ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No.	**: OT-194-RWD-048**
AGR No.	**: A193A-238**
Applicant	**: UNION COMMUNITY**
Address	**: Hyundai Topics Bldg. Bangi 2-dong, Songpa-gu, Seoul, South Korea**
Manufacturer	**: UNION COMMUNITY**
Address	**: Hyundai Topics Bldg. Bangi 2-dong, Songpa-gu, Seoul, South Korea**
Type of Equipment	**: Access controller**
FCC ID	**: XX2-UBIO-XPRO**
Model Name	**: UBio-X Pro**
Multiple Model Name	**: UBio-X Pro Lite**
Serial number	**: N/A**
Total page of Report	**: 22 pages (including this page)**
Date of Incoming	**: March 28, 2019**
Date of Issuing	**: April 23, 2019**

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: Tae-Ho, Kim / Senior Manager
ONETECH Corp.

Approved by: Ki-Hong, Nam / Chief Engineer
ONETECH Corp.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-194-RWD-048	April 23, 2019	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

-. APPLICANT : UNION COMMUNITY

-. ADDRESS : Hyundai Topics Bldg. Bangi 2-dong, Songpa-gu, Seoul, South Korea

-. CONTACT PERSON : KyungWook, Han

-. TELEPHONE NO : +82-2-6488-3027

-. FCC ID : XX2-UBIO-XPRO

-. MODEL NO/NAME : UBio-X Pro

-. SERIAL NUMBER : N/A

-. DATE : April 23, 2019

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.

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2. GENERAL INFORMATION

2.1 Product Description

The UNION COMMUNITY, Model UBio-X Pro (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	124.8 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)	124.8 kHz, 13.558 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:

The following lists consist of the added model and their differences.

Model Name	Differences	Tested
UBio-X Pro	Basic model.	☑
UBio-X Pro Lite	The model is buyers request model name.	☐

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

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.

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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-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

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

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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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	UNION COMMUNITY	PAC7000PMA01 V11	N/A
LCD INTERFACE BOARD	UNION COMMUNITY	PAC7000PLC01 V11	N/A
LCD BOARD	UNION COMMUNITY	N/A	N/A
FINGERPRINT BOARD(1)	UNION COMMUNITY	PFAS06MA01	N/A
FINGERPRINT BOARD(2)	UNION COMMUNITY	PFAS06SE01	N/A
CAMERA BOARD	UNION COMMUNITY	PAC7000PCM01	N/A
SPEAKER(1)	N/A	N/A	N/A
SPEAKER(2)	N/A	N/A	N/A
LED BOARD(1)	N/A	N/A	N/A
LED BOARD(2)	N/A	N/A	N/A
TOUNCH BOARD	N/A	MTH-UAC700	N/A
SD CARD BOARD	N/A	Pac7000SD01 V10	N/A
MODULE BOARD	N/A	PAC7000RF01 V10	N/A
Bluetooth LE Module	PROCHILD INC.	PBLN51822m	2AEEY-PBLN51822M
ADAPTER	Channel Well Technology (Guangzhow)Co., LTd.	KPL-060H-VI	N/A
13.56 MHz ANTENNA BOARD	N/A	PAC7000SA01	N/A
125 kHz ANTENNA	N/A	N/A	N/A

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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 Pro	UNION COMMUNITY	Access controller (EUT)	-
KPL-060H-VI	Channel Well Technology (Guangzhow)Co., LTd.	ADAPTER	EUT
Ideapad330	LENOVO	Notebook PC	EUT
PA-1450-55LR	LITE-ON TECHNOLOGY	ADAPTER	-
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

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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

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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 : (46 ~ 47) % R.H. Temperature: (23 ~ 24) ℃

