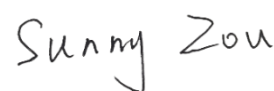
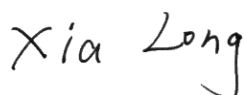


TEST REPORT

Applicant: HIWATT ELECTRONICS LIMITED
Address: Unit 3, Plumb Units, Sandall Stones Road Kirk
Sandall Doncaster United Kingdom DN3 1QR
Equipment Type: Instrument amplifier
Model Name: BULLDOG 30 (refer to section 2.3)
Brand Name: PARK, WEM
Test Standard: IEEE Std 149-2021
Sample Arrival Date: May 16, 2025
Test Date: May 19, 2025
Date of Issue: Jul. 18, 2025

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Mai Jintian**Checked by:** Xia Long**Approved by:** Sunny Zou
(Testing Director)

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jul. 18, 2025</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION	3
1.1	Test Laboratory	3
1.2	Test Location	3
2	PRODUCT INFORMATION	4
2.1	Applicant Information	4
2.2	Manufacturer Information	4
2.3	General Description for Equipment under Test (EUT).....	4
2.4	Ancillary Equipment.....	4
3	SUMMARY OF TEST RESULTS.....	5
3.1	Test Standards	5
3.2	Test Verdict	5
3.3	Test Uncertainty	5
4	GENERAL TEST CONFIGURATIONS.....	6
4.1	Test Condition	6
4.2	Test Equipment List.....	6
4.3	Test Setup	7
4.4	Test Frequencies.....	7
ANNEX A	TEST RESULTS.....	8
A.1	Gain and Efficiency.....	8
A.2	VSWR.....	9
ANNEX B	RADIATION PATTERN	10
ANNEX C	TEST SETUP PHOTOS	13
ANNEX D	EUT PHOTO	13

1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	HIWATT ELECTRONICS LIMITED
Address	Unit 3, Plumb Units, Sandall Stones Road Kirk Sandall Doncaster United Kingdom DN3 1QR

2.2 Manufacturer Information

Manufacturer	ZHONG SHAN HUA YING TECHNOLOGY LTD.
Address	Unit 3, Plumb Units, Sandall Stones Road Kirk Sandall Doncaster United Kingdom DN3 1QR

2.3 General Description for Equipment under Test (EUT)

EUT Name	Instrument amplifier
Model Name Under Test	BULLDOG 30
Series Model Name	LEEDS 25, BULLDOG 17, LEEDS 17, LONDON 12, GO20, GO40, AC60
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name. (this information provided by the applicant)
Antenna Type	PCB Antenna
Dimensions	15*5 mm

2.4 Ancillary Equipment

Note: Not applicable.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	IEEE Std 149-2021	IEEE Standard Test Procedures for Antennas

3.2 Test Verdict

Report Section	Description	Remark
ANNEX A.1	Gain and Efficiency	--
ANNEX A.2	VSWR	--
ANNEX B	Radiation Pattern	--

3.3 Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Item	Uncertainty
VSWR(S11)	± 0.61
Gain	$\pm 1.92\text{dB}$

