FCC RF Test Report

APPLICANT	:	Ningbo Lingzhu Technology CO., Ltd.
EQUIPMENT	:	Smart Battery Doorbell
MODEL NAME	:	SC060-WCB2,SC060-WCB2A, SC060-WCB2B,SC060-WCB2C, SC060-WCB3,SC060-WCB3A, SC060-WCB3B,SC060-WCB3C, SC060-WCB4,SC060-WCB4A, SC060-WCB4B,SC060-WCB4C
FCC ID	:	2A789SC060
STANDARD	:	47 CRF Part 15 Subpart C §15.231
CLASSIFICATION	:	(DSC) Security/Remote Control Transmitter
TEST DATE(S)	:	Jun. 06, 2023 ~ Jul. 28, 2023

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.

This report contains data that were produced under subcontract by Sporton International Inc. (ShenZhen).

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

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR342506B	Rev. 01	Initial issue of report	Jul. 31, 2023

SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
	FCC Rule Part 15C	**Description of Test**	**Result**	**Remark**
3.1	15.207	AC Power Line Conducted Emissions	Pass	Under limit 16.04 dB at 0.150MHz
3.2	15.231(a)	Types of Momentary Signals	Pass	-
3.3	15.231(c)	20dB and 99% Occupied Bandwidth	Pass	-
3.4	15.231(b) 15.205 15.209	Field Strength of Fundamental and Spurious Emissions	Pass	Under limit 8.65 dB at 3905.00 MHz
3.5	15.203	Antenna Requirement	Pass	-

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1. General Information

1.1 Applicant

Ningbo Lingzhu Technology CO., Ltd.

No.578, Building 7, No.535 Kangqiao South Road, Jiangbei District,Ningbo, Zhejiang, PRC

1.2 Manufacturer

Ningbo Lingzhu Technology CO., Ltd.

No.578, Building 7, No.535 Kangqiao South Road, Jiangbei District,Ningbo, Zhejiang, PRC

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Battery Doorbell
Model Name	SC060-WCB2, SC060-WCB2A, SC060-WCB2B, SC060-WCB2C, SC060-WCB3, SC060-WCB3A, SC060-WCB3B, SC060-WCB3C, SC060-WCB4, SC060-WCB4A, SC060-WCB4B, SC060-WCB4C
FCC ID	2A789SC060
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 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	433MHz
Channel Number	1
20dBW	7.380 KHz
99%OBW	57.959 KHz
Antenna Type	Spring Antenna
Type of Modulation	ASK

Remark: Regarding the 433MHz function, the doorbell only supports Tx mode, and the Dingdong machine only supports Rx mode.

1.5 Modification of EUT

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

1.6 Testing 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		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-KS CO01-KS	CN1257	314309

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

Note: Test data subcontracted: Test case of RE in section 3.4 of this report.

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	CO01-KS	AUDIX	E3	6.2009-8-24
2.	03CH04-SZ	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.231
- ANSI C63.10-2013

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

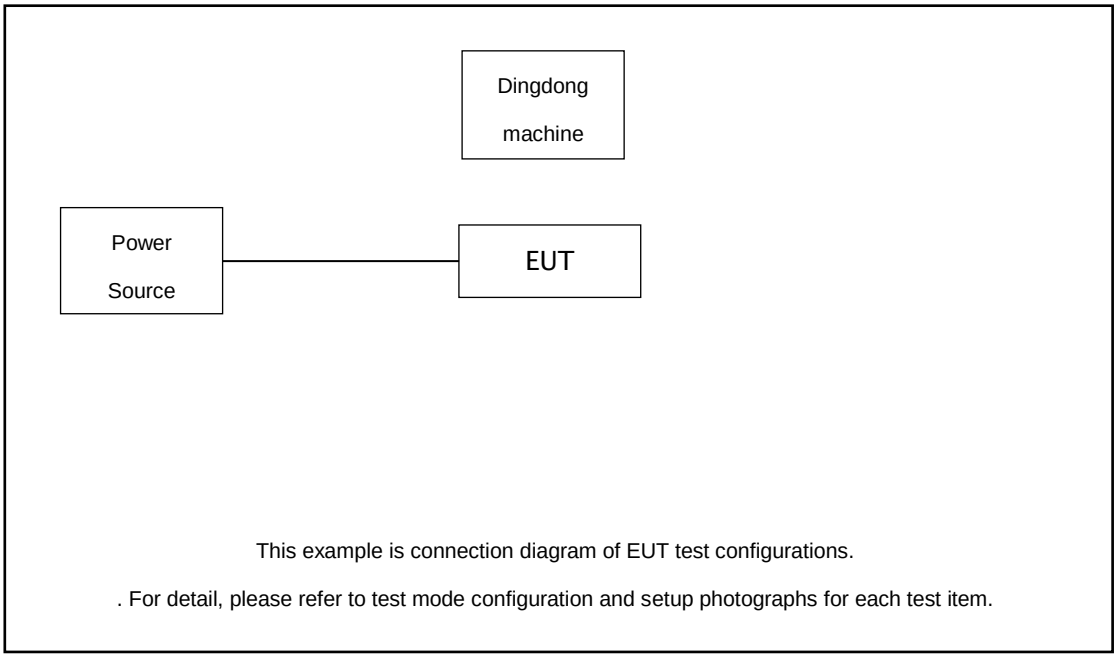
Investigation has been done on all the possible configurations for searching the worst cases.

