中国认可
国际互认
检测
TESTING
CNAS L6478

TEST REPORT

Reference No.	:	WTF21F02011377E
Applicant	:	Mid Ocean Brands B.V.
Address	:	7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong
Manufacturer	:	114276
Product Name	:	Thumb up keyring with LED light
Model No.	:	MO8940
Standards	:	EN IEC 55015:2019 EN 61547:2009
Date of Receipt sample	:	2021-02-05
Date of Test	:	2021-02-05 to 2021-02-09
Date of Issue	:	2021-02-09
Test Report Form No.	:	WEL-55015A-01A
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
Waltek Testing Group (Foshan) Co., Ltd.
Address: No.13-19, 2/F., 2nd Building, Sunlink International Machinery City, Chencun, Shunde District, Foshan, Guangdong, China
Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Compiled by:

Janice Lu / Project Engineer

Approved by:

Danny Zhou / Manager

1 Test Summary

EMISSION			
Test Item	**Test Standard**	**Class / Severity**	**Result**
Radiated Electromagnetic Disturbance, 9kHz to 30MHz	EN IEC 55015:2019	Clause 4.5.2	Pass
Radiated Emission, 30MHz to 1000MHz	EN IEC 55015:2019	Clause 4.5.3	Pass

IMMUNITY (EN 61547:2009)				
Test Item	**Test Method**	**Class / Severity**	**Performance Criteria**	**Result**
Electrostatic Discharge(ESD)	IEC 61000-4-2:2008	±4 kV Contact ±8 kV Air	B	Pass
Radio-Frequency Electromagnetic Fields (80MHz to 1GHz)	IEC 61000-4-3:2006+A1:2007	3V/m, 80%, 1kHz, Amp. Mod.	A	Pass

Remark:

Pass	Test item meets the requirement
Fail	Test item does not meet the requirement
N/A	Test case does not apply to the test object

2 Contents

3 General Information

3.1 General Description of E.U.T.

Product Name ..... : Thumb up keyring with LED light

Model No. ..... : MO8940

Remark..... : ---

3.2 Details of E.U.T.

Technical Data ..... : Battery 4.5V

3.3 Description of Support Units

The EUT has been tested as an independent unit. MO8940 is the test sample. All tests were performed in the condition of Battery 4.5V.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

EN IEC 55015:2019	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
EN 61547:2009	Equipment for general lighting purposes — EMC immunity requirements

3.5 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science an Economic Development Canada(ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number:21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 820106, August 16, 2018

- **NVLAP – Lab Code: 600191-0**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.6 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

3.7 Abnormalities from Standard Conditions

None.

4 Equipment Used during Test

Radiated Electromagnetic Disturbance(9kHz to 30MHz)					
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Status**
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2	Three Loops Antenna	SCHWARZBECK	HXYZ9170	213	Valid
Radiated Emission					
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Status**
1.	EMI Test Receiver	R&S	ESR7	101566	Valid
2.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	Valid
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	Valid
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	Valid
5.	Preamplifier	Lunar E M	LNA1G18-40	20160501002	Valid
6.	CDNE	SCHWARZBECK	CDNE M3	00083	Valid
7.	CDNE	SCHWARZBECK	CDNE M2	00092	Valid
ESD					
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Status**
1.	ESD Simulator	TESEQ	NSG437	521	Valid
Radio-Frequency Electromagnetic Fields					
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Status**
1.	RF Power Amplifier	OPHIR	5225R	1051/1712	Valid
2.	RF Power Amplifier	OPHIR	5293RE	1051/171	Valid
3.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP9128E-SPECIAL	142	Valid
4.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP 9149	476	Valid
5.	RF signal generator	Agilent	N5181A	MY48080720	Valid
6.	Power meter	RS	NRP6A	101133	Valid
7.	Power meter	RS	NRP6A	101134	Valid
8.	Electric field probe	Narda	EP 601	611WX70311	Valid

4.1 Software List

Description	Manufacturer	Model	Version
EMI Test Software (LOOP)	FARATRONIC	EZ-EMC	CON-03A1
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-1
Radiated Immunity Test Software	TONSCEND	JS35-RS	V2.0.1.7

4.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiated Electromagnetic Disturbance	9kHz~30MHz	±3.0dB	(1)
Radiated Emission	30MHz~1GHz	±4.1dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Technical Data	Manufacturer	Model No.	Serial No.
1.	/	/	/	/	/

4.4 Decision Rule

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{LAB} is less than or equal to U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

-Non-compliance is deemed to occur is any measured disturbance level exceeds the disturbance limt.

If U_{LAB} is greater than U_{cispr}, then

-Compliance is deemed to occur if no measured disturbance level, increased by(U_{LAB}-U_{cispr}) , exceeds the disturbance limit;

-Non-compliance is deemed to occur if any measured disturbance level, increased by(U_{LAB}-U_{cispr}) , exceeds the disturbance limit.

