



中国认可
国际互认
检测
TESTING
CNAS L6478



TEST REPORT

Reference No...... : WTF26F06158059W003
Applicant..... : Mid Ocean Brands B.V.
Address..... : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan,
Kowloon, Hong Kong.
Manufacturer : 118966
Address..... : ---
Product Name..... : Wireless speaker
Model No...... : MO3188
Test specification..... : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)
Date of Receipt sample : 2026-06-09
Date of Test..... : 2026-06-09 to 2026-06-10
Date of Issue..... : 2026-06-29
Test Report Form No. : WEW-301489A-01B
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 approver.

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1 Test Summary

Emission				
Test	Test Requirement	Test Method	Class / Severity	Result
Conducted Emissions	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 55032	Table A.10 of EN 55032	Pass
Radiation Emission	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 55032	Table A.4 and Table A.5 of EN 55032	Pass
Harmonic Current Emissions	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN IEC 61000-3-2	Clause 7 of EN IEC 61000-3-2	Pass ^{a)}
Voltage Fluctuations and Flicker	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-3-3	Clause 5 of EN 61000-3-3	Pass ^{b)}
Immunity				
Test	Test Requirement	Test Method	Class / Severity	Result
Electrostatic Discharge (ESD)	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-2	±2/±4 kV Contact ±2/±4/±8 kV Air	Pass
Radio frequency electromagnetic field (80 MHz to 6 000MHz)	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-3	3V/m, 80%, 1kHz, Amp. Mod.	Pass
Fast Transients Common Mode (EFT)	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-4	AC±0.5/1.0kV	Pass
Surge	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-5	±1kV D.M.† ±2kV C.M.‡	Pass
RF common mode 0,15 MHz to 80 MHz (CS)	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-6	3Vrms(emf), 80%, 1kHz Amp. Mod.	Pass
Voltage Dips and Interruptions	ETSI EN 301 489-17 V3.2.4	ETSI EN 301 489-1 V2.2.3 EN 61000-4-11	0 % UT* for 0.5per 0 % UT* for 1per 70 % UT* for 25per 0 % UT* for 250per	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

A.M Amplitude Modulation

† Differential Mode

‡ Common Mode

* U_T is the nominal supply voltage

a) According to the electrical characteristics and usage of the equipment, the EUT will not produce harmonics which might exceed the limits specified by the relevant standard. Therefore the requirements deem to be fulfilled without further testing.

b) According to the electrical characteristics and usage of the equipment, it is unlikely to produce significant voltage fluctuation or flicker. EUT is deemed to fulfil the requirement without testing.



2 Contents

	Page
1 TEST SUMMARY	2
2 CONTENTS	3
3 GENERAL INFORMATION	4
3.1 GENERAL DESCRIPTION OF E.U.T.	4
3.2 DETAILS OF E.U.T.	4
3.3 DESCRIPTION OF SUPPORT UNITS	4
3.4 STANDARDS APPLICABLE FOR TESTING	4
3.5 TEST FACILITY	4
3.6 SUBCONTRACTED	5
3.7 ABNORMALITIES FROM STANDARD CONDITIONS	5
4 EQUIPMENT USED DURING TEST	6
4.1 EQUIPMENT LIST	6
4.2 SOFTWARE LIST	8
4.3 MEASUREMENT UNCERTAINTY	8
4.4 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	9
4.5 DECISION RULE	9
5 EMC REQUIREMENTS FOR EMISSIONS	10
5.1 CONDUCTED EMISSION	10
5.2 RADIATED EMISSION	13
6 EMC REQUIREMENT FOR IMMUNITY	23
6.1 PERFORMANCE CRITERIA	23
6.2 ELECTROSTATIC DISCHARGE(ESD)	24
6.3 RF ELECTROMAGNETIC FIELD (80MHZ TO 6 000MHZ) (RS)	26
6.4 FAST TRANSIENTS COMMON MODE (EFT)	28
6.5 SURGES	30
6.6 RF COMMON MODE 0,15 MHZ TO 80MHZ (CS)	32
6.7 VOLTAGE DIPS AND INTERRUPTIONS	34
7 PHOTOGRAPHS - TEST SETUP	35
7.1 PHOTOGRAPH - RADIATED EMISSIONS TEST SETUP	35
7.2 PHOTOGRAPH - CONDUCTED EMISSIONS TEST SETUP	36
7.3 PHOTOGRAPH - RF ELECTROMAGNETIC FIELD TEST SETUP	36
7.4 PHOTOGRAPH - ESD TEST SETUP	37
7.5 PHOTOGRAPH - EFT IMMUNITY TEST SETUP	37
7.6 PHOTOGRAPH - SURGE IMMUNITY TEST SETUP	38
7.7 PHOTOGRAPH - RADIO-FREQUENCY COMMON MODE TEST SETUP	38
7.8 PHOTOGRAPH - VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST SETUP	39
8 PHOTOGRAPHS – EUT CONSTRUCTIONAL DETAILS	40



3 General Information

3.1 General Description of E.U.T.

Product Name : Wireless speaker

Model No. : MO3188

Remark : ---

3.2 Details of E.U.T.

Technical Data : Input: DC 5V
Battery: 3.7V, 1800mAh

3.3 Description of Support Units

The EUT has been tested as an independent unit. MO3188 is the test sample. The full tests were performed in the condition of AC 230V/50Hz input with the AC adapter specified by the laboratory. The RE, ESD and RS tests were performed in the condition of battery 3.7V input.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
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ETSI EN 301 489-17 V3.2.4 (2020-09)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
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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 and Economic Development Canada (ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number: 21895.

- **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.

- **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.

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4 Equipment Used during Test

4.1 Equipment List

☐ Mains Terminal Disturbance Voltage 1#(Conducted Emission)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	EMI Test Receiver	R&S	ESR3	102423	2026-01-04	2027-01-03
2.	LISN	R&S	ENV216	101343	2026-01-04	2027-01-03
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	2026-01-04	2027-01-03
4.	Switch	CD	RSU-A4	RSUA4008	2026-01-04	2027-01-03
☒ Mains Terminal Disturbance Voltage 2#(Conducted Emission)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	EMI Test Receiver	R&S	ESCI	101178	2026-01-04	2027-01-03
2.	LISN	R&S	ENV216	101215	2026-01-04	2027-01-03
3.	Cable 22	Times Microwave Systems	LMR195UF-BMNM-5.00M	---	2026-01-04	2027-01-03
4.	Switch	ESE	RSU/M2	---	2026-01-04	2027-01-03
☐ Mains Terminal Disturbance Voltage 3#(Conducted Emission)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	EMI Test Receiver	R&S	ESR3	102842	2026-01-04	2027-01-03
2.	LISN	R&S	ENV216	101542	2026-01-04	2027-01-03
3.	Cable 12	YIHENG	LMR195UF-NMNM-2.5	---	2026-01-04	2027-01-03
4.	Manual RF Switch	Top Precision	SW-2	RSU0402	2026-01-04	2027-01-03
☒ Radiated Emission (30MHz to 1GHz) 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	---	2024-01-05	2027-01-04
2.	EMI Test Receiver	R&S	ESR7	101566	2026-01-04	2027-01-03
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	2026-01-10	2027-01-09
4.	Cable 20	Times Microwave Systems	RG223-NMNM-10M	---	2026-01-04	2027-01-03
5.	Cable 21	Times Microwave Systems	RG223-NMNM-3M	---	2026-01-04	2027-01-03
☐ Radiated Emission (30MHz to 1GHz) 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	3m Semi-anechoic Chamber	YIHENG	9m×6m×6m	YH2021071801	2024-01-06	2027-01-05
2.	EMI Test Receiver	R&S	ESR7	102454	2026-01-04	2027-01-03
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9163	01418	2026-02-08	2027-02-07
4.	Cable 14	YIHENG	LMR240UF-NMSM-7.5	---	2026-01-04	2027-01-03



☒ Radiated Emission (1GHz to 6GHz) 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2024-01-05	2027-01-04
2.	EMI Test Receiver	R&S	ESR7	101566	2026-01-04	2027-01-03
3.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2026-01-06	2027-01-05
4.	Coaxial Cable (above 1GHz)	Times-Microwave	CBL5-NN	-	2026-01-04	2027-01-03
5.	Preamplifier	Lunar E M	LNA1G18-40	20160501002	2026-01-05	2027-01-04
☐ Radiated Emission (1GHz to 6GHz) 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	3m Semi-anechoic Chamber	YIHENG	9m×6m×6m	YH2021071801	2024-01-06	2027-01-05
2.	EMI Test Receiver	R&S	ESR7	102454	2026-01-04	2027-01-03
3.	Broad-band Horn Antenna	SCHWARZBECK	BBHA9120D	02465	2026-01-06	2027-01-05
4.	Coaxial Cable (above 1GHz)	Times-Microwave Systems	SFT205-NMSM-7	-	2026-01-04	2027-01-03
5.	Preamplifier	Tonscend	TAP0118045	AP21J806168	2026-01-05	2027-01-04
☐ Harmonics and Flicker Measuring System						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	Harmonics and Flicker Measuring System	YUANFANG	HFM-3000	V200	2026-01-05	2027-01-04
☒ ESD						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	ESD Simulator	TESEQ	NSG437	521	2026-01-06	2027-01-05
☒ EFT & Voltage Dips and Interruptions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	EMS test system	TESEQ	NSG3040	1858	2026-01-04	2027-01-03
2.	Step transformer	TESEQ	INA6501	206	2026-01-04	2027-01-03
3.	Coupling clamp	TESEQ	CDN8014	31405	2026-01-04	2027-01-03
☒ Surge						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	Surge Simulator	TESEQ	NSG3060	1395	2026-01-04	2027-01-03
☒ Injected Currents						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	Conducted Immunity test system	TESEQ	NSG4070	45345	2026-01-04	2027-01-03
2.	CDN	TESEQ	CDN M016	31586	2026-01-04	2027-01-03
3.	EM Clamp	TESEQ	KEMZ801	32362	2026-01-04	2027-01-03
4.	6dB Attenuator	TESEQ	ATN6075	32122	2026-01-04	2027-01-03



☒ Radio-frequency electromagnetic fields						
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1.	RF Power Amplifier	MICOTOP	MPA-80-1000-250	MPA2405139	2026-01-19	2027-01-18
2.	RF Power Amplifier	MICOTOP	MPA-1000-6000-100	MPA2405140	2026-01-04	2027-01-03
3.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP9128E-SPECIAL	142	2026-01-05	2027-01-04
4.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP 9149	476	2026-01-05	2027-01-04
5.	Analog signal generator	Agilent	N5181A	MY48180720	2026-01-05	2027-01-04
6.	Power meter	RS	NRP6A	101133	2026-01-04	2027-01-03

☐: Not Used

☒: Used

4.2 Software List

Description	Manufacturer	Model	Version
EMI Test Software (Conducted Emission 1#)	FARATRONIC	EZ-EMC	EMEC-3A1
EMI Test Software (Conducted Emission 2#)	FARATRONIC	EZ-CON	FARAD-3A1.1+
EMI Test Software (Conducted Emission 3#)	FARATRONIC	EZ-EMC	EMC-CON 3A1.1+
EMI Test Software (Radiated Emission 1#)	FARATRONIC	EZ-EMC	RA-03A1-2
EMI Test Software (Radiated Emission 2#)	FARATRONIC	EZ-EMC	RA-03A1-2
Harmonics and Flicker Test Software	YUANFANG	HFM-3000	V2.00.147
Radiated Immunity Test Software	Chinese EMC	EMS	V1.0.0.0

4.3 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conducted Emission	150kHz~30MHz	±2.6dB	(1)
Radiated Emission	30MHz~1GHz	±4.5dB	(1)
Radiated Emission	1GHz~6GHz	±4.5dB	(1)

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



4.4 Special Accessories and Auxiliary Equipment

Item	Equipment	Technical Data	Manufacturer	Model No.
1.	AC Adapter	Input: AC 100-240V~, 50/60Hz, 0.5A Output: DC 5V, 2A or DC 9V, 2A	HUAWEI	HW-090200CH0

4.5 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 if any measured disturbance level exceeds the disturbance limit.

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.

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5 EMC Requirements for Emissions

5.1 Conducted Emission

Test Requirement	ETSI EN 301 489-17
Test Method	ETSI EN 301 489-1, EN 55032 Class B
Frequency Range	150kHz to 30MHz
Class/Severity	Class B/ Table A.10 of EN 55032
Ports	AC Mains
Detector	Peak for pre-scan (9kHz Resolution Bandwidth)

5.1.1 E.U.T. Operation

Operating Environment:

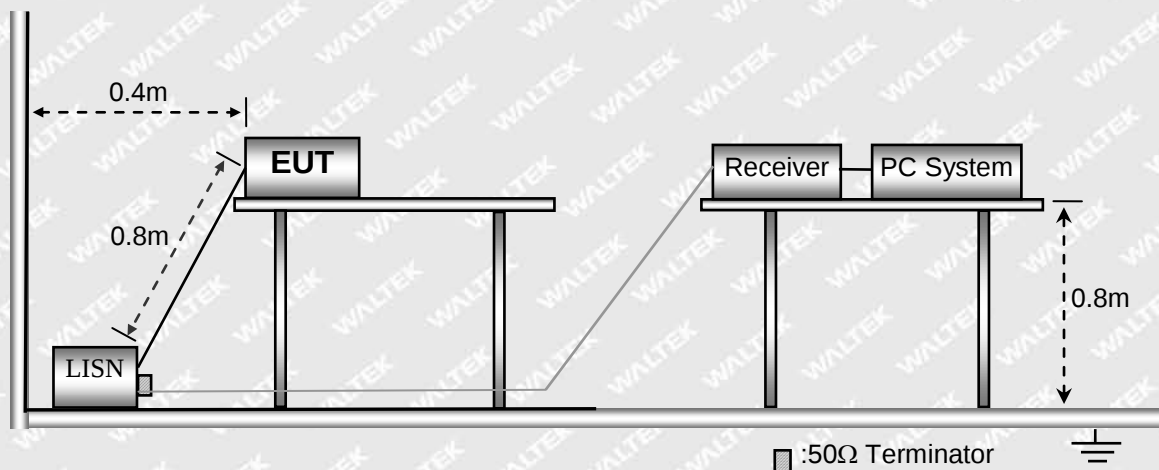
Temperature	20.8°C
Humidity	49.3%RH
Atmospheric Pressure	101.2kPa

EUT Operation:

Input Voltage	AC 230V/50Hz
Operating Mode	Communication mode

5.1.2 Test Setup

The conducted emission tests were performed using the setup accordance with the EN 55032.





5.1.3 Corrected Amplitude & Margin Calculation

The Corrected factor is calculated by adding LISN VDF(Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Measurement} = \text{Reading Level} + \text{Correct Factor}$$

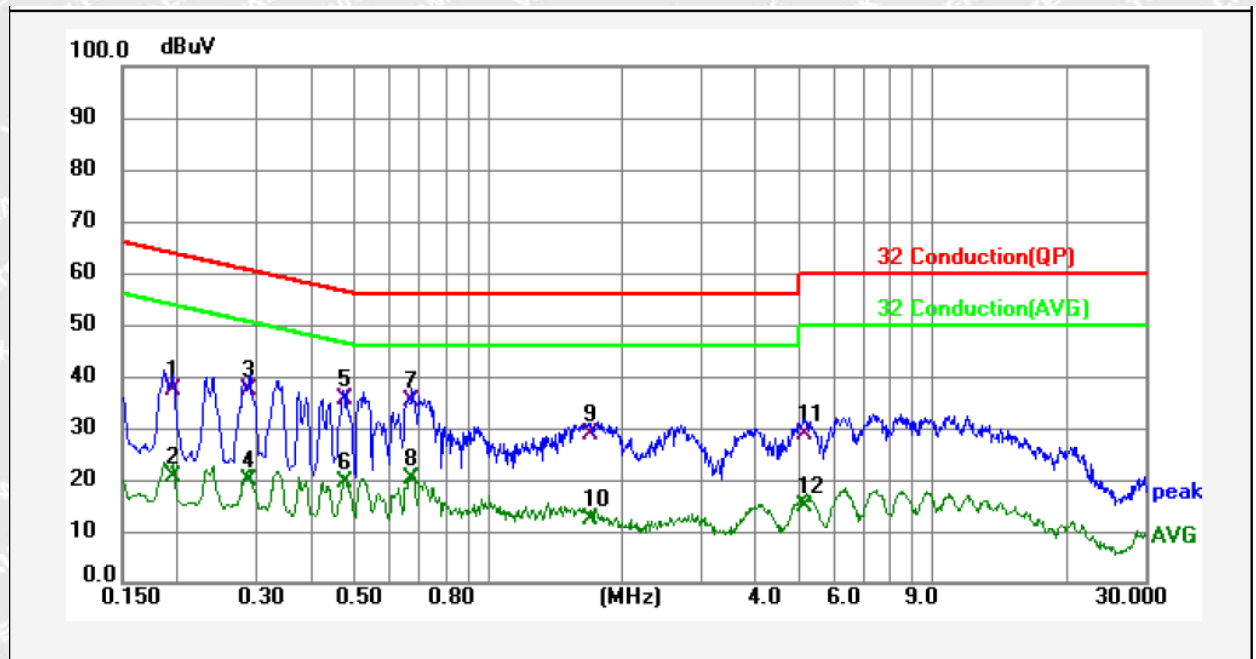
$$\text{Correct Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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 limit. The equation for margin calculation is as follows:

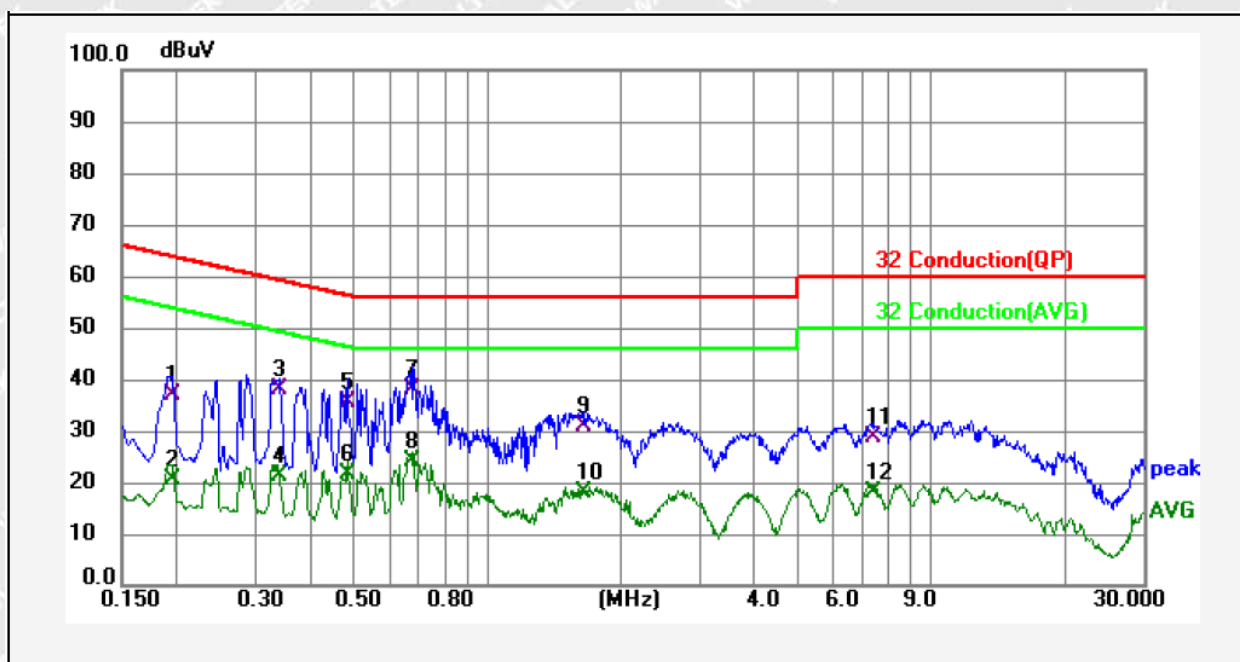
$$\text{Margin} = \text{Measurement} - \text{Limit}$$

5.1.4 Test Result

Live Line



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.195	27.61	9.61	37.22	63.83	-26.61	QP	
2	0.195	11.02	9.61	20.63	53.83	-33.20	AVG	
3	0.289	27.75	9.61	37.36	60.55	-23.19	QP	
4	0.289	10.39	9.61	20.00	50.55	-30.55	AVG	
5	0.476	25.82	9.63	35.45	56.41	-20.96	QP	
6	0.476	10.00	9.63	19.63	46.41	-26.78	AVG	
7	0.672	25.37	9.65	35.02	56.00	-20.98	QP	
8	0.672	10.47	9.65	20.12	46.00	-25.88	AVG	
9	1.702	18.87	9.73	28.60	56.00	-27.40	QP	
10	1.702	2.77	9.73	12.50	46.00	-33.50	AVG	
11	5.163	18.81	9.88	28.69	60.00	-31.31	QP	
12	5.163	5.12	9.88	15.00	50.00	-35.00	AVG	

