	2504	2464	2494	2506	2575	2541	2524	2496	2489	2433
65	534	504	494	484	487	515	526	505	462	438	422	431	464	538	553	542
70	126	127	128	132	133	138	138	138	138	137	136	139	137	138	134	127
75	69.0	68.5	69.1	70.5	72.3	74.3	77.5	77.1	76.9	75.6	73.2	71.2	70.1	70.7	71.7	70.1
80	28.0	28.7	28.3	26.8	26.6	28.4	32.0	31.9	31.0	30.1	27.4	23.9	22.5	23.4	26.1	27.5
85	3.72	4.42	2.75	1.44	1.64	1.70	3.50	3.91	3.98	3.57	1.81	1.03	1.25	1.19	2.31	3.95
90	0.44	0.49	0.44	0.50	0.55	0.55	0.61	0.62	0.22	0.41	0.11	0.05	0.51	0.37	0.24	0.46
95	0.53	0.52	0.55	0.46	0.66	0.42	0.61	0.55	0.22	0.30	0.21	0.16	0.16	0.22	0.27	0.38
100	0.65	0.76	0.76	0.84	0.76	0.76	0.81	0.82	0.61	0.61	0.60	0.61	0.66	0.72	0.83	0.82
105	2.59	2.56	2.49	2.55	2.67	2.71	2.83	2.77	1.80	1.91	1.91	1.75	1.81	1.92	2.08	2.13
110	5.41	5.43	5.10	4.63	5.06	4.80	5.12	5.33	3.80	3.65	3.43	3.39	3.45	3.39	3.56	3.88
115	6.99	6.90	6.72	5.29	5.94	5.61	6.54	7.19	5.31	5.33	4.73	4.03	4.85	4.06	4.80	5.29
120	8.56	8.21	7.72	7.45	6.97	7.08	8.02	8.60	6.45	6.42	6.47	6.01	5.89	5.84	6.33	6.11
125	9.86	9.73	8.67	10.1	10.8	10.2	8.68	9.81	7.59	7.62	7.45	8.35	8.89	7.91	7.31	7.30
130	11.3	10.6	8.78	11.1	11.8	11.3	9.25	10.6	9.22	8.59	8.03	9.88	10.3	9.61	7.73	8.39
135	11.3	10.6	9.22	11.9	12.0	12.2	9.66	10.5	9.76	8.92	8.22	11.0	10.9	10.2	7.90	8.72
140	11.2	10.6	9.46	12.0	11.8	12.1	9.46	10.4	10.0	9.79	8.37	11.1	11.0	10.7	7.86	9.27
145	11.2	9.52	9.90	11.9	11.0	12.1	9.17	10.4	10.4	10.1	8.98	10.5	10.9	11.1	8.96	9.71
150	11.0	9.49	11.2	11.8	12.1	12.0	10.6	10.6	10.3	10.3	10.3	10.4	11.3	11.3	10.3	10.1
155	10.3	9.73	12.0	12.1	12.1	11.8	11.3	10.8	9.86	10.3	10.3	10.4	10.7	10.8	10.5	10.3
160	9.71	10.2	11.9	12.0	11.9	11.7	11.4	11.0	9.87	10.1	10.3	10.5	10.6	10.5	10.3	10.5
165	10.6	10.3	12.2	11.3	11.2	11.9	11.8	10.6	10.6	10.0	10.3	10.7	10.5	10.6	10.2	11.9
170	11.4	11.0	12.7	12.5	12.4	12.9	12.7	10.6	11.9	11.8	11.3	13.3	13.6	13.5	13.0	12.9
175	12.3	11.5	13.3	13.0	14.3	13.0	13.6	11.2	12.8	12.9	12.1	13.7	14.2	14.9	13.5	13.5
180	12.4	12.2	13.6	12.6	14.4	13.0	13.5	11.5	12.1	12.2	12.0	12.9	12.5	13.9	12.7	13.1

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-12-04	Test Ambient:	25.2 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-100WoH-NV2-R3-00-5770-120-A		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
JAE180920 -AA2	120.0	60	0.8927	106.5	0.9942	4.09
	277.0	60	0.4316	105.0	0.8782	22.36
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