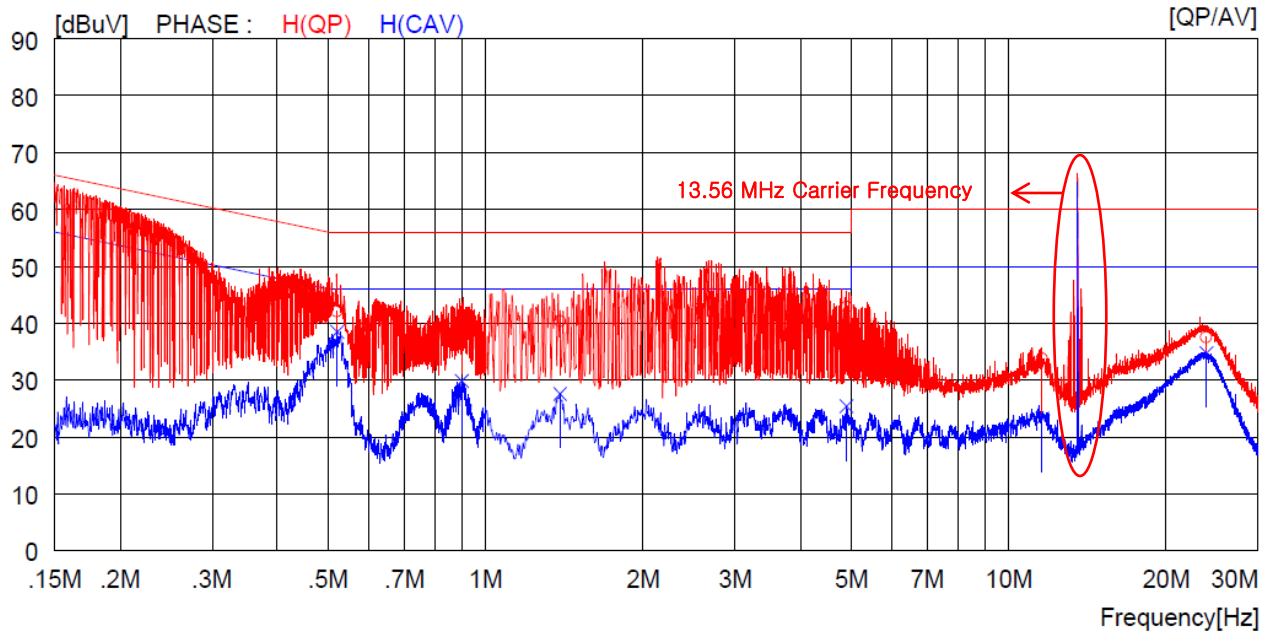
Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.207(a)

Result : PASSED

EUT : Access controller Date: April 02, 2019

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

Tested Line : HOT LINE



NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.52000	32.1	----	10.0	42.1	----	56.0	----	13.9	----	H(QP)
2	0.90100	30.5	----	10.1	40.6	----	56.0	----	15.4	----	H(QP)
3	1.38800	30.2	----	10.1	40.3	----	56.0	----	15.7	----	H(QP)
4	4.90400	32.8	----	10.1	42.9	----	56.0	----	13.1	----	H(QP)
5	11.59000	23.4	----	10.3	33.7	----	60.0	----	26.3	----	H(QP)
6	23.88000	27.1	----	10.4	37.5	----	60.0	----	22.5	----	H(QP)
7	0.52000	----	28.5	10.0	----	38.5	----	46.0	----	7.5	H(CAV)
8	0.90100	----	19.7	10.1	----	29.8	----	46.0	----	16.2	H(CAV)
9	1.38800	----	17.5	10.1	----	27.6	----	46.0	----	18.4	H(CAV)
10	4.90400	----	15.3	10.1	----	25.4	----	46.0	----	20.6	H(CAV)
11	11.59000	----	13.0	10.3	----	23.3	----	50.0	----	26.7	H(CAV)
12	23.88000	----	24.3	10.4	----	34.7	----	50.0	----	15.3	H(CAV)