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

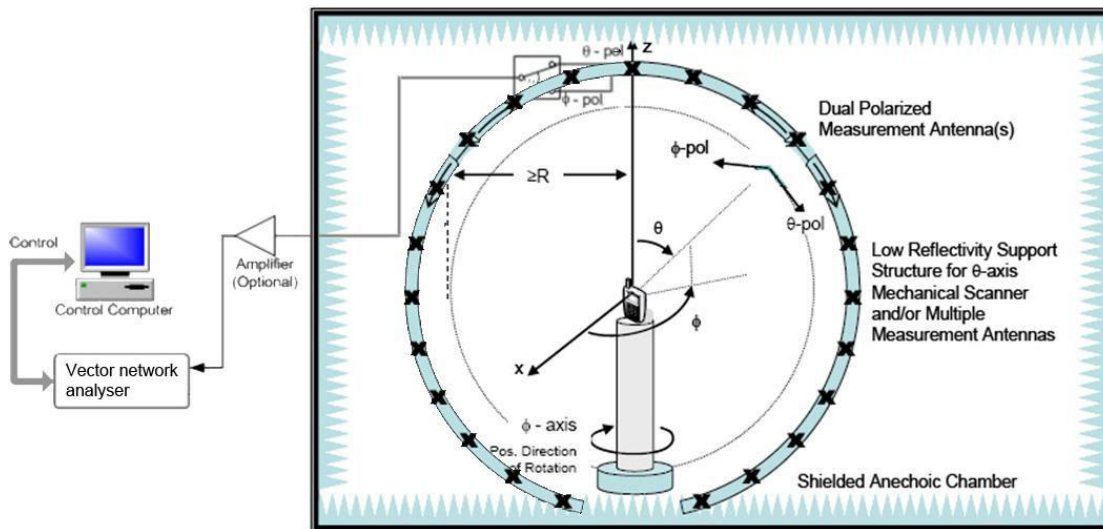
Environment Parameter	Selected Values During Tests			
	Ambient Pressure (KPa)	Temperature (°C)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.8	N/A	47

4.2 Test Equipment List

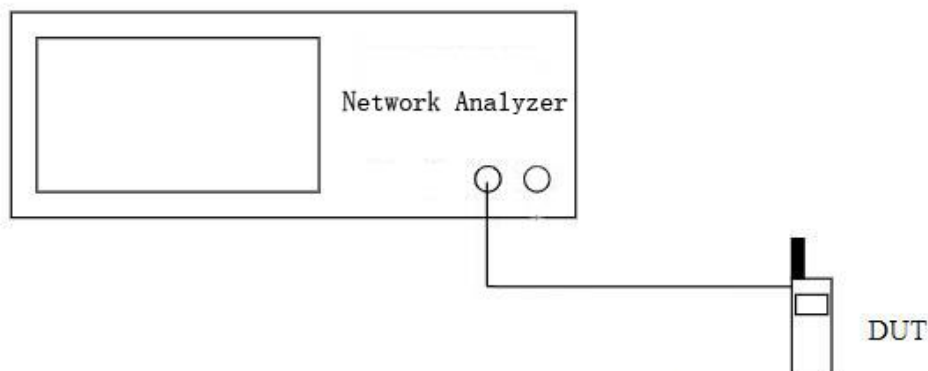
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SG24 Multi-probe Antenna Measurement System	SATIMO	SG24-L	1101855- 0001	2024/11/11	2027/11/10
Vector Network Analyzer	Agilent	E5071B	MY42404001	2025/1/23	2026/1/22
Description	Manufacturer	Name		Version	
Test Software	MVG	SPM		V 1.8	

4.3 Test Setup

4.3.1 Antenna gain, efficiency and radiation pattern test setup



4.3.2 S11 parameter test setup



4.4 Test Frequencies

Test Frequencies	2400MHz, 2402MHz, 2404MHz, 2406MHz, 2408MHz, 2410MHz, 2412MHz, 2414MHz, 2416MHz, 2418MHz, 2420MHz, 2422MHz, 2424MHz, 2426MHz, 2428MHz, 2430MHz, 2432MHz, 2434MHz, 2436MHz, 2438MHz, 2440MHz, 2442MHz, 2444MHz, 2446MHz, 2448MHz, 2450MHz, 2452MHz, 2454MHz, 2456MHz, 2458MHz, 2460MHz, 2462MHz, 2464MHz, 2466MHz, 2468MHz, 2470MHz, 2472MHz, 2474MHz, 2476MHz, 2478MHz, 2480MHz, 2482MHz, 2483.5MHz
------------------	--