The following table is a list of the test modes shown in this test report.

Test Mode	
Transmitting	433MHz

2.2 Connection Diagram of Test System

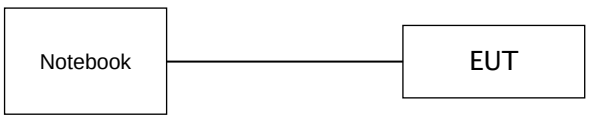
AC Conducted Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

Radiated Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	SD Card	Kingston	8GB	N/A	N/A	N/A
3.	Adapter	N/A	N/A	N/A	N/A	N/A

2.4 EUT Operation Test Setup

The EUT was programmed to be in transmitting mode.

3. Test Results

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit 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 (dBμV)	
	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.

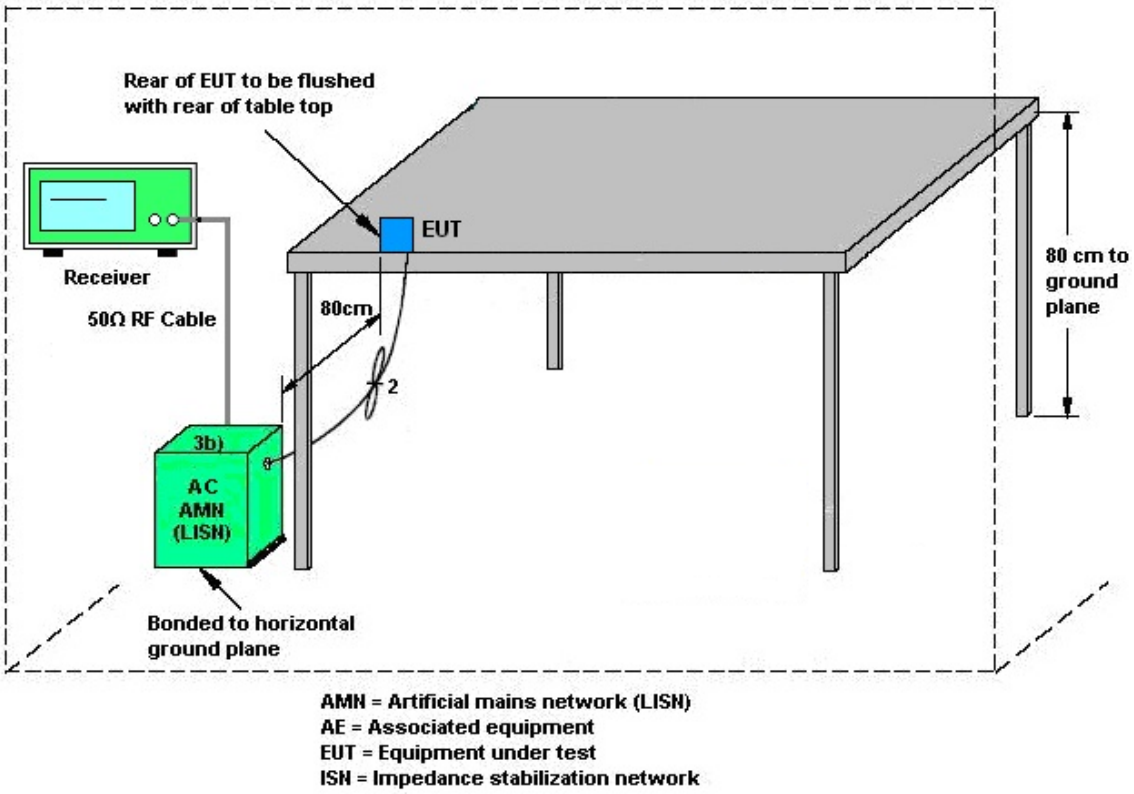
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it 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.