5 Emission Test Results

5.1 Radiated Electromagnetic Disturbance, 9kHz to 30MHz

Test Requirement..... : EN IEC 55015 Clause 4.5.2

Test Method..... : EN IEC 55015 Clause 9.3.2

Test Result..... : Pass

Frequency Range..... : 9kHz to 30MHz

Class/Severity..... : Table 8 of EN IEC 55015

5.1.1 E.U.T. Operation

Operating Environment:

Temperature ..... : 24.8°C

Humidity..... : 49.3%RH

Barometric Pressure..... : 101.2kPa

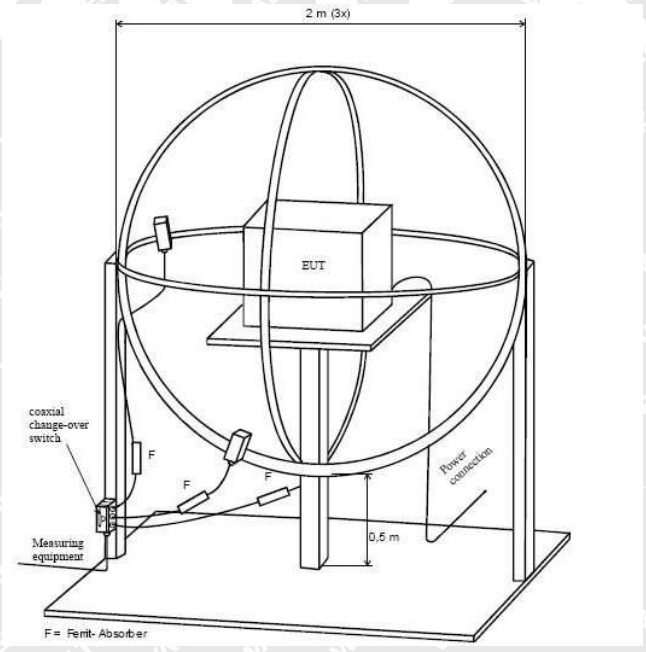
EUT Operation:

Input Voltage ..... : Battery 4.5V

Operating Mode..... : Lighting mode

5.1.2 Block Diagram of Test Setup

The Radiated Electromagnetic Disturbance (9kHz to 30MHz) test was performed in accordance with the EN IEC 55015.

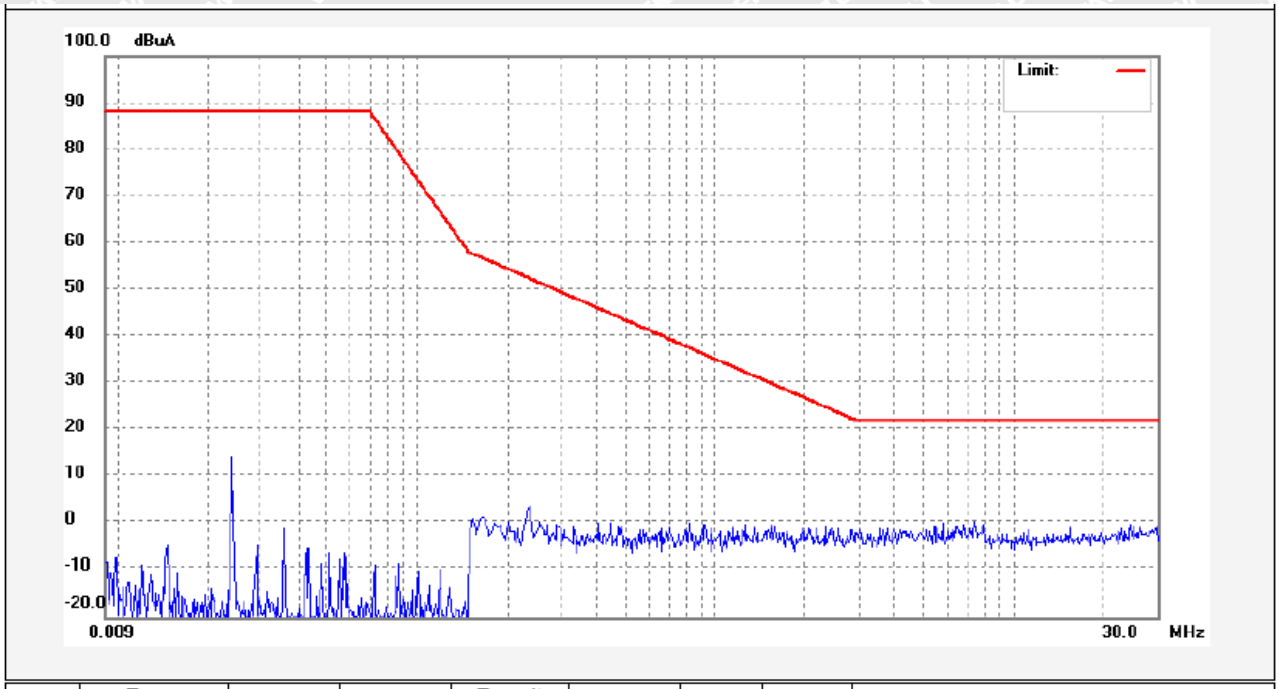


5.1.3 Measurement Data

According to the data in section 5.2.4, the EUT complied with the EN IEC 55015 standards.