**Neutral Line**

No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.195	27.44	9.53	36.97	63.83	-26.86	QP	
2	0.195	10.95	9.53	20.48	53.83	-33.35	AVG	
3	0.339	28.32	9.56	37.88	59.23	-21.35	QP	
4	0.339	11.75	9.56	21.31	49.23	-27.92	AVG	
5	0.483	25.85	9.57	35.42	56.29	-20.87	QP	
6	0.483	11.98	9.57	21.55	46.29	-24.74	AVG	
7	0.681	28.45	9.58	38.03	56.00	-17.97	QP	
8	0.681	14.51	9.58	24.09	46.00	-21.91	AVG	
9	1.653	21.36	9.64	31.00	56.00	-25.00	QP	
10	1.653	8.45	9.64	18.09	46.00	-27.91	AVG	
11	7.422	18.70	9.90	28.60	60.00	-31.40	QP	
12	7.422	8.24	9.90	18.14	50.00	-31.86	AVG	



5.2 Radiated Emission

Test Requirement	ETSI EN 301 489-17
Test Method	ETSI EN 301 489-1, EN 55032, Class B
Frequency Range	30MHz to 1GHz, 1GHz to 6GHz
Class/Severity	Class B/ Table A.4 and A.5 of EN 55032
Detector	Peak for pre-scan (120kHz Resolution Bandwidth Below 1GHz; 1MHz Resolution Bandwidth Above 1GHz)

5.2.1 EUT Operation:

Operating Environment:

Temperature	22.4°C
Humidity	51.3%RH
Atmospheric Pressure	101.2kPa

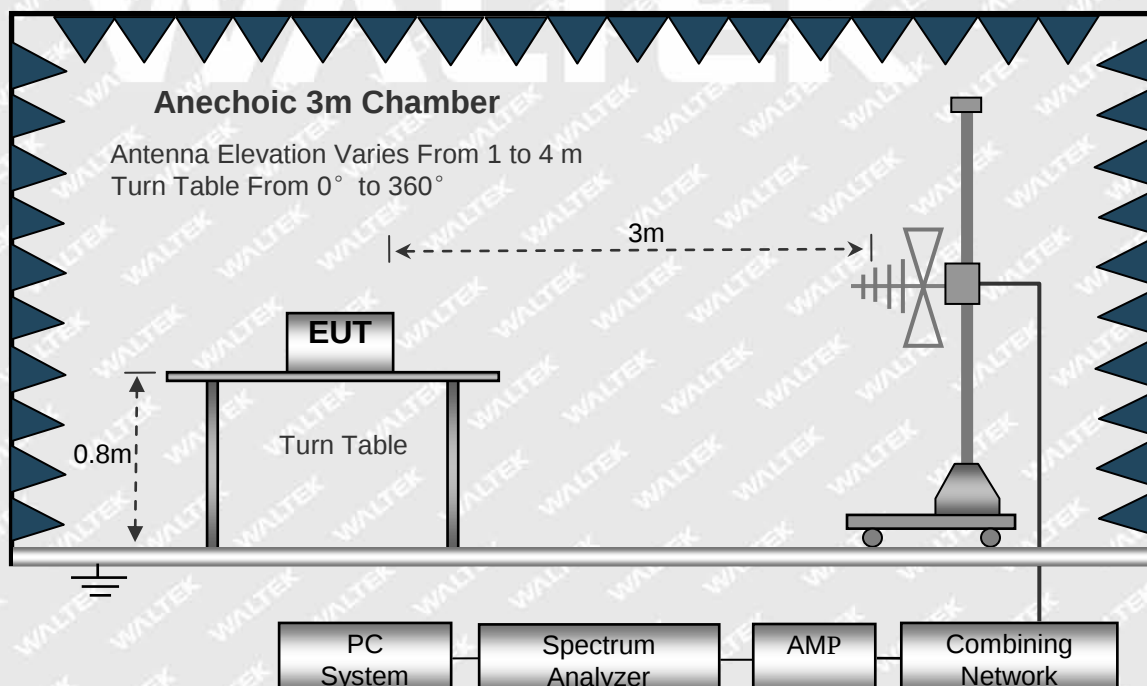
EUT Operation:

Input Voltage	AC 230V/50Hz; Battery 3.7V
Operating Mode	Communication mode

5.2.2 Test Setup

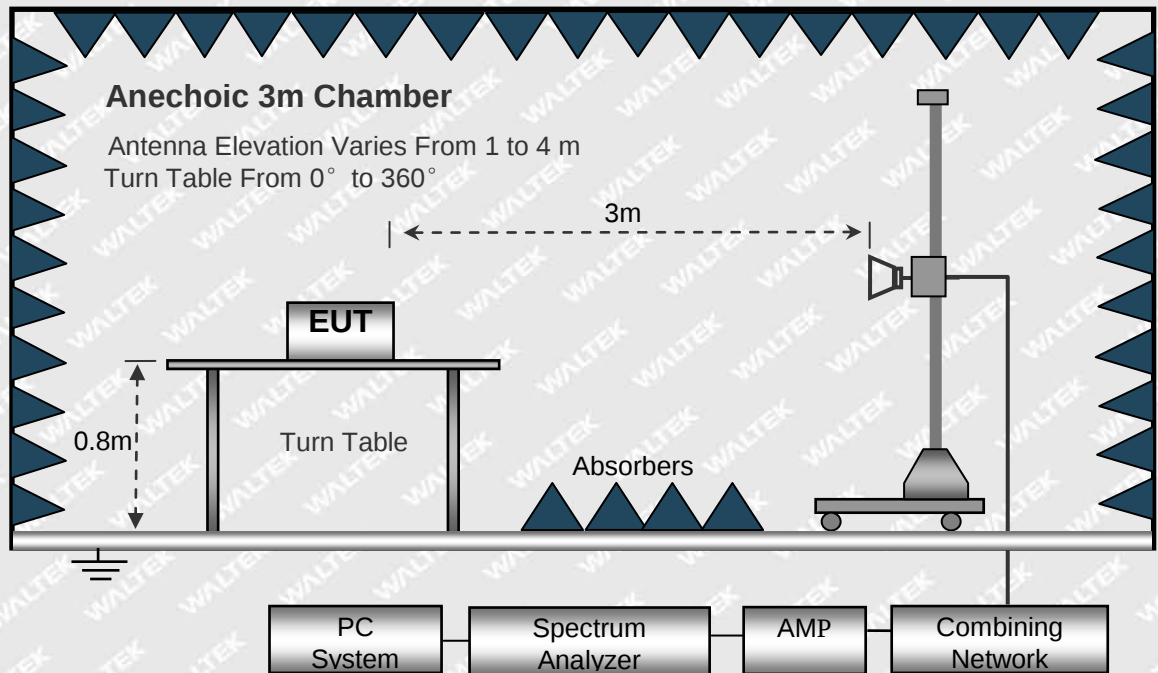
The radiated emission tests were performed using the setup accordance with the EN 55032.

Frequency Range: Below 1 GHz





Frequency Range: Above 1 GHz



5.2.3 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

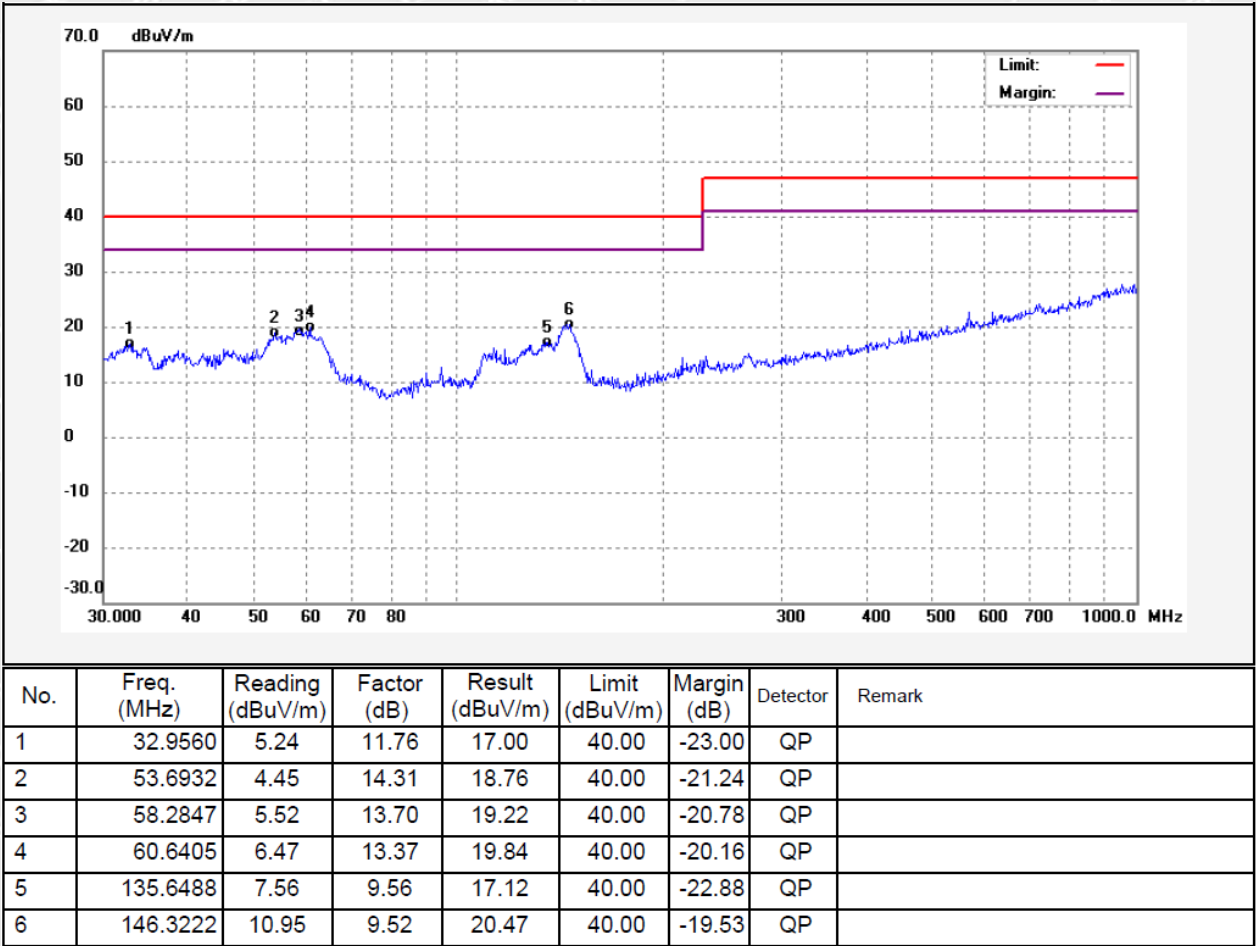


5.2.4 Test Result

Input Voltage: AC 230V/50Hz

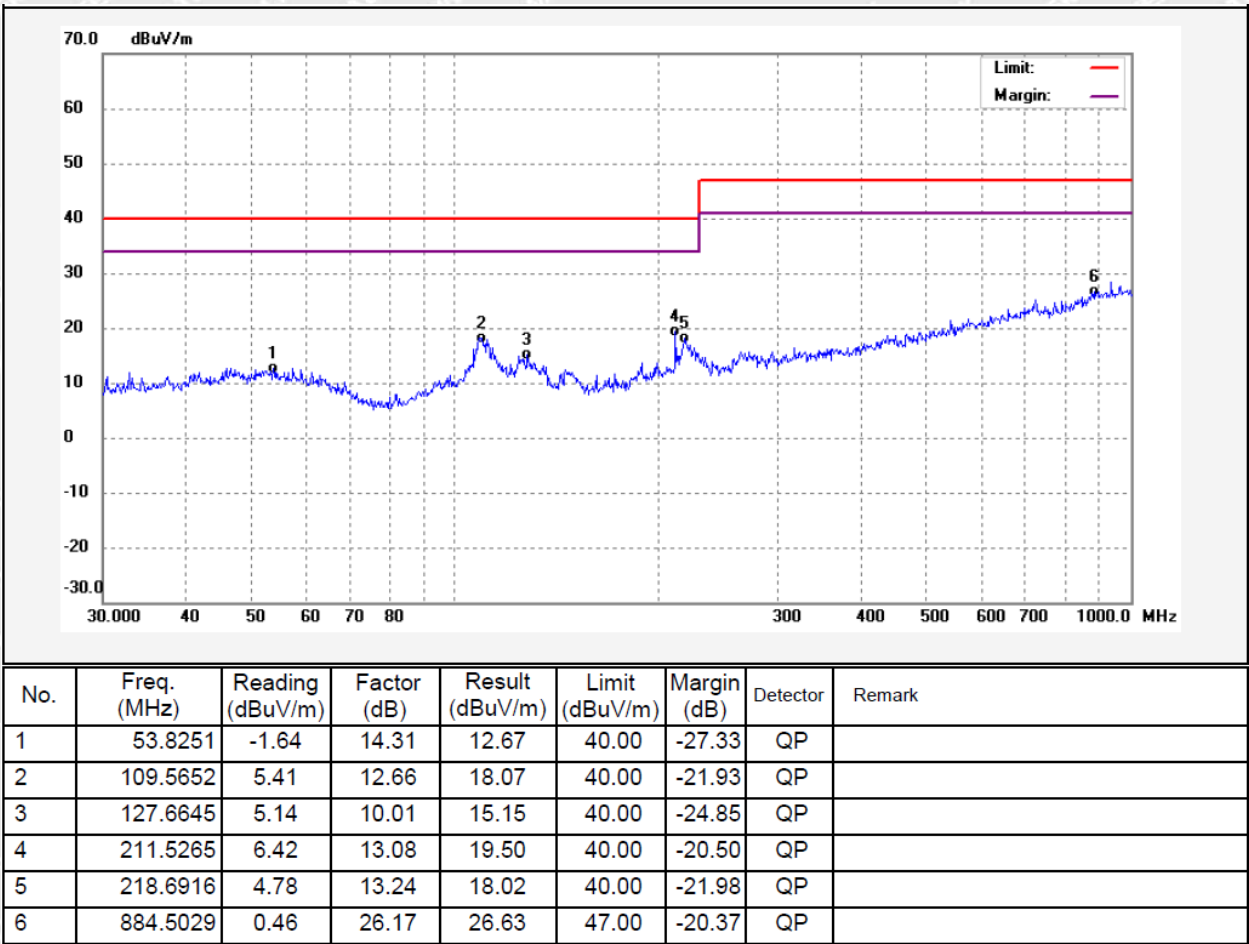
Frequency Range: 30MHz ~ 1000MHz

Antenna Polarization: Vertical



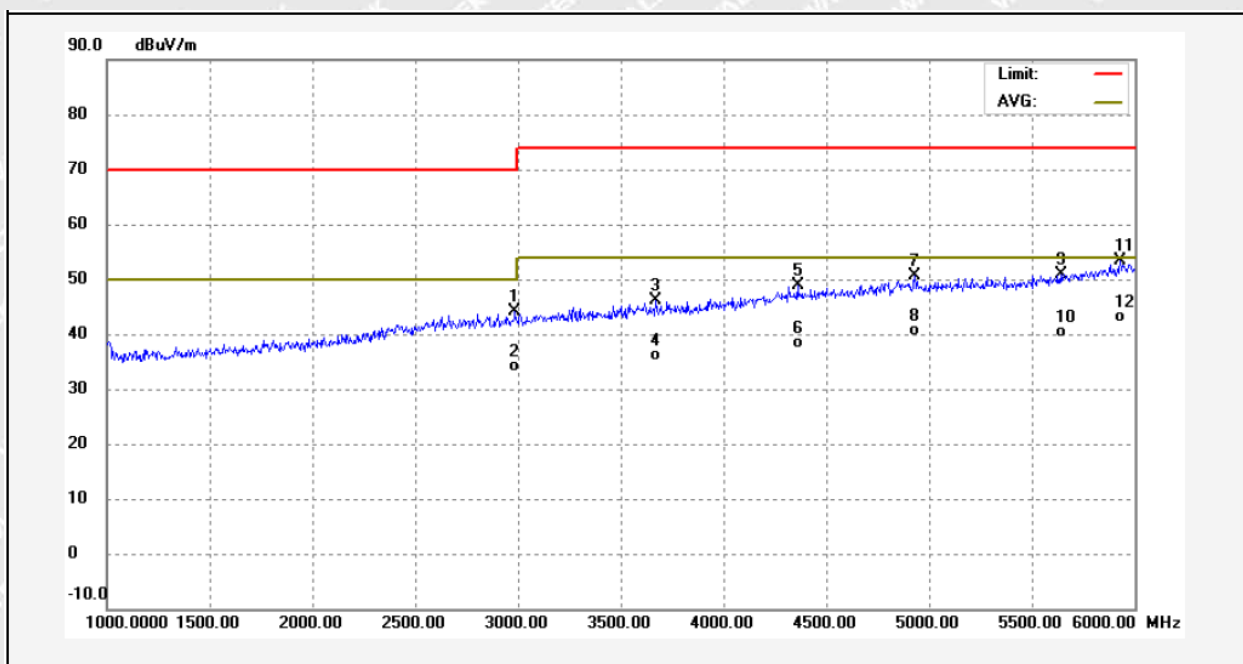


Antenna Polarization: Horizontal



**Frequency Range: 1000MHz ~ 6000MHz**

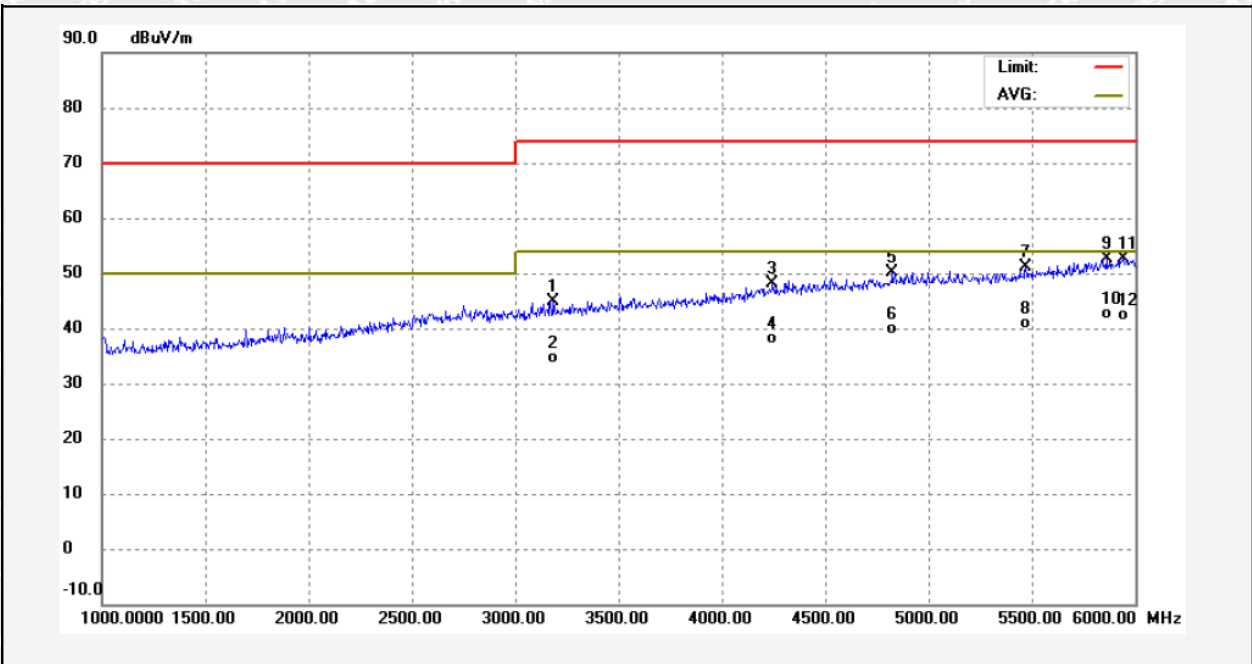
Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2986.500	10.20	33.87	44.07	70.00	-25.93	peak	
2	2986.500	0.31	33.87	34.18	50.00	-15.82	AVG	
3	3672.500	10.98	35.14	46.12	74.00	-27.88	peak	
4	3672.500	0.87	35.14	36.01	54.00	-17.99	AVG	
5	4364.500	11.82	37.05	48.87	74.00	-25.13	peak	
6	4364.500	1.39	37.05	38.44	54.00	-15.56	AVG	
7	4931.500	11.95	38.61	50.56	74.00	-23.44	peak	
8	4931.500	1.99	38.61	40.60	54.00	-13.40	AVG	
9	5643.500	10.90	39.98	50.88	74.00	-23.12	peak	
10	5643.500	0.40	39.98	40.38	54.00	-13.62	AVG	
11	5934.500	12.54	40.75	53.29	74.00	-20.71	peak	
12	5934.500	2.45	40.75	43.20	54.00	-10.80	AVG	