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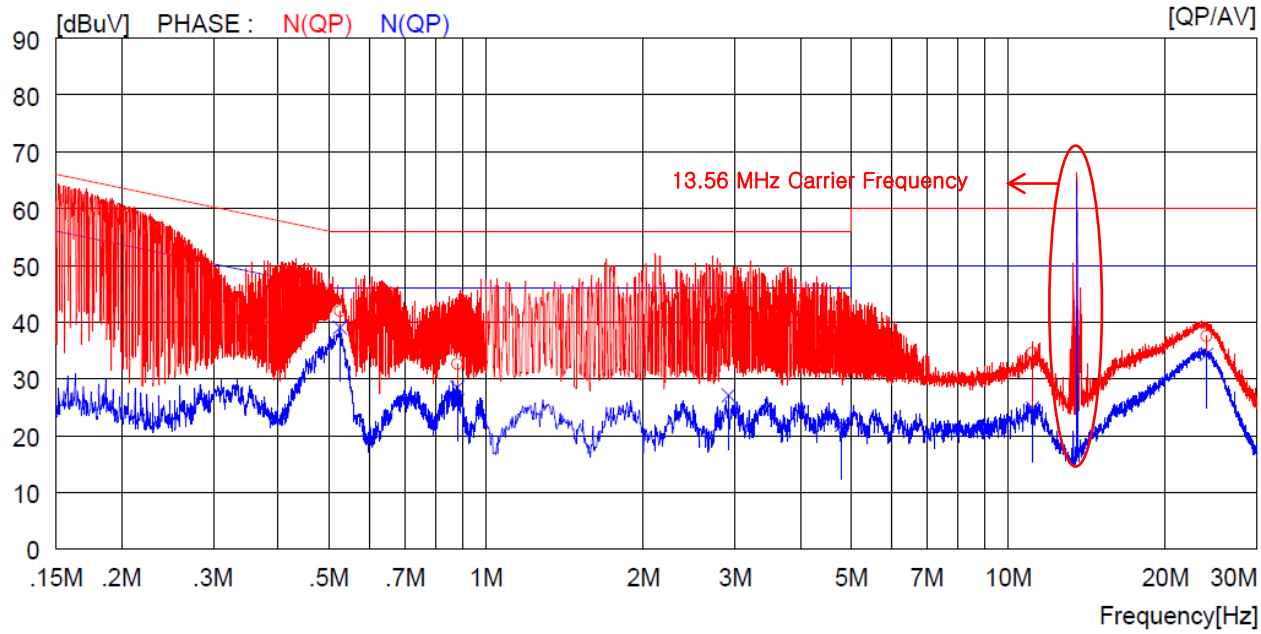
Tested Line : NEUTRAL LINE



NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.52500	32.0	----	10.0	42.0	----	56.0	----	14.0	----	N(QP)
2	0.88100	22.5	----	10.1	32.6	----	56.0	----	23.4	----	N(QP)
3	2.91200	30.8	----	10.1	40.9	----	56.0	----	15.1	----	N(QP)
4	4.79600	32.7	----	10.1	42.8	----	56.0	----	13.2	----	N(QP)
5	11.13000	24.3	----	10.3	34.6	----	60.0	----	25.4	----	N(QP)
6	24.00000	27.1	----	10.4	37.5	----	60.0	----	22.5	----	N(QP)
7	0.52500	----	29.0	10.0	----	39.0	----	46.0	----	7.0	N(CAV)
8	0.88100	----	18.4	10.1	----	28.5	----	46.0	----	17.5	N(CAV)
9	2.91200	----	17.0	10.1	----	27.1	----	46.0	----	18.9	N(CAV)
10	4.79600	----	11.8	10.1	----	21.9	----	46.0	----	24.1	N(CAV)
11	11.13000	----	14.5	10.3	----	24.8	----	50.0	----	25.2	N(CAV)
12	24.00000	----	23.9	10.4	----	34.3	----	50.0	----	15.7	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: Ju Yun Park / Assistant Manager

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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 ℃

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: March 29, 2019 ~ April 04, 2019

