

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

**Test Report No.** : OT-205-RWD-067

**AGR No.** : A204A-292

**Applicant** : UNION COMMUNITY

**Address** : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea

**Manufacturer** : UNION COMMUNITY

**Address** : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea

**Type of Equipment** : Access controller

**FCC ID** : XX2-UBIO-XPRO2

**Model Name** : UBio-X Pro2

**Multiple Model Name** : N/A

**Serial number** : N/A

**Total page of Report** : 21 pages (including this page)

**Date of Incoming** : May 20, 2020

**Date of Issuing** : May 29, 2020

## SUMMARY

The equipment complies with the requirements of *FCC CFR 47 PART 15 SUBPART C Section 15.225*

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by:

  
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Approved by:

  
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# CONTENTS

	Page
<b>1. VERIFICATION OF COMPLIANCE .....</b>	<b>5</b>
<b>2. GENERAL INFORMATION .....</b>	<b>6</b>
<b>2.1 PRODUCT DESCRIPTION.....</b>	<b>6</b>
<b>2.2 MODEL DIFFERENCES: .....</b>	<b>6</b>
<b>2.3 RELATED SUBMITTAL(S) / GRANT(S) .....</b>	<b>6</b>
<b>2.4 PURPOSE OF THE TEST .....</b>	<b>6</b>
<b>2.5 TEST METHODOLOGY.....</b>	<b>6</b>
<b>2.6 TEST FACILITY .....</b>	<b>6</b>
<b>3. SYSTEM TEST CONFIGURATION .....</b>	<b>7</b>
<b>3.1 JUSTIFICATION .....</b>	<b>7</b>
<b>3.2 PERIPHERAL EQUIPMENT .....</b>	<b>8</b>
<b>3.3 MODE OF OPERATION DURING THE TEST .....</b>	<b>8</b>
<b>3.4 EQUIPMENT MODIFICATIONS.....</b>	<b>8</b>
<b>3.5 CONFIGURATION OF TEST SYSTEM.....</b>	<b>9</b>
<b>3.6 ANTENNA REQUIREMENT .....</b>	<b>9</b>
<b>4. PRELIMINARY TEST .....</b>	<b>9</b>
<b>4.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....</b>	<b>9</b>
<b>4.2 RADIATED EMISSIONS TESTS.....</b>	<b>9</b>
<b>5. FINAL RESULT OF MEASUREMENT.....</b>	<b>10</b>
<b>5.1 CONDUCTED EMISSION TEST.....</b>	<b>10</b>
<b>5.2 RADIATED EMISSION TEST.....</b>	<b>12</b>
<i>5.2.1 Operation frequency band: (13.553 ~ 13.567) MHz.....</i>	<i>12</i>
<i>5.2.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz.....</i>	<i>13</i>
<b>5.3 SPURIOUS EMISSION TEST .....</b>	<b>14</b>
<i>5.3.1 Spurious Radiated Emission Below 30 MHz .....</i>	<i>14</i>
<i>5.3.2 Spurious Radiated Emission below 1 GHz.....</i>	<i>15</i>
<b>5.4 20 dB BANDWIDTH .....</b>	<b>16</b>
<i>5.4.1 Operating environment.....</i>	<i>16</i>
<i>5.4.2 Test set-up .....</i>	<i>16</i>
<i>5.4.3 Test data .....</i>	<i>17</i>

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<b>5.5 FREQUENCY STABILITY WITH TEMPERATURE VARIATION</b> .....	<b>18</b>
<b>5.5.1 Operating environment</b> .....	<b>18</b>
<b>5.5.2 Test set-up</b> .....	<b>18</b>
<b>5.5.3 Test data</b> .....	<b>18</b>
<b>5.6 FREQUENCY STABILITY WITH VOLTAGE VARIATION</b> .....	<b>19</b>
<b>5.6.1 Operating environment</b> .....	<b>19</b>
<b>5.6.2 Test set-up</b> .....	<b>19</b>
<b>5.6.3 Test data</b> .....	<b>19</b>
<b>6. FIELD STRENGTH CALCULATION</b> .....	<b>20</b>
<b>7. LIST OF TEST EQUIPMENT</b> .....	<b>21</b>

