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FCC TEST REPORT

Report No.: STS2212159W02

Issued for

Microwoo Electronic Technology Co., Ltd

NO.13, Hengrui 2nd Road, Tangxiayong Community, Yan Luo
Street, Baoan District, Shenzhen, China.

Product Name:	10000mAh Magsafe wireless power bank
Brand:	N/A
Model Number:	REF-TRAVEL001
Series Model(s):	MW-T009, MW-T009S
FCC ID:	2A9XL-REF
Test Standard:	FCC Part 15 Subpart C

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**TEST RESULT CERTIFICATION**

Applicant's Name: Microwoo Electronic Technology Co., Ltd
Address: NO.13, Hengrui 2nd Road, Tangxiayong Community, Yan Luo Street, Baoan District, Shenzhen, China.
Manufacturer's Name: Microwoo Electronic Technology Co., Ltd
Address: NO.13, Hengrui 2nd Road, Tangxiayong Community, Yan Luo Street, Baoan District, Shenzhen, China.

Product Description

Product Name: 10000mAh Magsafe wireless power bank
Brand.....: N/A
Model Number.....: REF-TRAVEL001

Series Model(s): MW-T009, MW-T009S

Test Standards.....: FCC Part 15 Subpart C

Test Procedure: ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....:

Date of receipt of test item.....: 30 Dec. 2022

Date (s) of performance of tests.: 30 Dec. 2022 ~ 05 Jan. 2023

Date of Issue: 05 Jan. 2023

Test Result: **Pass**

Testing Engineer :

(Chris Chen)

Technical Manager :

(Sean She)

Authorized Signatory :

(Bovey Yang)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	05 Jan. 2023	STS2212159W02	ALL	Initial Issue





1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209(a)	Radiated emission, Spurious Emission	PASS	
15.215	20 dB Bandwidth	PASS	

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 1.197\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.896\text{dB}$
3	All emissions, radiated 9K-30MHz	$\pm 3.84\text{dB}$
4	All emissions, radiated 30M-1GHz	$\pm 3.94\text{dB}$
5	All emissions, radiated 1G-6GHz	$\pm 4.59\text{dB}$
6	All emissions, radiated >6G	$\pm 5.22\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.14\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.54\text{dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	10000mAh Magsafe wireless power bank
Brand	N/A
Model Number	REF-TRAVEL001
Series Model(s)	MW-T009, MW-T009S
Model Difference	Only different in model name and colors
Channel List	Please refer to the Note 2.
Antenna Type	Please refer to the Note 3.
Equipemnt Category	Non-ISM frequency
Operating frequency	110.5-205KHz
Modulation Type	Load modulation
Rating	Input: 5V-3A ,9V-2.22A,12V-1.67A Output: wireless Output Power/ 5W/7.5W/10W/15Wmax Type C output: 5V/3A, 9V/2A USB -A Output: 5V/4.5A
Battery	Rated Voltage: 3.85V Charge Limit Voltage: 4.4V Capacity: 10000mah
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the Note 1.

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
- 2.

Channel List					
Channel	Frequency (KHz)	Channel	Frequency (KHz)	Channel	Frequency (KHz)
00	128.1				

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	NOTE
1	N/A	REF-TRAVEL001	Coil	N/A	Antenna



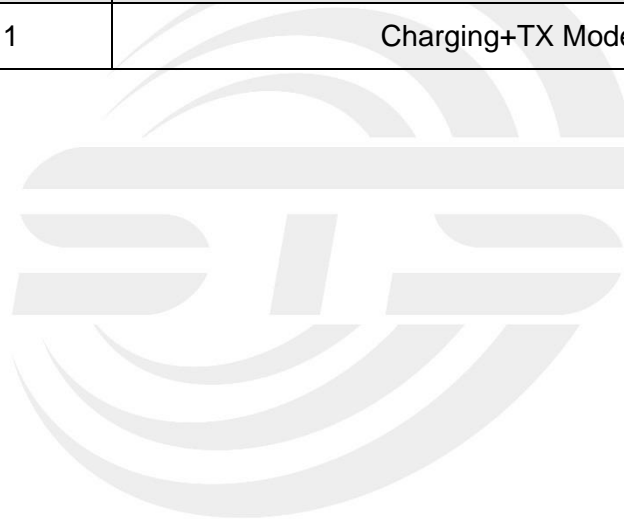
2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Charging+TX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	Charging+TX Mode