3.1.4 Test setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2 Types of Momentarily Operated Devices

3.2.1 Limit

☒	§15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
☐	§15.231 (a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
☐	§15.231 (a)(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
☐	§15.231 (a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
☐	§15.231 (a)(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

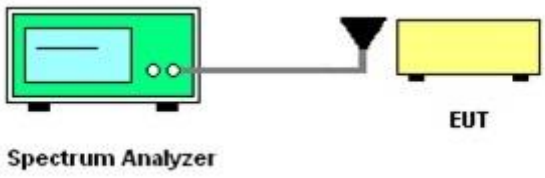
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

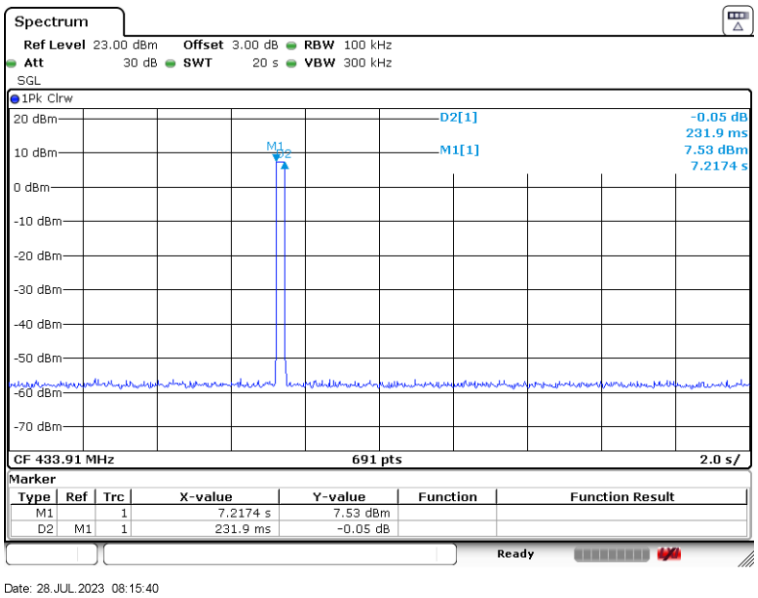
1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.
3. Set the spectrum analyzer for ZERO SPAN. Sweep time = 20 s
4. Measured the spectrum width with power higher than 20dB below carrier.
5. Measured the transmission period of EUT under specified condition.

3.2.4 Test Setup



3.2.5 Test Result of transmission time

☒	§15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.



Remark：M1 is the time when the switch is released.

Duration time (S)	Limit (S)	Result
0.2319	< 5	Pass

3.3 20dB Emission Bandwidth and 99% Bandwidth Measurement

3.3.1 Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the centre frequency.

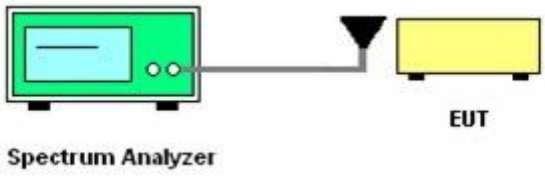
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% BW.

3.3.4 Test Setup



3.3.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.4 Field Strength of Fundamental and Spurious Emissions

3.4.1 Limit

☒ 15.231(b)

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following

Rules and specifications	FCC CFR 47 Part 15 section 15.231	
Fundamental frequency (MHz)	Field strength of fundamental (μV/m) at 3m	Field strength of spurious emissions (μV/m) at 3m
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750*	125 to 375*
174-260	3750	375
260-470	3750 to 12500*	375 to 1250*
Above 470	12500	1250

* Linear interpolation with frequency, f, in MHz.

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

☒ 15.209

For intentional device, according to 15.209(a) the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed 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

☐ 15.231(e)

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Rules and specifications	FCC CFR 47 Part 15 section 15.231	
Fundamental frequency (MHz)	Field strength of fundamental (μV/m) at 3m	Field strength of spurious emissions (μV/m) at 3m
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500	50 to 150
174-260	1500	150
260-470	1500 to 5000	150 to 500
Above 470	5000	500

* Linear interpolation with frequency, f, in MHz.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure Average reading.
5. For average measurement: use duty cycle correction factor method per 15.35(c).
   Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
   Set the spectrum analyzer for ZERO SPAN
   Adjust the SWEEP TIME to obtain at least a 100 ms period of time on the horizontal display axis of the spectrum analyzer.

Duty cycle = On time/100 milliseconds

On time = N1*L1+N2*L2+...+Nn-1*LNn-1+Nn*Ln

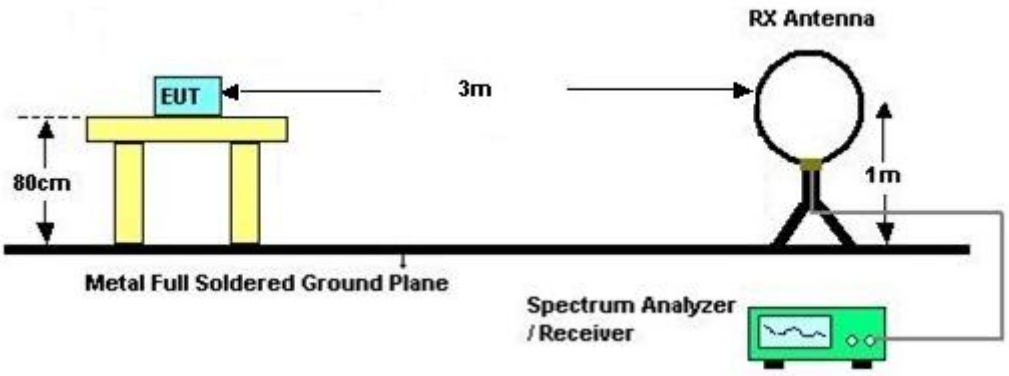
Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