**Revision History**

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-205-RWD-067	May 29, 2020	Initial Release	All

## 1. VERIFICATION OF COMPLIANCE

- . APPLICANT : UNION COMMUNITY
- . ADDRESS : 12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, South Korea
- . CONTACT PERSON : Dong Ho, Lee
- . TELEPHONE NO : +82-2-6488-3054
- . FCC ID : XX2-UBIO-XPRO2
- . MODEL NO/NAME : UBio-X Pro2
- . SERIAL NUMBER : N/A
- . DATE : May 29, 2020

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Access controller
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.225
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 m Semi Anechoic Chamber

- . The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The UNION COMMUNITY, Model UBio-X Pro2 (referred to as the EUT in this report) is an Access controller, Product specification information described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Access controller
TRANSMITTING FREQUENCY	125 kHz, 13.56 MHz, 2 402 MHz ~ 2 480 MHz
MODULATION	ASK
ANTENNA TYPE	Coil Antenna, PCB Antenna
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)	123.49 kHz, 13.558 9 MHz, 27 MHz, 8MHz, 32.768 kHz, 7.3728 MHz, 27.12 MHz
USED AC/DC ADAPTER	Output : DC 15 V, 4 A Model No : KPL-060H-VI Manufacturer : Channel Well Technology(Guangzhou) Co.,Ltd.

### 2.2 Model Differences:

-. None.

### 2.3 Related Submittal(s) / Grant(s)

Original submittal only

### 2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.225.

### 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiate d testing was performed at a distance of 3 m from EUT to the antenna.

### 2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	N/A	PUBXP2MA01 V10	N/A
SUB BOARD	N/A	PAC7000RF01 V10	N/A
FINGERPRINT BOARD(1)	N/A	RFAS06MA01 V20	N/A
FINGERPRINT BOARD(2)	N/A	N/A	N/A
CAMERA BOARD	N/A	M20_MB_V3	N/A
IR CAMERA BOARD	N/A	LHL-SC2315E-IR8.4	N/A
RGB CAMERA BOARD	N/A	LHL-SC2315E-RGB8.4	N/A
DISPLAY	N/A	HR1409FPC-A2	N/A
DISPLAY BOARD	N/A	PAC7000PLC01 V11	N/A
SPEAKER(1)	N/A	N/A	N/A
SPEAKER(2)	N/A	N/A	N/A
TOUCH BOARD	N/A	MTH-UAC700	N/A
SD CARD BOARD	N/A	PAC7000SD01 V10	N/A
Bluetooth LE Module	PROCHILD INC.	PBLN51822m	2AEEY-PBLN51822M
ADAPTER	Channel Well Technology (Guangzhou)Co., LTd.	KPL-060H-VI	N/A
13.56 MHz ANTENNA BOARD	N/A	PAC7000SA01 NJA24	N/A
125 kHz ANTENNA	N/A	N/A	N/A

### 3.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
UBio-X Pro2	UNION COMMUNITY	Access controller (EUT)	-
KPL-060H-VI	Channel Well Technology (Guangzhou)Co., LTd.	ADAPTER	EUT
Ideapad330	LENOVO	Notebook PC	EUT
N/A	N/A	Door Open Switch	EUT
N/A	N/A	Door lock	EUT
N/A	N/A	13.56 MHz Card	EUT
N/A	N/A	125 kHz Card	EUT

### 3.3 Mode of operation during the test

-. The EUT has 13.56 MHz RF boards for reading Card and program was used for making continuous transmission mode during the test.

### 3.4 Equipment Modifications

-. None



### 3.5 Configuration of Test System

**Line Conducted Test :** The EUT was connected to adaptor and the power of adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

**Radiated Emission Test :** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.  
 For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field. The measuring antenna is an electrically screened loop antenna.  
 The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

### 3.6 Antenna Requirement

For intentional device, according to section 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.