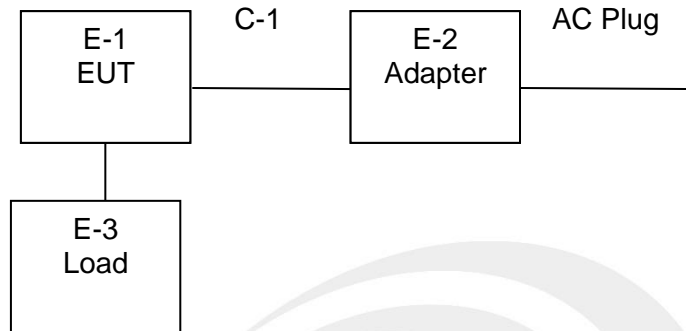
For Radiated Emission	
Final Test Mode	Description
Mode 1	Charging+TX Mode



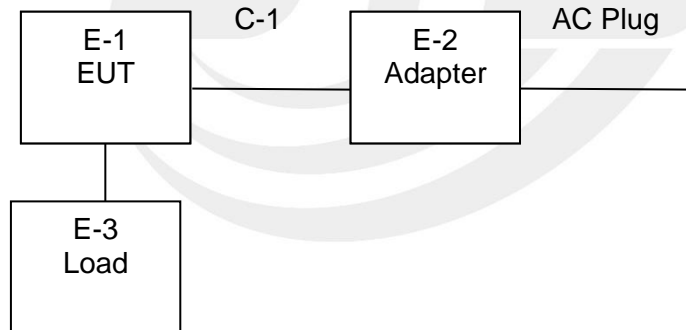
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Radiated Emission Test



Conducted Emission Test





2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
C-1	USB Cable	N/A	N/A	100cm	NO

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-2	Adapter	HUAWEI	HW-050450C00	N/A	N/A
E-3	LOAD	HPX	RSQM10	N/A	N/A

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” is means “with core”; “NO” is means “without core”.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.09.29	2023.09.28
Signal Analyzer	R&S	FSV 40-N	101823	2022.09.29	2023.09.28
Active loop Antenna	ZHINAN	ZN30900C	16035	2022.03.02	2023.03.01
Bilog Antenna	TESEQ	CBL6111D	34678	2022.09.30	2024.09.29
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2022.07.04	2023.07.03
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.09.29	2023.09.28
LISN	R&S	ENV216	101242	2022.09.28	2023.09.27
LISN	EMCO	3810/2NM	23625	2022.09.28	2023.09.27
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29

3. CONDUCTED EMISSION TEST RESULT (SECTION 15.207)

3.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “*” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

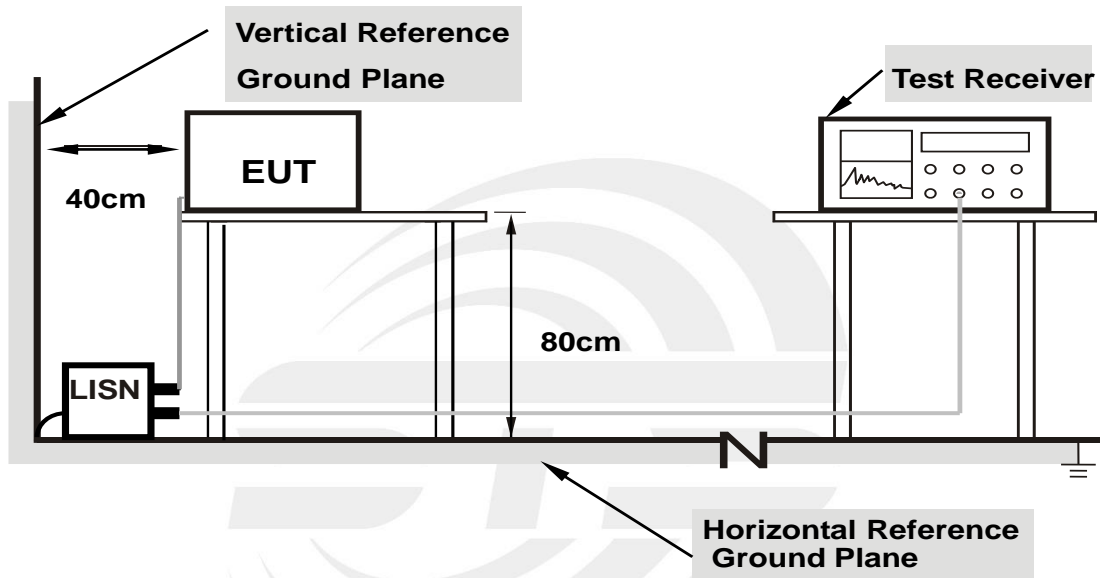
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

- The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from the nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