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 8	37.95	H	20.37	0.3	58.62	124	65.38
13.558 8	27.81	V	20.37	0.3	48.48	124	75.52

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

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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 : 47 % R.H. Temperature: 23 ℃

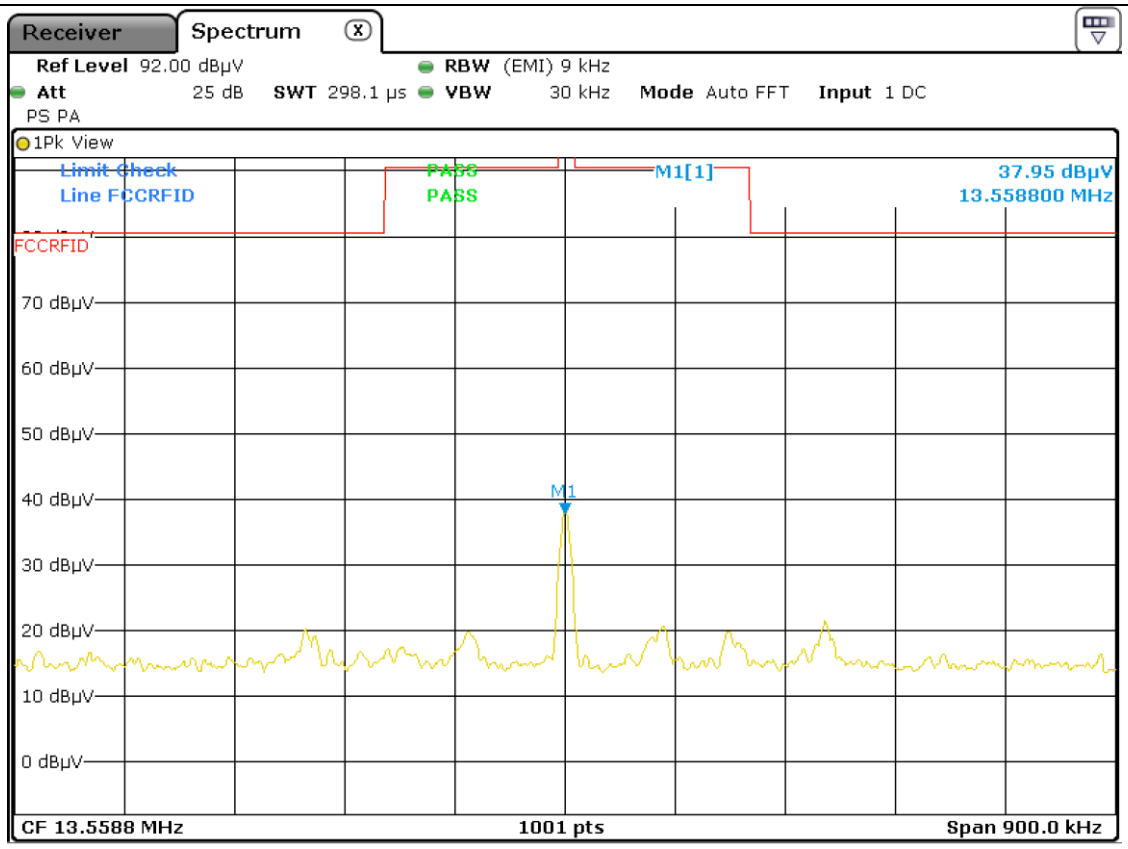
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Type of Test : Low Power Transmitter below 1 705 kHz

Result : PASSED

EUT : Access controller Date: April 03, 2019

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.5588 MHz is 37.95 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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5.3 SPURIOUS EMISSION TEST

5.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 47% R.H. Temperature: 23 ℃

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: March 29, 2019 ~ April 04, 2019

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.									