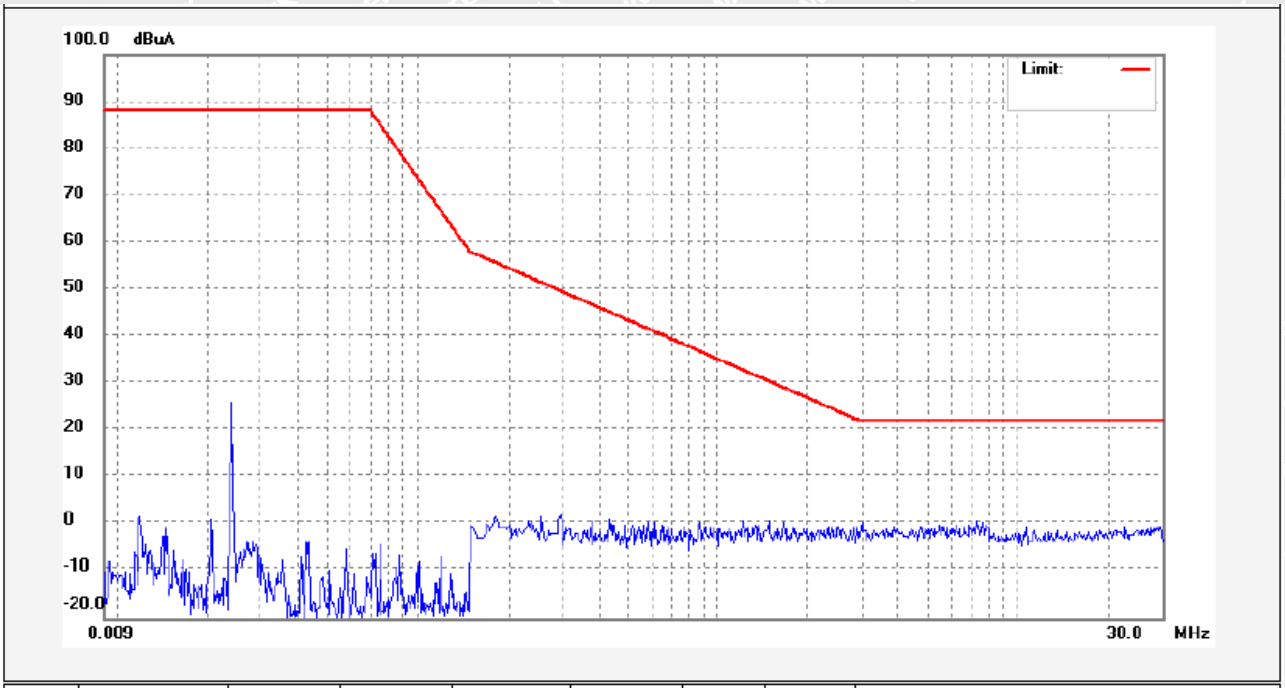
5.1.4 Radiated Electromagnetic Disturbance Test Data, 9kHz to 30MHz

Loop X



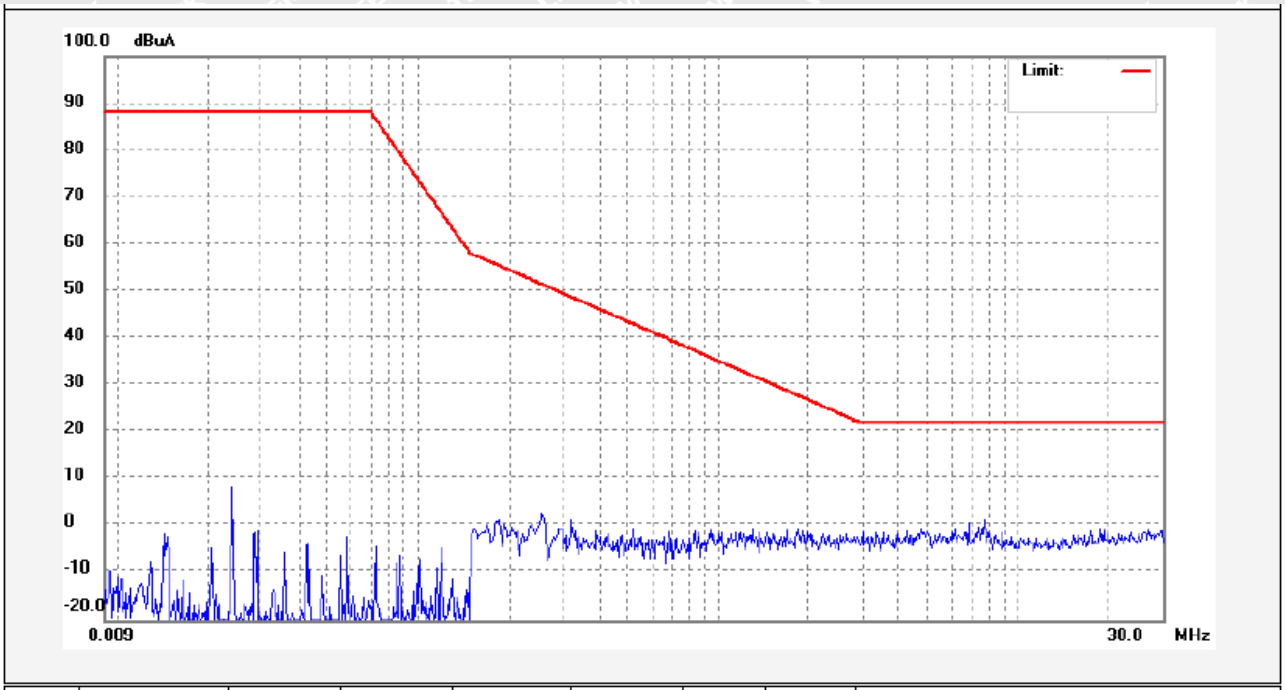
No.	Freq. (MHz)	Reading (dBuA)	Factor (())	Result (dBuA)	Limit (dBuA)	Margin (dB)	Detector	Remark