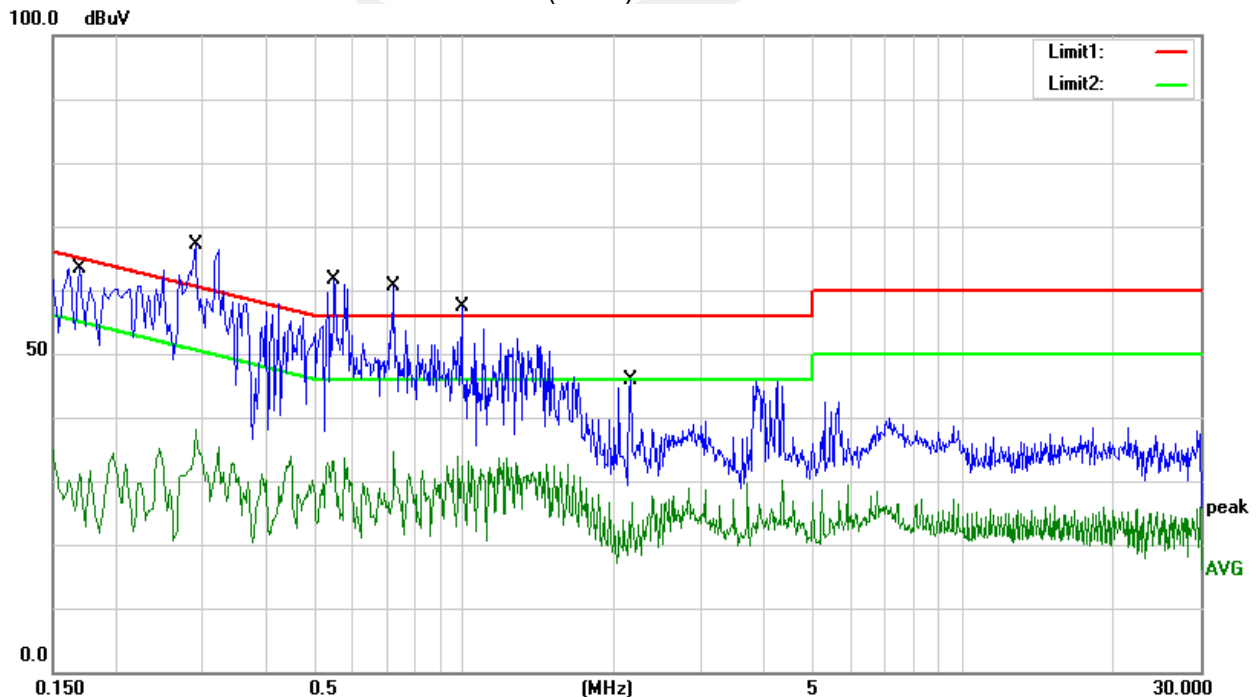
3.5 TEST RESULTS

Temperature:	23.2(C)	Relative Humidity:	41%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1700	46.02	10.33	56.35	64.96	-8.61	QP
2	0.1700	24.55	10.33	34.88	54.96	-20.08	AVG
3	0.2900	46.08	10.70	56.78	60.52	-3.74	QP
4	0.2900	27.38	10.70	38.08	50.52	-12.44	AVG
5	0.5500	38.10	10.49	48.59	56.00	-7.41	QP
6	0.5500	23.48	10.49	33.97	46.00	-12.03	AVG
7	0.7260	38.32	10.35	48.67	56.00	-7.33	QP
8	0.7260	24.27	10.35	34.62	46.00	-11.38	AVG
9	0.9940	38.14	10.30	48.44	56.00	-7.56	QP
10	0.9940	23.55	10.30	33.85	46.00	-12.15	AVG
11	2.1580	35.62	10.30	45.92	56.00	-10.08	QP
12	2.1580	18.60	10.30	28.90	46.00	-17.10	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)