Tested by: Ju Yun Park / Assistant Manager

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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 : (47 ~ 48) % R.H. Temperature: (23 ~ 24) ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Type of Test : Low Power Transmitter below 1 705 kHz

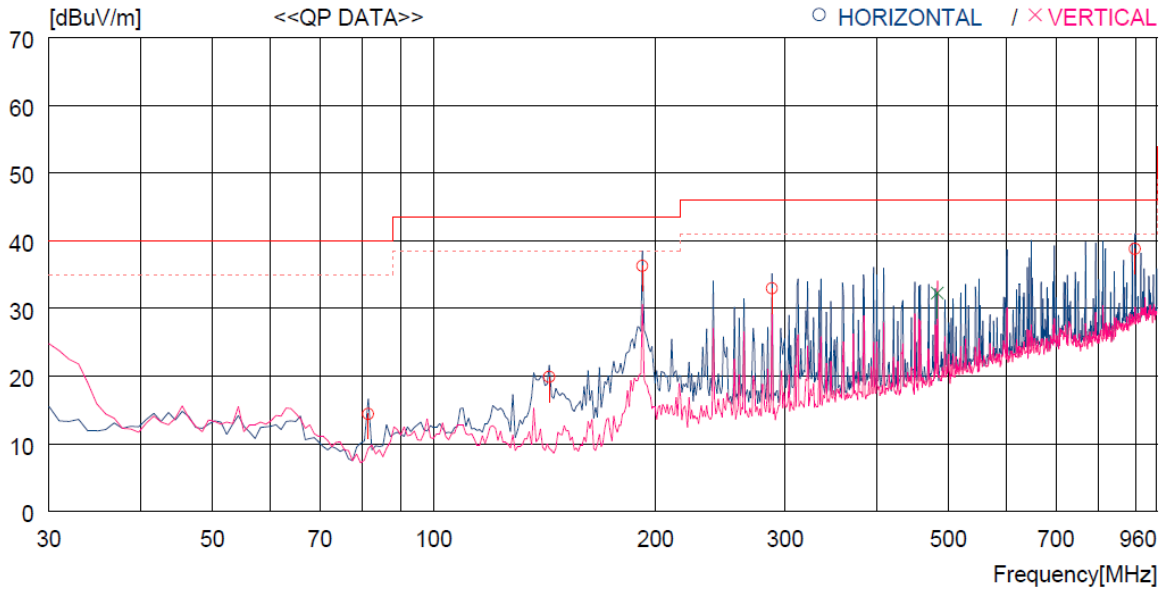
Frequency range : 30 MHz ~ 960 MHz

Result : PASSED

EUT : Access controller Date: March 28, 2019

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	81.410	37.3	8.1	2.0	33.0	14.4	40.0	25.6	200	353
2	143.490	41.6	8.5	2.8	33.0	19.9	43.5	23.6	300	359
3	191.990	55.2	10.9	3.2	33.0	36.3	43.5	7.2	100	191
4	288.020	48.9	13.2	3.9	33.0	33.0	46.0	13.0	100	0
5	896.199	41.5	22.6	7.1	32.4	38.8	46.0	7.2	200	183
----- Vertical ------										
6	482.991	43.3	17.1	5.1	33.2	32.3	46.0	13.7	400	359

Tested by: Ju Yun Park / Assistant Manager

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5.4 20 dB BANDWIDTH

5.4.1 Operating environment

Temperature : 23 ℃

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.