Loop Y



No.	Freq. (MHz)	Reading (dBuA)	Factor (())	Result (dBuA)	Limit (dBuA)	Margin (dB)	Detector	Remark

Loop Z



No.	Freq. (MHz)	Reading (dBuA)	Factor (())	Result (dBuA)	Limit (dBuA)	Margin (dB)	Detector	Remark

5.2 Radiated Emission, 30MHz to 1000MHz

Test Requirement..... : EN IEC 55015

Test Method..... : EN IEC 55015

Test Result..... : Pass

Frequency Range..... : 30MHz to 1000MHz

Class/Severity..... : Table 10 of EN IEC 55015

5.2.1 E.U.T. Operation

Operating Environment:

Temperature ..... : 23.8°C

Humidity..... : 49.8%RH

Atmospheric Pressure..... : 101.2kPa

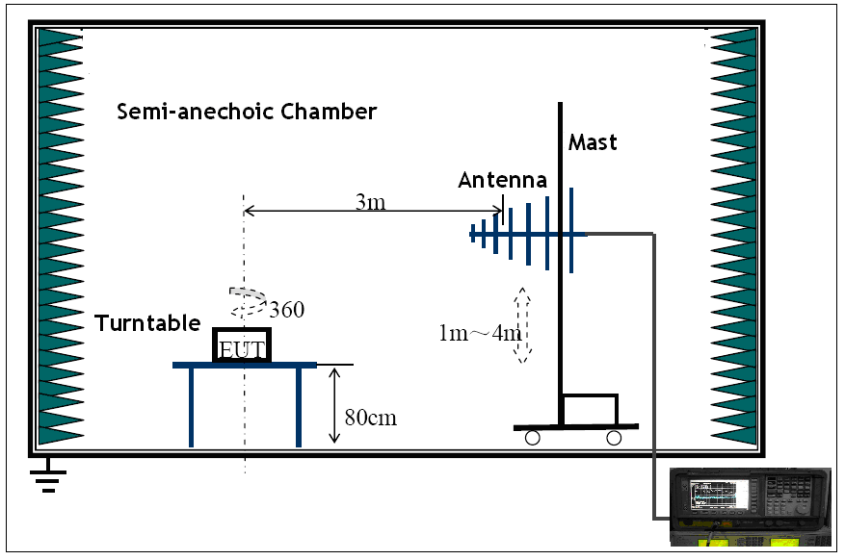
EUT Operation:

Input Voltage ..... : Battery 4.5V

Operating Mode..... : Lighting mode

5.2.2 Block Diagram of Test Setup

The Radiated Emission test was performed in the 3m Semi- Anechoic Chamber test site and accordance with CISPR16-2-3.



5.2.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for Horizontal & Vertical polarisation. Quasi-peak measurements were performed if peak emissions were within 6dB of the limit line.

