



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2301-4
FCC ID : IHDT56AH3
STANDARD : FCC Part 15 Subpart C §15.209
CLASSIFICATION : (DCD) Part 15 Low Power Transmitter Below 1705 kHz
TEST DATE(S) : Sep. 20, 2022 ~ Oct. 15, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 Applicant.....	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test	5
1.4 Specification of Accessory	6
1.5 Modification of EUT	6
1.6 Test Location	7
1.7 Test Software	7
1.8 Applied Standards	7
2 Test Configuration of Equipment Under Test	8
2.1 Test Mode	8
2.2 Connection Diagram of Test System	8
2.3 Support Unit used in test configuration and system	8
3 Test Result	9
3.1 20dB and 99% Occupied Bandwidth Measurement	9
3.2 Radiated Emission Measurement	13
3.3 AC Conducted Emission Measurement	21
3.4 Antenna Requirements.....	25
4 List of Measuring Equipment.....	26
5 Uncertainty of Evaluation	27
Appendix A. Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FR282619E	01	Initial issue of report	Oct. 19, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	2.1049	20dB Bandwidth	Reporting Only	-
3.1	2.1049	99% Occupied Bandwidth	Reporting Only	-
3.2	15.209	Radiated Emission	Pass	Under limit 3.82 dB at 46.490 MHz for Quasi-peak
3.3	15.207	AC Conducted Emission	Pass	Under limit 8.68 dB at 0.155 MHz
3.4	15.203	Antenna Requirements	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



1 General Description

1.1 Applicant

Motorola Mobility LLC

222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC

222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2301-4
FCC ID	IHDT56AH3
IMEI Code	Conducted: 354336350016499/354336360016507 Conduction: 354336350016432/354336350016440 Radiation: 354336350016333/354336350016341
HW Version	DVT2
SW Version	TTR33.76
WPT Frequency Range	111 ~ 148kHz
WPT Type of Modulation	ASK
WPT Antenna Type	FPC Antenna
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Specification of Accessory

Specification of Accessory				
AC Adapter 1 (US)	Brand Name	Motorola(Chenyang)	Model Name	MC-1251
AC Adapter 1 (EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-1252
AC Adapter 1 (UK)	Brand Name	Motorola(Chenyang)	Model Name	MC-1253
AC Adapter 1 (AU)	Brand Name	Motorola(Chenyang)	Model Name	MC-1255
AC Adapter 1 (AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-1256
AC Adapter 1 (BR)	Brand Name	Motorola(Chenyang)	Model Name	MC-1257
AC Adapter 2 (US)	Brand Name	Motorola(AOHAI)	Model Name	MC-1251
AC Adapter 2 (EU)	Brand Name	Motorola(AOHAI)	Model Name	MC-1252
AC Adapter 2 (UK)	Brand Name	Motorola(AOHAI)	Model Name	MC-1253
AC Adapter 2 (IN)	Brand Name	Motorola(AOHAI)	Model Name	MC-1254
AC Adapter 2 (AU)	Brand Name	Motorola(AOHAI)	Model Name	MC-1255
AC Adapter 2 (AR)	Brand Name	Motorola(AOHAI)	Model Name	MC-1256
AC Adapter 2 (BR)	Brand Name	Motorola(AOHAI)	Model Name	MC-1257
AC Adapter 2 (CHILE)	Brand Name	Motorola(AOHAI)	Model Name	MC-1259
Battery	Brand Name	Motorola(ATL)	Model Name	PF46
Earphone	Brand Name	Motorola(Lyand)	Model Name	MI181C(SH38D62338)
USB Cable	Brand Name	Motorola (Saibao)	Model Name	SC18D24968
C to HDMI HDMI/USBC Cable 1	Brand Name	Motorola (Linxee)	Model Name	SC18D02146
C to HDMI HDMI/USBC Cable 2	Brand Name	Motorola (Linxee)	Model Name	SC18D38847

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Test Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH02-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24a
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.209, §15.207
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

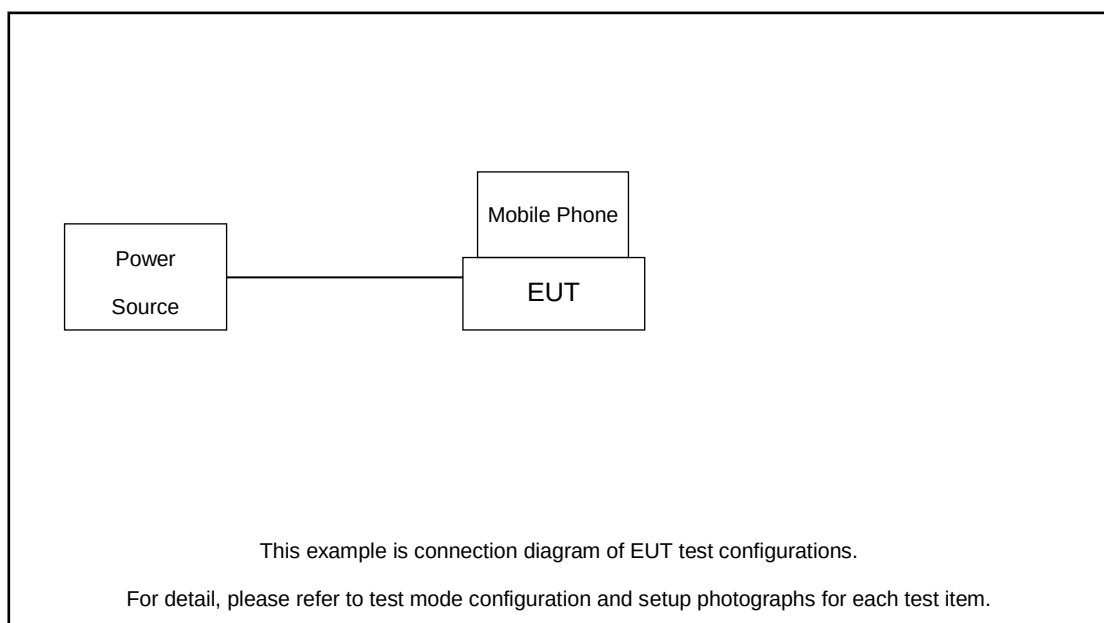
2 Test Configuration of Equipment Under Test

2.1 Test Mode

- The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 1000 MHz).
- AC power line Conducted Emission was tested under maximum output power.