Average Emission Level = Peak Emission Level + 20*log(Duty cycle)

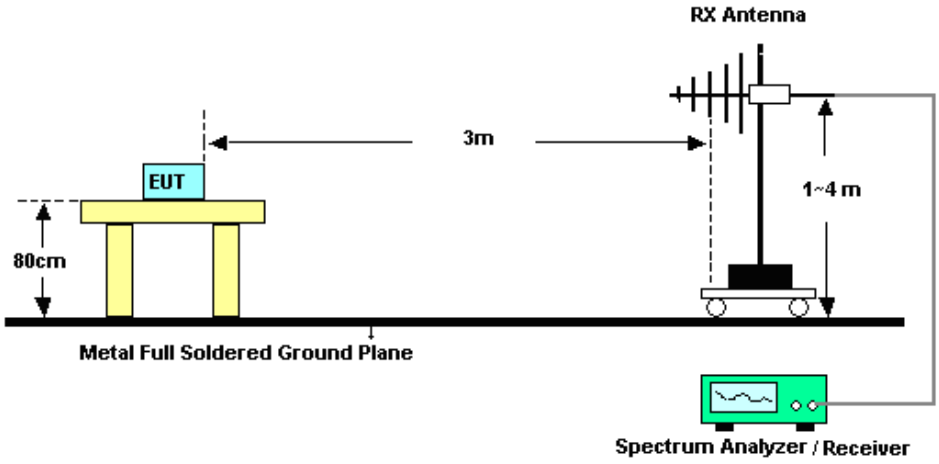
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.4.4 Test Setup

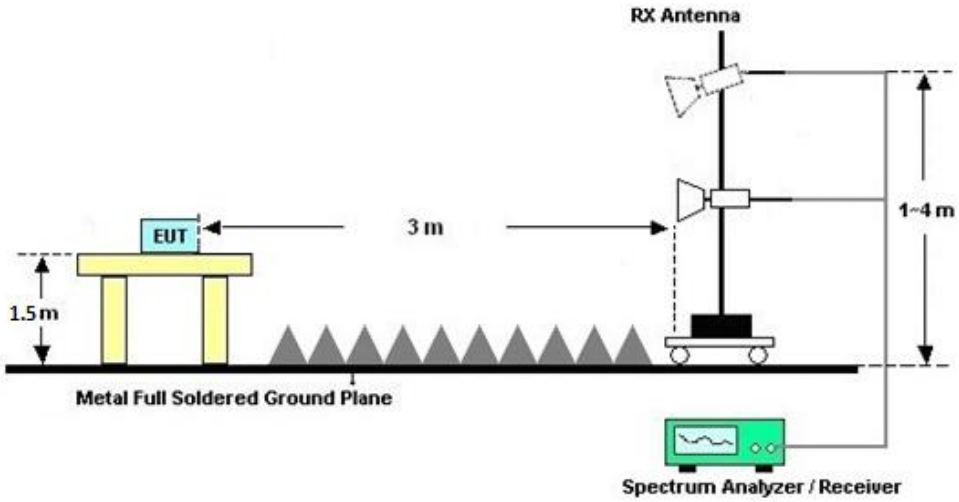
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

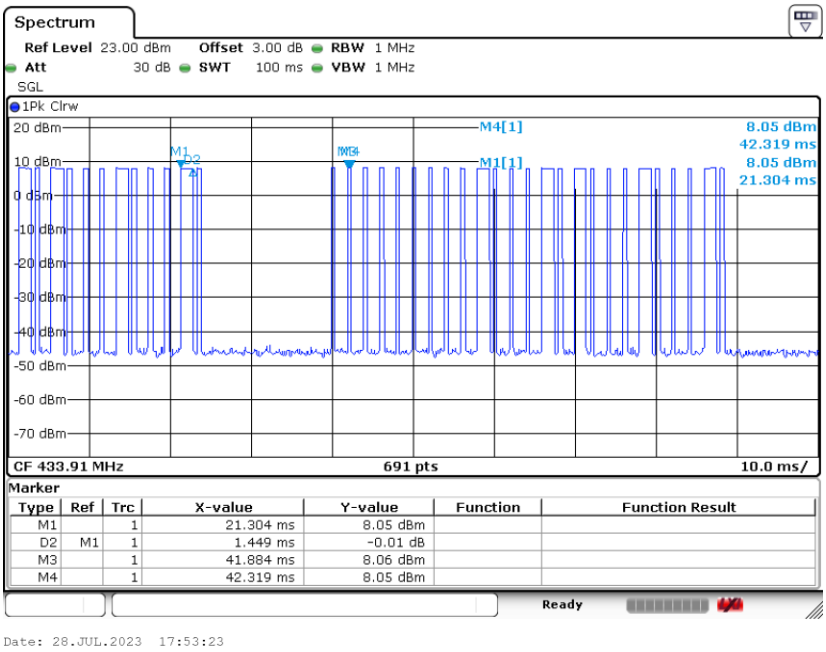
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Fundamental and Spurious Emissions