5.2.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Corr. Factor

Corr.Factor=Antenna Factor + Cable Factor - Amplifier Gain

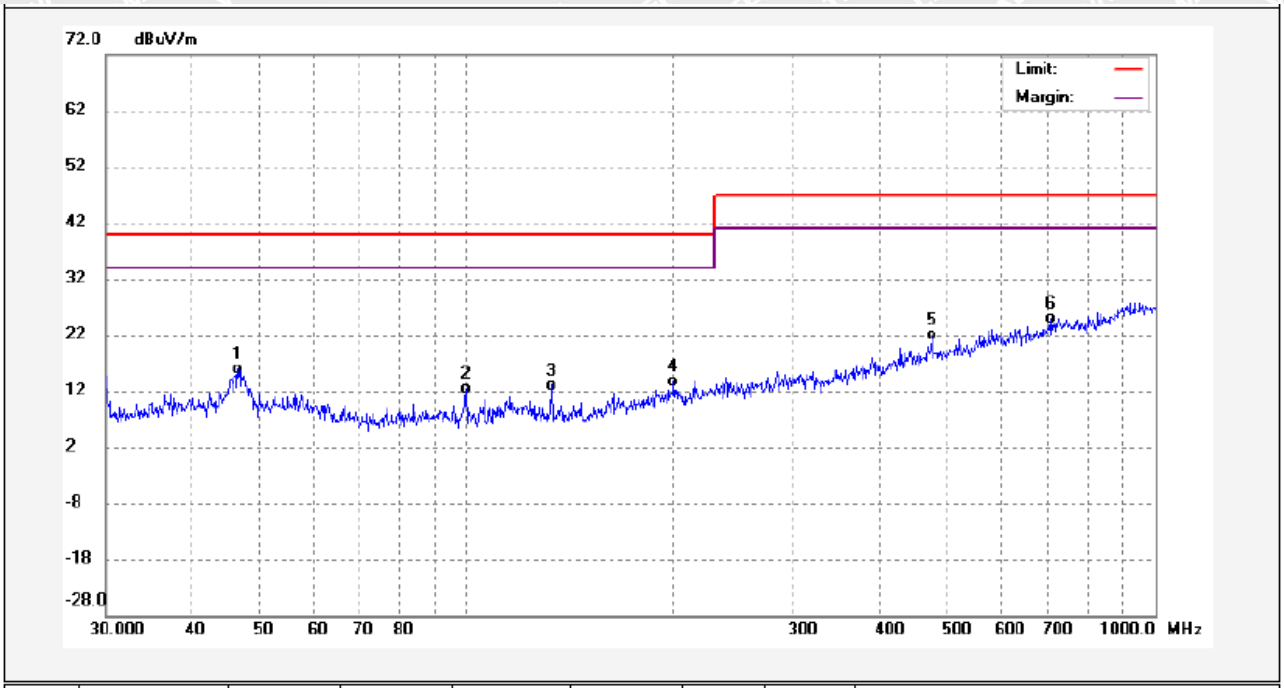
The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit.

The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

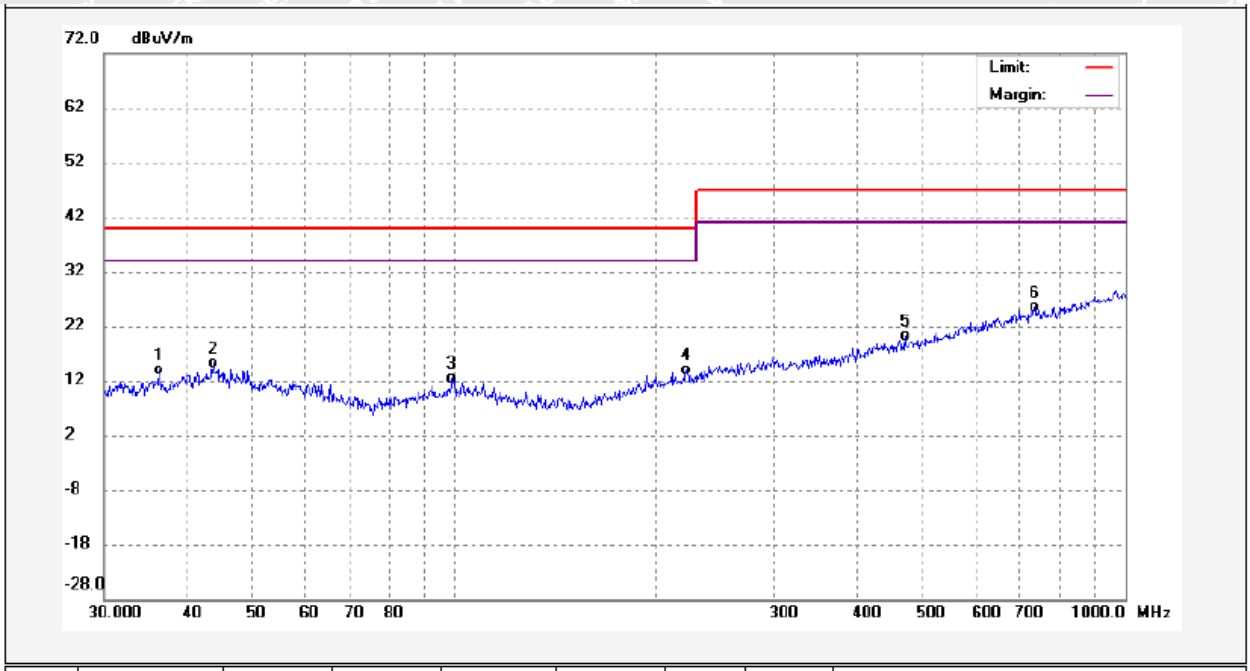
5.2.5 Radiated Emission Test Data

Vertical Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	46.6827	2.23	13.55	15.78	40.00	-24.22	QP	
2	100.0179	1.16	11.15	12.31	40.00	-27.69	QP	
3	133.2912	2.03	10.97	13.00	40.00	-27.00	QP	
4	200.2663	-0.78	14.39	13.61	40.00	-26.39	QP	
5	475.1658	1.28	20.68	21.96	47.00	-25.04	QP	
6	708.9336	-0.08	24.94	24.86	47.00	-22.14	QP	