ANNEX A TEST RESULTS

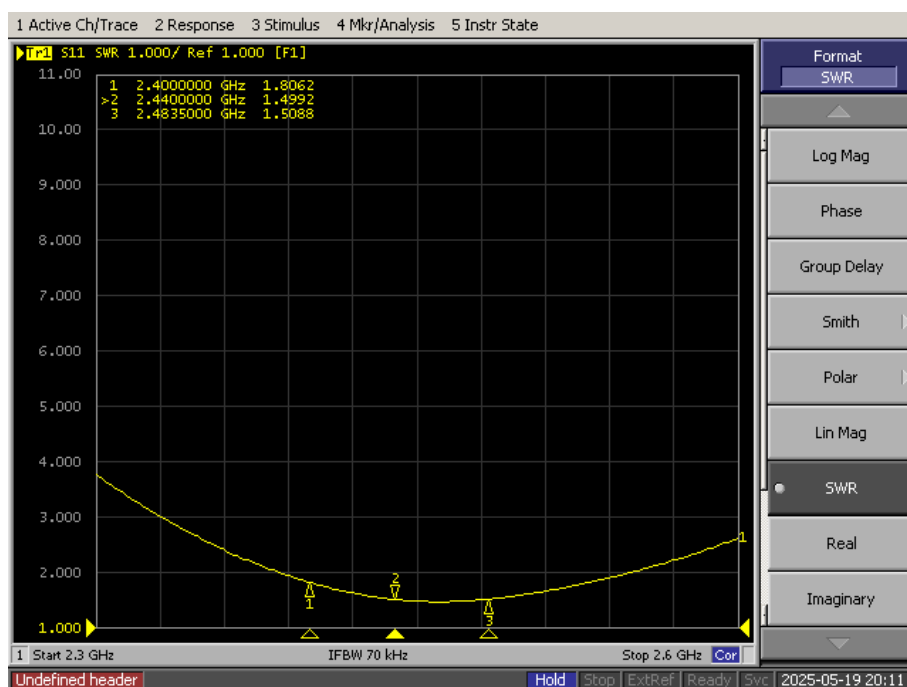
A.1 Gain and Efficiency

Frequency	Gain (dBi)	Efficiency (%)
2400MHz	2.23	51
2402MHz	2.24	51
2404MHz	2.24	51
2406MHz	2.16	50
2408MHz	2.17	50
2410MHz	2.18	50
2412MHz	2.16	50
2414MHz	2.14	50
2416MHz	2.13	50
2418MHz	2.12	50
2420MHz	2.07	50
2422MHz	2.03	50
2424MHz	2.02	50
2426MHz	2.11	51
2428MHz	2.08	51
2430MHz	2.02	50
2432MHz	1.98	50
2434MHz	1.95	50
2436MHz	1.97	50
2438MHz	1.95	49
2440MHz	1.96	49
2442MHz	1.96	49
2444MHz	1.94	49
2446MHz	1.88	49
2448MHz	1.88	49
2450MHz	1.89	49
2452MHz	1.87	49
2454MHz	1.83	48
2456MHz	1.81	48
2458MHz	1.79	48
2460MHz	1.72	47
2462MHz	1.65	47
2464MHz	1.61	47
2466MHz	1.69	47
2468MHz	1.65	47
2470MHz	1.59	47
2472MHz	1.57	46
2474MHz	1.56	47

2476MHz	1.44	47
2478MHz	1.39	46
2480MHz	1.36	46
2482MHz	1.33	46
2483.5MHz	1.32	46