Please refer to Appendix C.

3.4.7 Duty cycle correction factor for average measurement

Test Plot of Duty cycle



Note:

1. Worst case Duty cycle = on time/100 milliseconds = (D2*9+(M4-M3)*28)/100ms = (1.449*9+0.435*28)/100ms = 25.22/100ms = 25.22 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = 20*log(0.2522) = -11.96 dB

3.5 Antenna Requirements

3.5.1 Standard Applicable

§15.203: 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.

3.5.2 Antenna Anti-Replacement Construction

This EUT uses an integral antenna which is permanently attached.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	Jul. 19, 2023~ Jul. 28, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2023	Jul. 19, 2023~ Jul. 28, 2023	Jan. 04, 2024	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2023	Jul. 19, 2023~ Jul. 28, 2023	Jan. 04, 2024	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 19, 2022	Jul. 07, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2023	Jul. 07, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	Jul. 07, 2023	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 14, 2023	Jul. 07, 2023	May 13, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2023	Jul. 07, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 06, 2023	Jul. 07, 2023	Jul. 07, 2024	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2022	Jul. 07, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	Jul. 07, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2023	Jul. 07, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Sep. 30, 2022	Jul. 07, 2023	Sep. 29, 2023	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Nov. 10, 2022	Jul. 07, 2023	Nov. 10, 2023	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jul. 07, 2023	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jul. 07, 2023	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 16, 2023	Jun. 06, 2023	May 15, 2024	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2022	Jun. 06, 2023	Oct. 12, 2023	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 16, 2023	Jun. 06, 2023	May 15, 2024	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2022	Jun. 06, 2023	Oct. 11, 2023	Conduction (CO01-KS)

5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Occupied Channel Bandwidth	±0.1 %

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.94 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8 dB

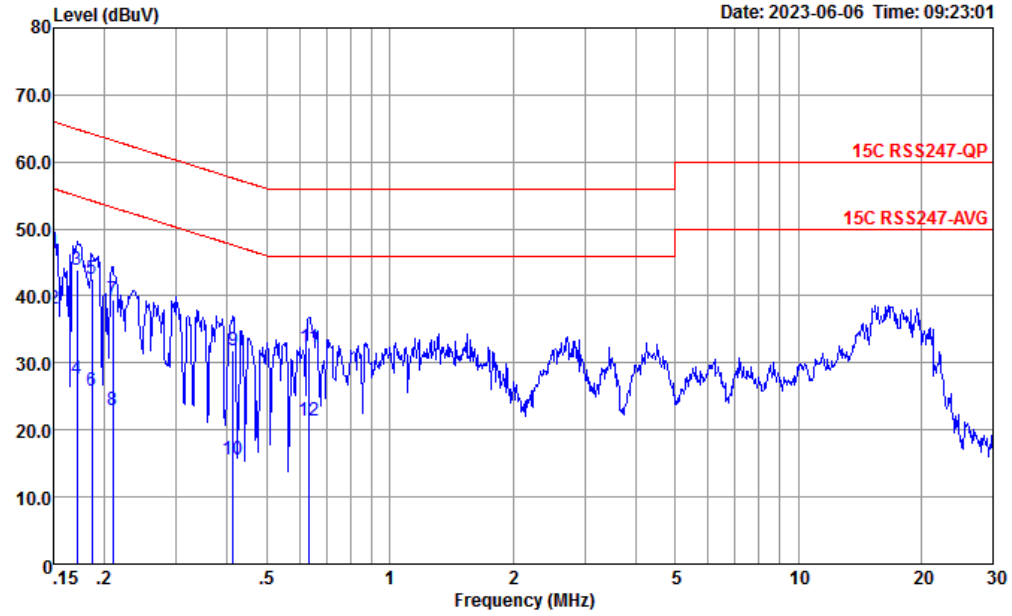
Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