**Antenna Construction:**

The transmitter antenna of the EUT is a Coil Antenna and PCB Antenna so there is no consideration of replacement by the user.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

### 4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

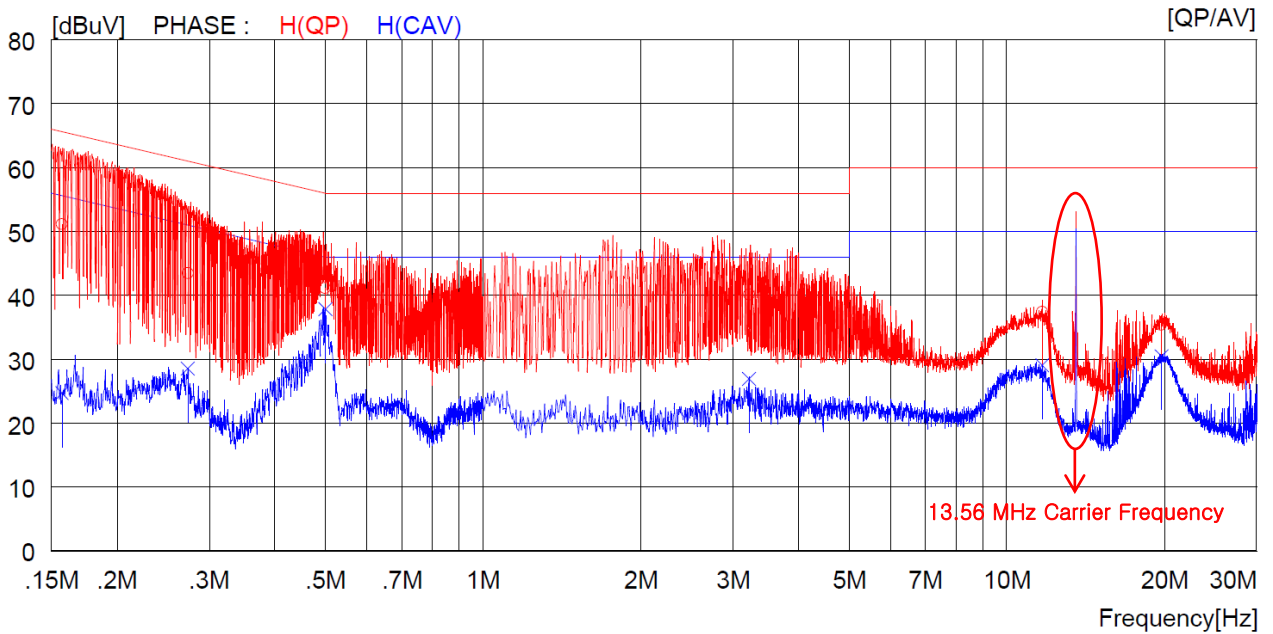
### 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

#### 5.1 Conducted Emission Test

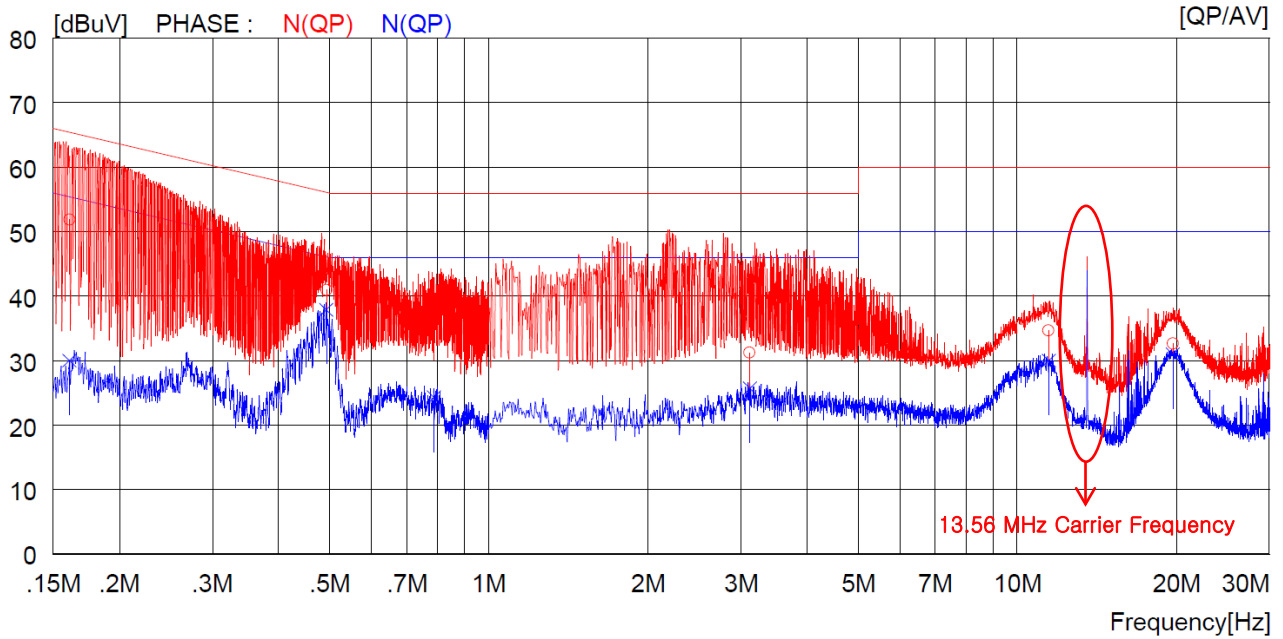
Humidity Level : (50 ~ 51) % R.H. Temperature: (22 ~ 23) °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.207(a)  
 Result : PASSED