Test Items	Function Type
AC Conducted Emission	Mode 1: Wireless Charging(Reverse charging for other phone)
RF Conducted / Radiated Emission	Mode 1: Wireless Charging(Reverse charging for other phone) at Low Frequency Mode 2: Wireless Charging(Reverse charging for other phone) at Mid Frequency Mode 3: Wireless Charging(Reverse charging for other phone) at high Frequency
Remark: 1. The worst case of radiated emission is mode 2; only the test data of it was reported. 2. The tests were performed with Adapter 1 and USB Cable.	

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile Phone	N/A	N/A	N/A	N/A	N/A

3 Test Result

3.1 20dB and 99% Occupied Bandwidth Measurement

3.1.1 Limit of 20dB and 99% Occupied Bandwidth

Reporting only

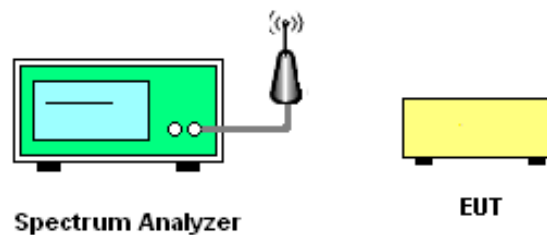
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while wirelessly charging a charging board.
2. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
3. Measure and record the results in the test report.

3.1.4 Test Setup

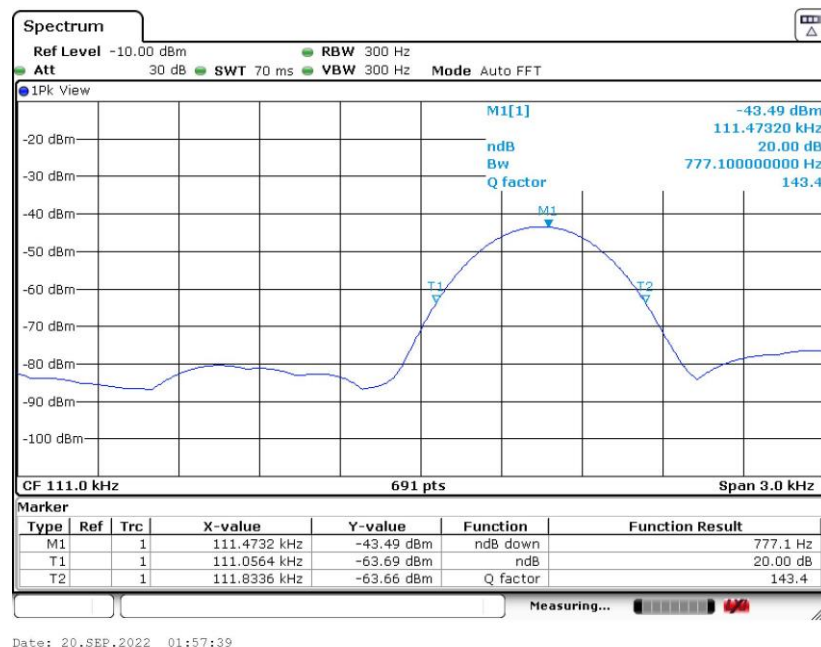




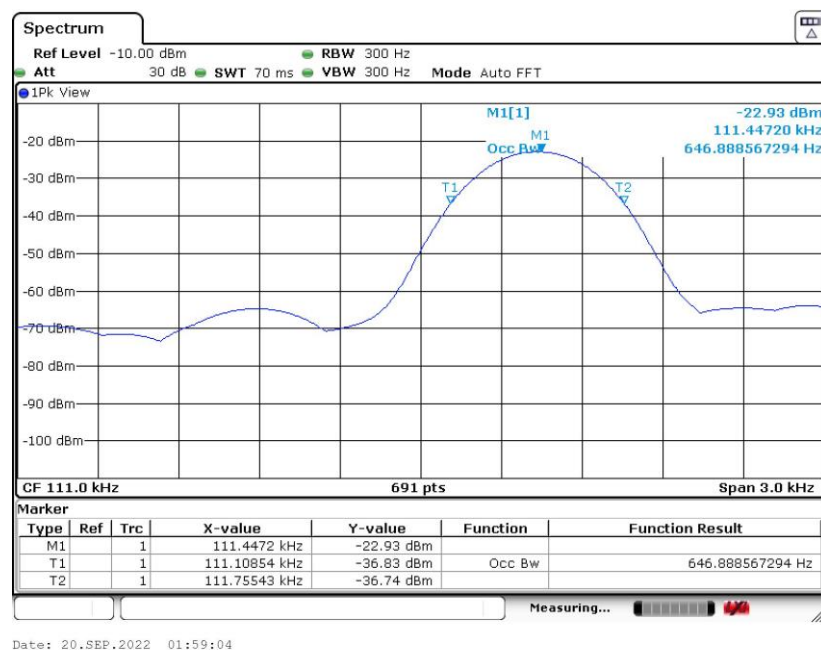
3.1.5 Test Result of 20dB and 99% Bandwidth