Horizontal Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	36.3177	0.41	13.35	13.76	40.00	-26.24	QP	
2	43.7811	-0.45	15.57	15.12	40.00	-24.88	QP	
3	99.4932	0.08	12.21	12.29	40.00	-27.71	QP	
4	221.9362	0.10	13.83	13.93	40.00	-26.07	QP	
5	470.0285	0.63	19.42	20.05	47.00	-26.95	QP	
6	732.9476	0.91	24.41	25.32	47.00	-21.68	QP	

6 Immunity Test Results

6.1 Performance Criteria

Performance criterion A: During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B: During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C: During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.

6.2 Electrostatic Discharge (ESD)

Test Requirement..... : EN 61547

Test Method..... : IEC 61000-4-2

Test Result..... : Pass

Discharge Impedance..... : 330Ω / 150pF

Discharge Voltage..... : Air Discharge: ±8kV
Contact Discharge: ±4kV
HCP & VCP: ±4kV

Polarity..... : Positive & Negative

Number of Discharge..... : Minimum 10 times at each test point

Discharge Mode..... : Single Discharge

Discharge Period..... : 1 second minimum

6.2.1 E.U.T. Operation

Operating Environment:

Temperature..... : 23.8°C

Humidity..... : 49.6%RH

Barometric Pressure..... : 100.1kPa

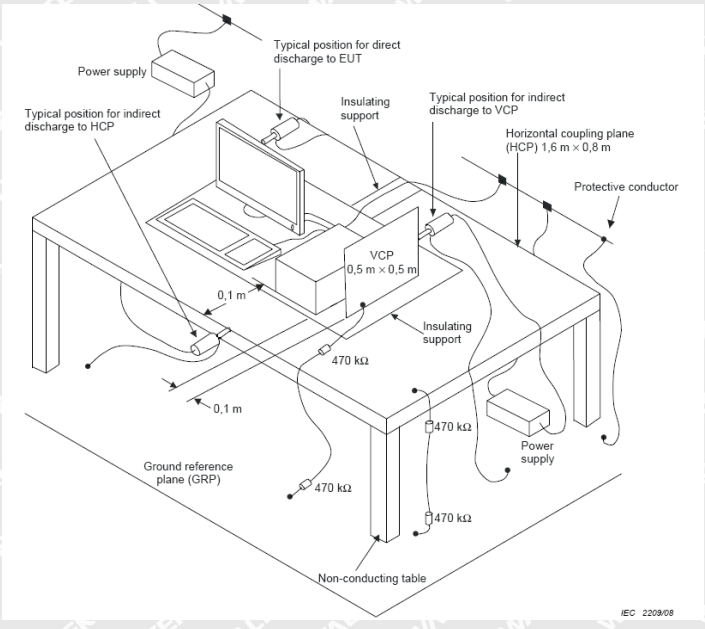
EUT Operation:

Input Voltage..... : Battery 4.5V

Operating Mode..... : On mode

6.2.2 Block Diagram of Setup

The ESD test was performed in accordance with the IEC 61000-4-2.



6.2.3Direct Discharge Test Results

Observations: **Test points:** **1. All Exposed Surface & Seams;**
2. All metallic part

Direct Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Contact Discharge	Air Discharge
±8	B	1	N/A	Pass*
±4	B	2	Pass*	N/A

Remark:

* During the test no deviation was detected to the selected operation mode(s)

6.2.4 Indirect Discharge Test Results

Observations: **Test points:** **1. All sides.**

Indirect Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Horizontal Coupling	Vertical Coupling
±4	B	1	Pass*	Pass*

Remark:

* During the test no deviation was detected to the selected operation mode(s)

6.3 Radio-Frequency Electromagnetic Fields, 80MHz to 1GHz

Test Requirement ..... : EN 61547

Test Method ..... : IEC 61000-4-3

Test Result ..... : Pass

Frequency Range ..... : 80MHz to 1GHz

Test level ..... : 3V/m

Modulation ..... : 80%, 1kHz Amplitude Modulation.