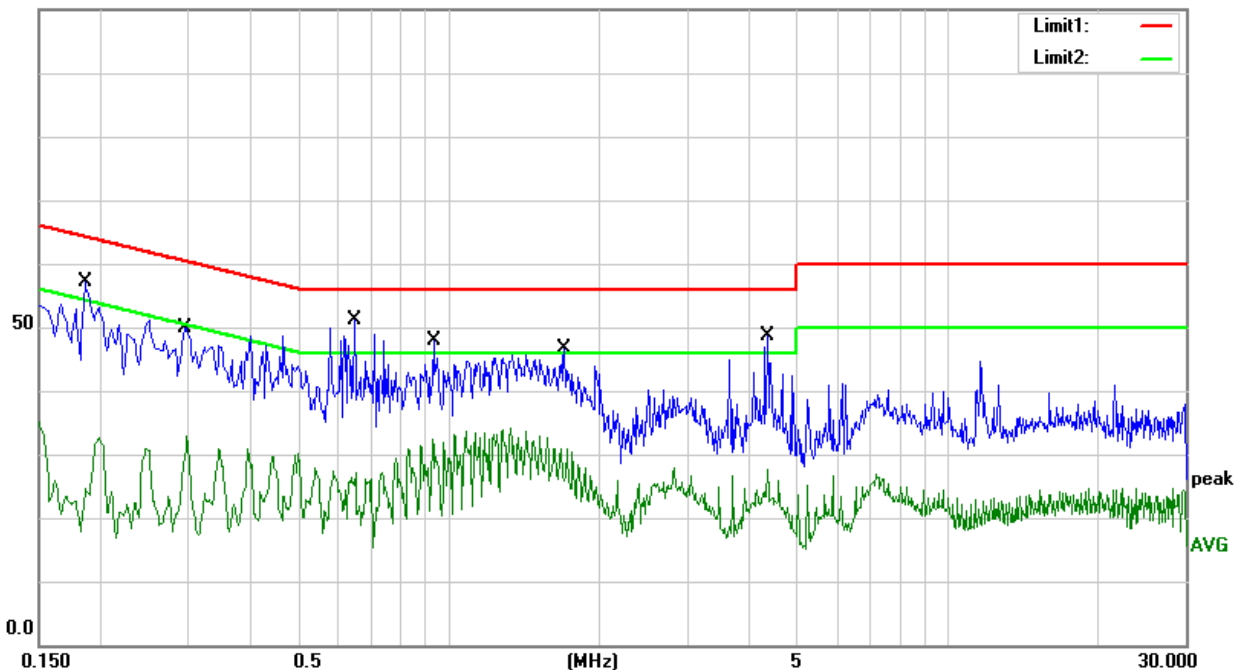
Temperature:	23.2(C)	Relative Humidity:	41%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 1		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1860	46.73	10.37	57.10	64.21	-7.11	QP
2	0.1860	22.19	10.37	32.56	54.21	-21.65	AVG
3	0.2940	39.02	10.77	49.79	60.41	-10.62	QP
4	0.2940	22.13	10.77	32.90	50.41	-17.51	AVG
5	0.6460	40.71	10.40	51.11	56.00	-4.89	QP
6	0.6460	19.69	10.40	30.09	46.00	-15.91	AVG
7	0.9300	37.63	10.32	47.95	56.00	-8.05	QP
8	0.9300	23.25	10.32	33.57	46.00	-12.43	AVG
9	1.7020	36.37	10.36	46.73	56.00	-9.27	QP
10	1.7020	23.88	10.36	34.24	46.00	-11.76	AVG
11	4.3580	38.03	10.52	48.55	56.00	-7.45	QP
12	4.3580	17.05	10.52	27.57	46.00	-18.43	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)

100.0 dBuV



4. RADIATED& FIELD EMISSION TEST RESULT (SECTION 15.209)

4.1 LIMIT

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

§ 15.209(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.2 TEST PROCEDURE

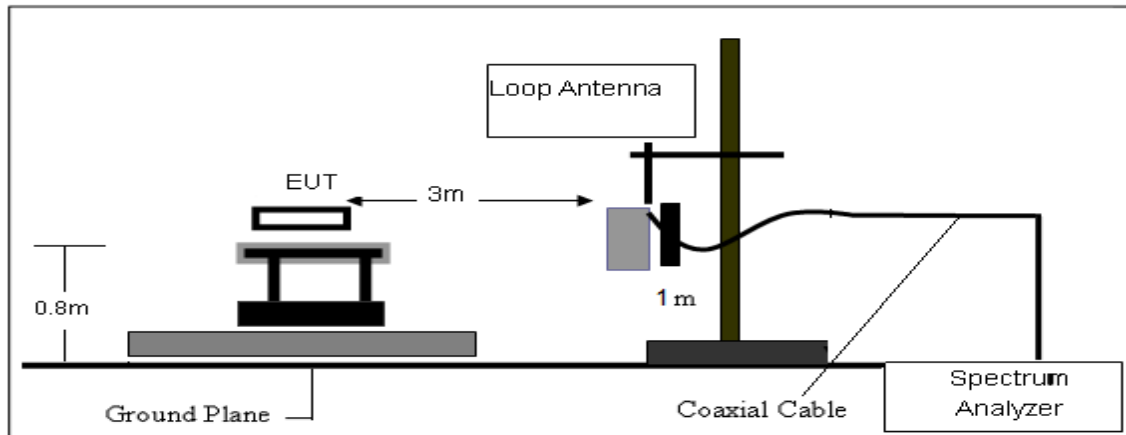
- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