Mode 1

20 dB Bandwidth Plot



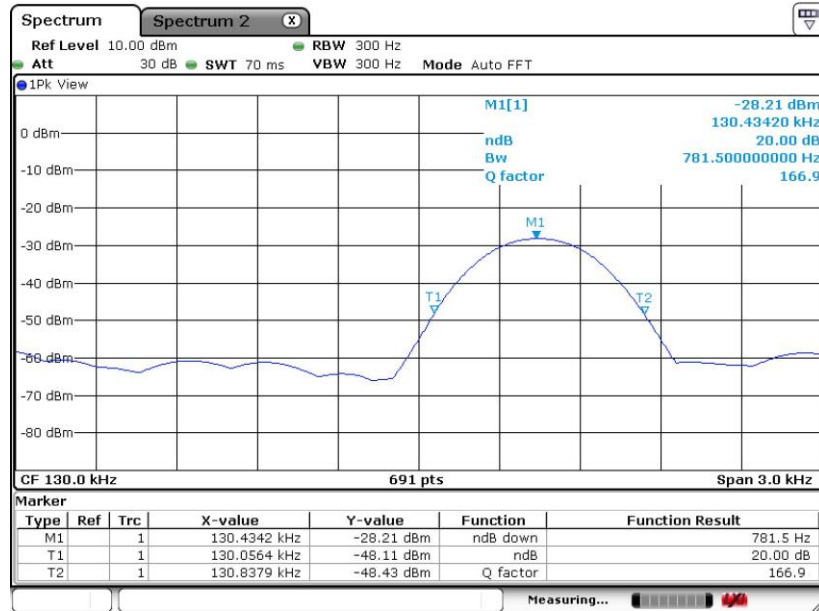
99% Occupied Bandwidth Plot





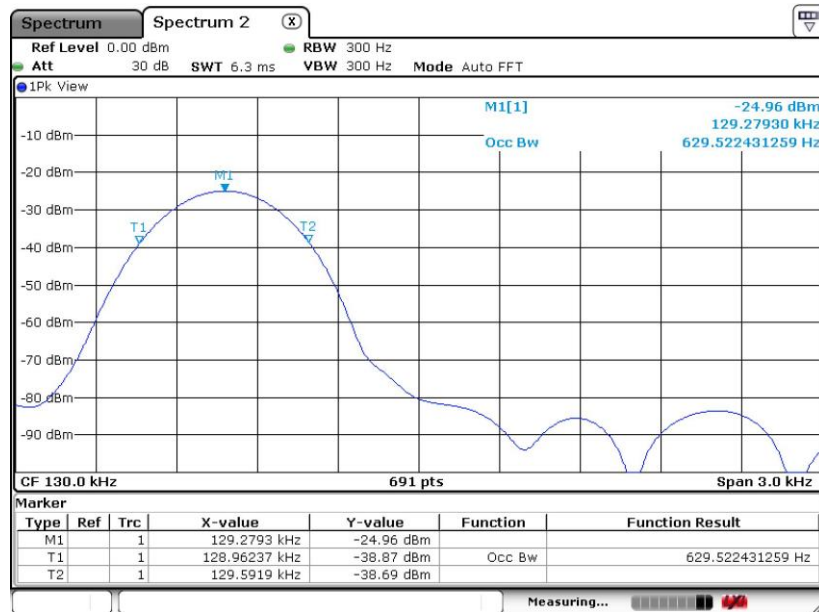
Mode 2

20 dB Bandwidth Plot



Date: 15.OCT.2022 12:02:06

99% Occupied Bandwidth Plot

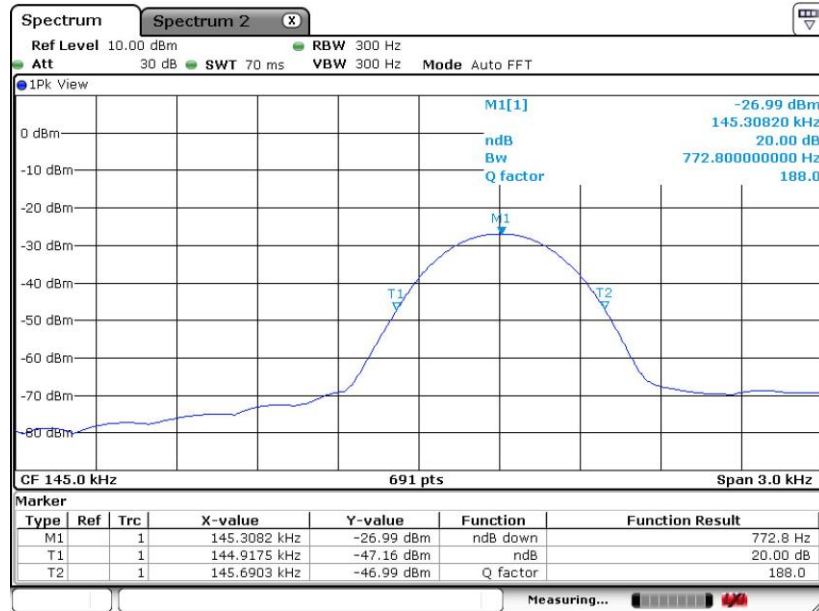


Date: 15.OCT.2022 11:55:34



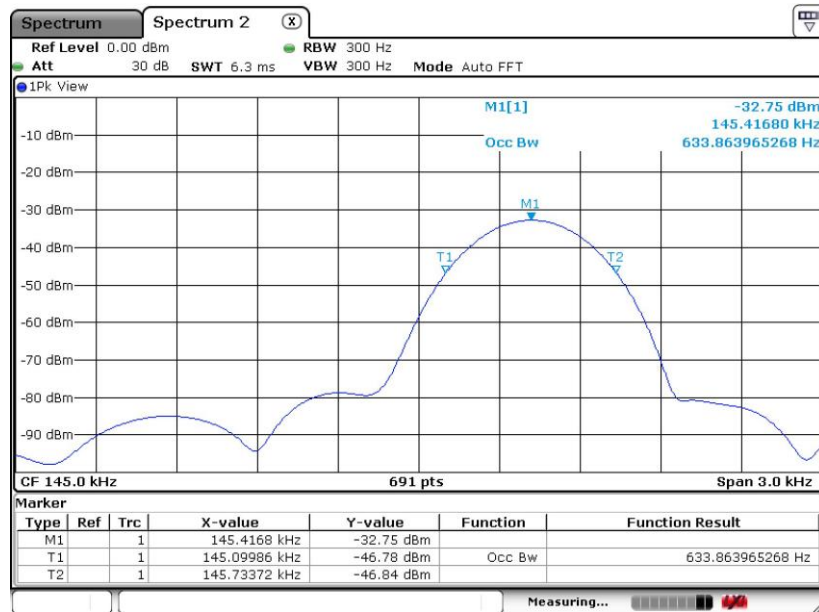
Mode 3

20 dB Bandwidth Plot



Date: 15.OCT.2022 12:04:17

99% Occupied Bandwidth Plot



Date: 15.OCT.2022 12:04:55

3.2 Radiated Emission Measurement

3.2.1 Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Receiver Parameter	Setting
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

Note: 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. Radiated emission limits in these two bands are based on measurements employing an average detector.

For radiated emissions from 9kHz to 1GHz test distance is 3m

For 9kHz ~ 30MHz

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
3. specific line (dB μ V/m) = $20 \log$ Emission level (μ V/m)
4. Limit line = specific limits (dB μ V/m) + distance extrapolation factor.