Antenna Polarization: Horizontal



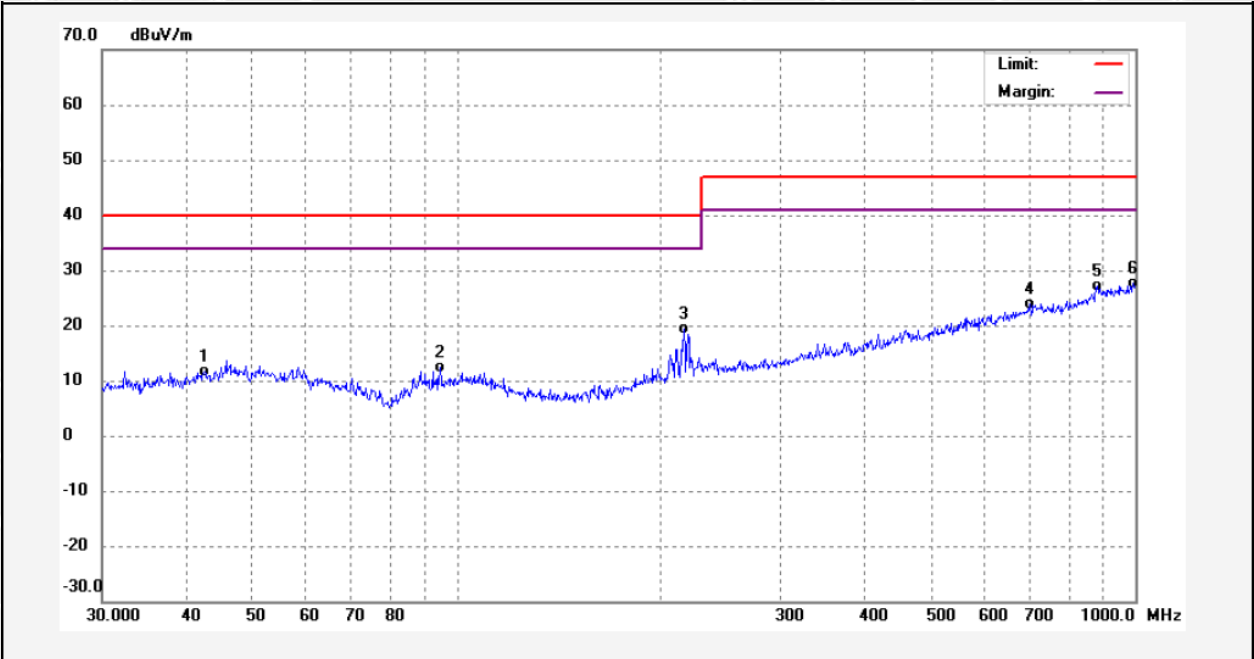
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	3187.500	10.58	34.21	44.79	74.00	-29.21	peak	
2	3187.500	0.35	34.21	34.56	54.00	-19.44	AVG	
3	4249.500	11.53	36.70	48.23	74.00	-25.77	peak	
4	4249.500	1.45	36.70	38.15	54.00	-15.85	AVG	
5	4826.500	11.72	38.33	50.05	74.00	-23.95	peak	
6	4826.500	1.54	38.33	39.87	54.00	-14.13	AVG	
7	5470.000	11.48	39.56	51.04	74.00	-22.96	peak	
8	5470.000	1.38	39.56	40.94	54.00	-13.06	AVG	
9	5861.500	12.04	40.56	52.60	74.00	-21.40	peak	
10	5861.500	1.99	40.56	42.55	54.00	-11.45	AVG	
11	5948.500	11.78	40.80	52.58	74.00	-21.42	peak	
12	5948.500	1.57	40.80	42.37	54.00	-11.63	AVG	



Input Voltage: Battery 3.7V

Frequency Range: 30MHz ~ 1000MHz

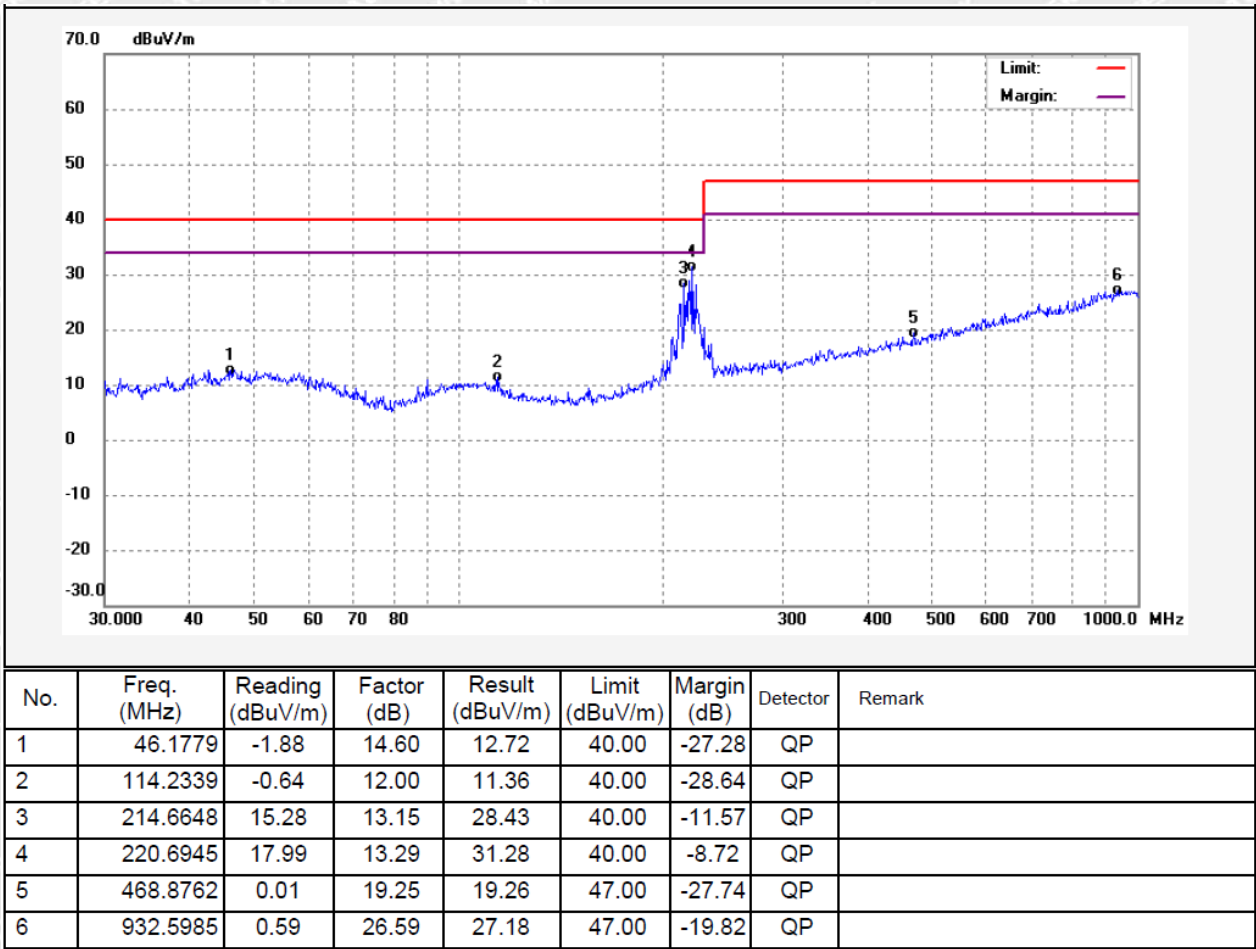
Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	42.4806	-2.18	13.90	11.72	40.00	-28.28	QP	
2	94.6273	0.27	12.02	12.29	40.00	-27.71	QP	
3	216.7068	6.27	13.20	19.47	40.00	-20.53	QP	
4	700.0406	0.37	23.48	23.85	47.00	-23.15	QP	
5	880.7888	1.07	26.16	27.23	47.00	-19.77	QP	
6	994.7540	0.37	27.24	27.61	47.00	-19.39	QP	

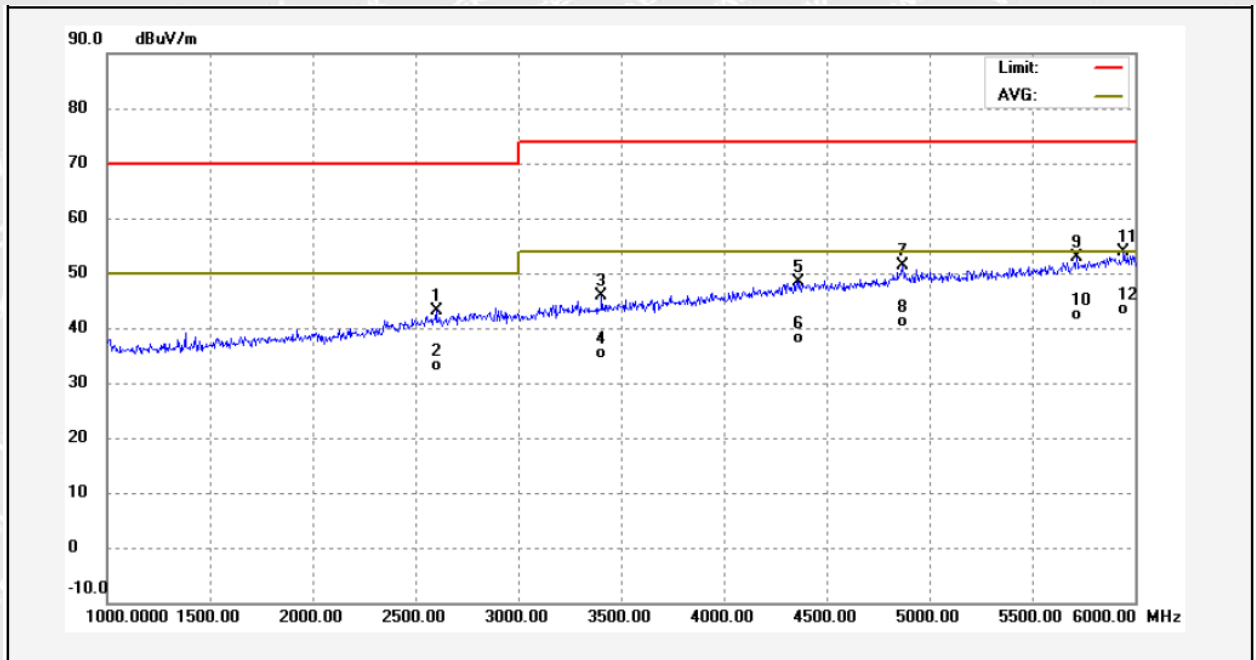


Antenna Polarization: Horizontal



**Frequency Range: 1000MHz ~ 6000MHz**

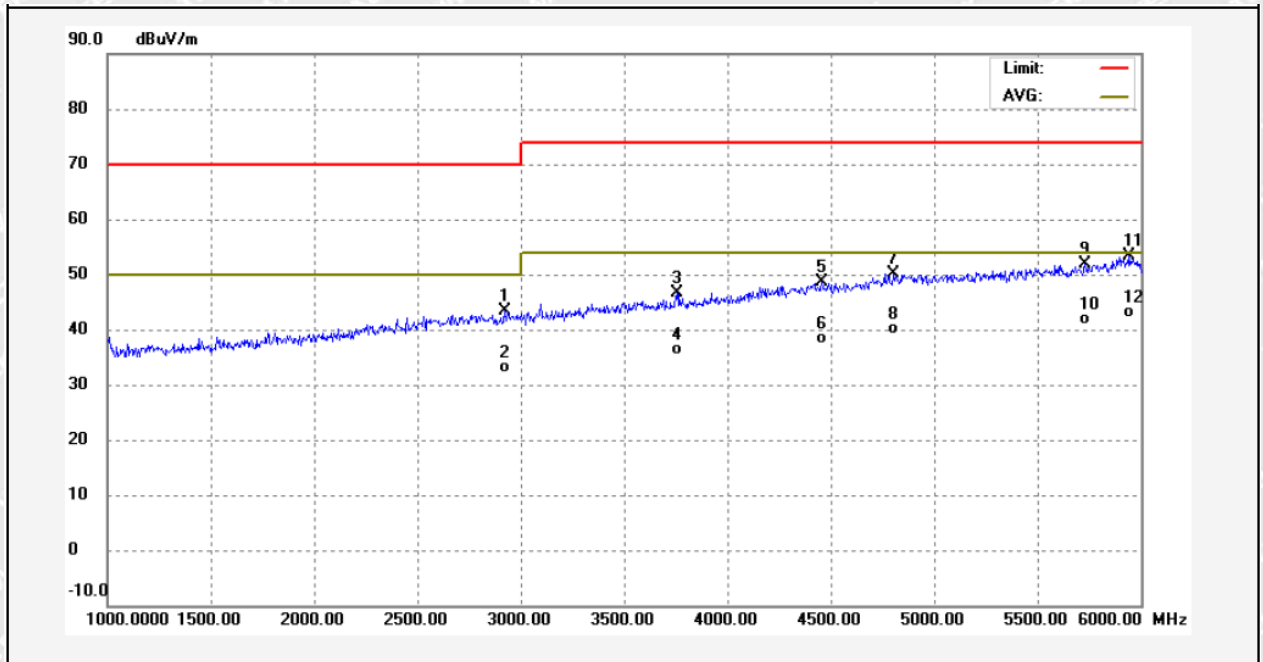
Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2603.000	10.15	32.94	43.09	70.00	-26.91	peak	
2	2603.000	0.21	32.94	33.15	50.00	-16.85	AVG	
3	3407.500	11.42	34.57	45.99	74.00	-28.01	peak	
4	3407.500	0.86	34.57	35.43	54.00	-18.57	AVG	
5	4360.000	11.40	37.04	48.44	74.00	-25.56	peak	
6	4360.000	1.13	37.04	38.17	54.00	-15.83	AVG	
7	4874.000	12.89	38.45	51.34	74.00	-22.66	peak	
8	4874.000	2.78	38.45	41.23	54.00	-12.77	AVG	
9	5718.500	12.63	40.18	52.81	74.00	-21.19	peak	
10	5718.500	2.32	40.18	42.50	54.00	-11.50	AVG	
11	5945.500	13.01	40.78	53.79	74.00	-20.21	peak	
12	5945.500	2.56	40.78	43.34	54.00	-10.66	AVG	



Antenna Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2924.500	9.60	33.71	43.31	70.00	-26.69	peak	
2	2924.500	-0.51	33.71	33.20	50.00	-16.80	AVG	
3	3759.500	11.22	35.35	46.57	74.00	-27.43	peak	
4	3759.500	1.13	35.35	36.48	54.00	-17.52	AVG	
5	4455.500	11.28	37.33	48.61	74.00	-25.39	peak	
6	4455.500	1.17	37.33	38.50	54.00	-15.50	AVG	
7	4805.500	11.95	38.28	50.23	74.00	-23.77	peak	
8	4805.500	1.87	38.28	40.15	54.00	-13.85	AVG	
9	5732.500	11.78	40.22	52.00	74.00	-22.00	peak	
10	5732.500	1.74	40.22	41.96	54.00	-12.04	AVG	
11	5949.000	12.55	40.80	53.35	74.00	-20.65	peak	
12	5949.000	2.36	40.80	43.16	54.00	-10.84	AVG	



6 EMC Requirement for Immunity

6.1 Performance Criteria

6.1.1 General performance criteria

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

6.1.2 Performance table

Criteria	During test	After test
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.

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6.2 Electrostatic Discharge(ESD)

Test Requirement	ETSI EN 301 489-17
Test Method	ETSI EN 301 489-1, EN 61000-4-2
Discharge Impedance	330 Ω / 150 pF
Discharge Voltage	Air Discharge: +/-2,4,8 KV Contact Discharge: +/-2,4 kV HCP & VCP: +/-2,4 kV
Polarity	Positive & Negative
Discharge Repeat Times	At Least 20 times at each test point
Discharge Mode	Single Discharge
Discharge Period	1 second minimum

6.2.1 E.U.T. Operation

Operating Environment:

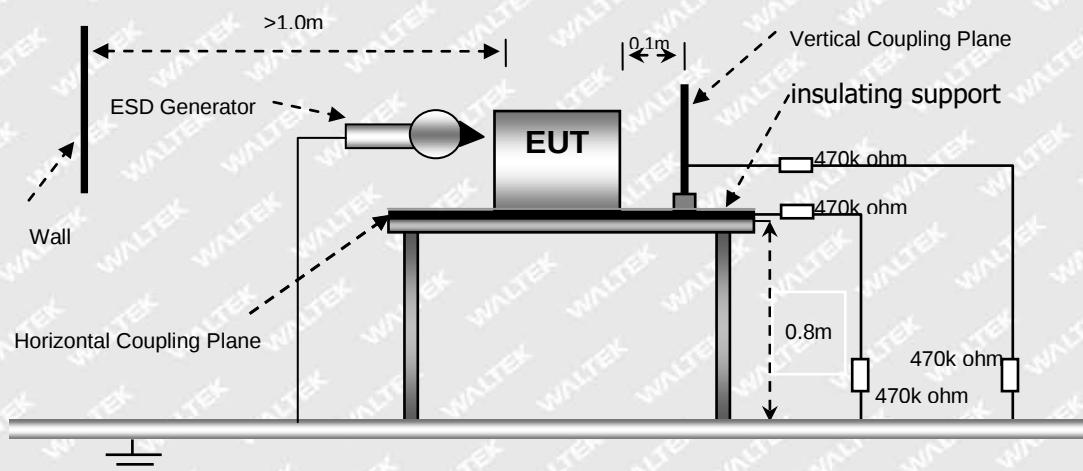
Temperature	24.2°C
Humidity	54.2%RH
Atmospheric Pressure	100.8kPa

EUT Operation:

Input Voltage	AC 230V/50Hz; Battery 3.7V
Operating Mode	Communication mode

6.2.2 Block Diagram of Setup

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





6.2.3 Test Result

Direct Discharge			Performance Criteria	
Discharge Level (kV)	Performance Criterion	Test Point	Contact Discharge	Air Discharge
$\pm 2 / \pm 4 / \pm 8$	B	1	N/A	Pass*
$\pm 2 / \pm 4$	B	2	Pass*	N/A

Remark:

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

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

Indirect Discharge			Performance Criteria	
Discharge Level (kV)	Performance Criterion	Test Point	Horizontal Coupling	Vertical Coupling
$\pm 2 / \pm 4$	B	1	Pass*	Pass*

Remark:

Test points 1. All sides

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

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6.3 RF Electromagnetic Field (80MHz to 6 000MHz) (RS)

Test Requirement : ETSI EN 301 489-17
Test Method : ETSI EN 301 489-1, EN 61000-4-3
Face of EUT : Front, Back, Left, Right
Frequency Range : 80MHz to 6 000MHz
Test Level : 3V/m
Modulation : 80%, 1kHz Amplitude Modulation.
Antenna polarisation : Horizontal& Vertical

6.3.1 E.U.T. Operation

Operating Environment:

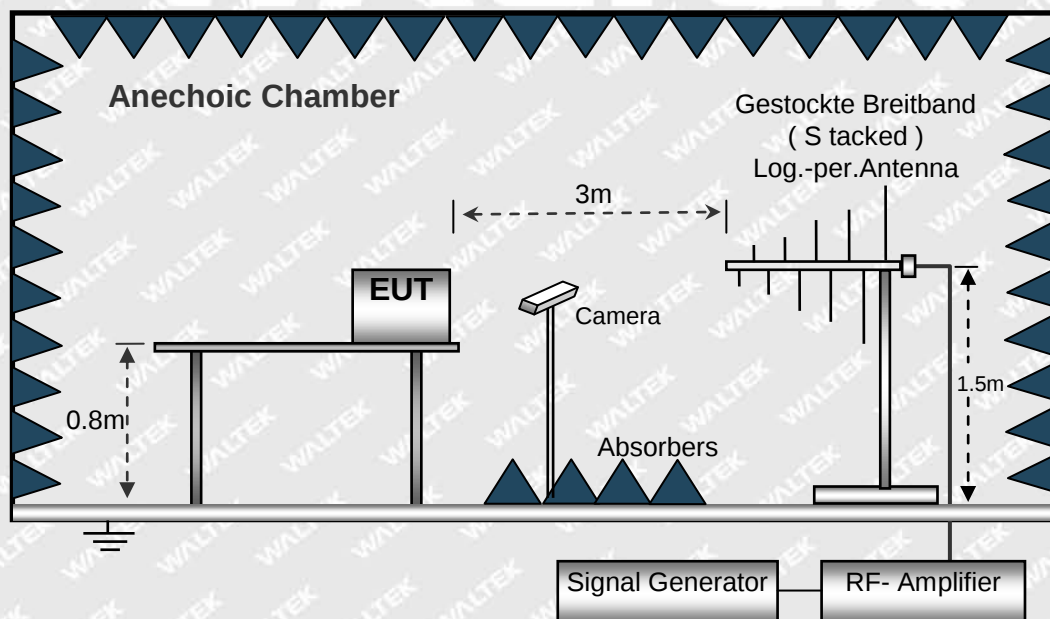
Temperature : 23.2°C
Humidity : 51.5%RH
Atmospheric Pressure : 101.4kPa

EUT Operation:

Input Voltage : AC 230V/50Hz; Battery 3.7V
Operating Mode : Communication mode

6.3.2 Block Diagram of Setup

The Radiated Immunity test was performed in accordance with the EN 61000-4-3.