EUT : Access controller Date: May 21, 2020 ~ May 27, 2020  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)  
 Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15700	41.1	----	10.0	51.1	----	65.6	----	14.5	----	H(QP)
2	0.27300	33.6	----	9.9	43.5	----	61.0	----	17.5	----	H(QP)
3	0.50000	31.1	----	10.0	41.1	----	56.0	----	14.9	----	H(QP)
4	3.22000	30.0	----	10.1	40.1	----	56.0	----	15.9	----	H(QP)
5	11.69000	27.2	----	10.2	37.4	----	60.0	----	22.6	----	H(QP)
6	19.72000	25.0	----	10.4	35.4	----	60.0	----	24.6	----	H(QP)
7	0.15700	----	14.7	10.0	----	24.7	----	55.6	----	30.9	H(CAV)
8	0.27300	----	18.6	9.9	----	28.5	----	51.0	----	22.5	H(CAV)
9	0.50000	----	27.8	10.0	----	37.8	----	46.0	----	8.2	H(CAV)
10	3.22000	----	16.8	10.1	----	26.9	----	46.0	----	19.1	H(CAV)
11	11.69000	----	18.8	10.2	----	29.0	----	50.0	----	21.0	H(CAV)
12	19.72000	----	20.1	10.4	----	30.5	----	50.0	----	19.5	H(CAV)

Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16100	41.8	----	10.0	51.8	----	65.4	----	13.6	----	N(QP)
2	0.49300	31.0	----	9.9	40.9	----	56.1	----	15.2	----	N(QP)
3	0.78700	28.5	----	10.0	38.5	----	56.0	----	17.5	----	N(QP)
4	3.11600	21.1	----	10.1	31.2	----	56.0	----	24.8	----	N(QP)
5	11.46000	24.5	----	10.2	34.7	----	60.0	----	25.3	----	N(QP)
6	19.69000	22.2	----	10.4	32.6	----	60.0	----	27.4	----	N(QP)
7	0.16100	----	20.0	10.0	----	30.0	----	55.4	----	25.4	N(CAV)
8	0.49300	----	28.0	9.9	----	37.9	----	46.1	----	8.2	N(CAV)
9	0.78700	----	14.3	10.0	----	24.3	----	46.0	----	21.7	N(CAV)
10	3.11600	----	15.6	10.1	----	25.7	----	46.0	----	20.3	N(CAV)
11	11.46000	----	19.8	10.2	----	30.0	----	50.0	----	20.0	N(CAV)
12	19.69000	----	20.6	10.4	----	31.0	----	50.0	----	19.0	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Soon-Ki, Choi / Engineer

## 5.2 RADIATED EMISSION TEST

### 5.2.1 Operation frequency band: (13.553 ~ 13.567) MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 47 % R.H. Temperature: 23 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter below 1 705 kHz  
 Result : PASSED

EUT : Access controller Date: May 21, 2020 ~ May 27, 2020

Operating Condition : Transmitting Mode

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Distance : 3 m

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amplitud (dBμV)	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
13.558 9	46.29	H	19.3	0.3	65.89	124	58.11
13.558 9	42.49	V	19.3	0.3	62.09	124	61.91

Remark. The EUT was tested at 3 m, so conversation factor was included at above limit.