3.2.2 Measuring Instruments

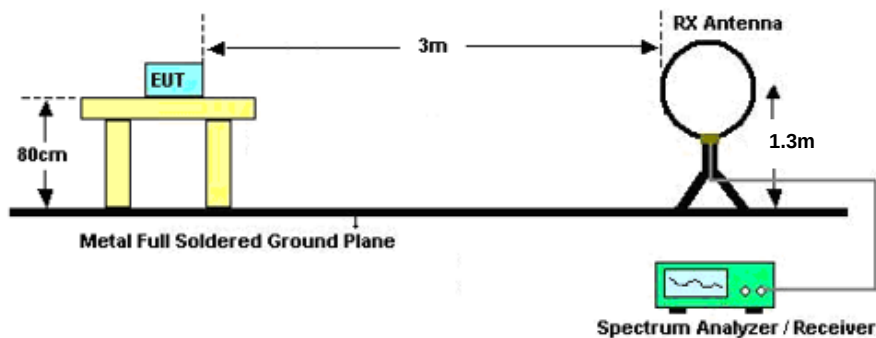
See list of measuring equipment of this test report.

3.2.3 Measuring Instrument Setting

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

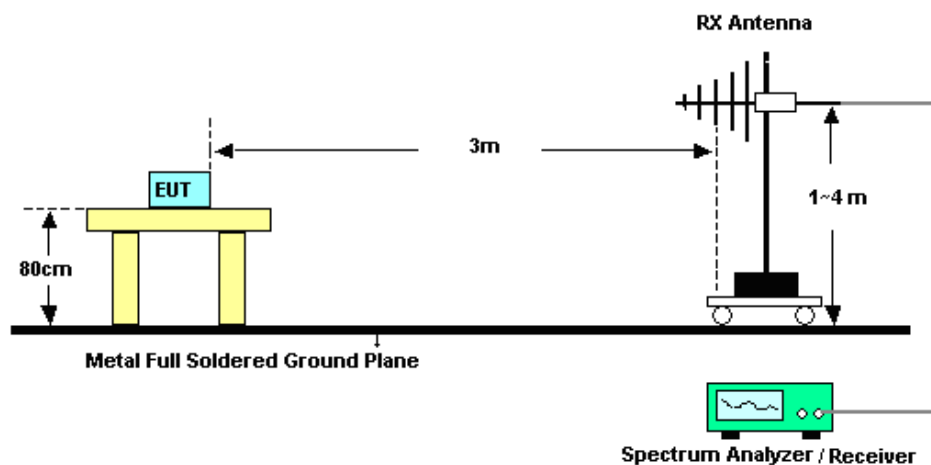
3.2.4 Test Setup of Radiated Emission

For radiated emissions below 30MHz



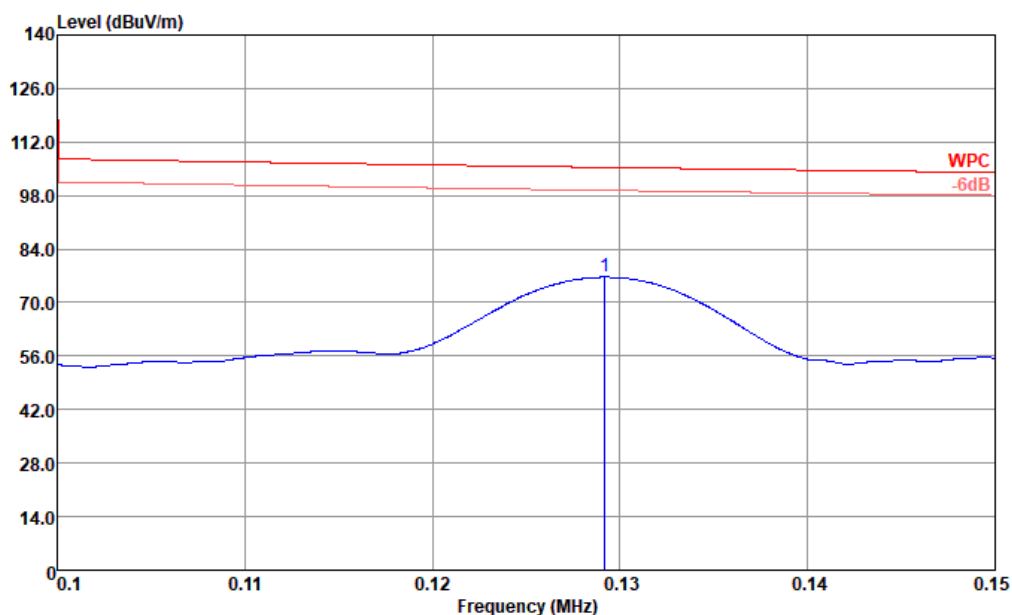
Note: There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

For radiated emissions above 30MHz



3.2.5 Test Result of Fundamental Emission

Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Horizontal	Relative Humidity :	41~42%

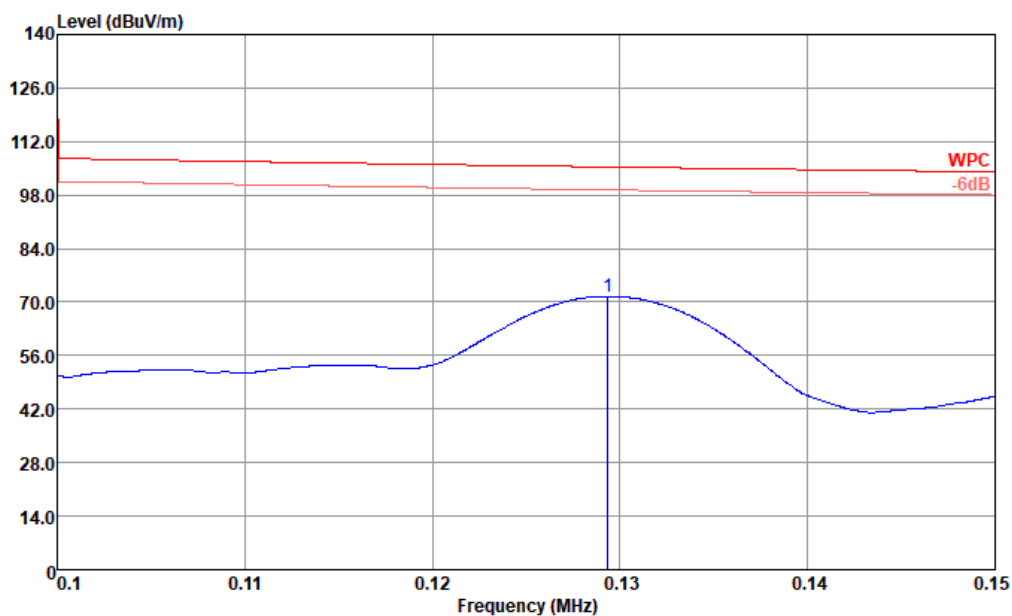


Site : 03CH02-KS
Condition : WPC 3m NFC-ANTENNA HORIZONTAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg
1	0.1292	76.65	-28.72	105.37	56.29	20.27	0.09	---	Peak