6.3.3 Test Result

Frequency	Face of EUT	Antenna polarisation	Test Level	Step Size	Dwell Time	Performance Criterion	Result
80MHz to 1000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
80MHz to 1000MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*
1000MHz to 6000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
1000MHz to 6000MHz	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)

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6.4 Fast Transients Common Mode (EFT)

Test Requirement	: ETSI EN 301 489-17
Test Method	: ETSI EN 301 489-1, EN 61000-4-4
Polarity	: Positive & Negative
Repetition Frequency	: 5kHz
Burst Duration	: 300ms
Test Duration	: 2 minutes per level & polarity

6.4.1 E.U.T. Operation

Operating Environment:

Temperature	: 24.2°C
Humidity	: 54.2%RH
Atmospheric Pressure	: 100.8kPa

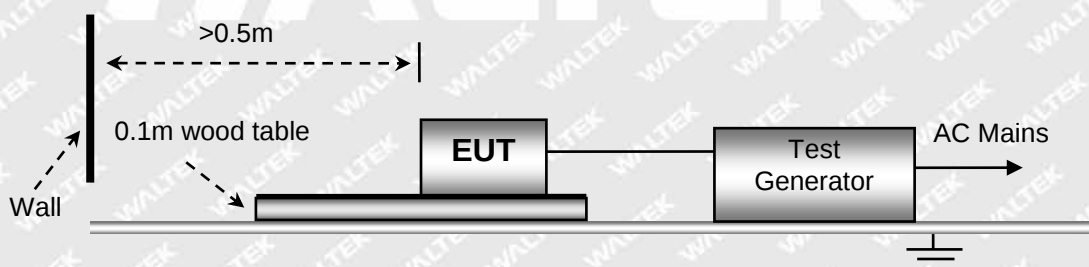
EUT Operation:

Input Voltage	: AC 230V/50Hz
Operating Mode	: Communication mode

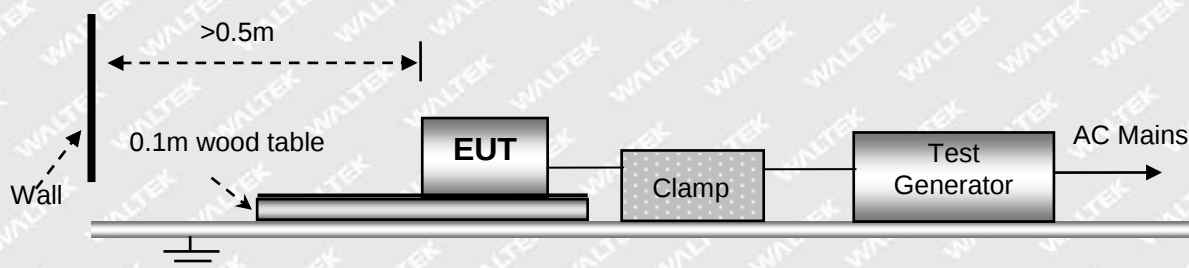
6.4.2 Block Diagram of Test Setup

The Electrical Fast Transients Immunity test was performed in accordance with the EN 61000-4-4.

For AC Mains or DC Ports:



For Signal, Wired network or Control Ports:





6.4.3 Test Result

Test Port	Test Level(kV)	Performance Criterion	Result
AC mains power port	±1.0	B	Pass*
DC power port	±0.5	B	N/A
Signal port	±0.5	B	N/A
Control port	±0.5	B	N/A
Wired network port	±0.5	B	N/A

Remark:

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

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6.5 Surges

Test Requirement : ETSI EN 301 489-17

Test Method : ETSI EN 301 489-1, EN 61000-4-5

Interval : 60s between each surge

No. of surges : 5 positive, 5 negative at 0°, 90°, 180°, 270°.

6.5.1 E.U.T. Operation

Operating Environment:

Temperature : 24.1°C

Humidity : 54.2%RH

Atmospheric Pressure : 100.8kPa

EUT Operation:

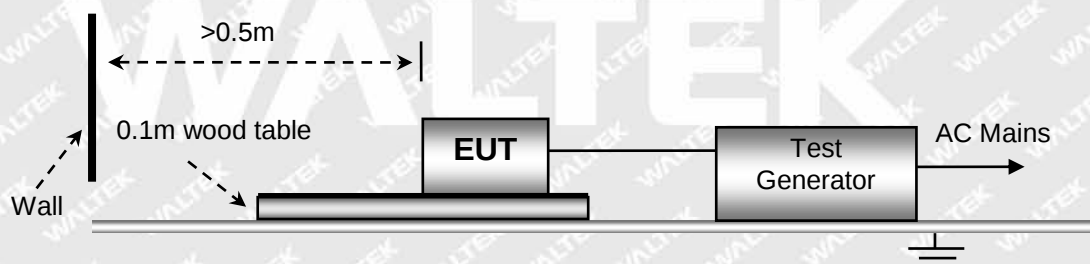
Input Voltage : AC 230V/50Hz

Operating Mode : Communication mode

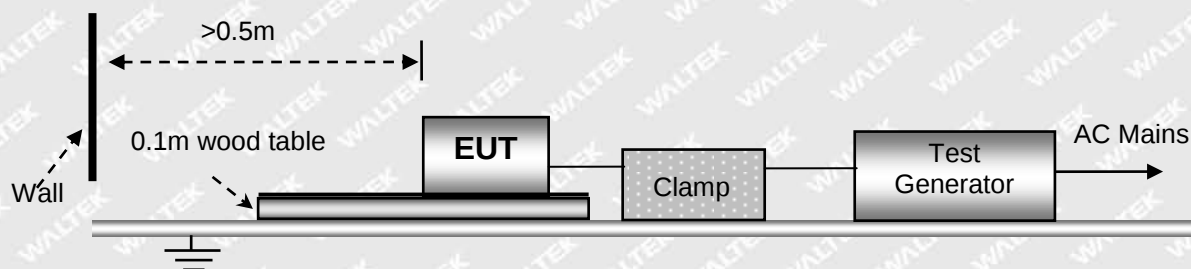
6.5.2 Block Diagram of Test Setup

The Surges Immunity test was performed in accordance with the EN 61000-4-5.

For AC Mains or DC Ports:



For Wired network port:





6.5.3 Test Result

Coupling point	Test Port	Applied Voltage (kV)	Performance criterion	Result
AC power port	Between Phase And Phase	±1	B	N/A
	Between Live And Neutral	±1	B	Pass*
	Between Live And Earth	±2	B	N/A
	Between Neutral And Earth	±2	B	N/A

Remark:

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

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6.6 RF Common Mode 0,15 MHz to 80MHz (CS)

Test Requirement : ETSI EN 301 489-17

Test Method : ETSI EN 301 489-1, EN 61000-4-6

Frequency Range : 150kHz to 80MHz

Test level : 3V rms (unmodulated emf into 150 Ω)

Modulation : 80%, 1kHz Amplitude Modulation.

6.6.1 E.U.T. Operation

Operating Environment:

Temperature : 24.2°C

Humidity : 54.2%RH

Atmospheric Pressure : 100.8kPa

EUT Operation:

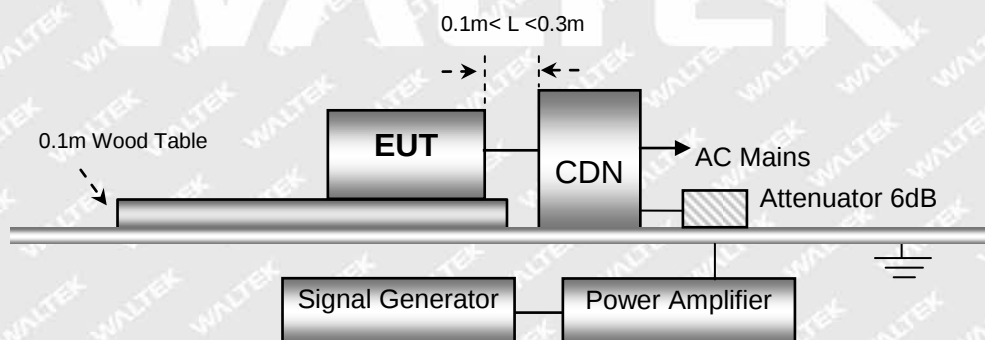
Input Voltage : AC 230V/50Hz

Operating Mode : Communication mode

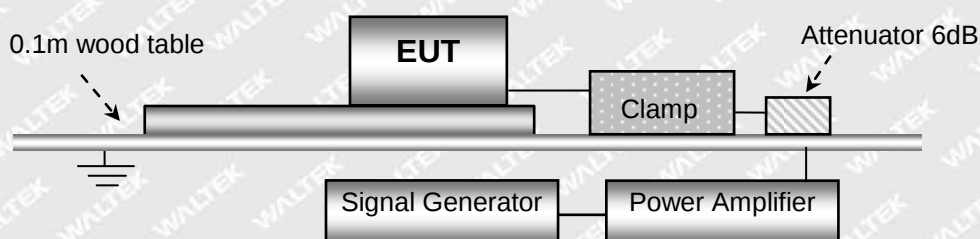
6.6.2 Block Diagram of Test Setup

The Injected Currents Immunity test was performed in accordance with the EN 61000-4-6.

For AC Mains or DC Ports:



For Signal, Wired network or Control Ports:





6.6.3 Test Result

Line	Voltage Level	Modulation	Step Size	Dwell Time	Performance Criteria	Test Result
AC mains power port	3Vr.m.s	80%, 1kHz Amp. Mod.	1%	1s	A	Pass*
DC power port	3Vr.m.s	80%, 1kHz Amp. Mod.	1%	1s	A	N/A
Signal port	3Vr.m.s	80%, 1kHz Amp. Mod.	1%	1s	A	N/A
Wired network port	3Vr.m.s	80%, 1kHz Amp. Mod.	1%	1s	A	N/A
Control port	3Vr.m.s	80%, 1kHz Amp. Mod.	1%	1s	A	N/A

Remark:

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

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6.7 Voltage Dips and Interruptions

Test Requirement : ETSI EN 301 489-17
Test Method : ETSI EN 301 489-1, EN 61000-4-11
No. of Dips / Interruptions : 3 per Level at 10ms intervals
Test Level(Voltage reduction) : 0%&70 % of U_T (Supply Voltage)

6.7.1 E.U.T. Operation

Operating Environment:

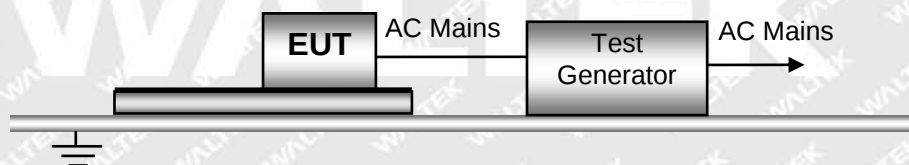
Temperature..... : 24.2°C
Humidity : 54.2%RH
Atmospheric Pressure : 100.8kPa

EUT Operation:

Input Voltage..... : AC 230V/50Hz
Operating Mode : Communication mode

6.7.2 Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the EN 61000-4-11.



6.7.3 Test Result

Type	Test Level in % U_T	Phase	Duration	Performance criterion	Result
Voltage Dips	0	0° & 180°	0.5	B	Pass*
	0	0° & 180°	1	B	Pass*
	70	0° & 180°	25	B	Pass*
Voltage Interruption	0	0° & 180°	250	B	Pass*

Remark:

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



7 Photographs - Test Setup

7.1 Photograph - Radiated Emissions Test Setup

Below 1000MHz



Above 1000MHz

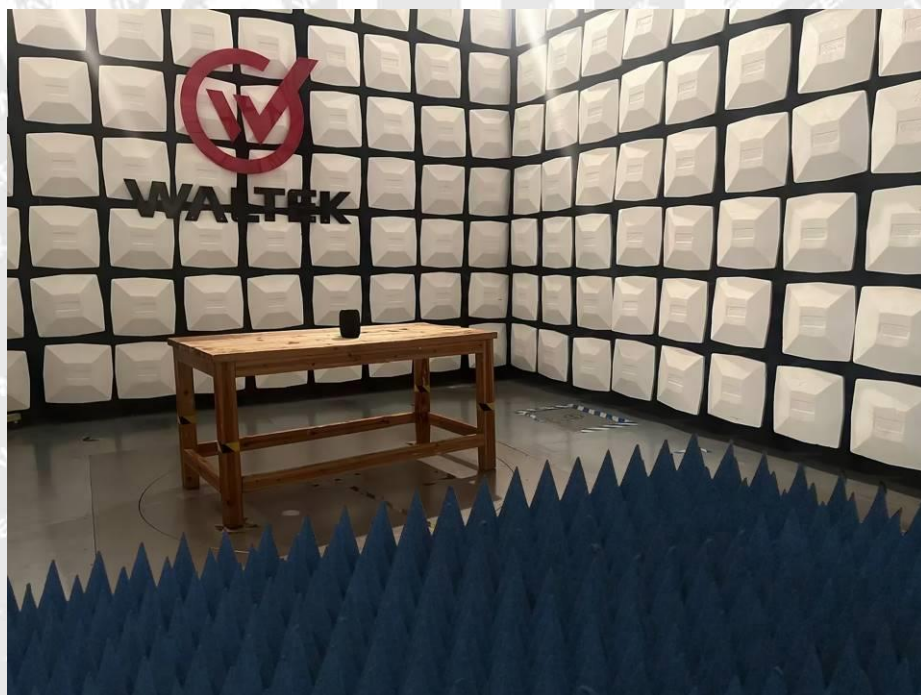




7.2 Photograph - Conducted Emissions Test Setup

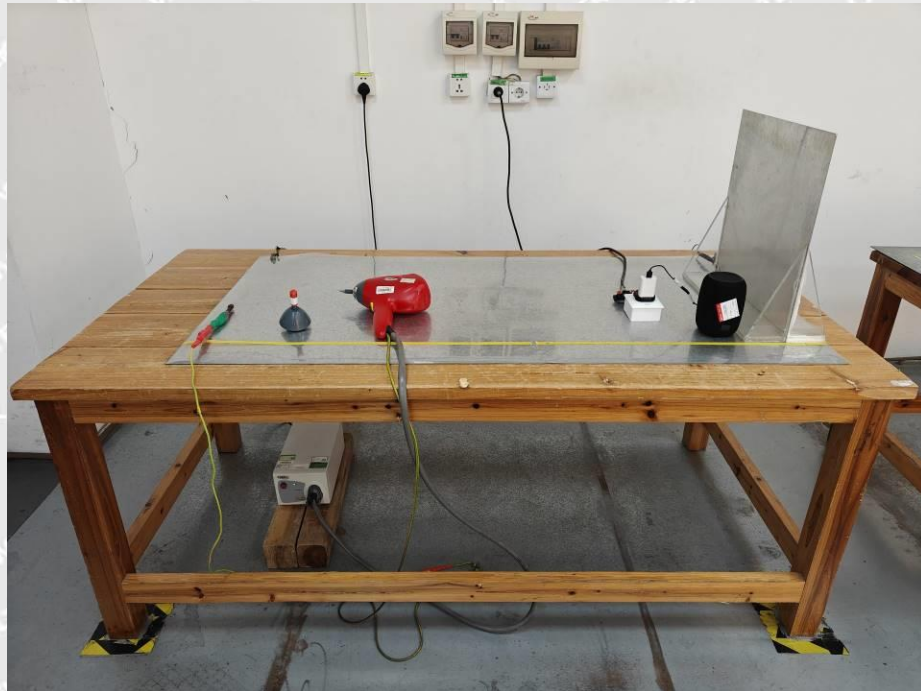


7.3 Photograph - RF Electromagnetic Field Test Setup





7.4 Photograph - ESD Test Setup



7.5 Photograph - EFT Immunity Test Setup





7.6 Photograph - Surge Immunity Test Setup



7.7 Photograph - Radio-frequency Common Mode Test Setup





7.8 Photograph - Voltage Dips and Interruptions Immunity Test Setup



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8 Photographs – EUT Constructional Details

Please refer to “ANNEX” (Reference No. WTF26F06158059W).

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

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国际互认
检测
TESTING
CNAS L6478



TEST REPORT

Reference No...... : WTF26F06158060W
Applicant..... : Mid Ocean Brands B.V.
Address..... : Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan,
Kowloon, Hong Kong.
Manufacturer : 118966
Address..... : ---
Product Name..... : Wireless speaker
Model No...... : MO3188
Test specification..... : EN 55032:2015+A11:2020+A1:2020
EN 55035:2017+A11:2020
Date of Receipt sample : 2026-06-09
Date of Test..... : 2026-06-09 to 2026-06-10
Date of Issue..... : 2026-06-29
Test Report Form No. : WEI-55032A-04B
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 approver.

Prepared By:

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Tested by:

Roy Hong

Approved by:

Danny Zhou



1 Test Summary

EMISSION				
Test Item	Test Standard		Class / Severity	Result
Mains Terminal Disturbance Voltage, 150kHz to 30MHz	EN 55032:2015+A11:2020+A1:2020		Table A.10	Pass
Radiated Emission, 30MHz to 1000MHz	EN 55032:2015+A11:2020+A1:2020		Table A.4	Pass
Radiation Emission, 1GHz to 6GHz	EN 55032:2015+A11:2020+A1:2020		Table A.5	Pass
IMMUNITY (EN 55035:2017+A11:2020)				
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
Continuous RF Electromagnetic Field Disturbances	IEC 61000-4-3: 2006+A1+A2	3V/m, 80%, 1kHz, Amp. Mod.	A	Pass
Electrical Fast Transients (EFT)	IEC 61000-4-4:2012	AC ±1.0Kv DC ±0.5Kv	B	Pass
Surge	IEC 61000-4-5:2005	±1Kv D.M.† ±2Kv C.M.‡	B	Pass
Continuous Induced RF Disturbances, 0.15MHz to 10MHz	IEC 61000-4-6:2008	3Vr.m.s.(emf), 80%, 1kHz Amp. Mod.	A	Pass
Continuous Induced RF Disturbances, 10MHz to 30MHz		3 to 1Vr.m.s.(emf), 80%, 1kHz Amp. Mod	A	
Continuous Induced RF Disturbances, 30MHz to 80MHz		1Vr.m.s.(emf), 80%, 1kHz Amp. Mod	A	
Power-Frequency Magnetic Field	IEC 61000-4-8:2009	1A/m	A	N/A
Voltage Dips	IEC 61000-4-11:2004	< 5 % U _T * for 0.5per	B	Pass
		70 % U _T * for 25/30per	C	
Voltage Interruptions		< 5 % U _T * for 250/300per	C	

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
- A.M Amplitude Modulation
- † Differential Mode
- ‡ Common Mode
- * U_T is the nominal supply voltage



2 Contents

	Page
COVER PAGE	1
1 TEST SUMMARY	2
2 CONTENTS	3
3 GENERAL INFORMATION.....	5
3.1 GENERAL DESCRIPTION OF E.U.T.	5
3.2 DETAILS OF E.U.T.	5
3.3 DESCRIPTION OF SUPPORT UNITS	5
3.4 STANDARDS APPLICABLE FOR TESTING	5
3.5 TEST FACILITY.....	5
3.6 SUBCONTRACTED.....	6
3.7 ABNORMALITIES FROM STANDARD CONDITIONS	6
4 EQUIPMENT USED DURING TEST	7
4.1 SOFTWARE LIST	9
4.2 MEASUREMENT UNCERTAINTY	9
4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	10
4.4 DECISION RULE.....	10
5 EMISSION TEST RESULTS.....	11
5.1 MAINS TERMINALS DISTURBANCE VOLTAGE, 150 KHZ TO 30MHZ.....	11
5.1.1 E.U.T. Operation	11
5.1.2 Block Diagram of Test Setup	11
5.1.3 Measurement Data	11
5.1.4 Corrected Amplitude & Margin Calculation	12
5.1.5 Mains Terminals Disturbance Voltage Test Data.....	12
5.2 RADIATED EMISSION, 30MHZ TO 1GHZ	14
5.2.1 E.U.T. Operation	14
5.2.2 Block Diagram of Test Setup	14
5.2.3 Measurement Data	14
5.2.4 Corrected Amplitude & Margin Calculation	15
5.2.5 Radiated Emission Test Data.....	15
5.3 RADIATED EMISSION, 1GHZ TO 6GHZ.....	19
5.3.1 E.U.T. Operation	19
5.3.2 Block Diagram of Test Setup	19
5.3.3 Measurement Data	19
5.3.4 Corrected Amplitude & Margin Calculation	20
5.3.5 Radiated Emission Test Data	20
6 IMMUNITY TEST RESULTS.....	24
6.1 PERFORMANCE CRITERIA	24
6.2 ELECTROSTATIC DISCHARGE (ESD)	25
6.2.1 E.U.T. Operation	25
6.2.2 Block Diagram of Setup	25
6.2.3 Direct Discharge Test Results	26
6.2.4 Indirect Discharge Test Results.....	26
6.3 CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES.....	27
6.3.1 E.U.T. Operation	27
6.3.2 Block Diagram of Setup	27
6.3.3 Test Results.....	28
6.4 ELECTRICAL FAST TRANSIENTS (EFT).....	29
6.4.1 E.U.T. Operation	29
6.4.2 Block Diagram of Setup	30