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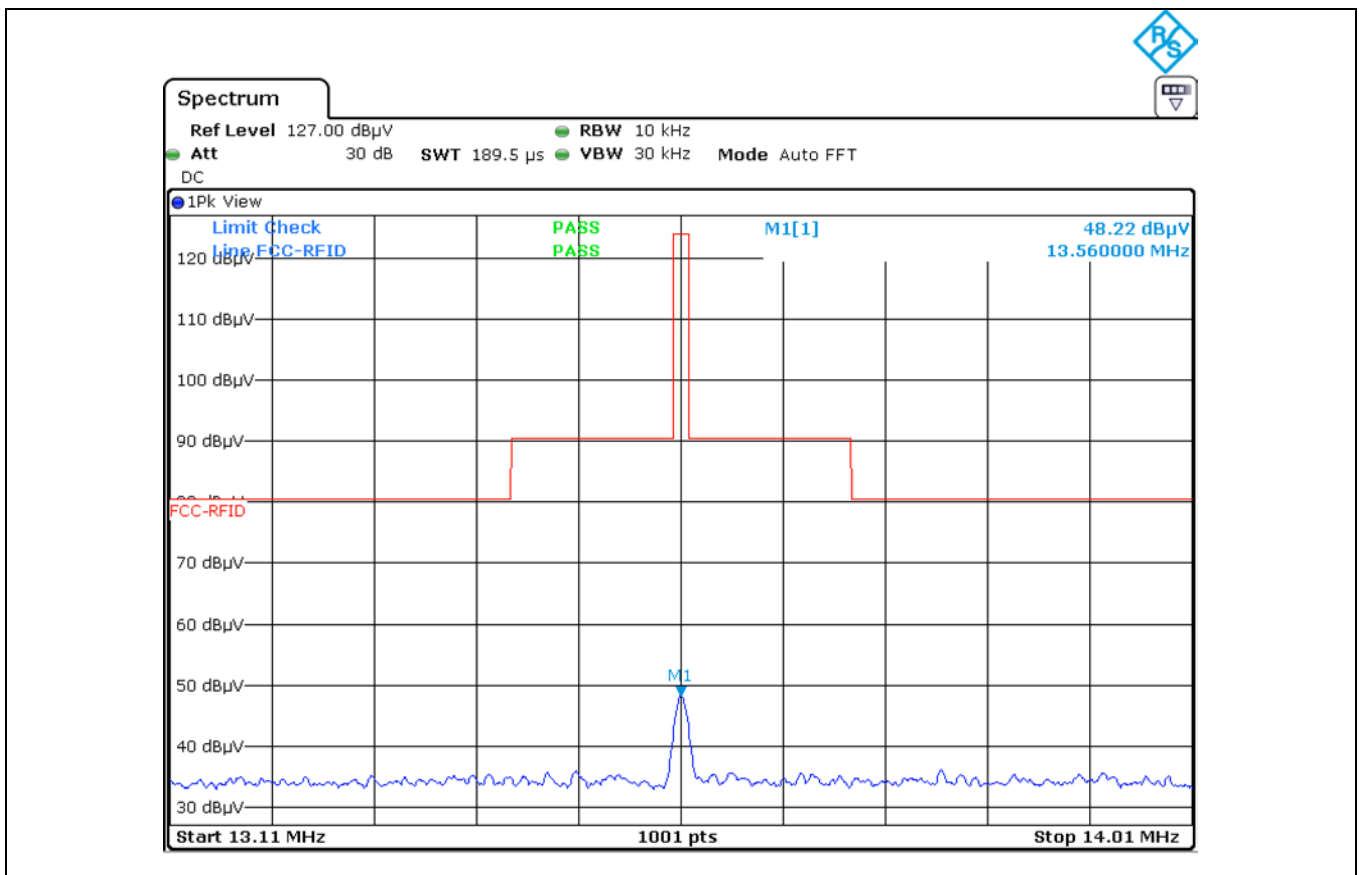
**Tested by: Soon-Ki, Choi / Engineer**