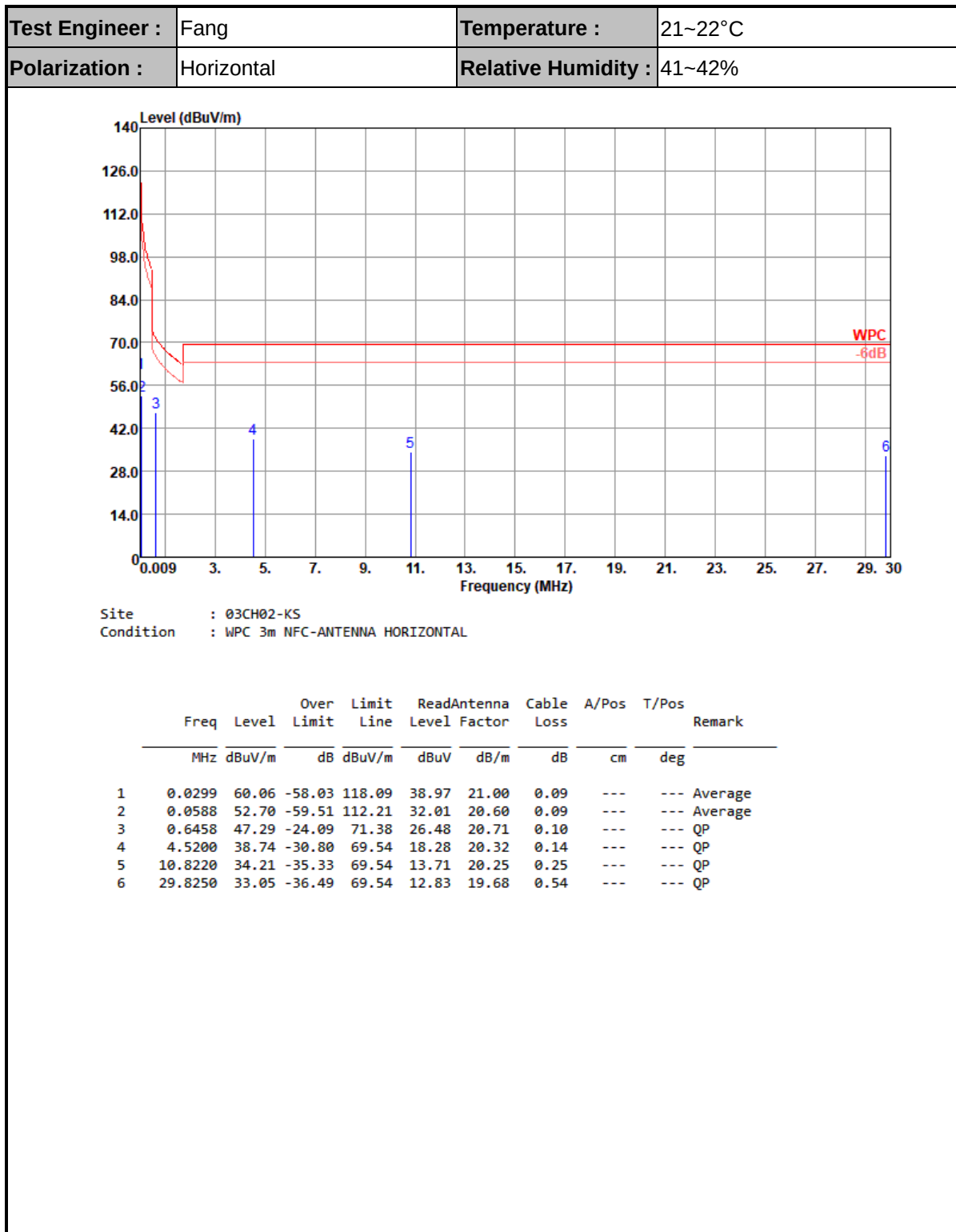


Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Vertical	Relative Humidity :	41~42%



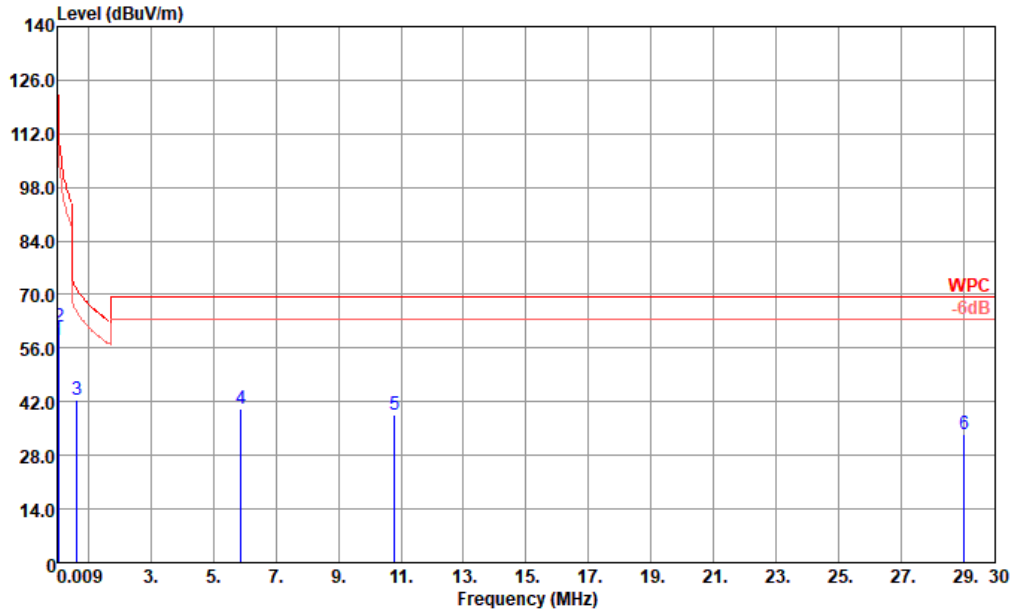
Site : 03CH02-KS
Condition : WPC 3m NFC-ANTENNA VERTICAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg
1	0.1294	71.56	-33.80	105.36	51.20	20.27	0.09	---	Peak