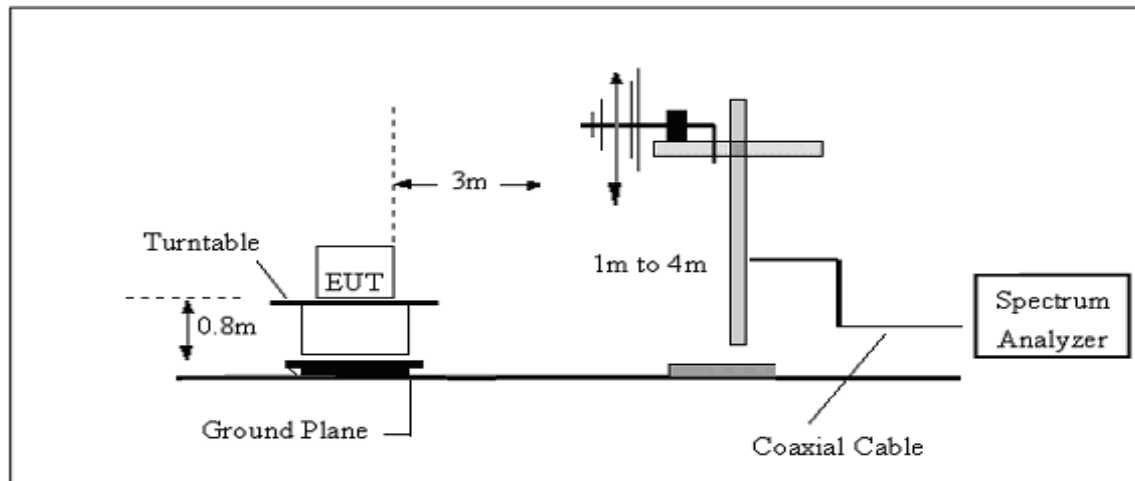
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz



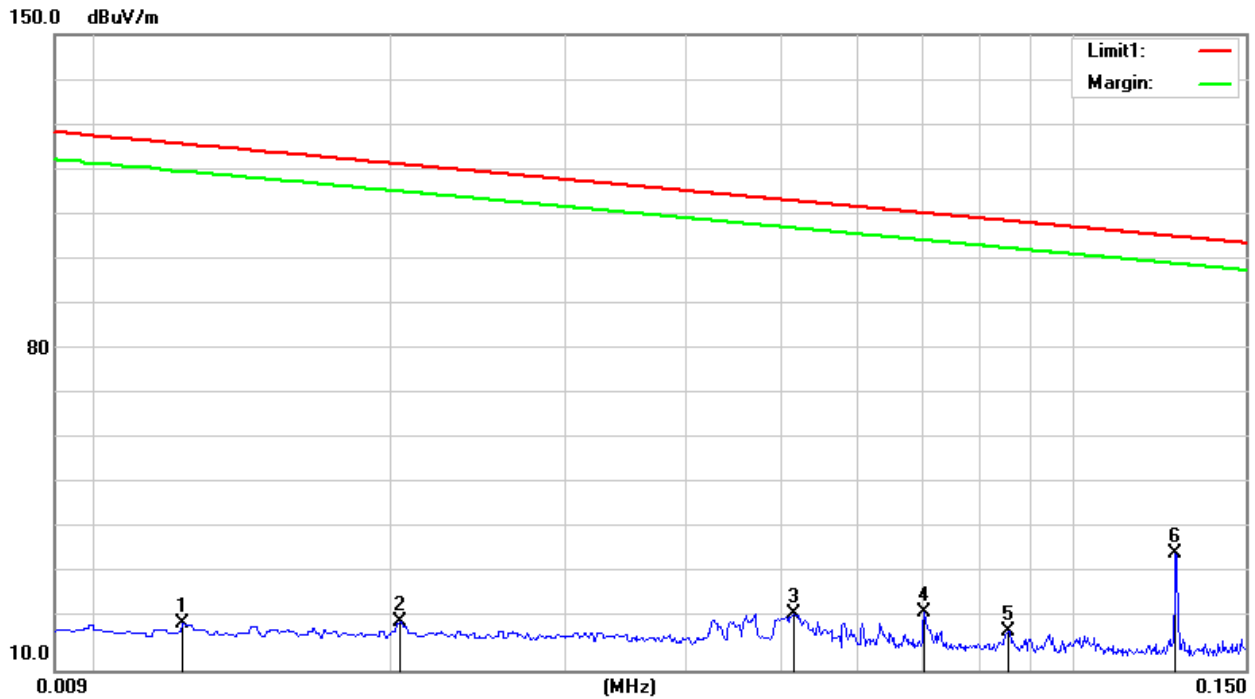
(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