**5.2.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level	: <u>47 % R.H.</u>	Temperature: <u>23 °C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART C, SECTION 15.209</u>	
Type of Test	: <u>Low Power Transmitter below 1 705 kHz</u>	
Result	: <u>PASSED</u>	

EUT : Access controller Date: May 21, 2020 ~ May 27, 2020  
 Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.56 MHz is 48.22 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

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 Tested by: Soon-Ki, Choi / Engineer


### 5.3 SPURIOUS EMISSION TEST

#### 5.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 47 % R.H. Temperature: 23 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter below 1 705 kHz  
 Frequency Range : 9 kHz ~ 30 MHz  
 Result : PASSED

EUT : Access controller Date: May 21, 2020 ~ May 27, 2020  
 Operating Condition : Transmitting Mode  
 Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

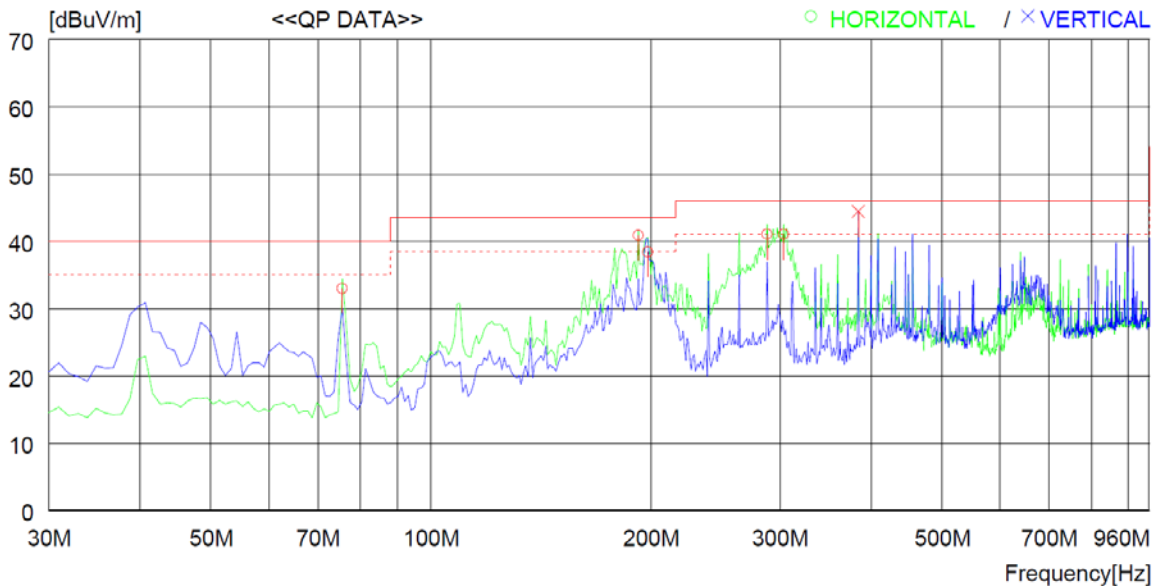
  
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**Tested by: Soon-Ki, Choi / Engineer**

**5.3.2 Spurious Radiated Emission below 1 GHz**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : (50 ~ 51) % R.H. Temperature: (22 ~ 23) °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter below 1 705 kHz  
 Frequency range : 30 MHz ~ 960 MHz  
 Result : PASSED

EUT : Access controller Date: May 21, 2020 ~ May 27, 2020  
 Operating Condition : Transmitting Mode  
 Distance : 3 m