3.2.6 Test Result of Radiated Emission (9kHz ~ 30MHz)




Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Vertical	Relative Humidity :	41~42%

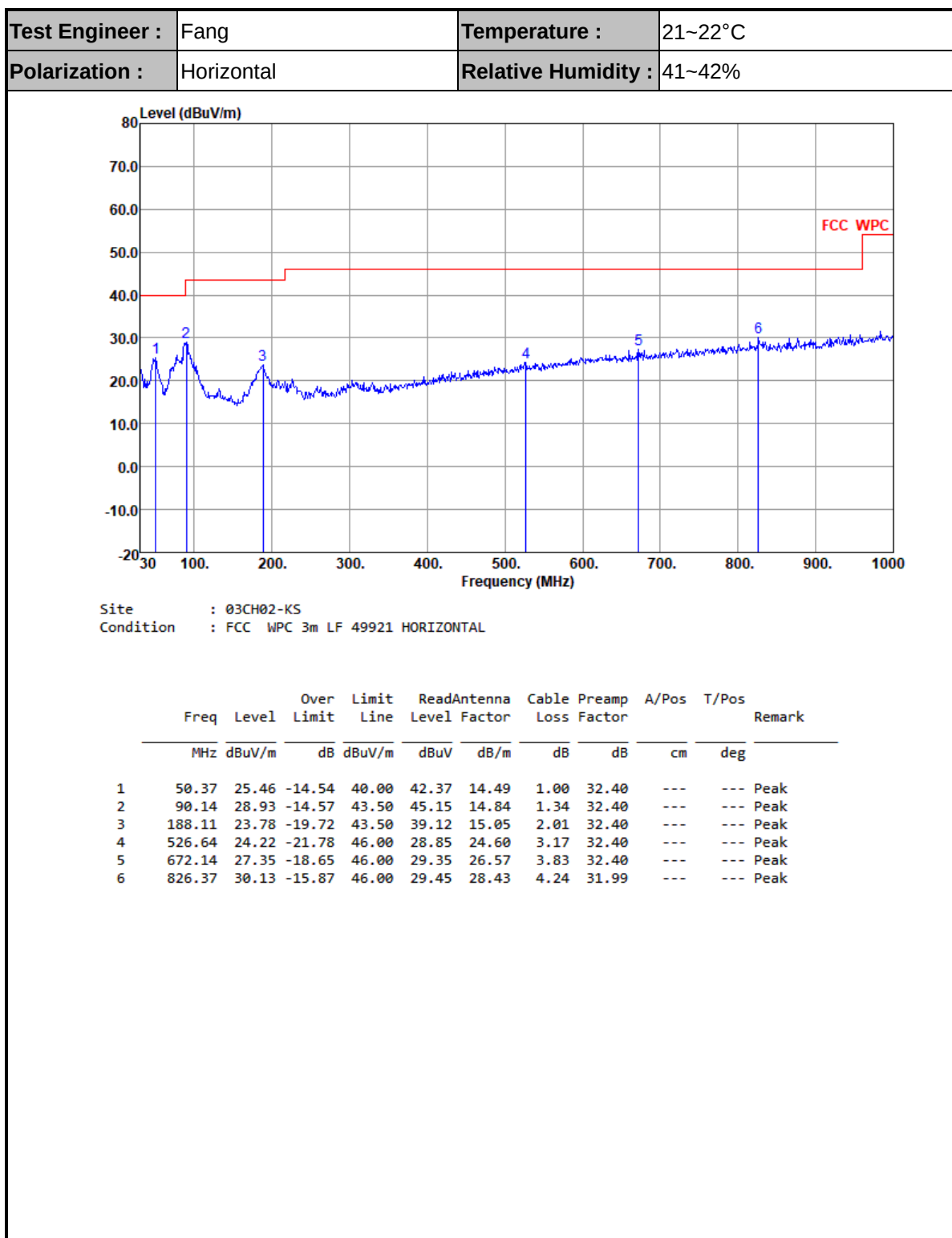


Site : 03CH02-KS
Condition : WPC 3m NFC-ANTENNA VERTICAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg
1	0.0299	58.28	-59.81	118.09	37.19	21.00	0.09	---	Average
2	0.0588	61.43	-50.78	112.21	40.74	20.60	0.09	---	Average
3	0.6458	42.58	-28.80	71.38	21.77	20.71	0.10	---	QP
4	5.8820	40.01	-29.53	69.54	19.72	20.12	0.17	---	QP
5	10.7880	38.57	-30.97	69.54	18.06	20.26	0.25	---	QP
6	29.0200	33.47	-36.07	69.54	13.36	19.58	0.53	---	QP