6.4.3	Test Results.....	30
6.5	SURGE.....	31
6.5.1	E.U.T. Operation.....	31
6.5.2	Block Diagram of Setup.....	31
6.5.3	Test Result.....	32
6.6	CONTINUOUS INDUCED RF DISTURBANCE.....	33
6.6.1	E.U.T. Operation.....	33
6.6.2	Block Diagram of Setup.....	33
6.6.3	Test Results.....	34
6.7	VOLTAGE DIPS AND INTERRUPTIONS.....	35
6.7.1	E.U.T. Operation.....	35
6.7.2	Block Diagram of Setup.....	35
6.7.3	Test Results.....	36
7	PHOTOGRAPHS – TEST SETUP	37
7.1	PHOTOGRAPH – MAINS TERMINAL DISTURBANCE VOLTAGE TEST SETUP	37
7.2	PHOTOGRAPH – RADIATED EMISSION TEST SETUP, 30MHZ TO 1GHZ.....	37
7.3	PHOTOGRAPH – RADIATED EMISSION TEST SETUP, 1GHZ TO 6GHZ	38
7.4	PHOTOGRAPH – ESD IMMUNITY TEST SETUP.....	38
7.5	PHOTOGRAPH – CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES TEST SETUP	39
7.6	PHOTOGRAPH – EFT IMMUNITY TEST SETUP.....	39
7.7	PHOTOGRAPH – SURGE IMMUNITY TEST SETUP.....	40
7.8	PHOTOGRAPH – CONTINUOUS INDUCED RF DISTURBANCE TEST SETUP	40
7.9	PHOTOGRAPH – VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST SETUP	41
8	PHOTOGRAPHS – CONSTRUCTIONAL DETAILS	42
8.1	EUT – EXTERNAL PHOTOS.....	42
8.2	EUT – INTERNAL PHOTOS.....	43

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3 General Information

3.1 General Description of E.U.T.

Product Name : Wireless speaker
Model No. : MO3188
Remark : ---

3.2 Details of E.U.T.

Technical Data : Input: DC 5V
Battery: 3.7V, 1800mAh

3.3 Description of Support Units

The EUT has been tested as an independent unit. MO3188 is the test sample. The full tests were performed in the condition of AC 230V/50Hz input with the AC adapter specified by the laboratory. The RE, ESD and RS tests were performed in the additional condition of battery 3.7V input.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

EN 55032:2015+A11:2020 +A1:2020	Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 55035:2017+A11:2020	Electromagnetic compatibility of multimedia equipment - 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 and Economic Development Canada (ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number: 21895.

- **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.

- **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.

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4 Equipment Used during Test

☐ Mains Terminal Disturbance Voltage (Conducted Emission) 1#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESR3	102423	Valid
2.	LISN	R&S	ENV216	101343	Valid
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	Valid
4.	Switch	CD	RSU-A4	RSUA4008	Valid
☒ Mains Terminal Disturbance Voltage (Conducted Emission) 2#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	LISN	R&S	ENV216	101215	Valid
3.	Cable 22	Times Microwave Systems	LMR195UF-BMNM-5.00M	---	Valid
4.	Switch	ESE	RSU/M2	---	Valid
☐ Mains Terminal Disturbance Voltage (Conducted Emission) 3#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESR3	102842	Valid
2.	LISN	R&S	ENV216	101542	Valid
3.	Cable 12	YIHENG	LMR195UF-NMNM-2.5	---	Valid
4.	Manual RF Switch	Top Precision	SW-2	RSU0402	Valid
☒ Radiated Emission (30MHz to 1GHz) 1#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	---	Valid
2.	EMI Test Receiver	R&S	ESR7	101566	Valid
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	Valid
4.	Cable 20	Times Microwave Systems	RG223-NMNM-10M	---	Valid
5.	Cable 21	Times Microwave Systems	RG223-NMNM-3M	---	Valid
☐ Radiated Emission (30MHz to 1GHz) 2#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	3m Semi-anechoic Chamber	YIHENG	9m×6m×6m	YH2021071801	Valid
2.	EMI Test Receiver	R&S	ESR7	102454	Valid
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9163	01418	Valid
4.	Cable 14	YIHENG	LMR240UF-NMSM-7.5	---	Valid



☒ Radiated Emission (1GHz to 6GHz) 1#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	Valid
2.	EMI Test Receiver	R&S	ESR7	101566	Valid
3.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	Valid
4.	Coaxial Cable (above 1GHz)	Times-Microwave	CBL5-NN	-	Valid
5.	Preamplifier	Lunar E M	LNA1G18-40	20160501002	Valid
☐ Radiated Emission (1GHz to 6GHz) 2#					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	Valid
2.	EMI Test Receiver	R&S	ESR7	101566	Valid
3.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	Valid
4.	Coaxial Cable (above 1GHz)	Times-Microwave	CBL5-NN	-	Valid
5.	Preamplifier	Lunar E M	LNA1G18-40	20160501002	Valid
☒ ESD					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	ESD Simulator	TESEQ	NSG437	521	Valid
☒ EFT & Voltage Dips and Interruptions					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMS test system	TESEQ	NSG3040	1858	Valid
2.	Step transformer	TESEQ	INA6501	206	Valid
3.	Coupling clamp	TESEQ	CDN8014	31405	Valid
☒ Surge					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Surge Simulator	TESEQ	NSG3060	1395	Valid
☒ Injected Currents					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	Conducted Immunity test system	TESEQ	NSG4070	45345	Valid
2.	CDN	TESEQ	CDN M016	31586	Valid
3.	EM Clamp	TESEQ	KEMZ801	32362	Valid
4.	6dB Attenuator	TESEQ	ATN6075	32122	Valid



☒ Radio-frequency Electromagnetic Fields					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	RF Power Amplifier	MICOTOP	MPA-80-1000-250	MPA2405139	Valid
2.	RF Power Amplifier	MICOTOP	MPA-1000-6000-100	MPA2405140	Valid
3.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP9128E-SPECIAL	142	Valid
4.	Stacked double logarithmic periodic antenna	SCHWARZBECK	STLP 9149	476	Valid
5.	Analog signal generator	Agilent	N5181A	MY46240792	Valid
6.	Power meter	RS	NRP6A	101133	Valid

☐: Not Used

☒: Used

4.1 Software List

Description	Manufacturer	Model	Version
EMI Test Software (Conducted Emission 1#)	FARATRONIC	EZ-EMC	EMEC-3A1
EMI Test Software (Conducted Emission 2#)	FARATRONIC	EZ-CON	FARAD-3A1.1+
EMI Test Software (Conducted Emission 3#)	FARATRONIC	EZ-EMC	EMC-CON 3A1.1+
EMI Test Software (Radiated Emission 1#)	FARATRONIC	EZ-EMC	RA-03A1-2
EMI Test Software (Radiated Emission 2#)	FARATRONIC	EZ-EMC	RA-03A1-2
Radiated Immunity Test Software	Chinese EMC	EMS	V1.0.0.0

4.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conducted Emission	150kHz~30MHz	±2.6dB	(1)
Radiated Emission	30MHz~1GHz	±4.5dB	(1)
Radiated Emission	1GHz~6GHz	±4.5dB	(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.
1.	AC Adapter	Input: AC 100-240V~, 50/60Hz, 0.5A Output: DC 5V, 2A or DC 9V, 2A	HUAWEI	HW-090200CH0

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 if any measured disturbance level exceeds the disturbance limit.

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.

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5 Emission Test Results

5.1 Mains Terminals Disturbance Voltage, 150 kHz to 30MHz

Test Requirement	: EN 55032 Annex A.3
Test Method	: EN 55032 Annex A.3
Limit	: Table A.10 of EN 55032
Test Result	: Pass
Frequency Range	: 150kHz to 30MHz
Class	: Class B

5.1.1 E.U.T. Operation

Operating Environment:

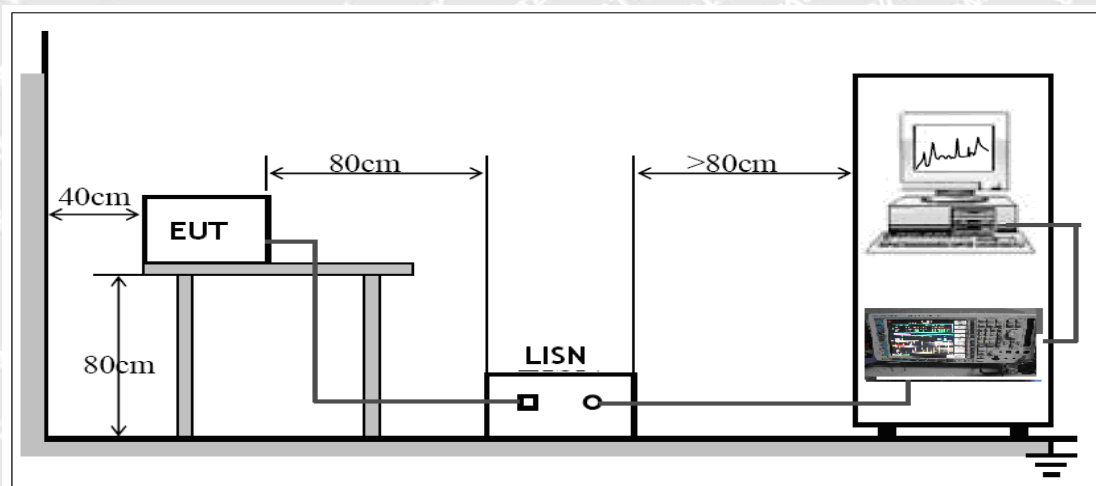
Temperature	: 20.8°C
Humidity	: 49.3%RH
Atmospheric Pressure	: 101.2kPa

EUT Operation:

Input Voltage	: AC 230V/50Hz
Operating Mode	: Working mode with AC input

5.1.2 Block Diagram of Test Setup

The Mains Terminals Disturbance Voltage tests were performed in accordance with the CISPR 16-1-2.



5.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



5.1.4 Corrected Amplitude & Margin Calculation

The Corrected factor is calculated by adding LISN VDF(Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Measurement} = \text{Reading Level} + \text{Correct Factor}$$

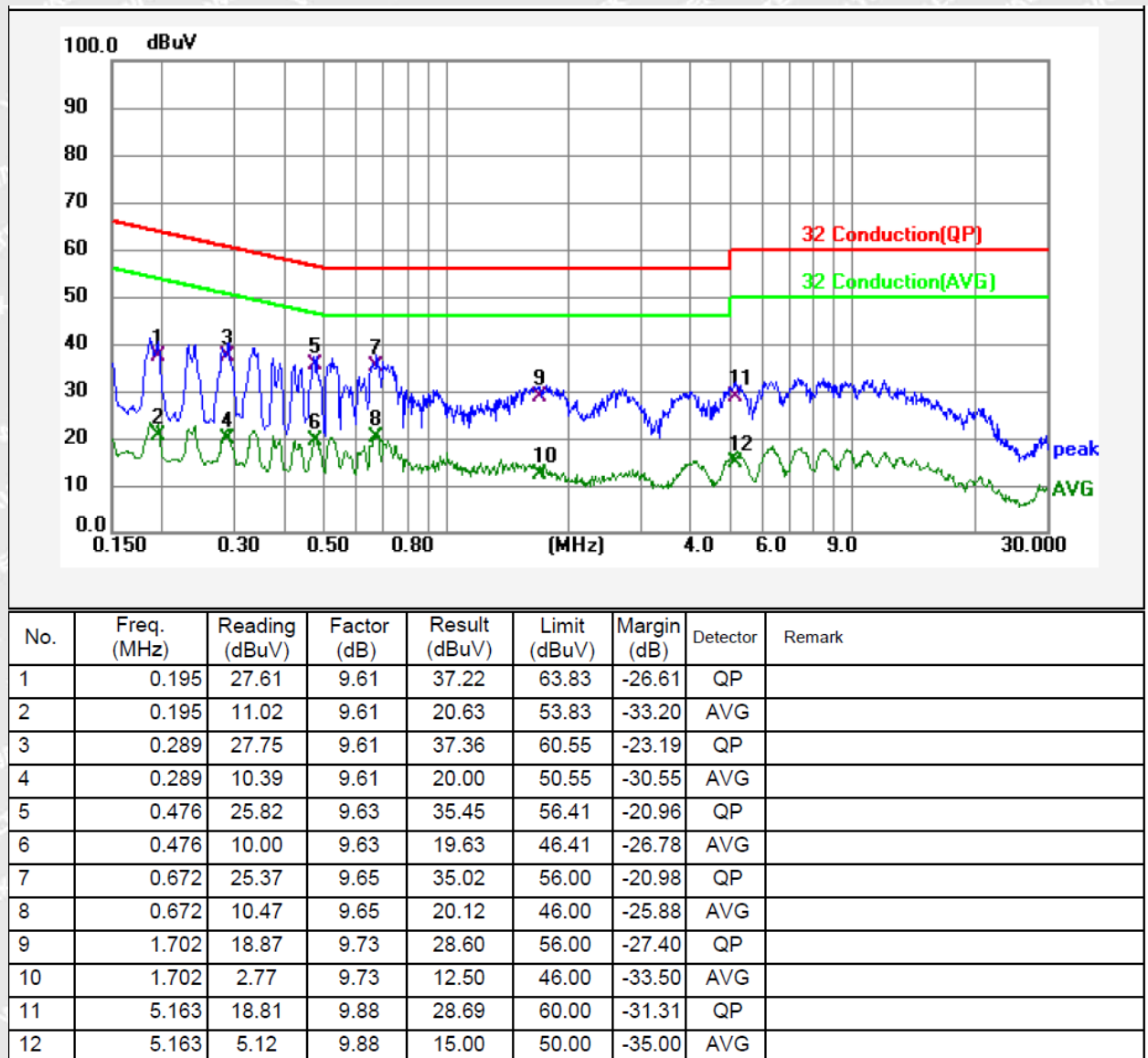
$$\text{Correct Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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 limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Measurement} - \text{Limit}$$

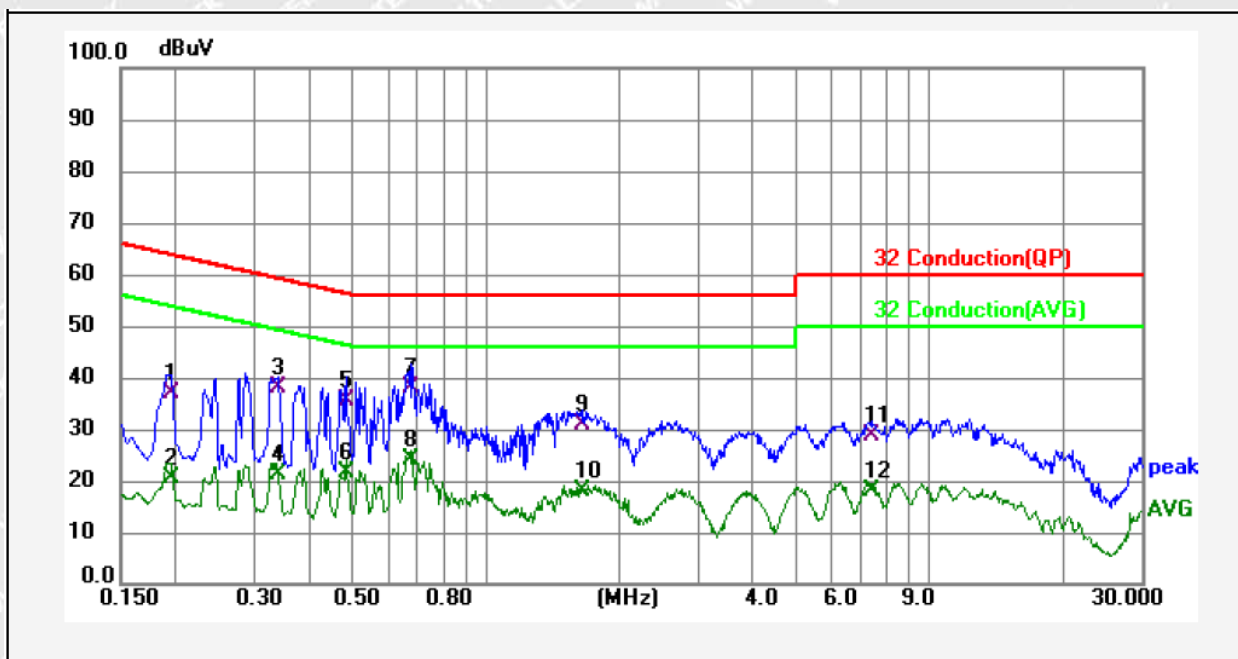
5.1.5 Mains Terminals Disturbance Voltage Test Data

Live Line





Neutral Line



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.195	27.44	9.53	36.97	63.83	-26.86	QP	
2	0.195	10.95	9.53	20.48	53.83	-33.35	AVG	
3	0.339	28.32	9.56	37.88	59.23	-21.35	QP	
4	0.339	11.75	9.56	21.31	49.23	-27.92	AVG	
5	0.483	25.85	9.57	35.42	56.29	-20.87	QP	
6	0.483	11.98	9.57	21.55	46.29	-24.74	AVG	
7	0.681	28.45	9.58	38.03	56.00	-17.97	QP	
8	0.681	14.51	9.58	24.09	46.00	-21.91	AVG	
9	1.653	21.36	9.64	31.00	56.00	-25.00	QP	
10	1.653	8.45	9.64	18.09	46.00	-27.91	AVG	
11	7.422	18.70	9.90	28.60	60.00	-31.40	QP	
12	7.422	8.24	9.90	18.14	50.00	-31.86	AVG	



5.2 Radiated Emission, 30MHz to 1GHz

Test Requirement	: EN 55032 Annex A.2
Test Method	: EN 55032 Annex A.2
Test Limit.....	: Table A.4 of EN 55032
Test Result	: Pass
Frequency Range	: 30MHz to 1000MHz
Class	: Class B

5.2.1 E.U.T. Operation

Operating Environment:

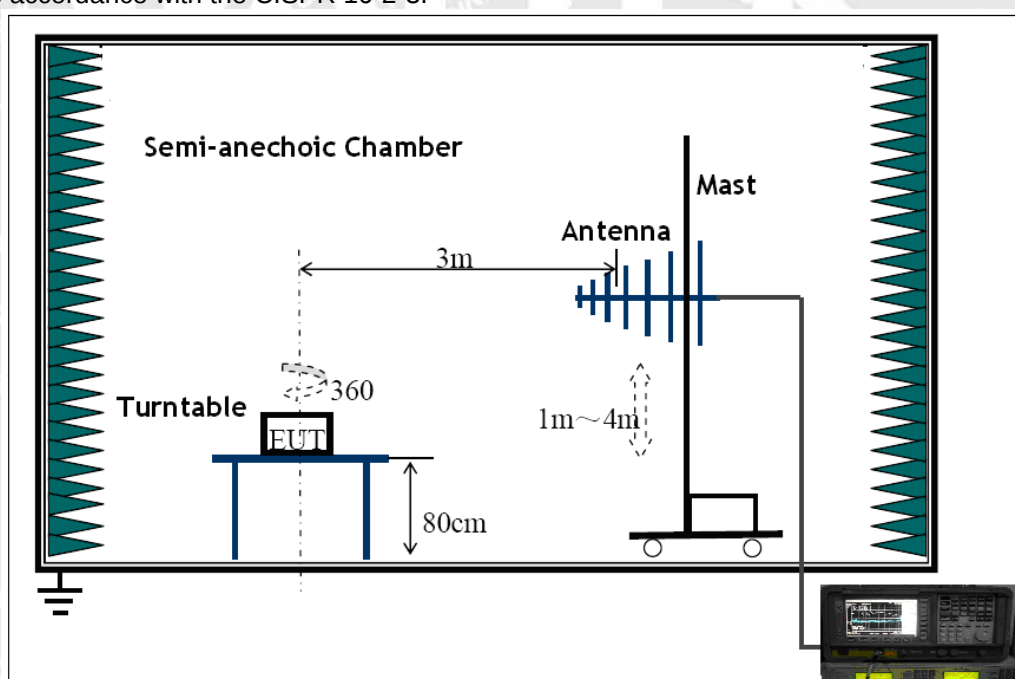
Temperature.....	: 22.4°C
Humidity	: 51.3%RH
Atmospheric Pressure	: 101.2kPa

EUT Operation:

Input Voltage.....	: AC 230V/50Hz for mode 1; Battery 3.7V for mode 2
Operating Mode	: Mode 1: Working mode with AC input Mode 2: Working mode with battery operated

5.2.2 Block Diagram of Test Setup

The Radiated Emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the CISPR 16-2-3.



