



TEST REPORT

According to ANSI/IES LM-80-15
For

Hongli Zhihui Group Co.,Ltd. Guangzhou Branch

Room 316, Building 2, No.1, Xianke Yi Road, Huadong Town, Huadu District, Guangzhou, China

Model: HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS

Report Type: 7000 Hours Test Report	Product Type: LED Module
---	------------------------------------

Reviewed By: Pote Wang

	2022-04-10 to 2023-02-20
Report Date:	2023-03-08
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China. Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China.

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.(Shenzhen). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S. Government.



TABLE OF CONTENTS

1 - General Information	3
1.1 Description of LED Light Sources#.....	3
1.2 Standards and Reference Documentations.....	3
1.3 Testing Equipment.....	4
1.4 Drive Level.....	4
1.5 Ambient Conditions for Maintenance Test.....	4
1.6 Photometric Measurement Method and Uncertainty.....	4
1.7 Statement of Traceability.....	4
1.8 Sample Set.....	5
2 - Summary of Test Result	6
3 - Test Data	7
3.1 Data Set 1, 55°C, 700mA, 1600K (Lumen Maintenance).....	7
3.2 Data Set 1, 55°C, 700mA, 1600K (Forward Voltage).....	7
3.3 Data Set 1, 55°C, 700mA, 1600K (Chromaticity Shift).....	8
3.4 Data Set 2, 105°C, 700mA, 1600K (Lumen Maintenance).....	9
3.5 Data Set 2, 105°C, 700mA, 1600K (Forward Voltage).....	9
3.6 Data Set 2, 105°C, 700mA, 1600K (Chromaticity Shift).....	10
3.7 Data Set 3, 55°C, 700mA, 8000K (Lumen Maintenance).....	11
3.8 Data Set 3, 55°C, 700mA, 8000K (Forward Voltage).....	11
3.9 Data Set 3, 55°C, 700mA, 8000K (Chromaticity Shift).....	12
3.10 Data Set 4, 105°C, 700mA, 8000K (Lumen Maintenance).....	13
3.11 Data Set 4, 105°C, 700mA, 8000K (Forward Voltage).....	13
3.12 Data Set 4, 105°C, 700mA, 8000K (Chromaticity Shift).....	14
4 - DUT Photo	15
4.1 Mechanical Dimensions.....	15
4.2 DUT Photo.....	15
Directions	16



1 - General Information

1.1 Description of LED Light Sources[#]

Sample Size:

60 PCS test samples were in good condition and received on 2022-04-07. The samples were numbered from 1 to 15, 16 to 30, 31 to 45 and 46 to 60.

Manufacturer:	Hongli Zhihui Group Co.,Ltd. Guangzhou Branch
Part Number:	HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS
Part Type:	LED Module
Drive Level:	DC 700mA
Nominal CCT:	1600K / 8000K
Power:	12.6W
Average Current Density per LED die:	529.78mA/mm ²
Average Power Density per LED die:	1.59W/mm ²
CRI:	90
Die Spacing:	0.2mm

Note

The EUT is designed color with 1600K and 8000K. Data set 1 and 2 corresponding to sample No. 01-30, were aged and tested at 1600K. Data set 3 and 4 corresponding to sample No. 31-60, were aged and tested at 8000K.

Sampling Method:

LED samples for IESNA LM-80 testing consist of units built from a minimum of three manufacturing lots with each manufacturing lot built from different wafer lots built on non-consecutive days.

These manufacturing lots are picked to represent a wide parametric distribution.