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

Appendix A. Test Results of Conducted Emission Test

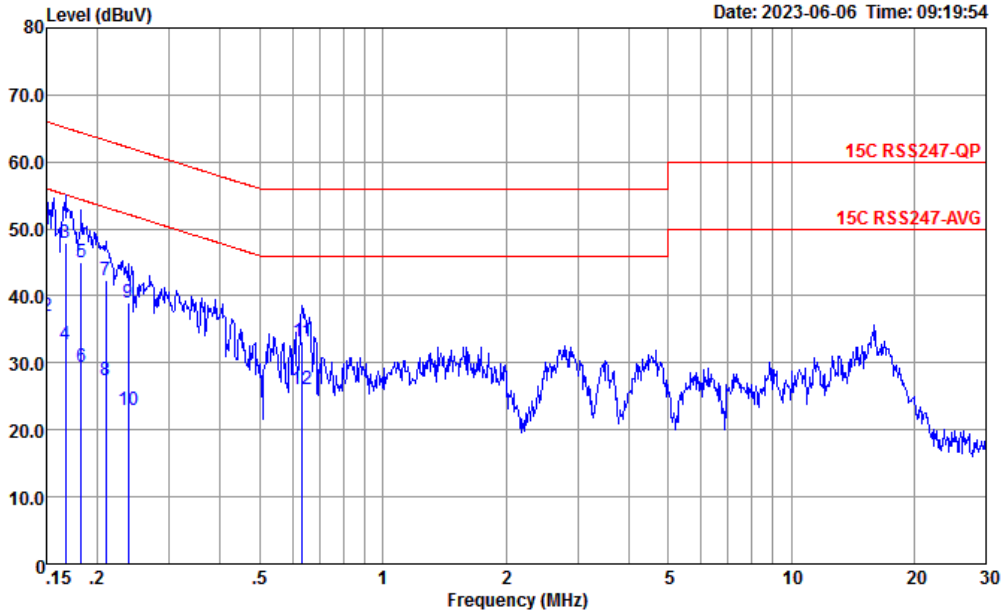
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	433MHz Link with dingdong machine(Loud Speaker) + USB Cable(Charging From Adapter)		



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

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.150	46.30	-19.70	66.00	35.80	0.07	10.43	QP
2	*	0.150	38.10	-17.90	56.00	27.60	0.07	10.43	Average
3		0.171	43.97	-20.93	64.90	33.49	0.05	10.43	QP
4		0.171	27.67	-27.23	54.90	17.19	0.05	10.43	Average
5		0.186	42.65	-21.55	64.20	32.20	0.03	10.42	QP
6		0.186	25.95	-28.25	54.20	15.50	0.03	10.42	Average
7		0.209	39.34	-23.89	63.23	28.91	0.02	10.41	QP
8		0.209	22.94	-30.29	53.23	12.51	0.02	10.41	Average
9		0.413	31.79	-25.80	57.59	21.50	0.00	10.29	QP
10		0.413	15.59	-32.00	47.59	5.30	0.00	10.29	Average
11		0.634	32.30	-23.70	56.00	22.20	-0.07	10.17	QP
12		0.634	21.30	-24.70	46.00	11.20	-0.07	10.17	Average

Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	433MHz Link with dingdong machine(Loud Speaker) + USB Cable(Charging From Adapter)		



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

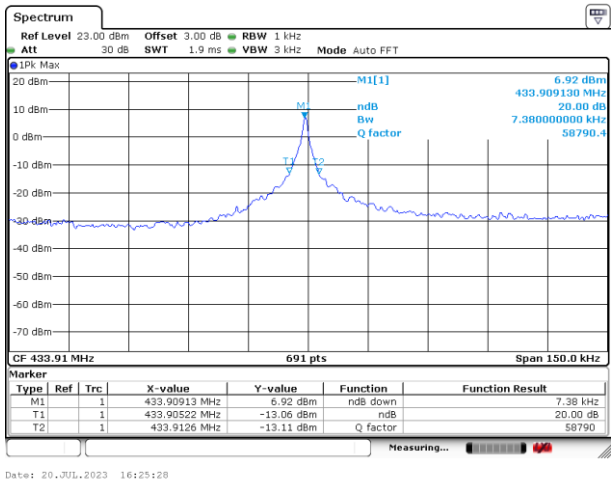
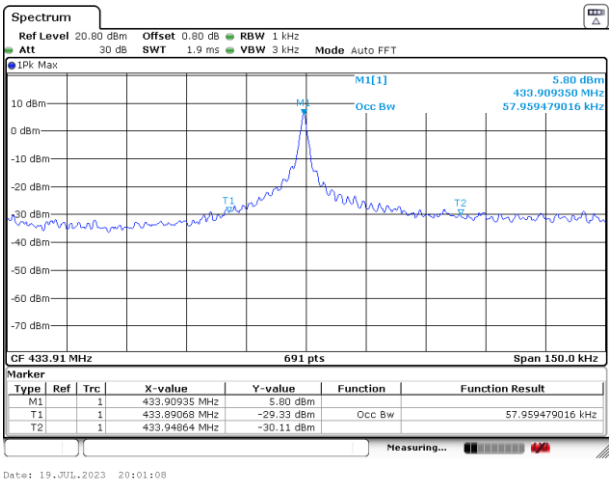
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.150	49.96	-16.04	66.00	39.50	0.03	10.43	QP
2	0.150	37.06	-18.94	56.00	26.60	0.03	10.43	Average
3	0.167	47.96	-17.16	65.12	37.49	0.04	10.43	QP
4	0.167	32.66	-22.46	55.12	22.19	0.04	10.43	Average
5	0.182	44.97	-19.40	64.37	34.51	0.04	10.42	QP
6	0.182	29.37	-25.00	54.37	18.91	0.04	10.42	Average
7	0.209	42.25	-20.98	63.23	31.80	0.04	10.41	QP
8	0.209	27.35	-25.88	53.23	16.90	0.04	10.41	Average
9	0.238	38.90	-23.27	62.17	28.50	0.01	10.39	QP
10	0.238	23.00	-29.17	52.17	12.60	0.01	10.39	Average
11	0.634	33.29	-22.71	56.00	23.21	-0.09	10.17	QP
12	0.634	25.99	-20.01	46.00	15.91	-0.09	10.17	Average