5.2.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for EUT 0°-360°. 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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 for Class B. The equation for margin calculation is as follows:

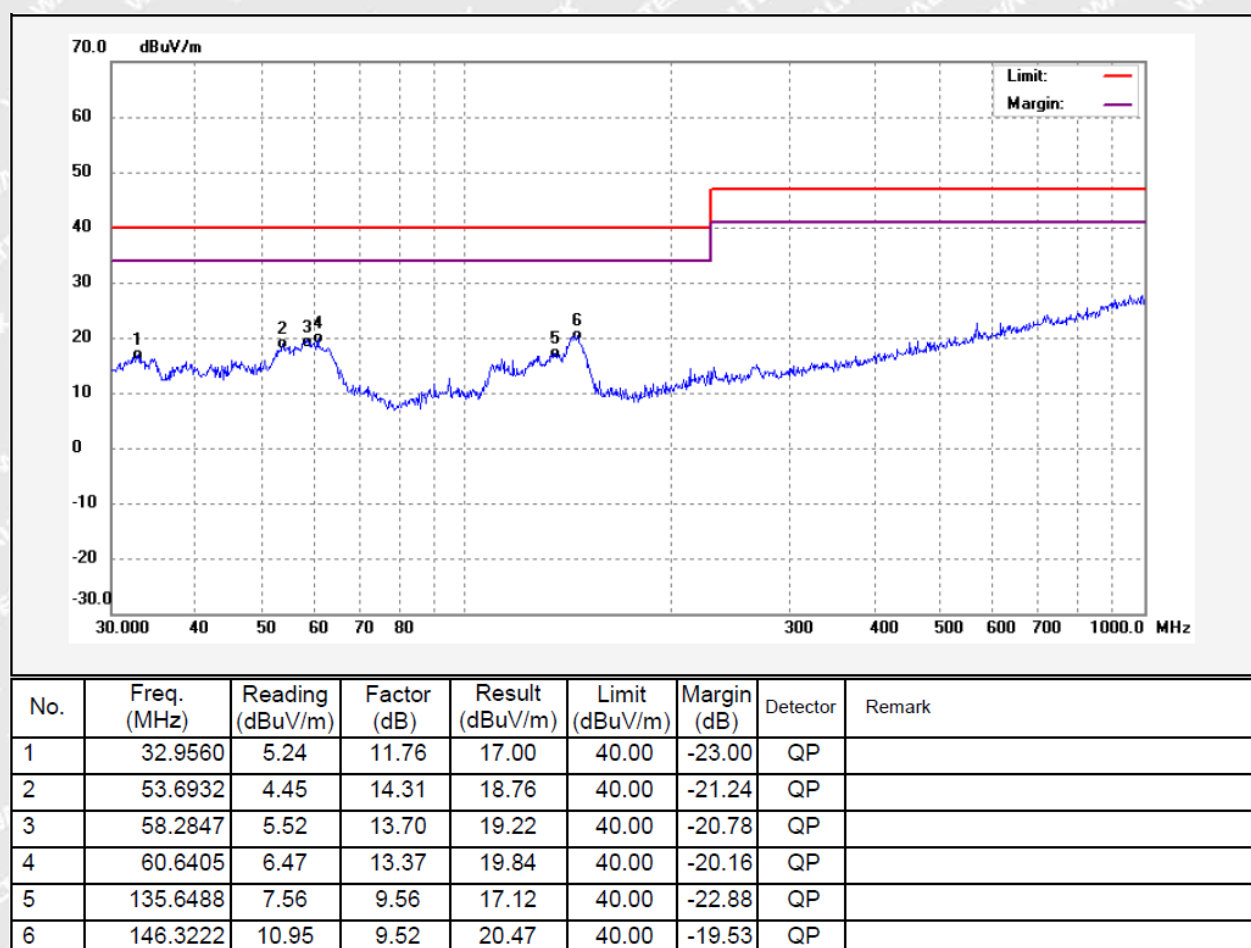
$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

5.2.5 Radiated Emission Test Data

Test Mode: Working mode with AC input

Input Voltage: AC 230V/50Hz

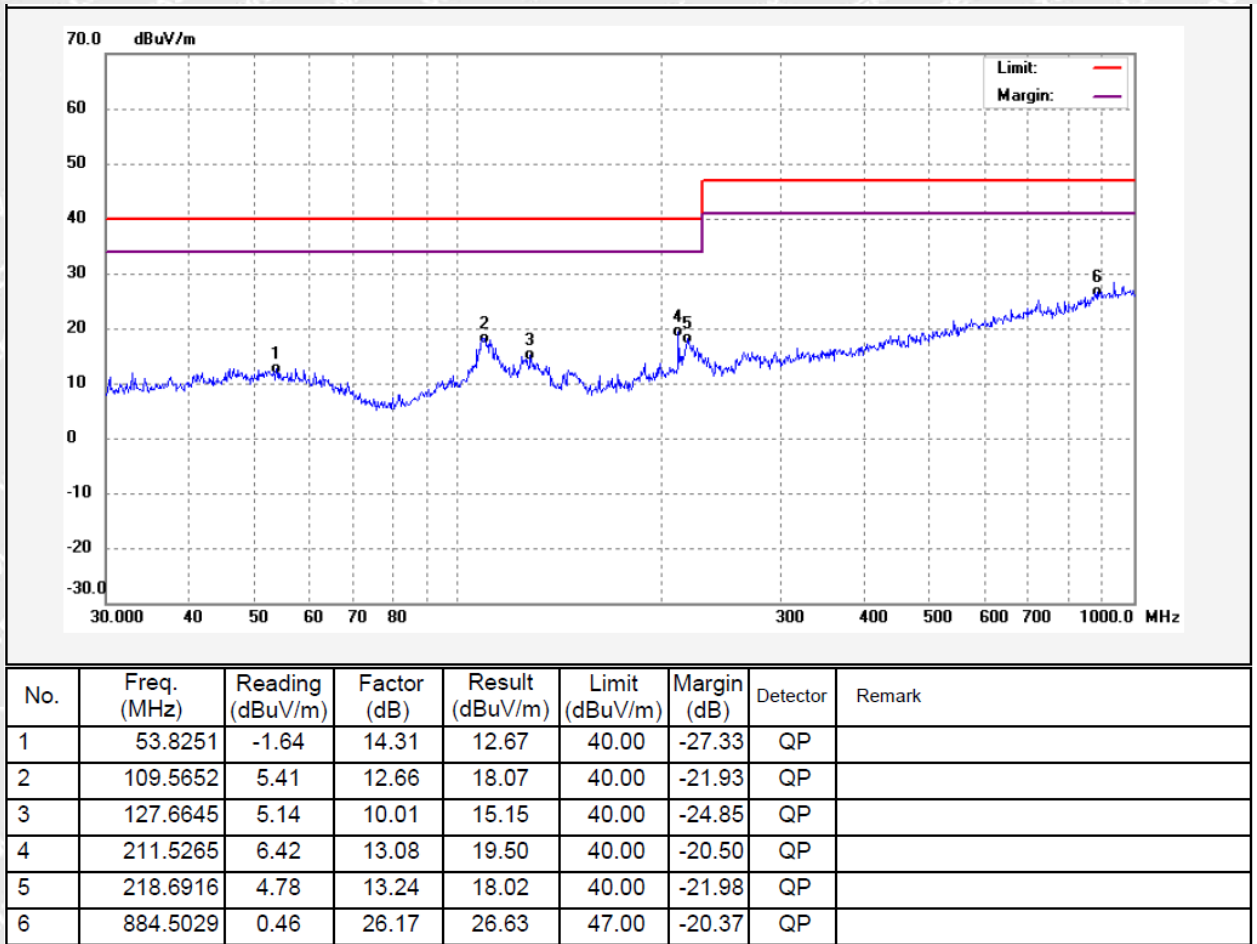
Vertical Polarization





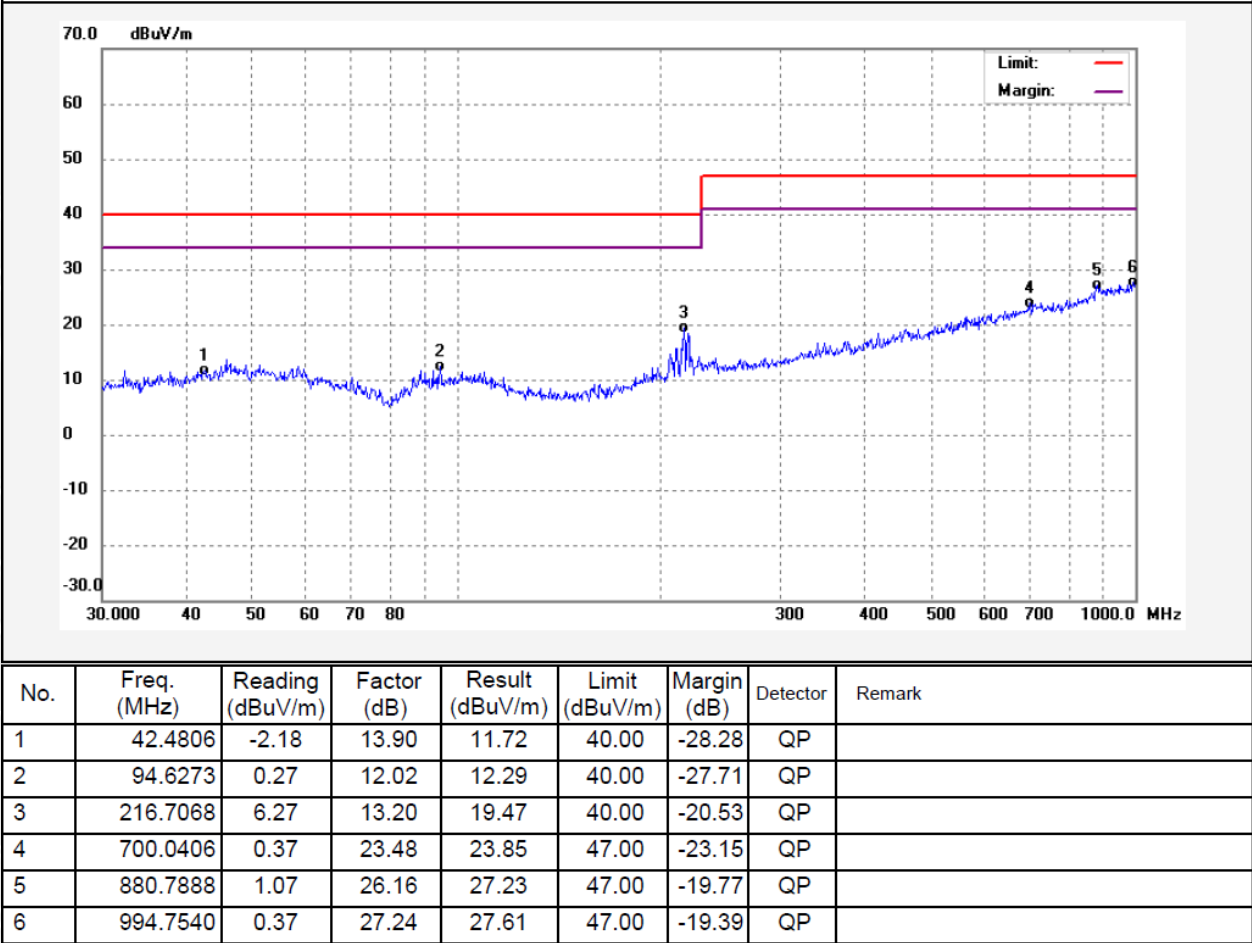
Test Mode: Working mode with AC input
Horizontal Polarization

Input Voltage: AC 230V/50Hz



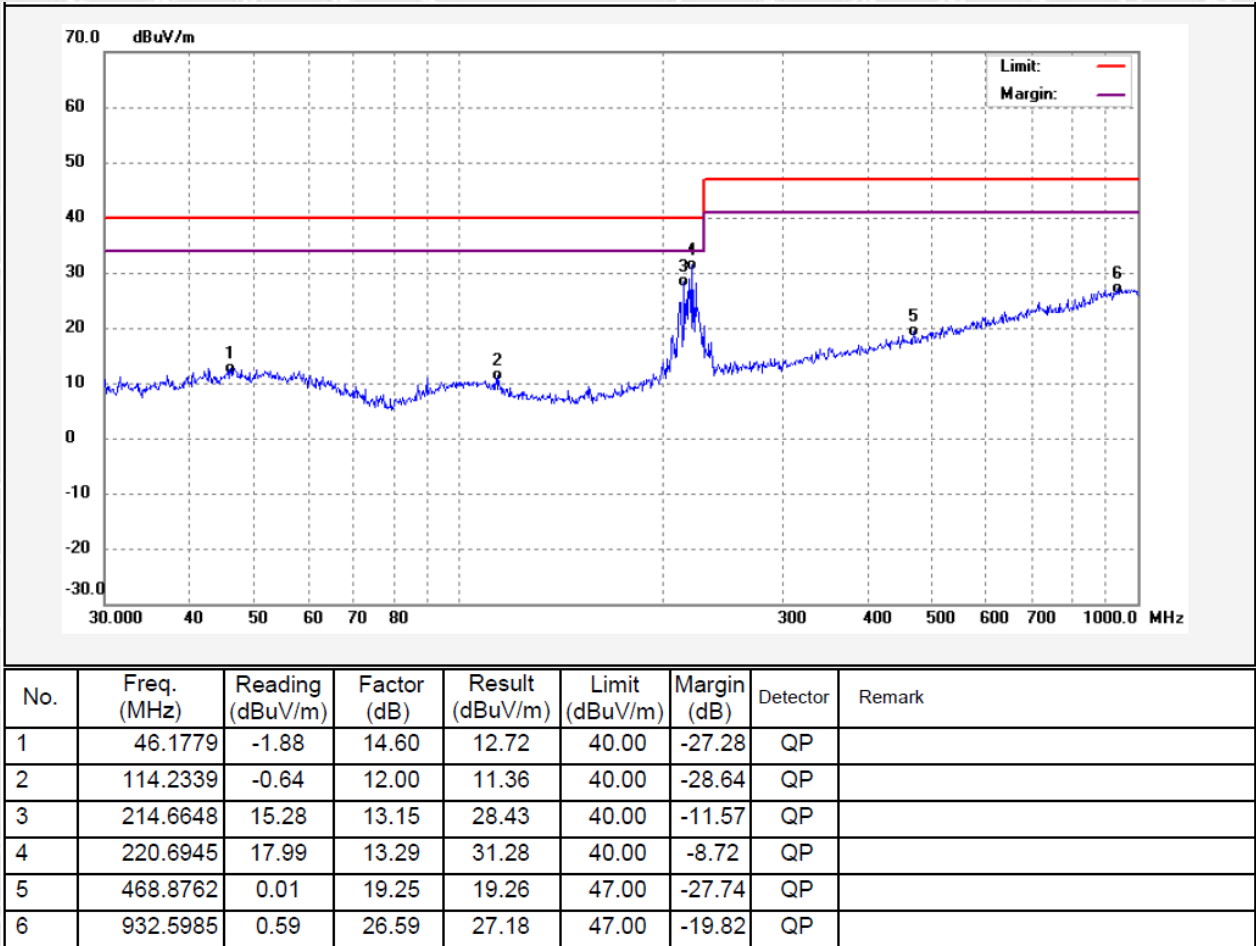


Test Mode: Working mode with battery operated Input Voltage: Battery 3.7V
Vertical Polarization





Test Mode: Working mode with battery operated Input Voltage: Battery 3.7V
Horizontal Polarization





5.3 Radiated Emission, 1GHz to 6GHz

Test Requirement	: EN 55032 Annex A.2
Test Method	: EN 55032 Annex A.2
Test Limit.....	: Table A.5 of EN 55032
Test Result	: Pass
Frequency Range	: 1GHz to 6GHz
Class.....	: Class B

5.3.1 E.U.T. Operation

Operating Environment:

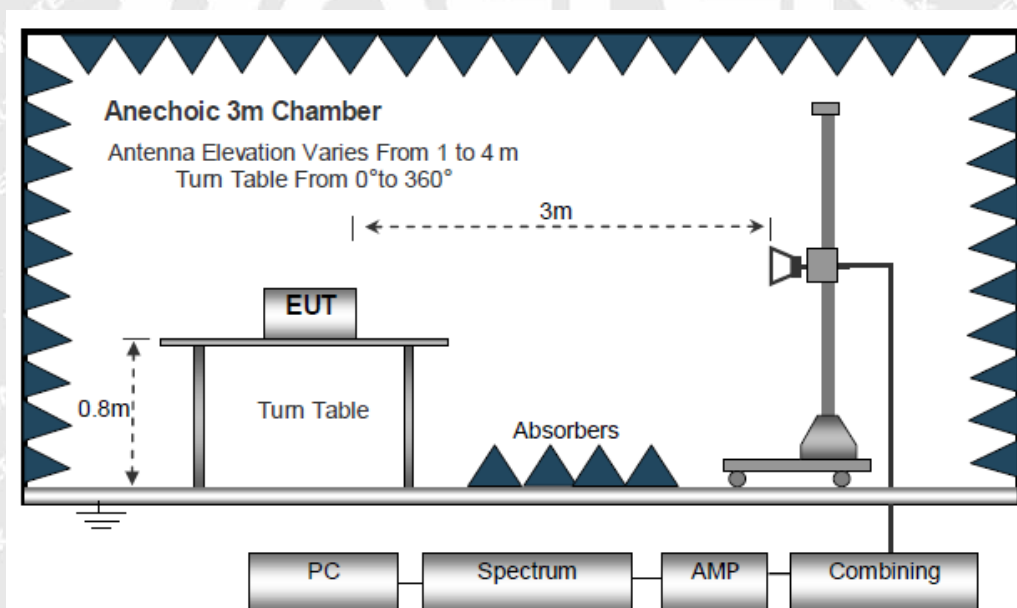
Temperature.....	: 22.4°C
Humidity	: 51.3%RH
Atmospheric Pressure	: 101.2kPa

EUT Operation:

Input Voltage.....	: AC 230V/50Hz for mode 1; Battery 3.7V for mode 2
Operating Mode	: Mode 1: Working mode with AC input Mode 2: Working mode with battery operated

5.3.2 Block Diagram of Test Setup

The Radiated Emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the CISPR 16-2-3.



5.3.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for EUT 0°-360°. Quasi-peak measurements were performed if peak emissions were within 6dB of the limit line.