Family products covered by this report:

According to *ENERGY STAR[®] Requirements for the Use of LM-80 Data*, the following products can be covered by this report base on the information and declaration provided by manufacturer. The information of these models shows that the covered products meet all section 4 requirements of *ENERGY STAR[®] Requirements for the Use of LM-80 Data* (September 28, 2017)

This report covers the following models:

Model type	Model name	CRI (typ.)	CCT (typ.)	Series&Parallel	Power density (W/mm ²)	Current density per LED die (mA/mm ²)	Current (mA)	Distance between of dies (mm)	Current (mA)
Test model	HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS	90	1600K/8000K	B2C6+B2C6	0.0707	529.78	350	0.2	700
Multiple models	HL-LH1308F95W-6B2C12(Ra4)-S-FC-DS	90	1600K/8000K	B1C12+B1C12	0.0707	529.78	350	0.2	350

1.2 Standards and Reference Documentations

- ANSI/IES LM-80-15: IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- *CIE 127:2007: Measurement of LEDs (This standard was not accredited by NVLAP)
- *ENERGY STAR[®] Requirements for the Use of LM-80 Data (This standard was not accredited by NVLAP)



1.3 Testing Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
High Accuracy Array Spectroradiometer	EVERFINE	HAAS 2000	P600674CM5391140	2022-09-27	2023-09-26
0.5M Integrating Sphere	EVERFINE	0.5m	NA	2022-09-27	2023-09-26
LED Test Source	EVERFINE	LTS-300	P185616CJ1391143	2022-11-18	2023-11-17
Standard Light Source	EVERFINE	D062	1011093	2021-10-15	2023-10-14
Multilayer aging machine	BACL	B2-270	20015	2022-11-18	2023-11-17
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090005	2022-11-18	2023-11-17
Digital CC&CV DC Power Supply	EVERFINE	WY5015	11090003	2022-11-18	2023-11-17

1.4 Drive Level

Samples are driven with a constant direct current (DC) during maintenance test, photometric and electrical measurement. The current value was regulated to within $\pm 3\%$ of the specified value of the manufacturer during maintenance test, and was within $\pm 0.5\%$ during photometric and electrical measurement test.

1.5 Ambient Conditions for Maintenance Test

For lumen maintenance test, samples within one data set, were installed on cooling boards in thermal chambers with minimal ambient airflow. The case temperature and ambient temperature was monitored by thermocouples which one was soldered to the LED location, while the other is mounted at a distance of 5 mm above the TMP location.

During life testing, TMP_{LED} of the coldest LEDs were maintained at a temperature that was greater than or equal to $2^{\circ}C$ below the corresponding nominal case temperature. Surrounding air was maintained at a temperature that was greater than or equal to $5^{\circ}C$ below the corresponding nominal case temperature. Thermocouples were shielded from direct DUT optical radiation and comply with

Samples were connected to DC power supply in series circuits with a constant current. The forward current was regulated to within $\pm 3\%$ of the specified value of the manufacturer.

The relative humidity within chamber was kept less than 65% during test.

For photometry measurement, the ambient temperature during test was set to $25^{\circ}C \pm 2^{\circ}C$, RH <65%.

1.6 Photometric Measurement Method and Uncertainty

Integrating sphere and spectroradiometer is used to measure luminous flux and chromaticity coordinate u_v . 2 measurement was used and sample was driven by DC power supply. The forward current was regulated to within $\pm 0.5\%$ of the nominal value. The test system was calibrated by halogen reference lamp. The ambient temperature during test was set to $25^{\circ}C \pm 2^{\circ}C$, RH <65%. The temperature measurement point was located in the sphere and the temperature was detected by a temperature probe.

The uncertainty of the light output measurements is $U=1.59\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=21K$ ($K=2$), at the 95% confidence level.

The uncertainty of the temperature is $U=0.8671^{\circ}C$ ($K=2$), at the 95% confidence level.

1.7 Statement of Traceability

Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).



Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0

1.8 Sample Set

Data Set 1: 55°C, 700mA(1600K)

Part Number: HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS
Number of Units: 15
Case Temperature: >53°C
Ambient Temperature: >50°C
Life Test Drive Current: 700mA
Measurement Current: 700mA

Data Set 2: 105°C, 700mA(1600K)

Part Number: HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS
Number of Units: 15
Case Temperature: >103°C
Ambient Temperature: >100°C
Life Test Drive Current: 700mA
Measurement Current: 700mA

Data Set 3: 55°C, 700mA(8000K)

Part Number: HL-LH1308F95W-6B4C6(Ra4)-S-FC-DS
Number of Units: 15
Case Temperature: >53°C

Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0

Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0



Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
 Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
 The NVLAP Lab Code is 200707-0

3.4 Data Set 2, 105°C, 700mA, 1600K (Lumen Maintenance)

No.	Lumen Maintenance (%)							
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
16	574.20	99.65	99.44	99.36	99.27	98.97	98.85	98.57
17	572.90	99.35	99.25	99.14	99.01	98.87	98.80	98.45
18	603.90	99.67	99.59	99.35	99.22	98.97	98.64	98.49
19	572.80	99.39	99.34	99.32	99.28	99.07	98.73	98.50
20	557.90	100.34	99.71	99.57	99.48	99.27	98.98	98.83
21	580.80	99.98	99.43	99.16	98.86	98.79	98.52	98.38
22	577.80	100.17	99.57	99.29	98.72	98.43	98.15	97.92
23	602.50	99.92	99.50	99.07	98.51	98.29	97.71	97.29
24	566.70	99.22	99.08	98.99	98.91	98.71	98.57	98.29
25	577.80	100.28	99.57	99.29	99.15	98.91	98.82	98.44
26	578.90	100.09	99.57	99.15	98.79	98.65	98.51	98.08
27	571.80	100.30	99.79	99.35	99.06	98.81	98.71	98.34
28	571.80	99.74	99.63	99.28	98.85	98.71	98.50	98.34
29	578.70	99.86	99.71	99.50	98.79	98.70	98.43	98.13
30	573.90	99.46	99.36	99.25	99.06	98.78	98.48	98.05
Avg.	577.49	99.83	99.50	99.27	99.00	98.80	98.56	98.27
Med.	574.20	99.86	99.57	99.29	99.01	98.79	98.57	98.34
st dev	11.86	0.3670	0.1897	0.1524	0.2569	0.2414	0.3121	0.3555
Min.	557.90	99.22	99.08	98.99	98.51	98.29	97.71	97.29
Max.	603.90	100.34	99.79	99.57	99.48	99.27	98.98	98.83

3.5 Data Set 2, 105°C, 700mA, 1600K (Forward Voltage)

No.	Forward Voltage (V)							
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
16	17.29	17.29	17.20	17.40	17.36	17.22	17.39	17.36
17	17.28	17.29	17.27	17.29	17.26	17.22	17.35	17.38
18	17.27	17.29	17.29	17.46	17.43	17.34	17.40	17.36
19	17.27	17.29	17.26	17.28	17.36	17.22	17.31	17.30
20	17.35	17.35	17.35	17.33	17.29	17.32	17.32	17.37
21	17.28	17.29	17.25	17.27	17.28	17.21	17.20	17.39
22	17.29	17.29	17.27	17.20	17.33	17.10	17.37	17.38
23	17.27	17.27	17.27	17.25	17.26	17.18	17.49	



Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
 Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
 The NVLAP Lab Code is 200707-0

3.6 Data Set 2, 105°C, 700mA, 1600K (Chromaticity Shift)

No.			CCT(K)	Chromaticity						
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
16	0.3332	0.5439	1703	0.0005	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012
17	0.3347	0.5437	1689	0.0003	0.0003	0.0004	0.0005	0.0005	0.0005	0.0005
18	0.3285	0.5439	1746	0.0000	0.0001	0.0002	0.0003	0.0004	0.0006	0.0008
19	0.3344	0.5437	1692	0.0003	0.0005	0.0006	0.0007	0.0009	0.0010	0.0011
20	0.3386	0.5434	1655	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006
21	0.3350	0.5438	1686	0.0030	0.0031	0.0031	0.0033	0.0034	0.0035	0.0036
22	0.3324	0.5440	1710	0.0006	0.0008	0.0009	0.0010	0.0011	0.0012	0.0013
23	0.3305	0.5434	1727	0.0005	0.0006	0.0007	0.0009	0.0010	0.0012	0.0013
24	0.3345	0.5436	1691	0.0007	0.0008	0.0009	0.0011	0.0012	0.0013	0.0015
25	0.3334	0.5439	1701	0.0007	0.0008	0.0009	0.0010	0.0011	0.0011	0.0012
26	0.3344	0.5438	1692	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011
27	0.3376	0.5432	1664	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010
28	0.3343	0.5438	1693							

Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0



Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0

3.9 Data Set 3, 55°C, 700mA, 8000K (Chromaticity Shift)

No.			CCT(K)							
	0hr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
31	0.1976	0.4491	8042	0.0007	0.0008	0.0009	0.0010	0.0008		



Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
 Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
 The NVLAP Lab Code is 200707-0

3.10 Data Set 4, 105°C, 700mA, 8000K (Lumen Maintenance)

No.	Lumen Maintenance (%)							
	Ohr(Initial)	1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
46	1410.00	100.14	99.86	99.43	98.94	98.44	97.94	97.59
47	1406.00	99.64	99.50	99.22	98.93	98.51	98.15	97.80
48	1399.00	99.71	99.50	99.14	98.78	98.50	98.07	97.71
49	1404.00	99.72	99.29	99.00	98.72	98.36	98.08	97.86
50	1422.00	99.79	99.23	98.87	98.66	98.38	98.10	97.82
51	1418.00	100.28	99.44	99.15	98.80	98.38	98.24	98.10
52	1432.00	99.86	99.58	99.23	98.95	98.67	98.32	98.11
53	1417.00	99.93	99.29	99.01	98.73	98.52	98.38	98.09
54	1394.00	99.71	99.14	98.85	98.57	98.21	97.99	97.85
55	1413.00	99.72	99.22	98.94	98.58	98.30	98.02	97.88
56	1410.00	99.36	99.15	99.01	98.79	98.44	98.09	97.87
57	1424.00	99.93	99.37	99.02	98.74	98.31	97.96	97.61
58	1416.00	99.58	99.44	99.22	99.08	98.73	98.59	98.31



Bay Area Compliance Laboratories Corp. (Shenzhen)

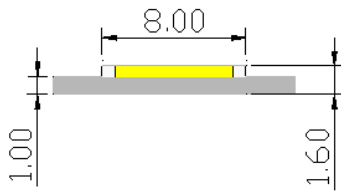
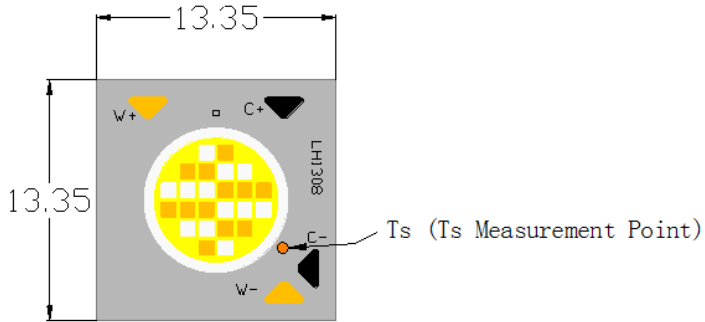
5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
 Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
 The NVLAP Lab Code is 200707-0