A.2 VSWR

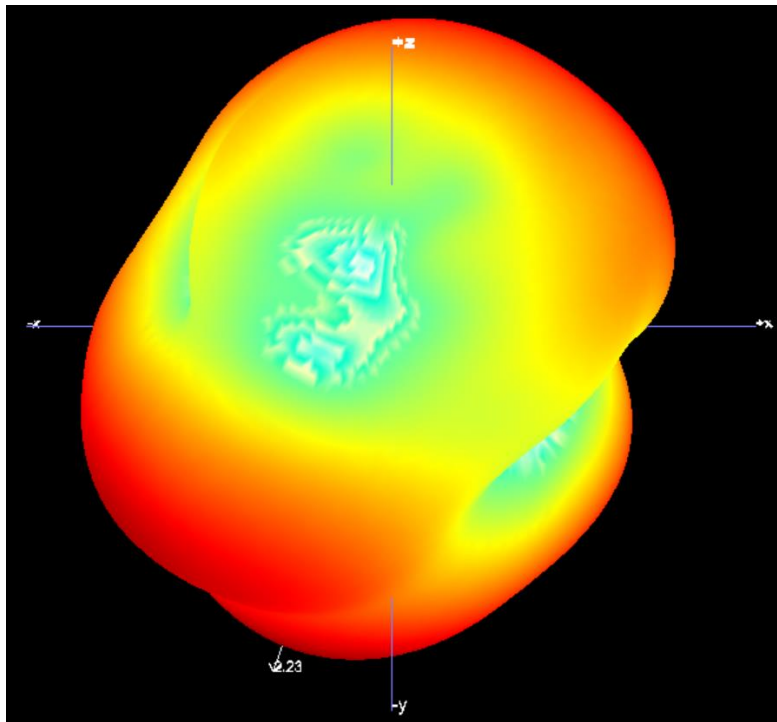
Frequency	VSWR
2400MHz	1.81
2440MHz	1.50
2483.5MHz	1.51