4.4 TEST RESULTS

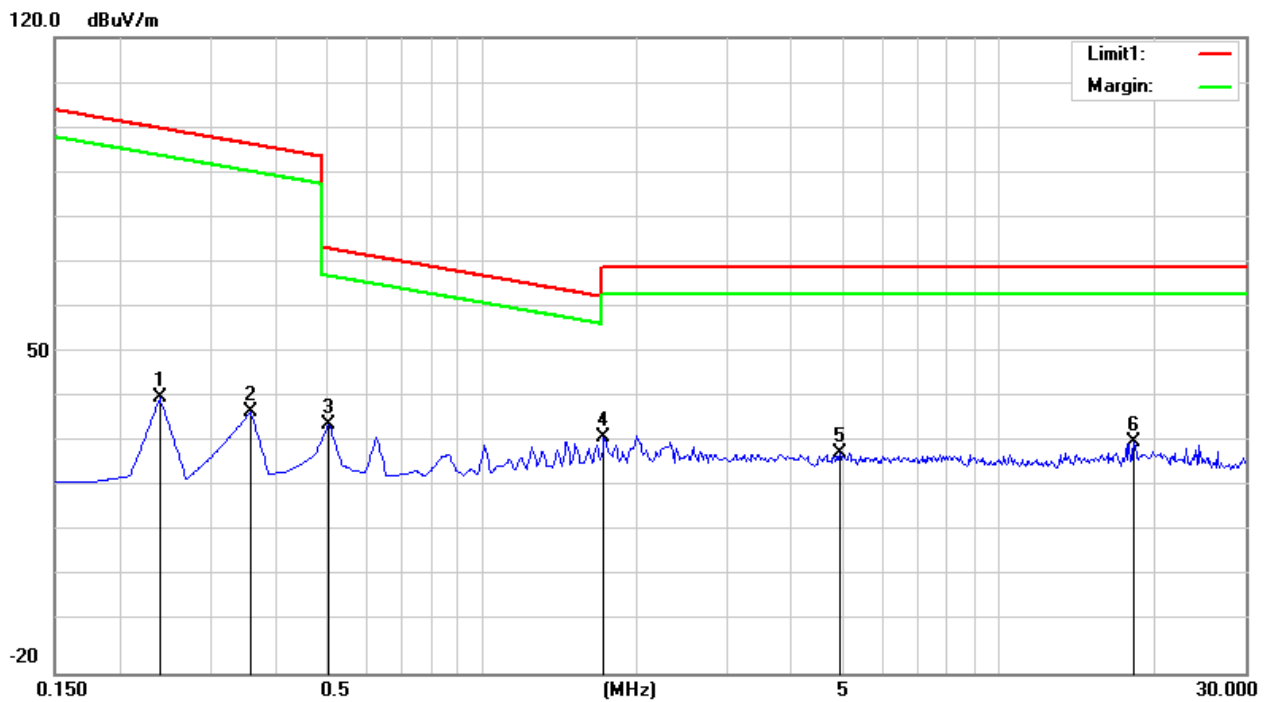
Temperature :	23.1℃	Relative Humidity :	60%
Test Voltage :	DC 3.85V	Test Mode :	TX Mode

4.4.1 Spurious Radiated Emission Below 30 MHz
9KHz-150KHz

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0122	0.73	19.53	20.26	125.88	-105.62	peak
2	0.0204	0.43	20.09	20.52	121.41	-100.89	peak
3	0.0516	3.08	19.46	22.54	113.35	-90.81	peak
4	0.0703	3.78	18.93	22.71	110.67	-87.96	peak
5	0.0856	0.33	18.29	18.62	108.95	-90.33	peak
6	0.1273	18.34	17.55	35.89	105.51	-69.62	peak



150KHz-30MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2396	20.82	19.83	40.65	100.01	-59.36	peak
2	0.3590	17.49	20.14	37.63	96.50	-58.87	peak
3	0.5082	14.73	20.20	34.93	73.48	-38.55	peak
4	1.7321	11.59	20.35	31.94	69.50	-37.56	peak
5	4.9260	8.13	20.49	28.62	69.50	-40.88	peak
6	18.2391	8.71	22.08	30.79	69.50	-38.71	peak