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

Appendix B. Test Results of Conducted Test Items

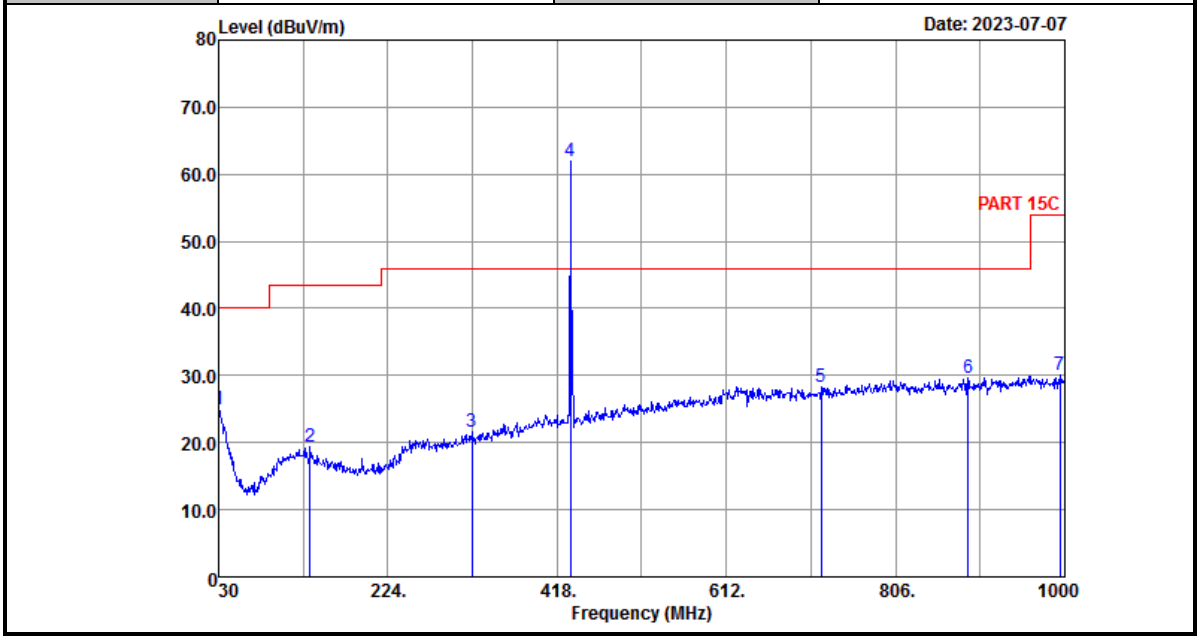
B1. Test Result of 20dB Bandwidth and Occupied Bandwidth

Test mode	433MHz Tx	Test Frequency (MHz)	433
			
20dB Bandwidth (kHz)	7.380	**99% OBW(kHz)**	57.959
20dB Bandwidth Limit	**Shall be less than 0.25% of 433.91MHz**	**Shall be less than 0.25% of 433.91MHz**	**Test Result**
	< 1084.775kHz	**< 1084.775kHz**	**Complies**

Appendix C. Test Results of Radiated Test Items

Radiated Spurious Emissions (30MHz ~ 1GHz)