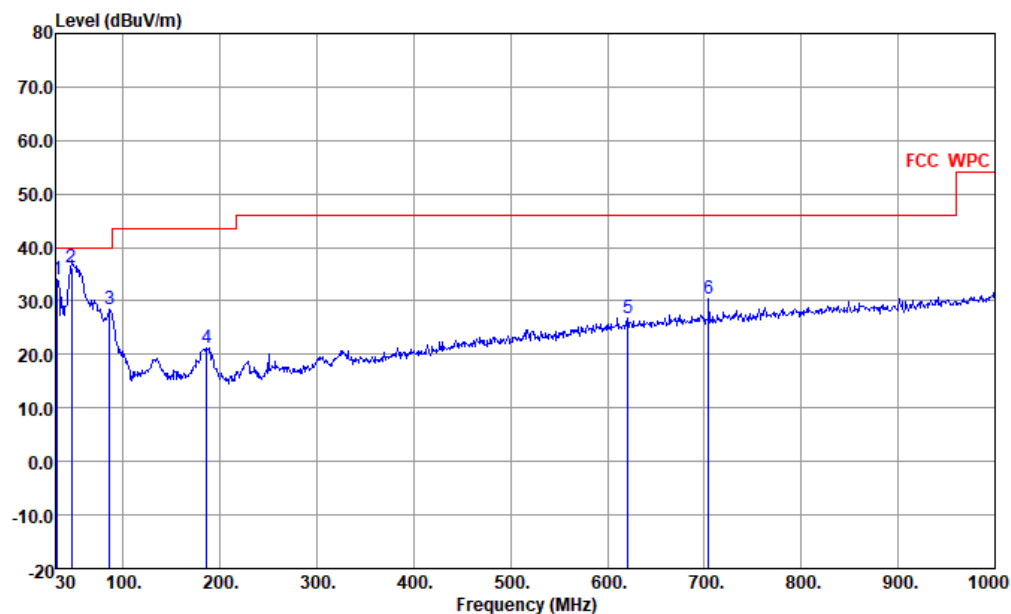


3.2.7 Test Result of Radiated Emission (30MHz ~ 1000MHz)





Test Engineer :	Fang	Temperature :	21~22°C
Polarization :	Vertical	Relative Humidity :	41~42%



Site : 03CH02-KS
Condition : FCC WPC 3m LF 49921 VERTICAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	31.94	34.16	-5.84	40.00	41.41	24.39	0.76	32.40	---	---	Peak
2	46.49	36.18	-3.82	40.00	51.43	16.19	0.96	32.40	100	128	QP
3	86.26	28.58	-11.42	40.00	45.32	14.33	1.33	32.40	---	---	Peak
4	186.17	21.36	-22.14	43.50	36.70	15.06	2.00	32.40	---	---	Peak
5	620.73	26.93	-19.07	46.00	29.35	26.30	3.68	32.40	---	---	Peak
6	704.15	30.45	-15.55	46.00	32.10	26.78	3.96	32.39	---	---	Peak

3.3 AC Conducted Emission Measurement

3.3.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, 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 of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

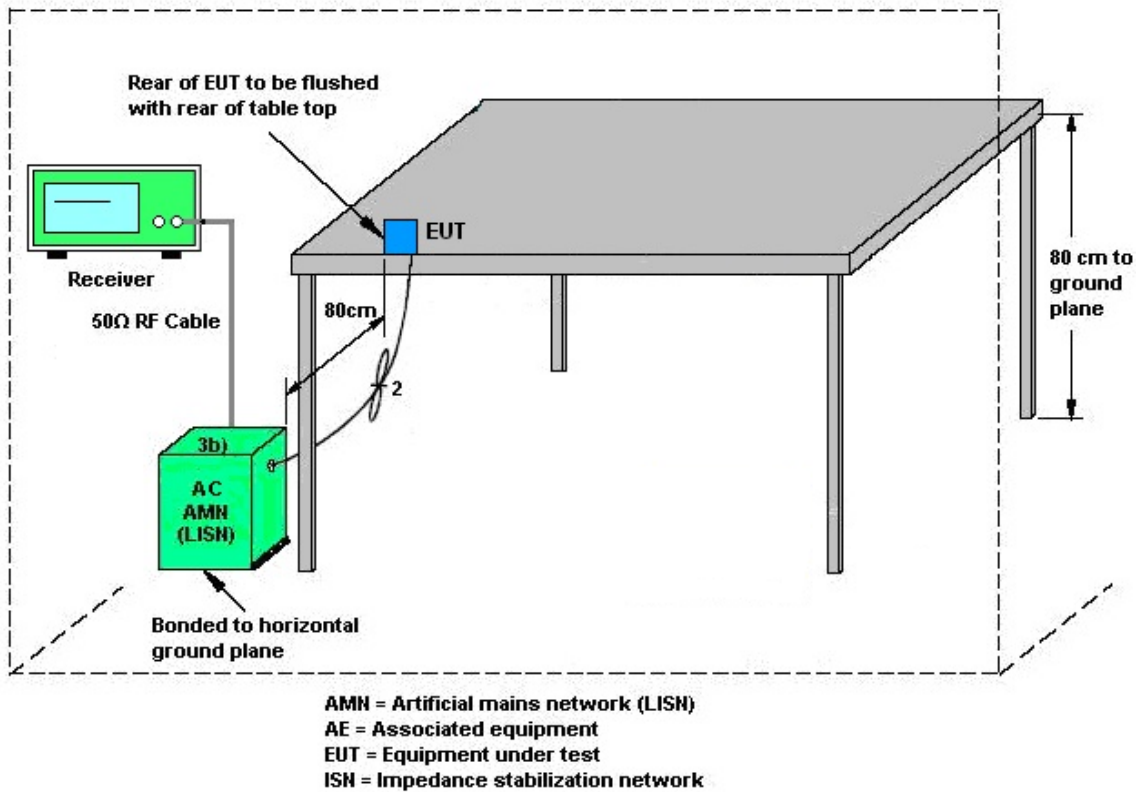
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