4.4.2 Spurious Radiated Emission below 1 GHz

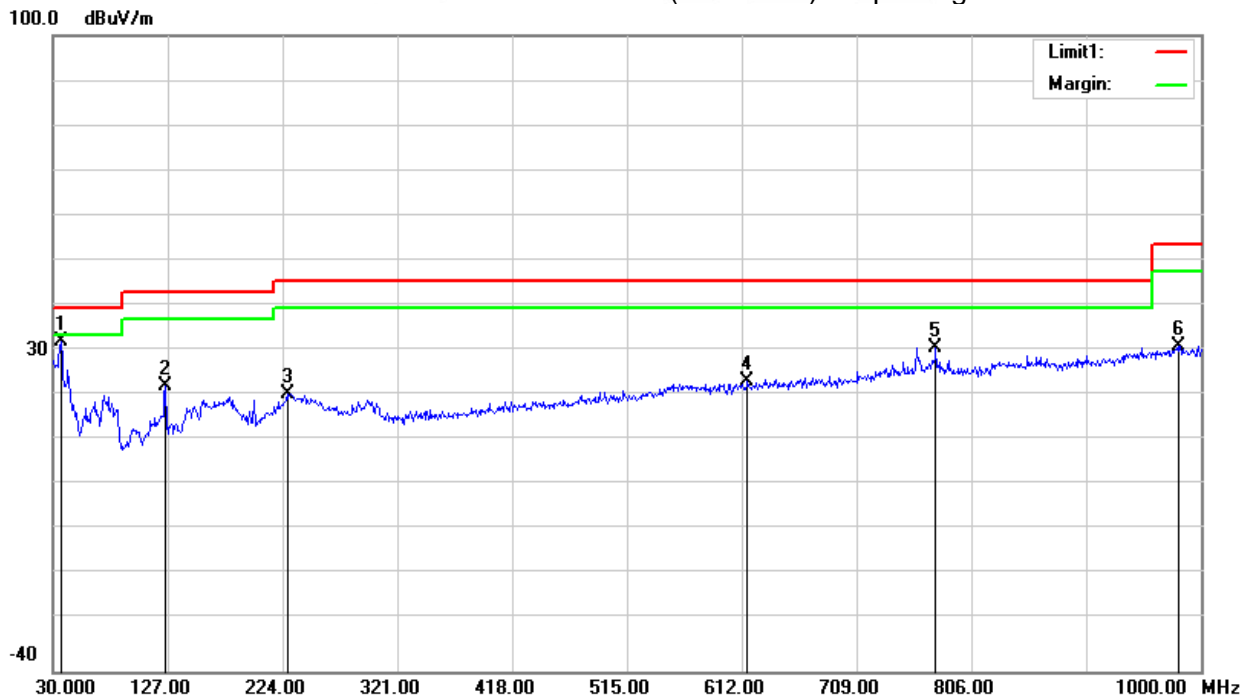
Temperature :	23.1 °C	Relative Humidity :	60%
Test Voltage :	DC 3.85V	Test Mode :	Mode 1

The following table shows the highest levels of radiated emissions on polarizations of vertical

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
36.7900	49.15	-16.39	32.76	40.00	-7.24	peak
125.0600	40.91	-18.22	22.69	43.50	-20.81	peak
227.8800	40.24	-19.20	21.04	46.00	-24.96	peak
616.8500	29.53	-5.49	24.04	46.00	-21.96	peak
775.9300	33.45	-2.26	31.19	46.00	-14.81	peak
980.6000	29.02	2.63	31.65	54.00	-22.35	peak

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit
2. Factor = Antenna factor + Cable attenuation factor (cable loss) - Amplifier gain





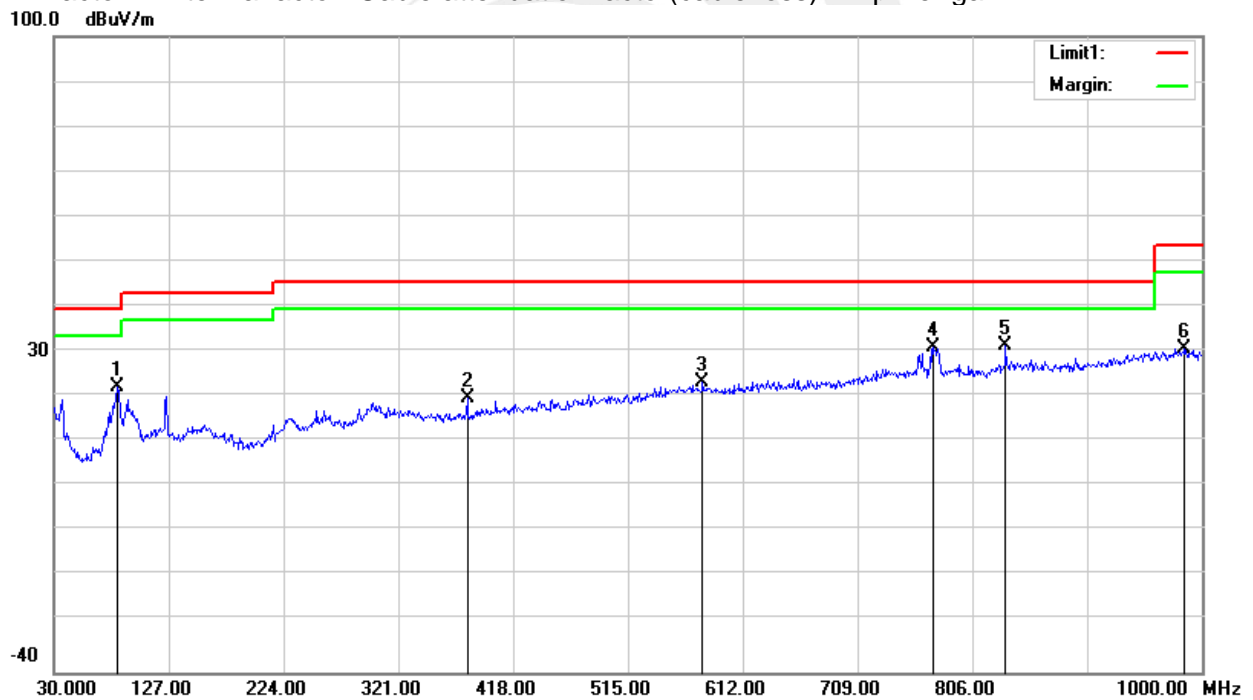
Temperature :	23.1 °C	Relative Humidity :	60%
Test Voltage :	DC 3.85V	Test Mode :	Mode 1