Face of EUT ..... : Front, Back, Left, Right

Antenna polarisation ..... : Horizontal & Vertical

Test Distance ..... : 3m

6.3.1E.U.T. Operation

Operating Environment:

Temperature ..... : 24.7°C

Humidity ..... : 54.3% RH

Barometric Pressure ..... : 101.2kPa

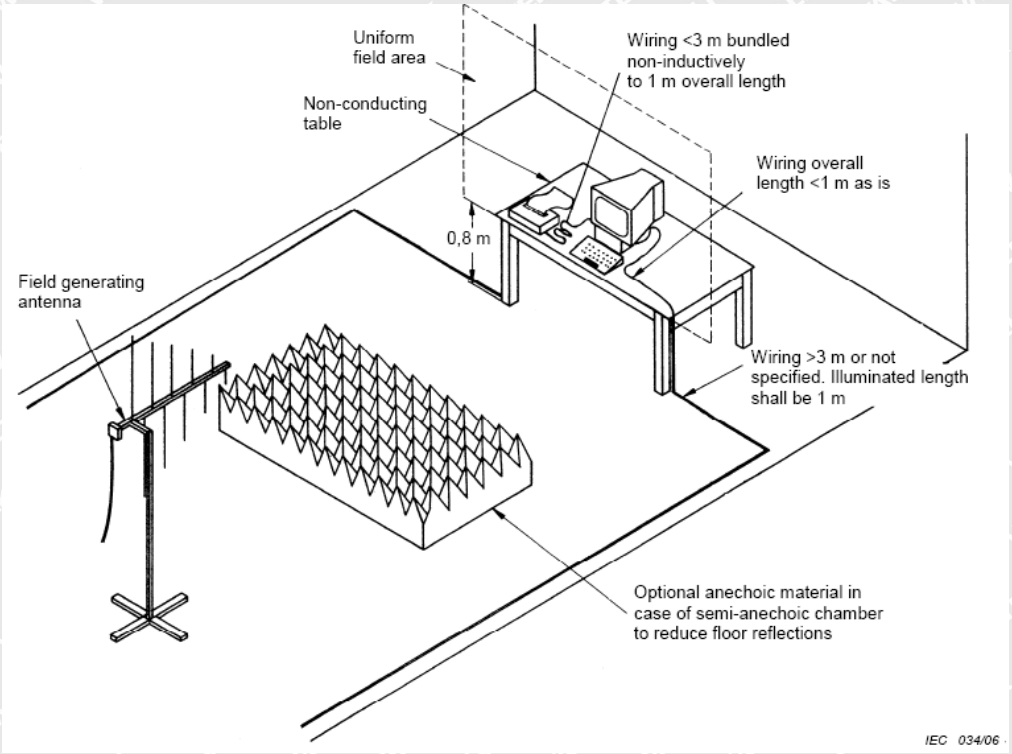
EUT Operation:

Input Voltage ..... : Battery 4.5V

Operating Mode ..... : On mode

6.3.2 Block Diagram of Setup

The Radio-Frequency Electromagnetic Fields Immunity test was performed in accordance with the IEC 61000-4-3.



6.3.3 Test Results

Frequency	Face of EUT	Antenna polarisation	Test Level	Step Size	Dwell Time	Performance Criterion	Result
80 to 1000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
80 to 1000MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*

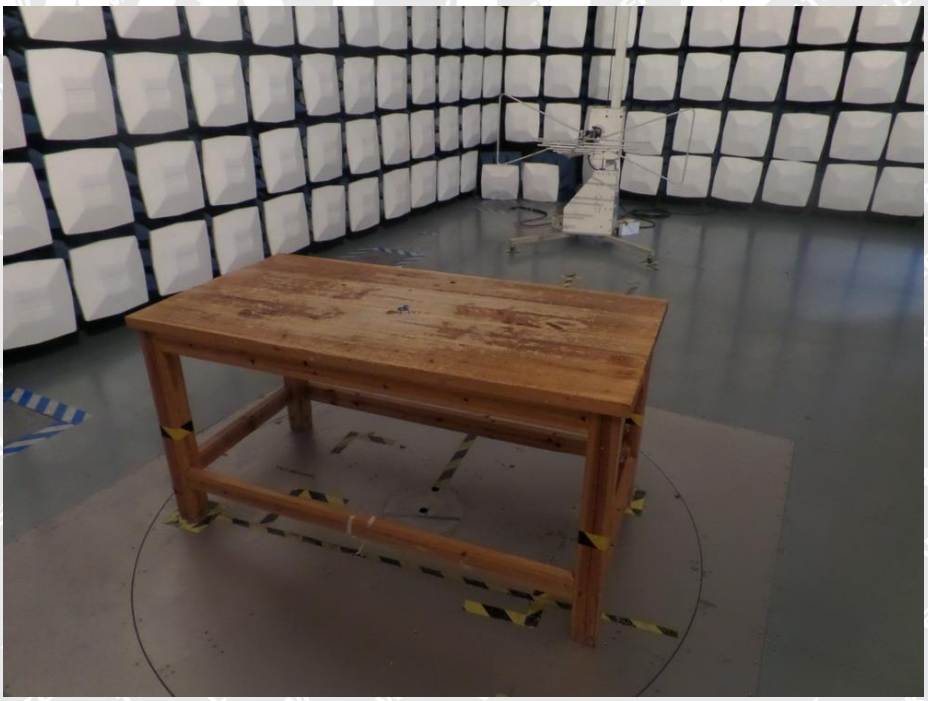
Remark:

* During the test no deviation was detected to the selected operation mode(s)

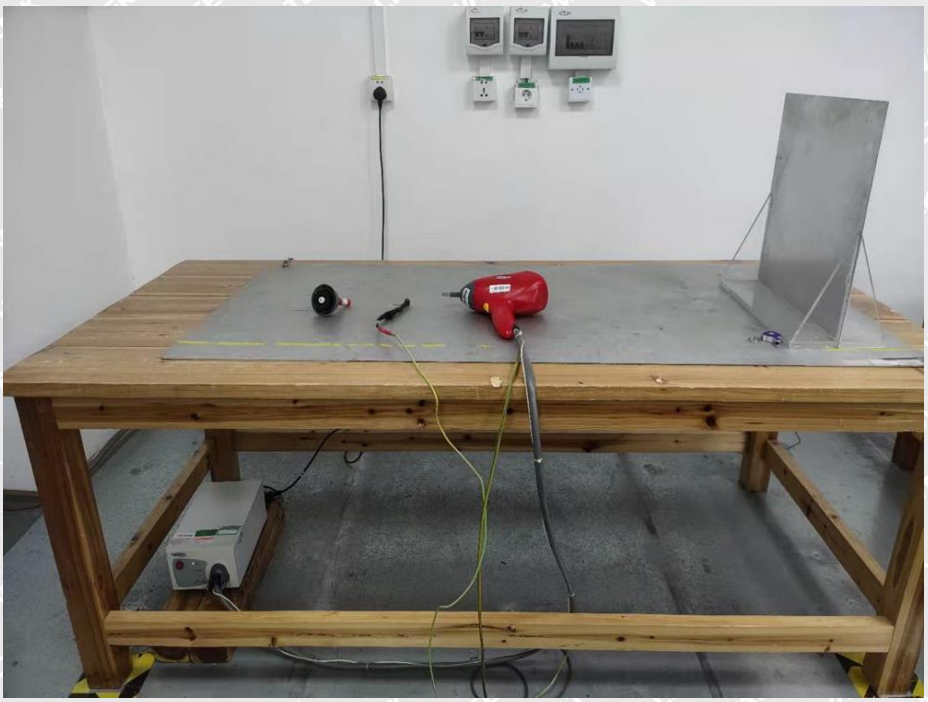
7 Photographs – Test Setup

7.1 Photograph – Radiated Electromagnetic Disturbance Test Setup

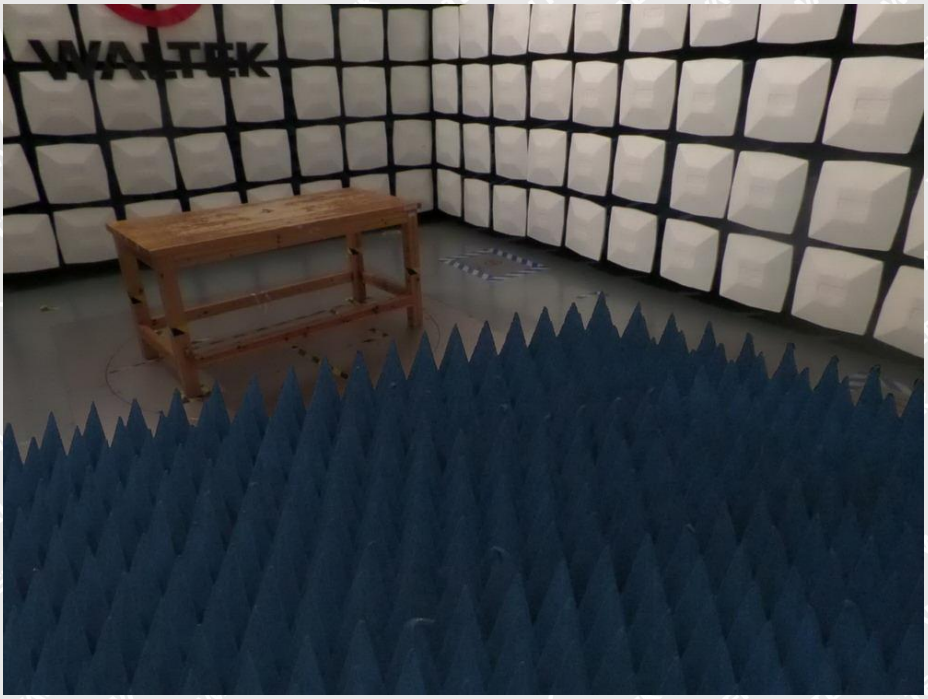
7.2 Photograph – Radiated Emission Test Setup, 30MHz to 1000MHz



7.3 Photograph – ESD Immunity Test Setup



7.4 Photograph – Radio-Frequency Electromagnetic Fields Immunity Test Setup



8 Photographs – Constructional Details

8.1 EUT – External View

8.2 EUT – Internal View

====== End of Report ======