3.12 Data Set 4, 105°C, 700mA, 8000K (Chromaticity Shift)

No.			CCT(K)							
	Ohr(Initial)			1000hrs	2000hrs	3000hrs	4000hrs	5000hrs	6000hrs	7000hrs
46	0.1980	0.4480	8125	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011
47	0.1964	0.4528	7778	0.0004	0.0004	0.0005	0.0006	0.0007	0.0009	0.0009
48	0.1970	0.4508	7924	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008
49	0.1970	0.4540	7621	0.0006	0.0007	0.0008	0.0009	0.0010	0.0012	0.0013
50	0.1965	0.4517	7876	0.0004	0.0005	0.0005	0.0006	0.0008	0.0009	0.0010
51	0.1968	0.4549	7558	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011	0.0012
52	0.1963	0.4546	7625	0.0009	0.0010	0.0010	0.0011	0.0012	0.0013	0.0014
53	0.1964	0.4519	7867	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011	0.0012
54	0.1975	0.4448	8533	0.0005	0.0006	0.0007	0.0009	0.0009	0.0010	0.0011
55	0.1958	0.4552	7612	0.0007	0.0008	0.0009	0.0010	0.0011	0.0012	0.0013
56	0.1961	0.4544	7655	0.0002	0.0003	0.0004	0.0005	0.0007	0.0008	0.0009
57	0.1960	0.4533	7771	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010
58	0.1968	0.4510	7924	0.0003	0.0004	0.0005	0.0007	0.0009	0.0009	0.0010
59	0.1964	0.4517	7892	0.0003	0.0004	0.0005	0.0007	0.0008	0.0009	0.0010
60	0.1975	0.4477	8199	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0009
Avg.	0.1967	0.4518	7864	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011
Med.	0.1965	0.4519	7867	0.0004	0.0005	0.0006	0.0007	0.0009	0.0009	0.0010
st dev	0.0006	0.0030	263	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Min.	0.1958	0.4448	7558	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008
Max.	0.1980	0.4552	8533	0.0009	0.0010	0.0010	0.0011	0.0012	0.0013	0.0014

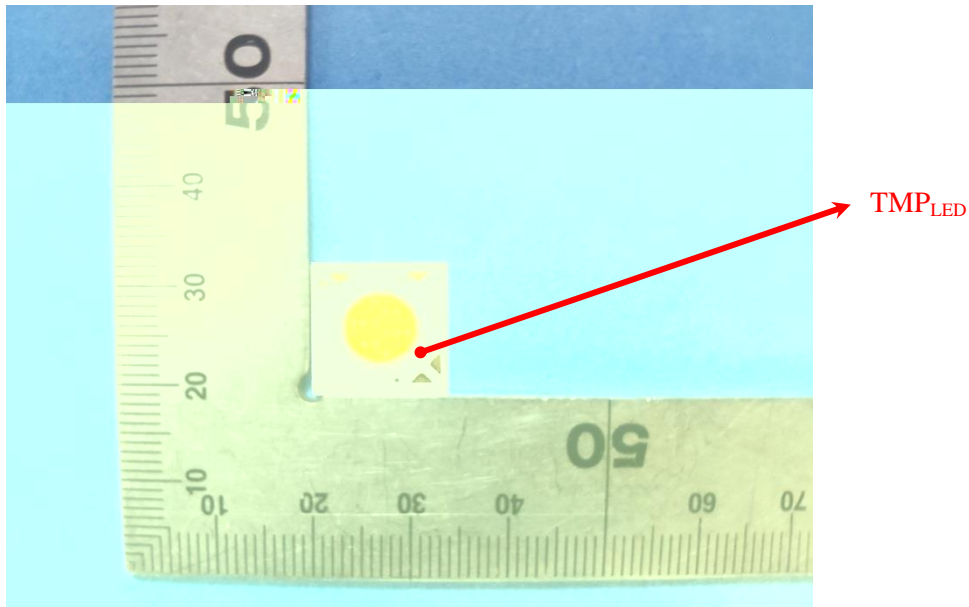
4 - DUT Photo

4.1 Mechanical Dimensions



All dimensions are in millimeter

4.2 DUT Photo





Bay Area Compliance Laboratories Corp. (Shenzhen)

5/F(B-West) -7/F, the 3rd Phase of Wan Li Industrial
Building D, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.
The NVLAP Lab Code is 200707-0

Directions

1. The information marked[#]is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report includes some test methods are not in NVLAP accreditation scope marked *.
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty givenⁱⁿthis report is obtained by combining the standard uncertainty times the coverage factor ~~#2~~ with the 95% confidence interval.
6. This report cannot be reproduced except in full, without prior written approval of the Company.
7. This report is valid only with^{valid} digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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