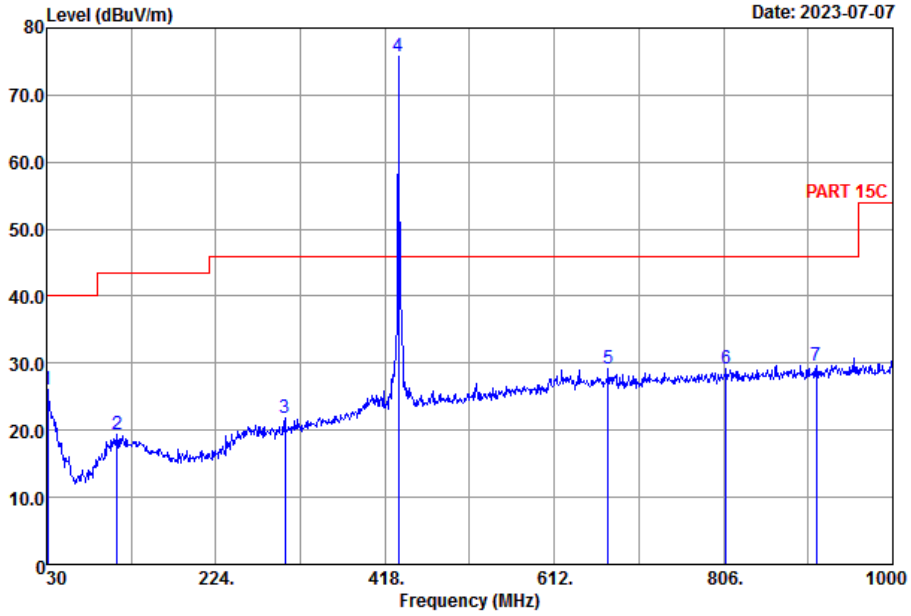
Test Engineer :	Eason Wu	**Temperature :**	22~23°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Polarization :**	Horizontal



No.	Fre.	Level	Margin	Limit	Read	Antenna	Cable	Preamp	Peak	Pol.
				Line	Level	Factor	Loss	Factor	Avg.	
	(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(P/A)	(H/V)
1	30	24.92	15.08	40	30.31	25.88	0.53	31.8	P	H
2	134.76	19.4	24.1	43.5	31.48	18.1	1.19	31.37	P	H
3	320.03	21.62	24.38	46	30.68	20.37	1.87	31.3	P	H
4	433.52	61.89	38.92	100.81	68.08	22.94	2.17	31.3	P	H
5	720.64	28.35	17.65	46	30.95	26.08	2.8	31.48	P	H
6	889.42	29.67	16.33	46	30.98	27.13	3.14	31.58	P	H
7	994.18	30.06	23.94	54	30.27	27.9	3.3	31.41	P	H

Fundamental Result (Average)							
Frequency	Peak	Average	Average	Average	Margin	Peak	Pol.
	Level	Cor. Factor	Level	Limit		Avg.	
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/A)	(H/V)
433.52	61.89	-11.96	49.93	80.81	30.88	A	H

Test Engineer :	Eason Wu	**Temperature :**	22~23°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Polarization :**	Vertical



No.	Fre. (MHz)	Level (dBµV/m)	Margin (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Avg. (P/A)	Pol. (H/V)
1	30.97	25.97	14.03	40	31.88	25.33	0.54	31.78	P	V
2	110.51	19.35	24.15	43.5	31.24	18.43	1.07	31.39	P	V
3	303.54	21.73	24.27	46	31.27	19.95	1.81	31.3	P	V
4	433.52	75.73	25.08	100.81	81.92	22.94	2.17	31.3	P	V
5	674.08	29.18	16.82	46	32.09	25.81	2.7	31.42	P	V
6	808.91	29.18	16.82	46	30.82	26.82	2.96	31.42	P	V
7	912.7	29.71	16.29	46	30.83	27.27	3.18	31.57	P	V

Fundamental Result (Average)							
Frequency	Peak	Average	Average	Average	Margin	Peak	Pol.
	Level	Cor. Factor	Level	Limit		Avg.	
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(P/A)	(H/V)
433.52	75.73	-11.96	63.77	80.81	17.04	A	V

Radiated Spurious Emissions (Above 1GHz)

Fre.	Level	Margin	Limit	Read	Antenna	Cable	Preamp	Peak	Pol.
			Line	Level	Factor	Loss	Factor	Avg.	
(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(P/A)	(H/V)
2169	45.81	35.00	80.81	59.65	32.74	5.15	51.73	P	H
3037	51.75	29.09	80.81	63.8	33.74	6.11	51.9	P	H
3905	57.31	16.69	74	67.36	34.6	7.17	51.82	P	H
2169	49.85	30.96	80.81	63.69	32.74	5.15	51.73	P	V
3037	50.31	30.50	80.81	62.36	33.74	6.11	51.9	P	V
3905	56.23	17.77	74	66.28	34.6	7.17	51.82	P	V

Harmonic Result (Average)							
Frequency (MHz)	Peak Level (dBµV/m)	Average Cor. Factor (dB)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Peak Avg. (P/A)	Pol. (H/V)
3905	57.31	-11.96	45.35	54	8.65	A	H
3905	56.23	-11.96	44.27	54	9.73	A	V