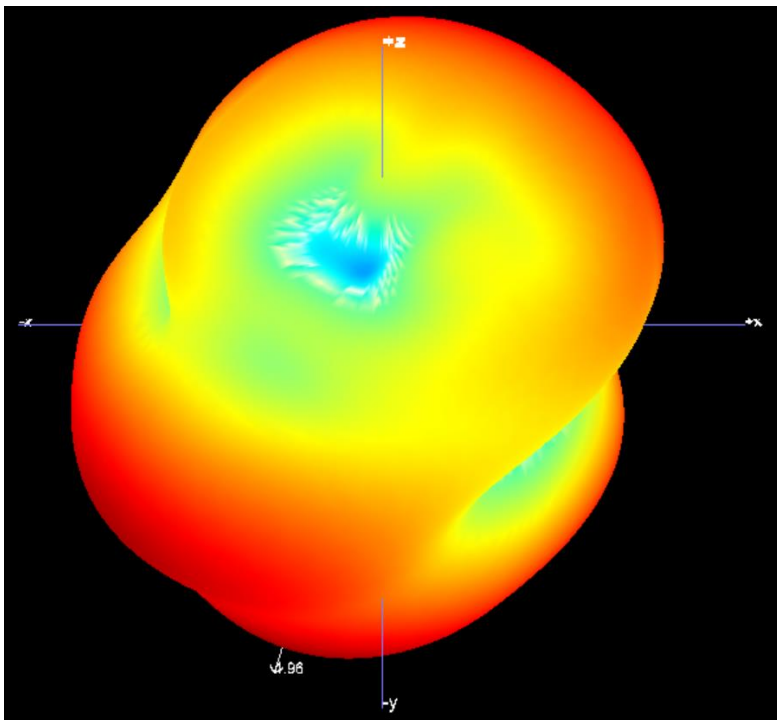
ANNEX B RADIATION PATTERN

B.1 3D Pattern

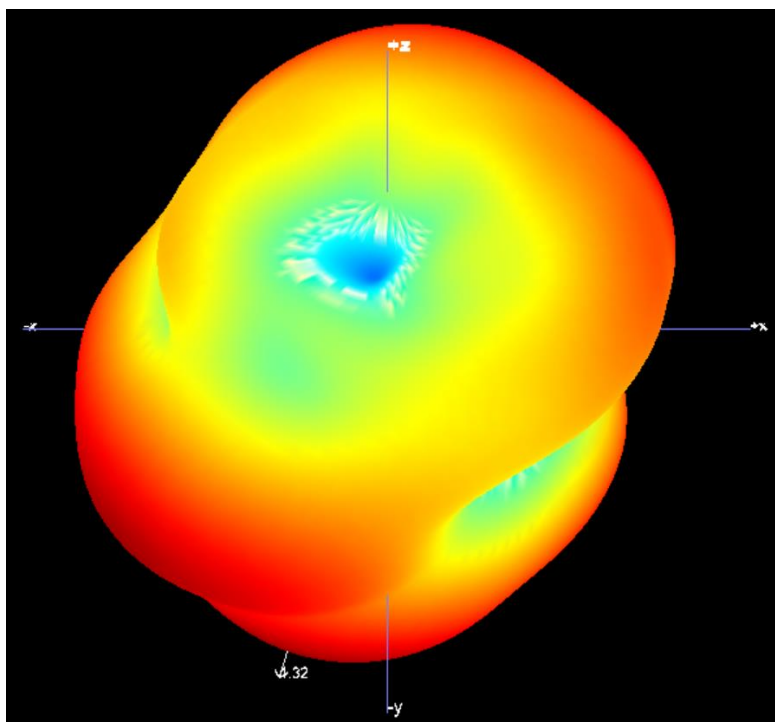
B1.1 3D Pattern for 2400MHz



B1.2 3D Pattern for 2440MHz

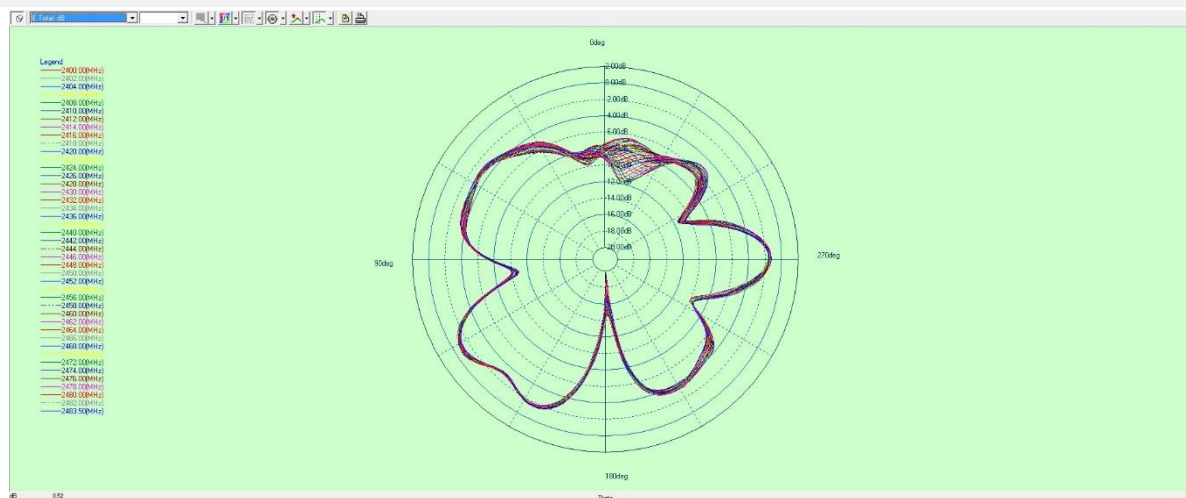


B1.3 3D Pattern for 2483.5MHz

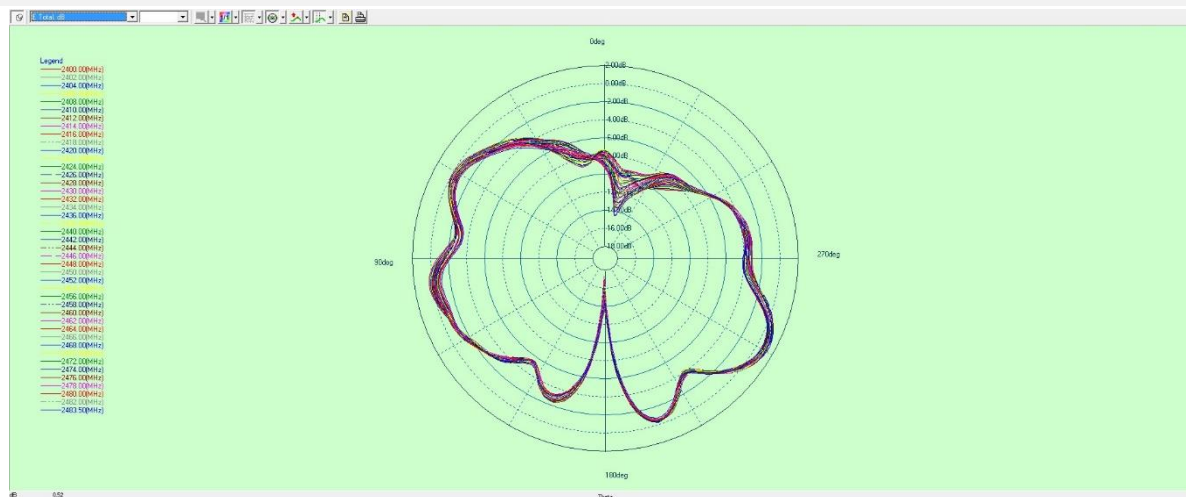