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	75.590	47.4	16.3	1.8	32.5	33.0	40.0	7.0	400	2
2	191.990	54.9	16.2	2.3	32.6	40.8	43.5	2.7	100	38
3	197.810	52.2	15.9	2.8	32.5	38.4	43.5	5.1	100	38
4	288.020	51.1	19.1	3.2	32.4	41.0	46.0	5.0	100	5
5	303.540	50.8	19.4	3.3	32.5	41.0	46.0	5.0	100	0
----- Vertical -----										
6	384.050	52.3	21.2	3.3	32.4	44.4	46.0	1.6	100	359

*Signature*  
**Tested by: Soon-Ki, Choi / Engineer**

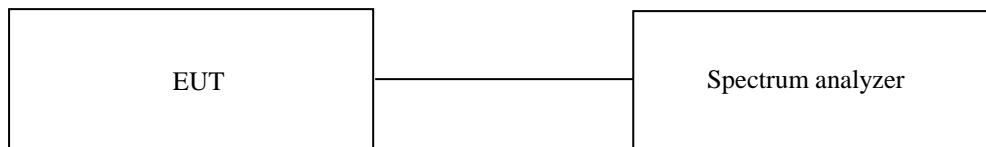
## 5.4 20 dB BANDWIDTH

### 5.4.1 Operating environment

Temperature : 23 °C  
Relative humidity : 47 % R.H.