The following table shows the highest levels of radiated emissions on polarizations of horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
83.3500	45.19	-22.52	22.67	40.00	-17.33	peak
379.2000	32.70	-12.29	20.41	46.00	-25.59	peak
578.0500	29.72	-5.73	23.99	46.00	-22.01	peak
773.0200	33.71	-2.30	31.41	46.00	-14.59	peak
834.1300	32.54	-0.59	31.95	46.00	-14.05	peak
985.4500	28.89	2.33	31.22	54.00	-22.78	peak

Remark:

1. Margin = Result (Result = Reading + Factor) – Limit
2. Factor = Antenna factor + Cable attenuation factor (cable loss) – Amplifier gain





5. 20 DB BANDWIDTH TEST

5.1 Limit

FCC Part 15.215, Only applicable to report.

5.2 TEST SETUP

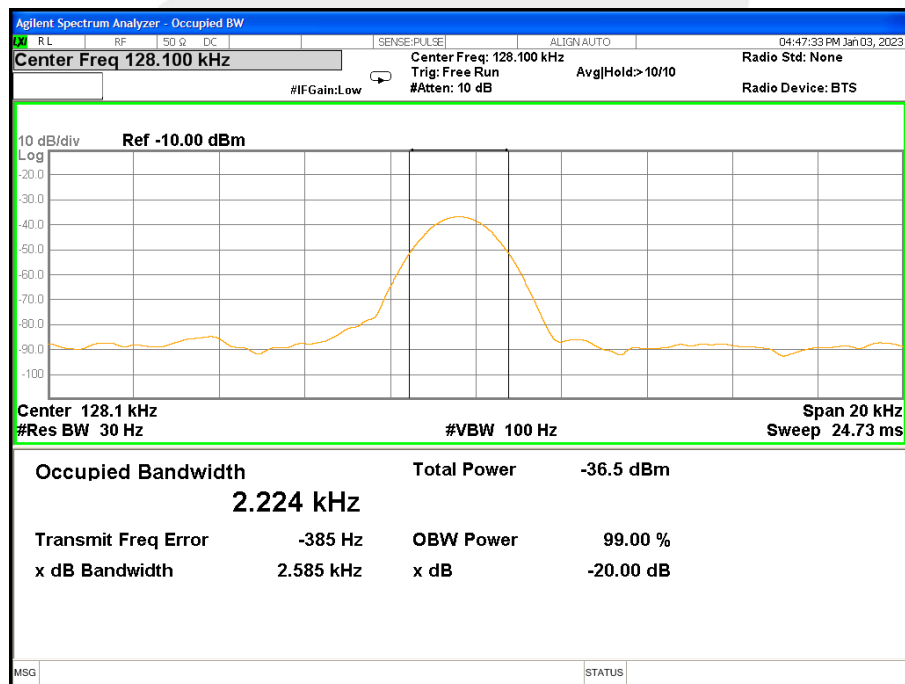
Spectrum Parameter	Setting
Span Frequency	approximately 2 to 3 times the 20 dB bandwidth
RB	greater than 1 % of the 20 dB bandwidth,
VB	equal to the RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

The test program and configuration, Refer to 4.2 and 4.3

5.3 TEST RESULTS

Operating Frequency (kHz)	20 dB Bandwidth(kHz)
128.1	2.585

CH00





APPENDIX-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※