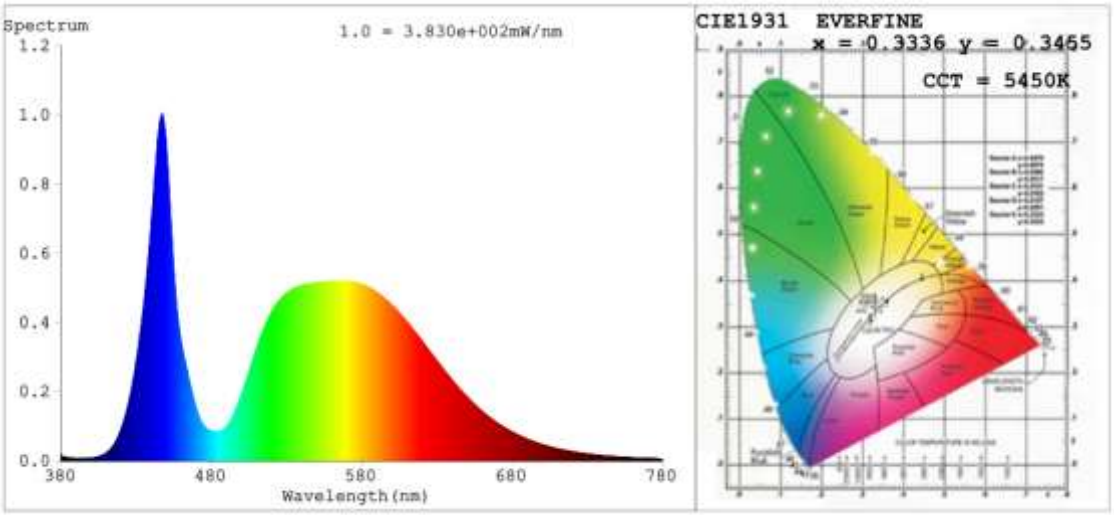
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	5450
Duv	0.0017
Chromaticity (x, y)	x=0.3336 y=0.3455
Chromaticity (u', v')	u'=0.2060 v'=0.4799
Color Rendering Index (CRI)	72.1
R9	0

Special Color Rendering Indices			
R1	71	R9	0
R2	75	R10	41
R3	77	R11	73
R4	74	R12	44
R5	72	R13	71
R6	67	R14	87
R7	79	R15	66
R8	60	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.4 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	13705	13690	>=10000 (-10%)	
Luminous Efficacy (lm/W)	128.69	130.38	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	128.54		105(-3%)	130(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
AOK-100WoH-NV2-R3-00-3070-120-A	3000K	13313	105.4	126.31
AOK-100WoH-NV2-R3-00-3570-120-A	3500K	13391*1	106.0*2	126.33*3
AOK-100WoH-NV2-R3-00-4070-120-A	4000K	13470*1	106.0*2	127.08*3
AOK-100WoH-NV2-R3-00-4570-120-A	4500K	13548*1	106.0*2	127.81*3
AOK-100WoH-NV2-R3-00-5070-120-A	5000K	13627*1	106.0*2	128.56*3
AOK-100WoH-NV2-R3-00-5770-120-A	5700K	13705	106.5	128.69

*1: This value is calculated and the calculation formula is as below:

13391= (13705-13313)/5*1+13313

13470= (13705-13313)/5*2+13313

13548= (13705-13313)/5*3+13313

13627= (13705-13313)/5*4+13313

*2: This value is calculated and the calculation formula is as below:

106.0= (106.5+105.4)/2

*3: This value is calculated and the calculation formula is as below:

126.33= (13391/106.0)

127.08= (13470/106.0)

127.81= (13548/106.0)

128.56= (13627/106.0)

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2018-07-02	2019-07-01
ST-R-327	Spectral analysis system HAAS-2000	2018-07-02	2019-07-01
ST-R-332	Standard Lamp	2018-07-04	2019-07-03
ST-R-333	Power Meter for Integrating Sphere	2018-06-28	2019-06-27
ST-R-355	Goniophotometer system	2018-07-01	2019-06-30
ST-R-359	Standard Lamp	2018-07-04	2019-07-03
ST-R-358	Power Meter for Goniophotometer	2018-06-28	2019-06-27
Expand Uncertainty: Photometric Measurement (Sphere):2.04%, k=2 Chromaticity Measurement(Sphere):28.8K, k=2 Photometric Measurement(Goniophotometer):2.36%, k=2			

******** END OF REPORT ********