5.3.4 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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 for Class B. The equation for margin calculation is as follows:

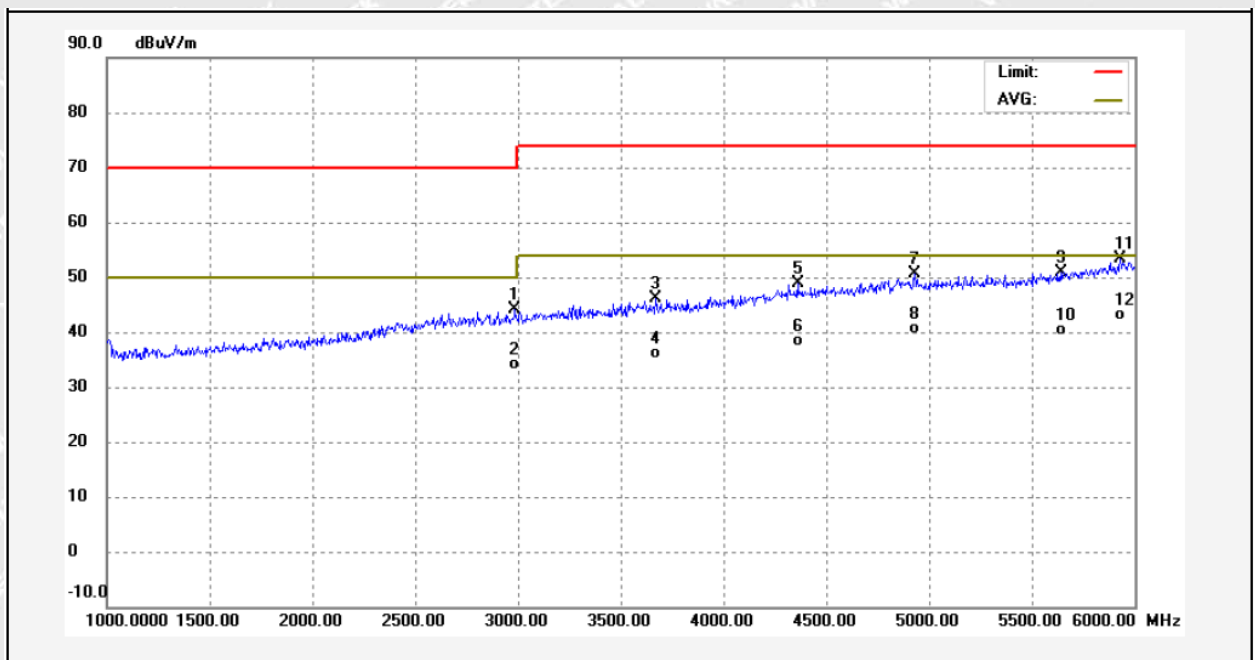
$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

5.3.5 Radiated Emission Test Data

Test Mode: Working mode with AC input

Input Voltage: AC 230V/50Hz

Vertical Polarization

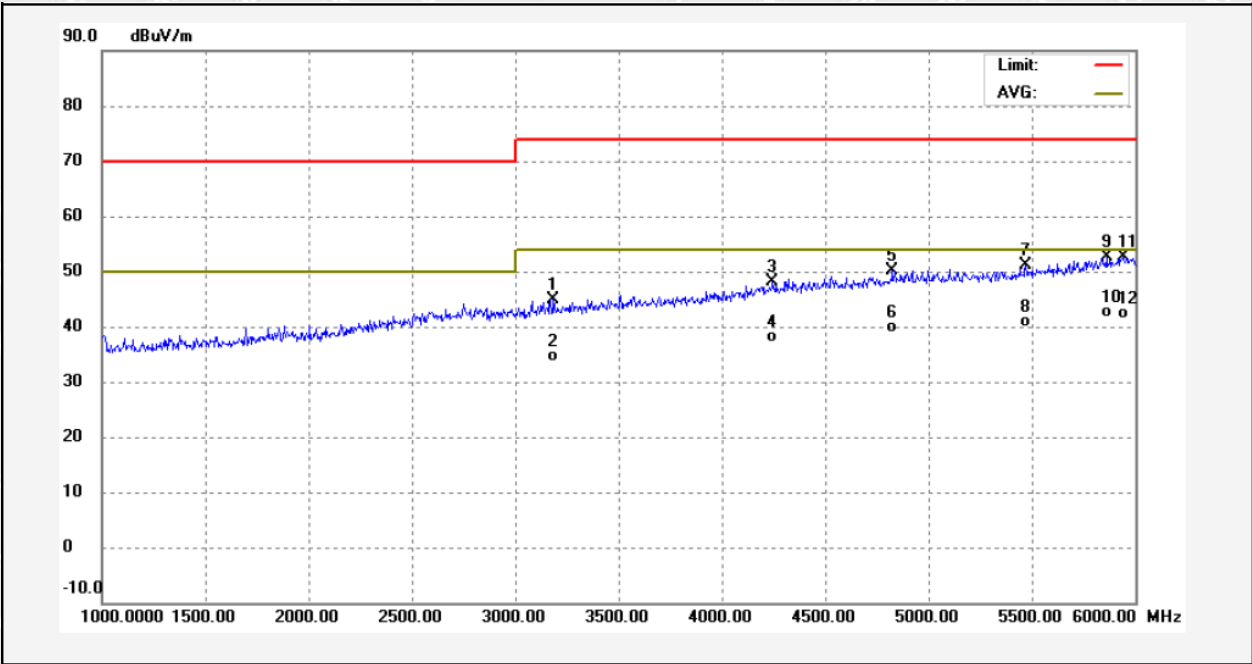


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2986.500	10.20	33.87	44.07	70.00	-25.93	peak	
2	2986.500	0.31	33.87	34.18	50.00	-15.82	AVG	
3	3672.500	10.98	35.14	46.12	74.00	-27.88	peak	
4	3672.500	0.87	35.14	36.01	54.00	-17.99	AVG	
5	4364.500	11.82	37.05	48.87	74.00	-25.13	peak	
6	4364.500	1.39	37.05	38.44	54.00	-15.56	AVG	
7	4931.500	11.95	38.61	50.56	74.00	-23.44	peak	
8	4931.500	1.99	38.61	40.60	54.00	-13.40	AVG	
9	5643.500	10.90	39.98	50.88	74.00	-23.12	peak	
10	5643.500	0.40	39.98	40.38	54.00	-13.62	AVG	
11	5934.500	12.54	40.75	53.29	74.00	-20.71	peak	
12	5934.500	2.45	40.75	43.20	54.00	-10.80	AVG	



Test Mode: Working mode with AC input
Horizontal Polarization

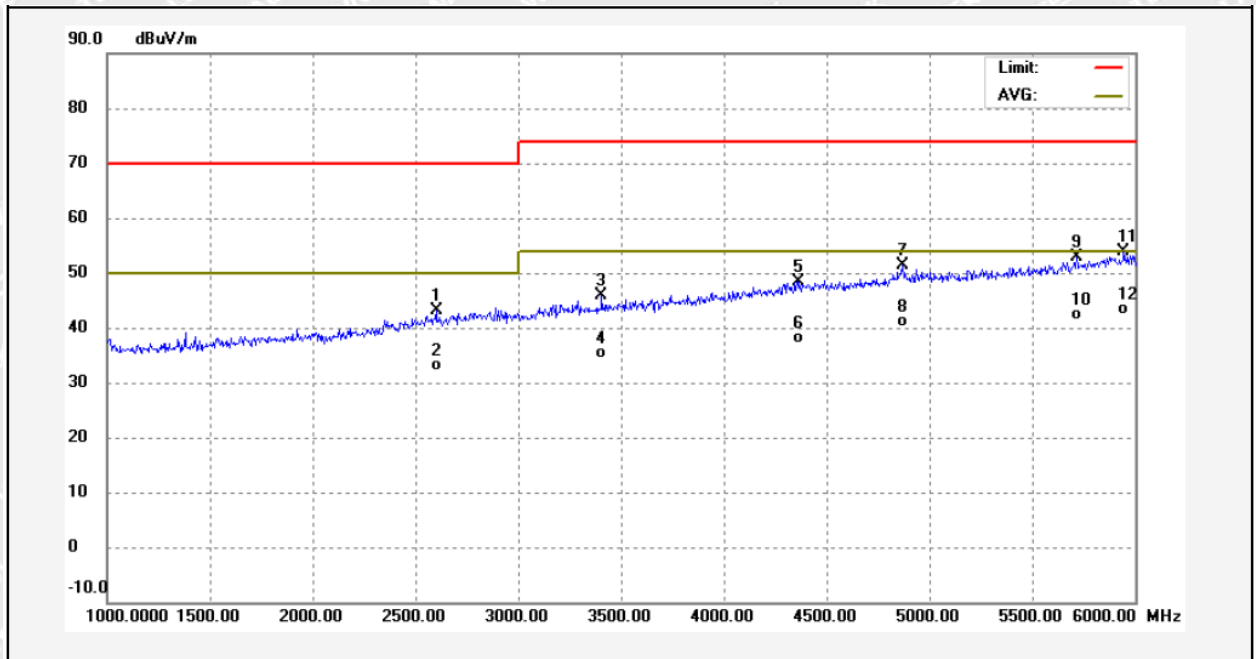
Input Voltage: AC 230V/50Hz



No.	Freq. (MHz)	Reading (dBUV/m)	Factor (dB)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Remark
1	3187.500	10.58	34.21	44.79	74.00	-29.21	peak	
2	3187.500	0.35	34.21	34.56	54.00	-19.44	AVG	
3	4249.500	11.53	36.70	48.23	74.00	-25.77	peak	
4	4249.500	1.45	36.70	38.15	54.00	-15.85	AVG	
5	4826.500	11.72	38.33	50.05	74.00	-23.95	peak	
6	4826.500	1.54	38.33	39.87	54.00	-14.13	AVG	
7	5470.000	11.48	39.56	51.04	74.00	-22.96	peak	
8	5470.000	1.38	39.56	40.94	54.00	-13.06	AVG	
9	5861.500	12.04	40.56	52.60	74.00	-21.40	peak	
10	5861.500	1.99	40.56	42.55	54.00	-11.45	AVG	
11	5948.500	11.78	40.80	52.58	74.00	-21.42	peak	
12	5948.500	1.57	40.80	42.37	54.00	-11.63	AVG	



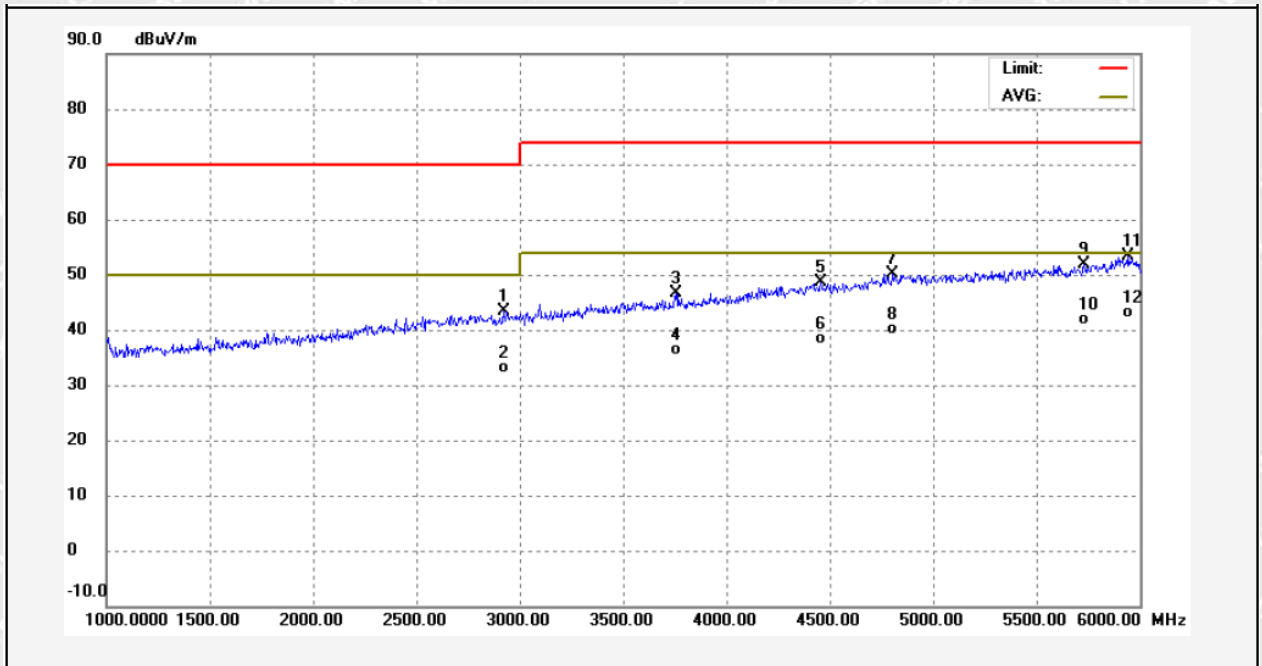
Test Mode: Working mode with battery operated **Input Voltage: Battery 3.7V**
Vertical Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2603.000	10.15	32.94	43.09	70.00	-26.91	peak	
2	2603.000	0.21	32.94	33.15	50.00	-16.85	AVG	
3	3407.500	11.42	34.57	45.99	74.00	-28.01	peak	
4	3407.500	0.86	34.57	35.43	54.00	-18.57	AVG	
5	4360.000	11.40	37.04	48.44	74.00	-25.56	peak	
6	4360.000	1.13	37.04	38.17	54.00	-15.83	AVG	
7	4874.000	12.89	38.45	51.34	74.00	-22.66	peak	
8	4874.000	2.78	38.45	41.23	54.00	-12.77	AVG	
9	5718.500	12.63	40.18	52.81	74.00	-21.19	peak	
10	5718.500	2.32	40.18	42.50	54.00	-11.50	AVG	
11	5945.500	13.01	40.78	53.79	74.00	-20.21	peak	
12	5945.500	2.56	40.78	43.34	54.00	-10.66	AVG	



Test Mode: Working mode with battery operated **Input Voltage: Battery 3.7V**
Horizontal Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2924.500	9.60	33.71	43.31	70.00	-26.69	peak	
2	2924.500	-0.51	33.71	33.20	50.00	-16.80	AVG	
3	3759.500	11.22	35.35	46.57	74.00	-27.43	peak	
4	3759.500	1.13	35.35	36.48	54.00	-17.52	AVG	
5	4455.500	11.28	37.33	48.61	74.00	-25.39	peak	
6	4455.500	1.17	37.33	38.50	54.00	-15.50	AVG	
7	4805.500	11.95	38.28	50.23	74.00	-23.77	peak	
8	4805.500	1.87	38.28	40.15	54.00	-13.85	AVG	
9	5732.500	11.78	40.22	52.00	74.00	-22.00	peak	
10	5732.500	1.74	40.22	41.96	54.00	-12.04	AVG	
11	5949.000	12.55	40.80	53.35	74.00	-20.65	peak	
12	5949.000	2.36	40.80	43.16	54.00	-10.84	AVG	



6 Immunity Test Results

6.1 Performance Criteria

Performance criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Performance criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test

Performance criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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6.2 Electrostatic Discharge (ESD)

Test Requirement	: EN 55035
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:

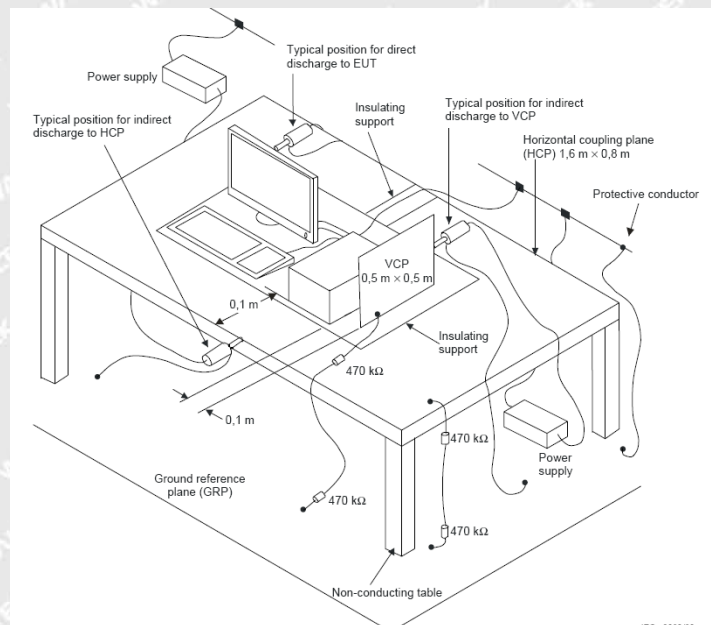
Temperature	: 24.2°C
Humidity	: 54.2%RH
Barometric Pressure	: 100.8kPa

EUT Operation:

Input Voltage	: AC 230V/50Hz for mode 1; Battery 3.77V for mode 2
Operating Mode	: Mode 1: Working mode with AC input Mode 2: Working mode with battery operated

6.2.2 Block Diagram of Setup

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





6.2.3 Direct 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 Continuous RF Electromagnetic Field Disturbances

Test Requirement	: EN 55035
Test Method	: IEC 61000-4-3
Test Result	: Pass
Frequency Range	: 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
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:

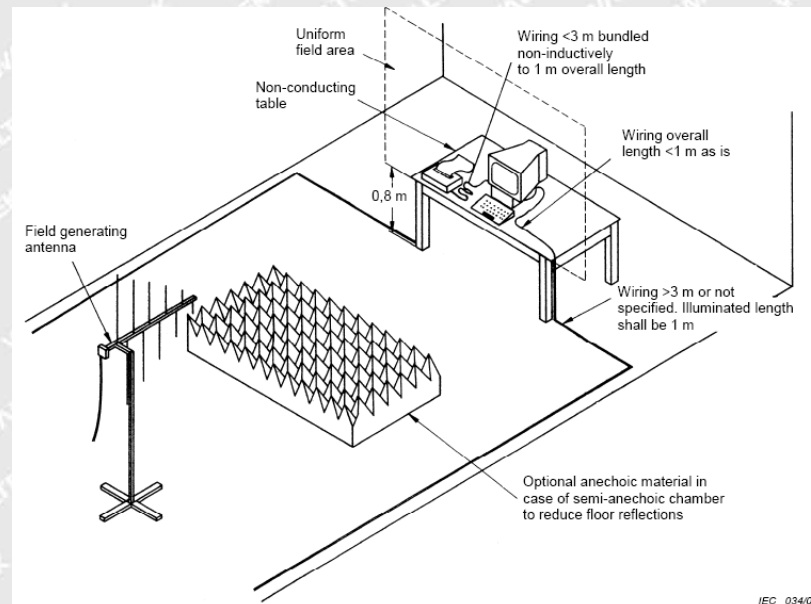
Temperature	: 23.2°C
Humidity	: 51.5%RH
Barometric Pressure	: 101.4kPa

EUT Operation:

Input Voltage	: AC 230V/50Hz for mode 1; Battery 3.7V for mode 2
Operating Mode	: Mode 1: Working mode with AC input Mode 2: Working mode with battery operated

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*
1800MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
1800MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*
2600MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
2600MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*
3500MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
3500MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass*
5000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass*
5000MHz	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)



6.4 Electrical Fast Transients (EFT)

Test Requirement	: EN 55035
Test Method	: IEC 61000-4-4
Test Result	: Pass
Test Level	: 1.0kV on AC Mains
Polarity	: Positive & Negative
Repetition Frequency....	: 5kHz
Burst Duration	: 5/50ns
Test Duration	: 2 minutes per level & polarity

6.4.1E.U.T. Operation

Operating Environment:

Temperature.....	: 24.2°C
Humidity	: 54.2%RH
Barometric Pressure	: 100.8kPa

EUT Operation:

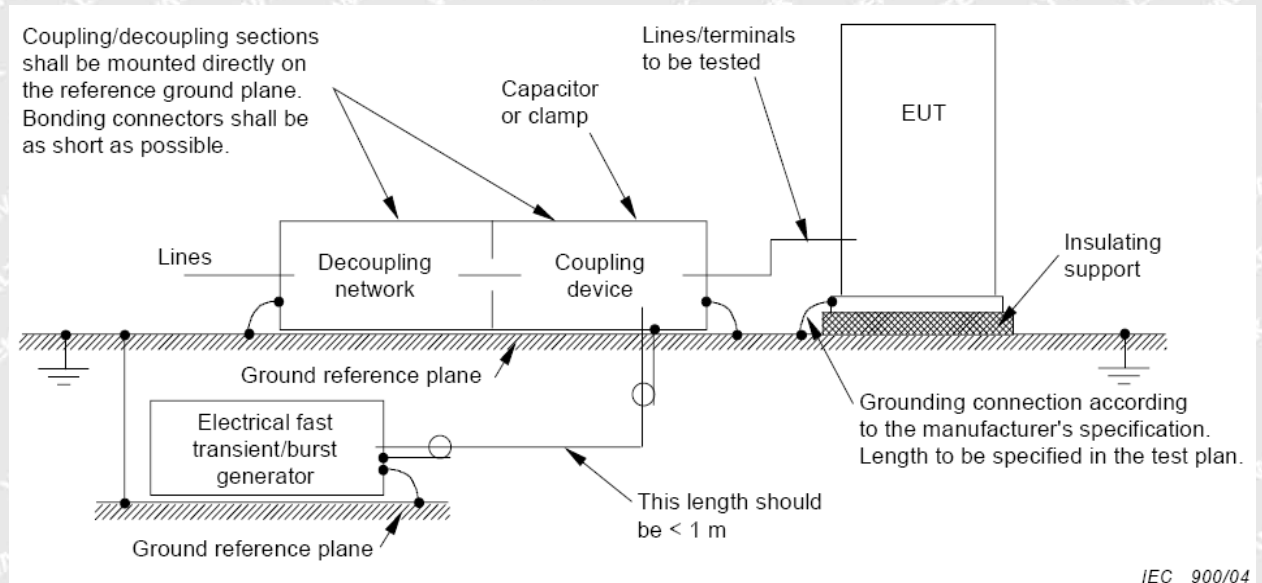
Input Voltage.....	: AC 230V/50Hz
Operating Mode	: Working mode with AC input

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6.4.2 Block Diagram of Setup

The Electrical Fast Transients Immunity test was performed in accordance with the IEC 61000-4-4.