### 5.4.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.





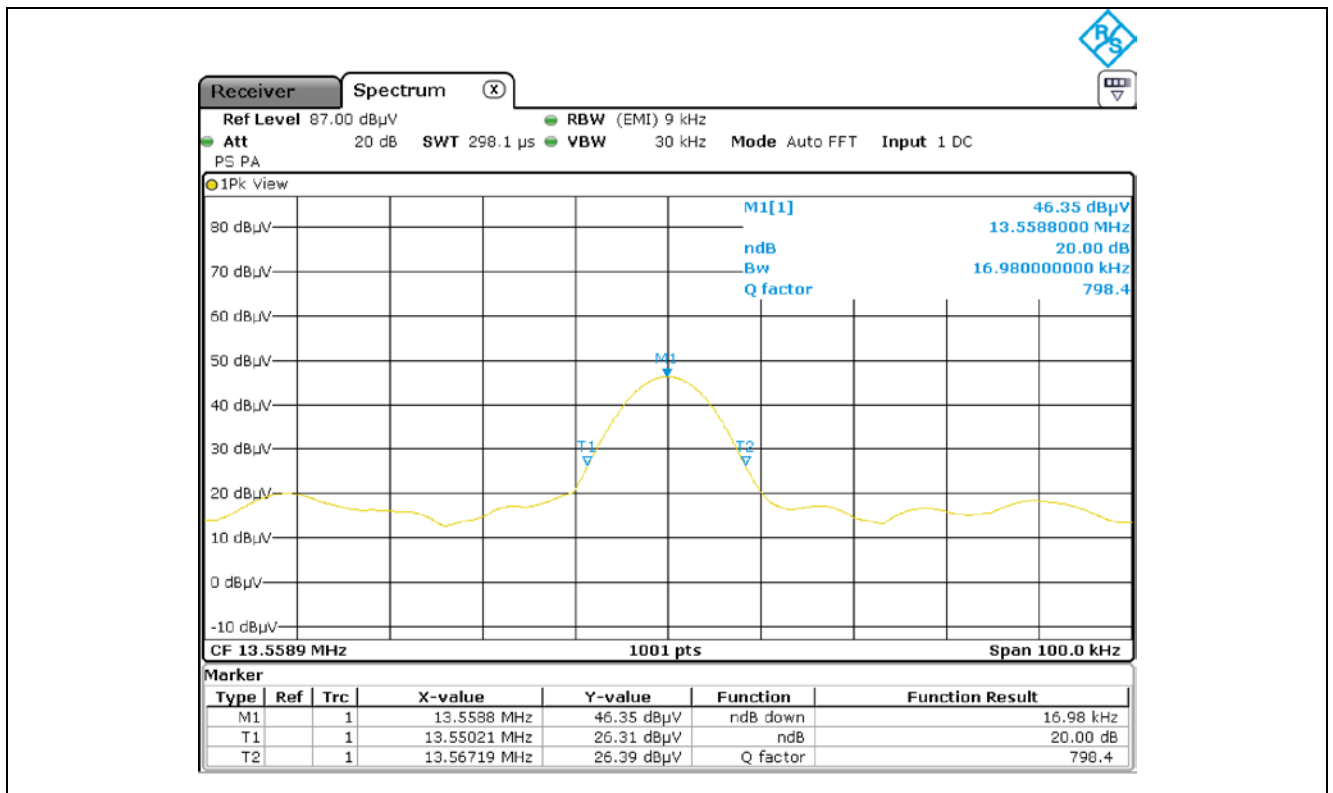
5.4.3 Test data

- Test Date : May 21, 2020 ~ May 27, 2020
- Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Operating Freq. (MHz)	Measured Value (kHz)	Assigned Operating Frequency Band (kHz)	Result
13.558 9	16.98	900	PASS



Tested by: Soon-Ki, Choi / Engineer



**5.5 FREQUENCY STABILITY WITH TEMPERATURE VARIATION**

**5.5.1 Operating environment**

Temperature : 23 °C  
 Relative humidity : 47 % R.H.

**5.5.2 Test set-up**

Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +50°C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

**5.5.3 Test data**

-. Test Date : May 21, 2020 ~ May 27, 2020  
 -. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 558 900	13 558 850	-50	± 1 355.88
-10		13 558 890	-10	
0		13 558 855	-45	
10		13 558 760	-140	
20		13 558 871	-29	
30		13 558 762	-138	
40		13 558 893	-7	
50		13 558 726	-174	

  
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**Tested by: Soon-Ki, Choi / Engineer**

## 5.6 FREQUENCY STABILITY WITH VOLTAGE VARIATION

### 5.6.1 Operating environment

Temperature : 23 °C  
 Relative humidity : 47 % R.H.


### 5.6.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.

### 5.6.3 Test data

-. Test Date : May 21, 2020 ~ May 27, 2020  
 -. Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
17.25(115 %)	13 558 900	13 559 029	129	± 1 355.88
15.0(100 %)		13 559 135	235	
12.75(85 %)		13 559 086	186	

  
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**Tested by: Soon-Ki, Choi / Engineer**

## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses.

+ Meter reading	(dB $\mu$ V)
- Amplifier Gain	(dB)
+ Cable Loss	(dB)
- Antenna Factor	(dB/m)
<hr/>	
= Corrected Result	(dB $\mu$ V/m)

Margin (dB)

Specification Limit	(dBuV/m)
- Corrected Result	(dBuV/m)
<hr/>	
= dB Relative to Spec	( $\pm$ dB)

### 7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESCI	101012	Oct. 22, 2019	One Year	-
2.		R/S	ESR	101470	Oct. 22, 2019	One Year	■
3.		R/S	ESCI	101012	Oct. 22, 2019	One Year	■
4.	Spectrum analyzer	R/S	FSV30	101372	Jul. 24, 2019	One Year	■
5.	Amplifier	Sonoma Instrument	310N	312544	Mar. 16, 2020	One Year	■
6.	Amplifier	Sonoma Instrument	310N	312545	Mar. 16, 2020	One Year	-
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	Jun. 05, 2018	Two Year	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Mar. 20, 2020	Two Year	-
9.	Controller	Innco System	CO3000	CO3000/904/ 37211215/L	N/A	N/A	■
10.	LISN	EMCO	3825/2	9109-1869	Mar. 16, 2020	One Year	-
		Schwarzbeck	NNLK8121	804	Oct. 21, 2019	One Year	■
		Schwarzbeck	NSLK8128	8128-216	Mar. 16, 2020	One Year	■
11.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
12.	Antenna Master	Innco System	MA4000-EP	MA4000/332	N/A	N/A	-
13.	Antenna Master	Innco System	MA-4000XPET	MA4000/509	N/A	N/A	■
14.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-235	Mar. 24, 2020	Two Year	■
15.	Frequency Counter	HP	53152A	US39270295	Jul. 25, 2019	One Year	■
16.	Environmental Test Chamber	ESPEC	PSL-2KP	14009407	Feb. 21, 2020	One Year	■
17.	DC Power Supply	Protek	PWS-3003D	4020409	Jul. 24, 2019	One Year	■