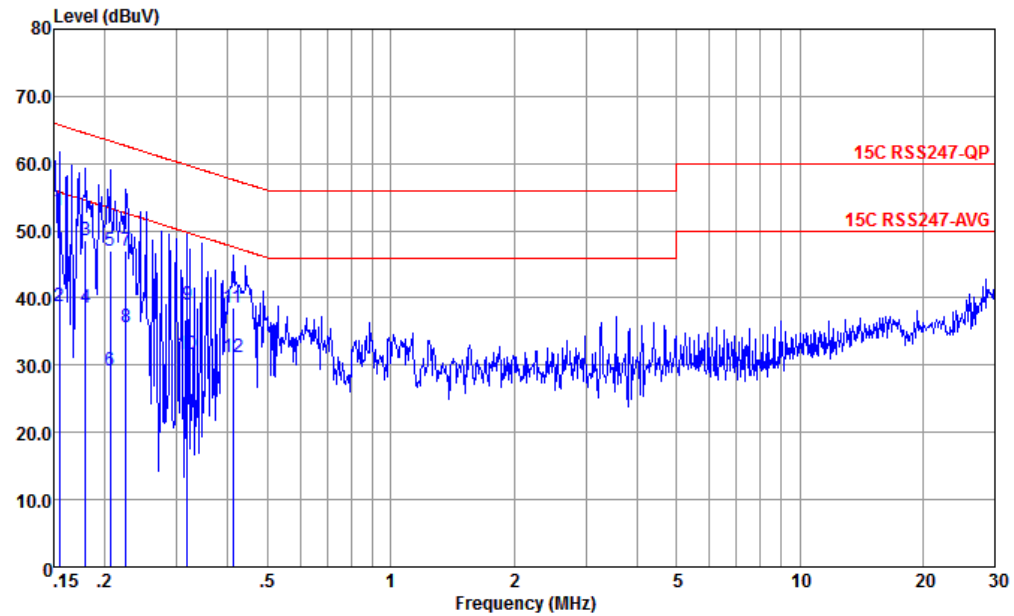
3.3.4 Test Setup





3.3.5 Test Result of AC Conducted Emission

Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

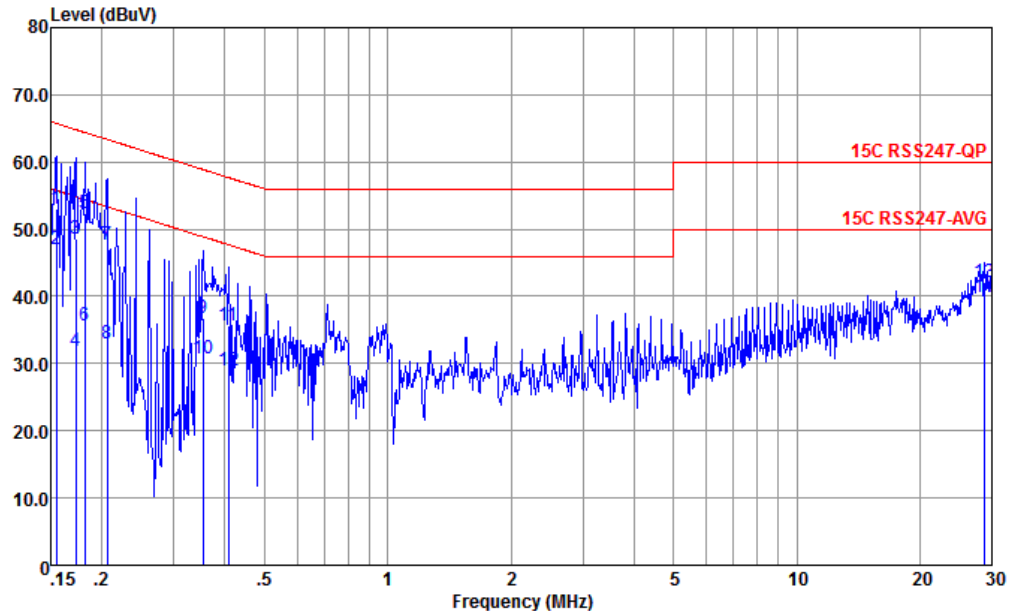


Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-LINE LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1 *	0.155	53.09	-12.65	65.74	42.60	0.06	10.43	QP
2	0.155	38.69	-17.05	55.74	28.20	0.06	10.43	Average
3	0.180	48.66	-15.84	64.50	38.20	0.04	10.42	QP
4	0.180	38.66	-15.84	54.50	28.20	0.04	10.42	Average
5	0.206	47.04	-16.32	63.36	36.61	0.02	10.41	QP
6	0.206	29.24	-24.12	53.36	18.81	0.02	10.41	Average
7	0.226	47.03	-15.58	62.61	36.60	0.03	10.40	QP
8	0.226	35.63	-16.98	52.61	25.20	0.03	10.40	Average
9	0.318	38.89	-20.86	59.75	28.50	0.05	10.34	QP
10	0.318	31.59	-18.16	49.75	21.20	0.05	10.34	Average
11	0.410	38.49	-19.15	57.64	28.20	0.00	10.29	QP
12	0.410	31.09	-16.55	47.64	20.80	0.00	10.29	Average



Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-NEUTRAL NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.155	52.96	-12.78	65.74	42.50	0.03	10.43	QP
2 *	0.155	47.06	-8.68	55.74	36.60	0.03	10.43	Average
3	0.173	48.66	-16.15	64.81	38.19	0.04	10.43	QP
4	0.173	31.96	-22.85	54.81	21.49	0.04	10.43	Average
5	0.182	52.37	-12.05	64.42	41.91	0.04	10.42	QP
6	0.182	35.57	-18.85	54.42	25.11	0.04	10.42	Average
7	0.206	47.66	-15.70	63.36	37.21	0.04	10.41	QP
8	0.206	33.06	-20.30	53.36	22.61	0.04	10.41	Average
9	0.354	36.86	-22.01	58.87	26.60	-0.06	10.32	QP
10	0.354	30.76	-18.11	48.87	20.50	-0.06	10.32	Average
11	0.408	35.72	-21.96	57.68	25.50	-0.07	10.29	QP
12	0.408	29.02	-18.66	47.68	18.80	-0.07	10.29	Average
13	28.755	42.20	-17.80	60.00	30.90	-0.40	11.70	QP
14	28.755	39.90	-10.10	50.00	28.60	-0.40	11.70	Average

Note:

- Level(dBuV) = Read Level(dBuV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBuV) – Limit Line(dBuV)



3.4 Antenna Requirements

3.4.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV30	101338	10Hz~30GHz	Apr. 12, 2022	Sep. 20, 2022~ Oct. 15, 2022	Apr. 11, 2023	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Oct. 16, 2021	Oct. 12, 2022	Oct. 15, 2022	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Oct. 12, 2022	Oct. 29, 2022	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 22, 2021	Oct. 12, 2022	Dec. 21, 2022	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2022	Oct. 12, 2022	Jan. 04, 2023	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Oct. 12, 2022	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Oct. 12, 2022	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Oct. 12, 2022	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz;	May 24, 2022	Sep. 26, 2022	May 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Sep. 26, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Sep. 26, 2022	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Sep. 26, 2022	Oct. 13, 2022	Conduction (CO01-KS)

NCR: No Calibration Required



5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.78dB
--	--------

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.0dB
--	-------

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.0dB
--	-------

----- THE END -----