6.4.3 Test Results

Test Port	Test Level(kV)	Performance Criterion	Result
Line-Neutral	± 1.0	B	Pass*

Remark:

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



6.5 Surge

Test Requirement : EN 55035

Test Method : IEC 61000-4-5

Test Result : Pass

Test level : $\pm 1\text{kV}$ Live to Neutral, $\pm 2\text{kV}$ Live to PE and Neutral to PE

Interval : 60s between each surge

No. of surges : five positive and five negative pulses each at 0° , 90° , 180° and at 270°

6.5.1E.U.T. Operation

Operating Environment:

Temperature : 24.1°C

Humidity : 54.2%RH

Barometric Pressure : 100.8kPa

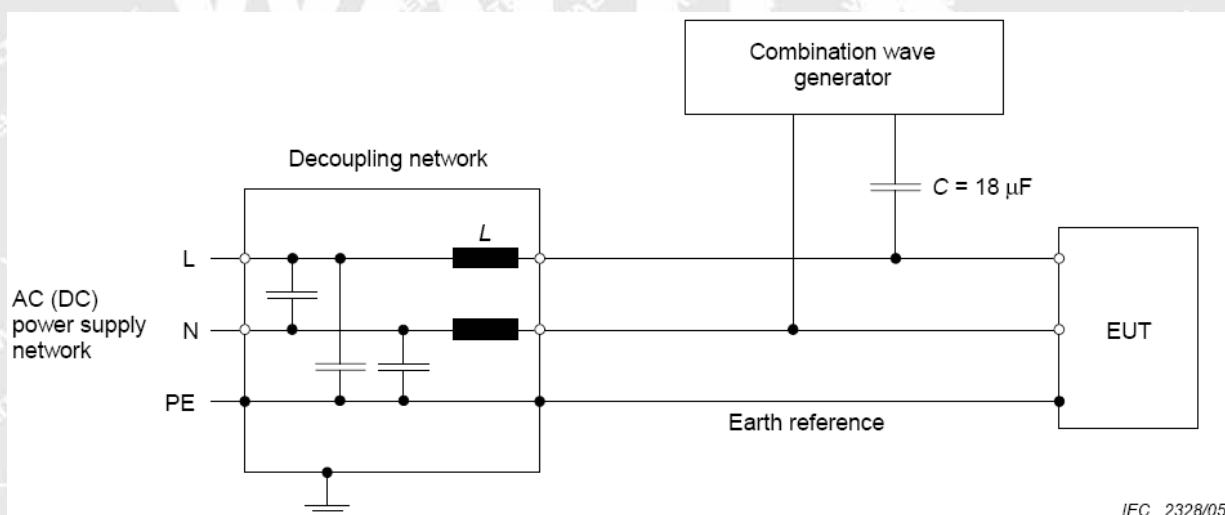
EUT Operation:

Input Voltage : AC 230V/50Hz

Operating Mode : Working mode with AC input

6.5.2Block Diagram of Setup

The Surge Immunity test was performed in accordance with the IEC 61000-4-5.





6.5.3 Test Result

Test Port	Applied Voltage (kV)	Performance criterion	Result
Between Phase And Phase	± 1	B	N/A
Between Live And Neutral	± 1	B	Pass*
Between Live And Earth	± 2	B	N/A
Between Neutral And Earth	± 2	B	N/A

Remark:

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

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6.6 Continuous Induced RF Disturbance

Test Requirement : EN 55035

Test Method : IEC 61000-4-6

Test Result : Pass

Frequency Range : 0.15 to 10MHz, 10 to 30MHz, 30 to 80MHz

Test level : 3V r.m.s. / 3~1V r.m.s. / 1V r.m.s. (unmodulated emf into 150 Ω)

Modulation : 80%, 1kHz Amplitude Modulation.

6.6.1E.U.T. Operation

Operating Environment:

Temperature : 24.2°C

Humidity : 54.2%RH

Barometric Pressure : 100.8kPa

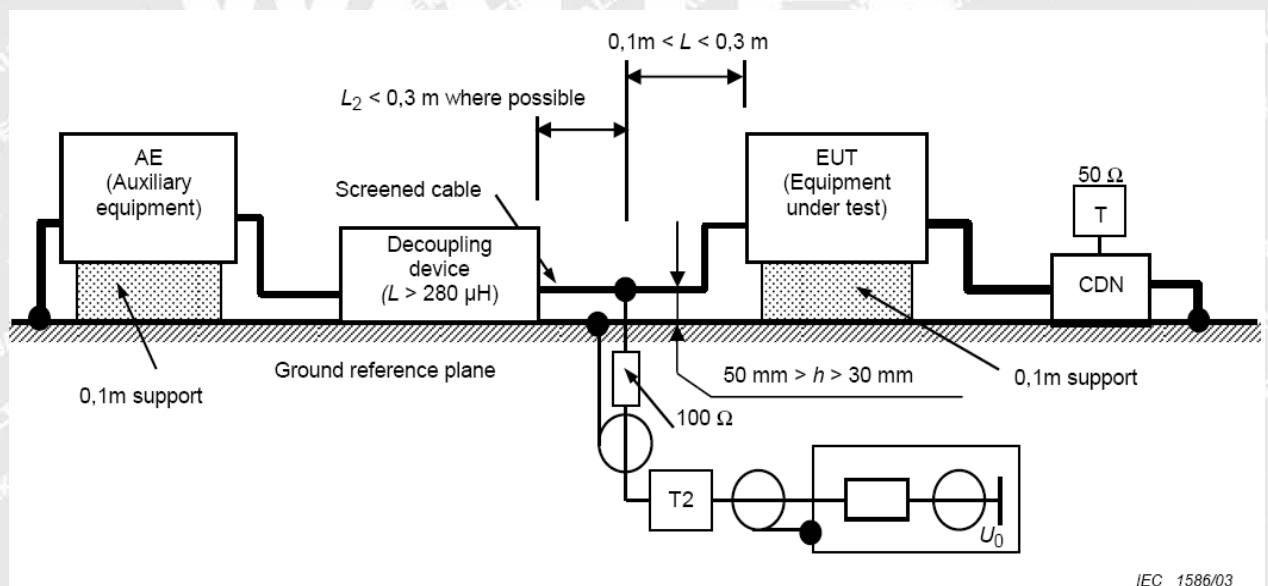
EUT Operation:

Input Voltage : AC 230V/50Hz

Operating Mode : Working mode with AC input

6.6.2 Block Diagram of Setup

The Injected Currents Immunity test was performed in accordance with the IEC 61000-4-6.





6.6.3 Test Results

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Performance Criterion	Result
0.15MHz to 10MHz	2 Wire AC Supply Cables	3Vr.m.s.	80%, 1kHz Amp. Mod.	1%	1s	A	Pass*
10MHz to 30MHz	2 Wire AC Supply Cables	3 to 1 Vr.m.s.	80%, 1kHz Amp. Mod.	1%	1s	A	Pass*
30MHz to 80MHz	2 Wire AC Supply Cables	1Vr.m.s.	80%, 1kHz Amp. Mod.	1%	1s	A	Pass*

Remark:

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

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6.7 Voltage Dips and Interruptions

Test Requirement : EN 55035
Test Method : IEC 61000-4-11
Test Result : Pass
Test Level(Voltage reduction) : >90% & 30 % of Induction
No. of Dips / Interruptions : 1 per Level at 20ms intervals

6.7.1E.U.T. Operation

Operating Environment:

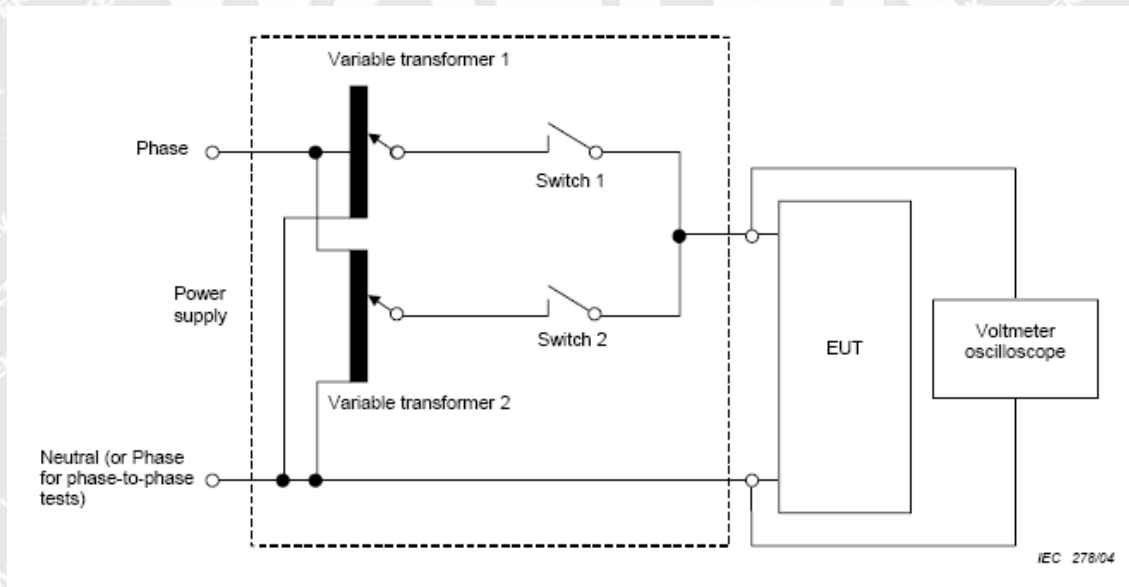
Temperature : 24.2°C
Humidity : 54.2%RH
Barometric Pressure : 100.8kPa

EUT Operation:

Input Voltage : AC 230V/50Hz
Operating Mode : Working mode with AC input

6.7.2 Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the IEC 61000-4-11.





6.7.3 Test Results

Test Item	Test Level in %U _T	Performance criterion	50Hz		60Hz	
			Duration	Result	Duration	Result
Voltage Dips	< 5	B	0.5	Pass*	0.5	Pass*
	70	C	25	Pass*	30	Pass*
Voltage Interruptions	< 5	C	250	Pass*	300	Pass*

Remark:

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

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7 Photographs – Test Setup

7.1 Photograph – Mains Terminal Disturbance Voltage Test Setup



7.2 Photograph – Radiated Emission Test Setup, 30MHz to 1GHz

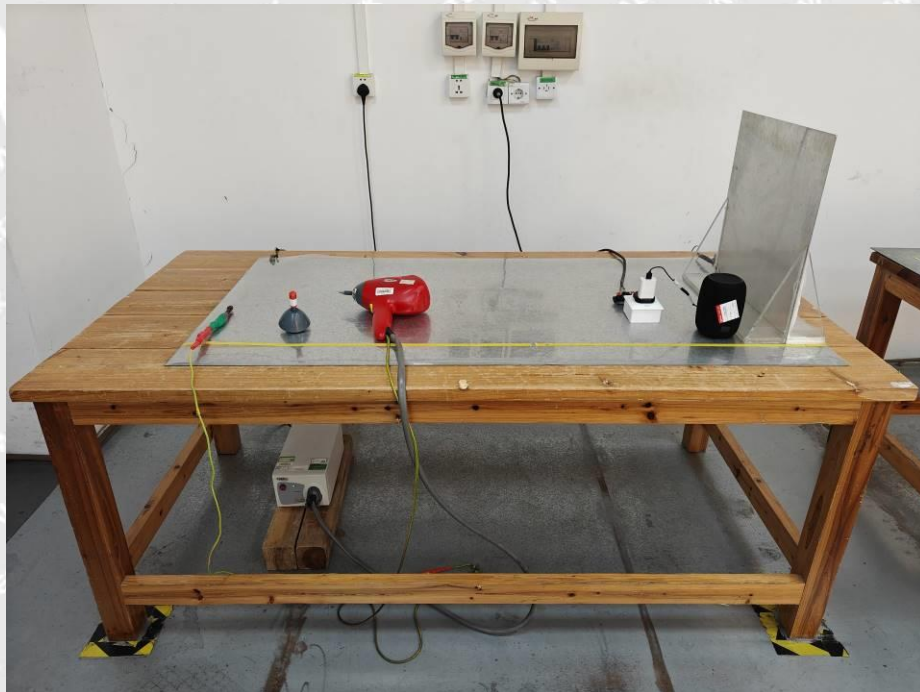




7.3 Photograph – Radiated Emission Test Setup, 1GHz to 6GHz



7.4 Photograph – ESD Immunity Test Setup





7.5 Photograph – Continuous RF Electromagnetic Field Disturbances Test Setup



7.6 Photograph – EFT Immunity Test Setup





7.7 Photograph – Surge Immunity Test Setup



7.8 Photograph – Continuous Induced RF Disturbance Test Setup





7.9 Photograph – Voltage Dips and Interruptions Immunity Test Setup



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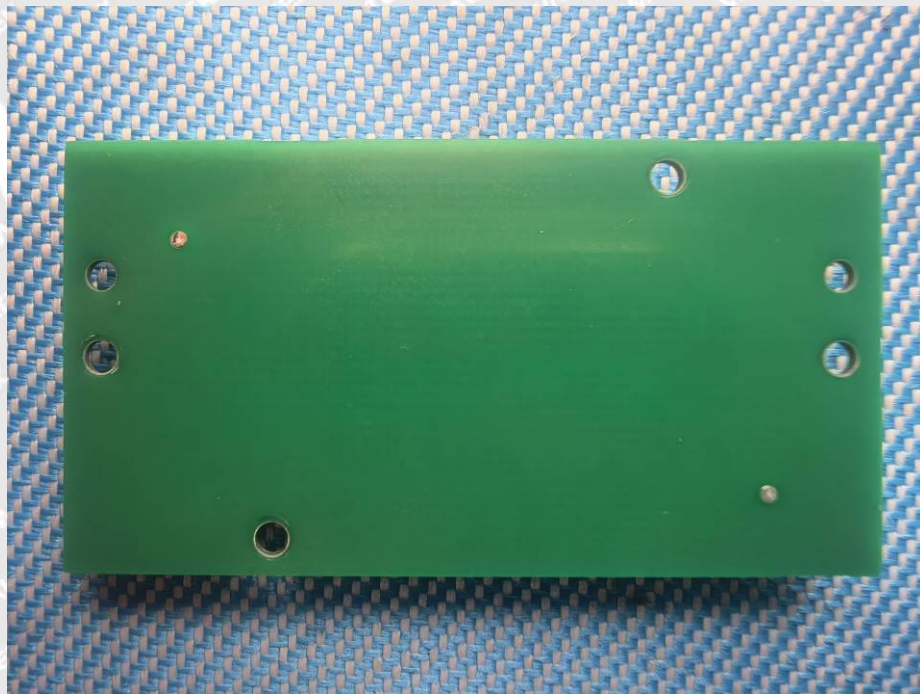
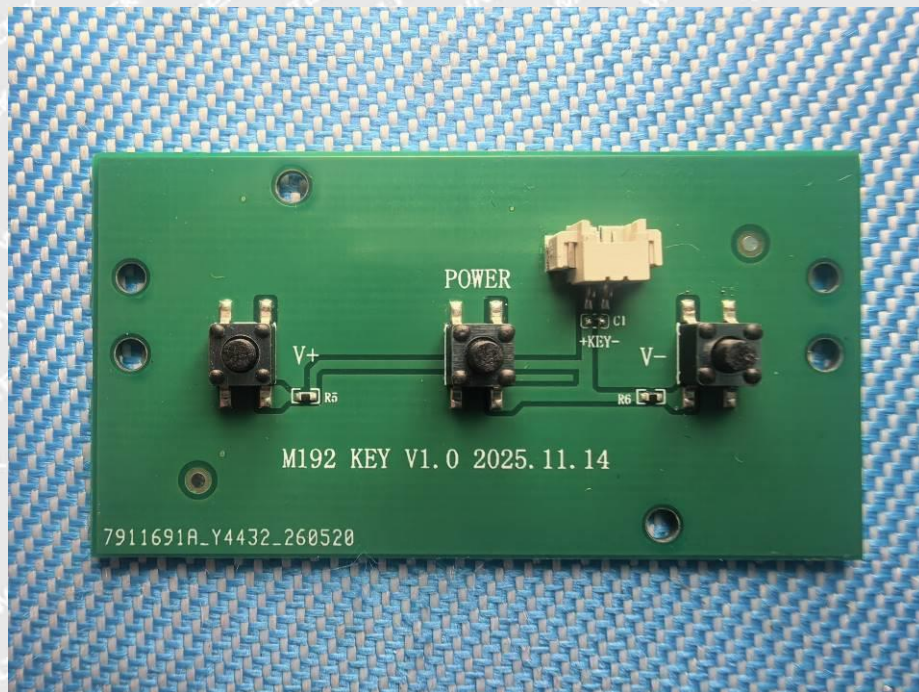
8 Photographs – Constructional Details

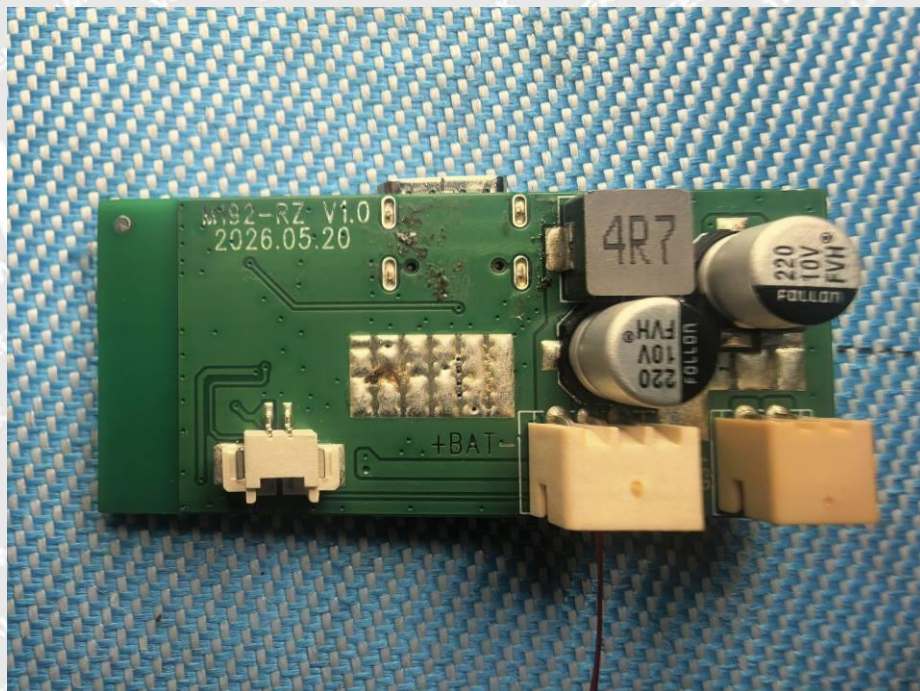
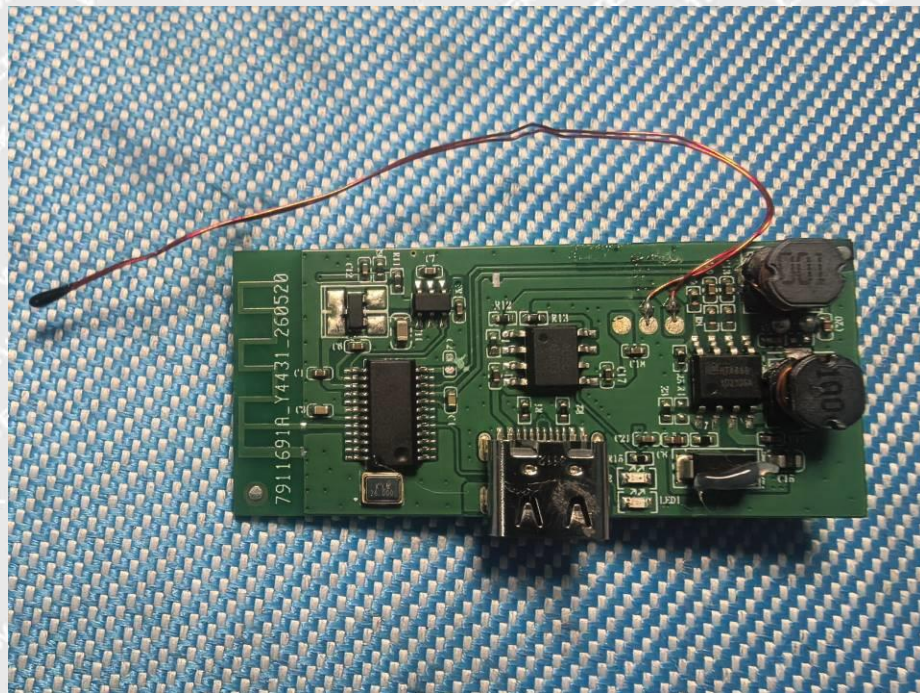
8.1 EUT – External Photos





8.2 EUT – Internal Photos





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