B.2 1D Radiation Pattern

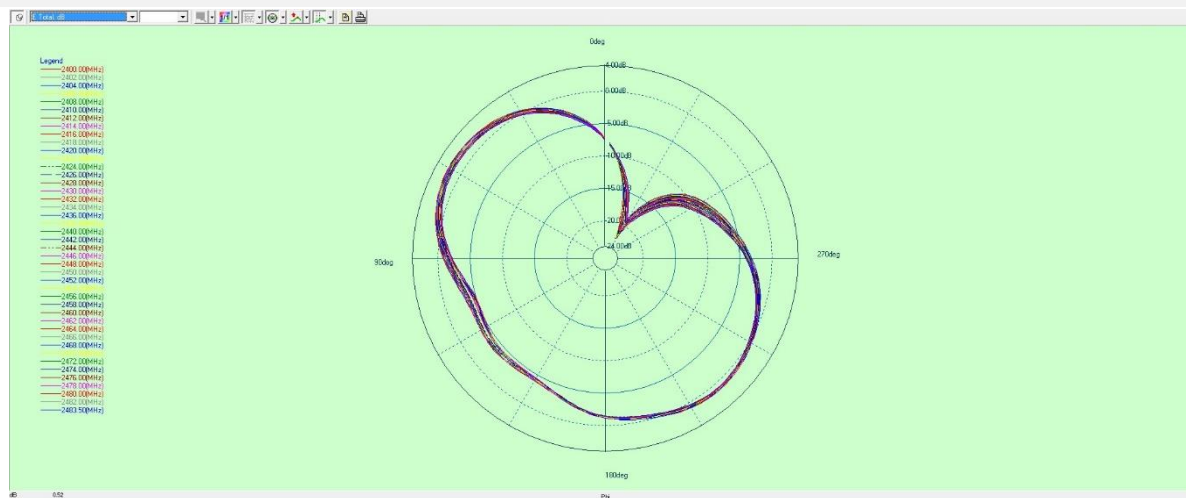
B2.1 PHI=0



B2.2 PHI=90



B2.3 THETA=90



ANNEX C TEST SETUP PHOTOS

Please refer the document “BL-SZ2550525-AO.PDF”.

ANNEX D EUT PHOTO

Please refer the document “BL-SZ2550525-AA.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--