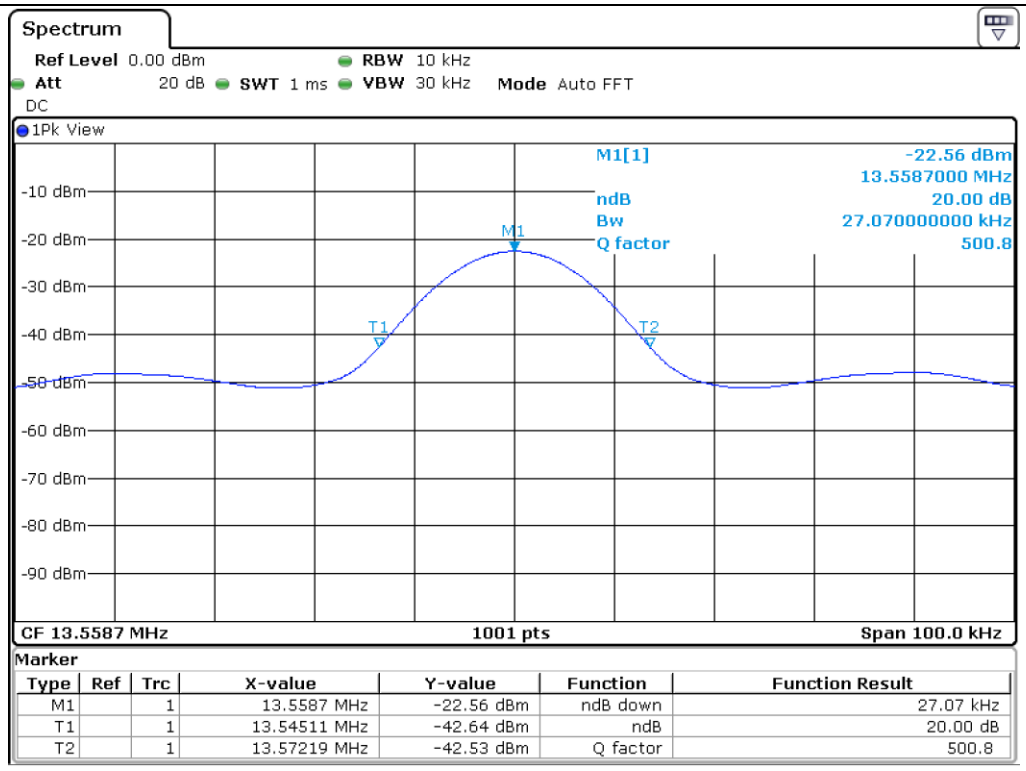
5.4.3 Test data

-. Test Date : March 29, 2019 ~ April 04, 2019

-. 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	27.07	900	**PASS**

Tested by: Ju Yun Park / Assistant Manager



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5.5 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

5.5.1 Operating environment

Temperature : 23 ℃

Relative humidity : 47 % R.H.

5.5.2 Test set-up

Turn EUT off and set chamber temperature to -20 ℃ 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 ℃ step from -20 ℃ to +50℃. Repeat above method for frequency measurements every 10 ℃ step and then record all measured frequencies on each temperature step.

5.5.3 Test data

-. Test Date : March 29, 2019 ~ April 04, 2019

-. Result : PASSED

Temperature (˚C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 558 800	13 559 040	240	± 1 355.88
-10		13 558 986	186	
0		13 558 871	71	
10		13 558 862	62	
20		13 558 845	45	
30		13 558 783	-17	
40		13 558 717	-83	
50		13 558 691	-109	

Tested by: Ju Yun Park / Assistant Manager

5.6 FREQUENCY STABILITY WITH VOLTAGE VARIATION

5.6.1 Operating environment

Temperature : 23 ℃

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 : March 29, 2019 ~ April 04, 2019

-. Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
17.25(115 %)	13 558 800	13 558 858	58	± 1 355.88
15.0(100 %)		13 558 867	67	
12.75(85 %)		13 558 895	95	

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6. FIELD STRENGTH CALCULATION

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

+	Meter reading	(dBμV)
-	Amplifier Gain	(dB)
+	Cable Loss	(dB)
-	Antenna Factor	(dB/m)
=	Corrected Result	(dBμV/m)

Margin (dB)

	Specification Limit	(dBuV/m)
-	Corrected Result	(dBuV/m)
=	dB Relative to Spec	(± dB)

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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, 2018	One Year	-
2.		R/S	ESR	101470	Oct. 22, 2018	One Year	■
3.		R/S	ESPI	101278	Oct. 20, 2018	One Year	■
4.	Spectrum analyzer	R/S	FSV30	101372	Aug. 23, 2018	One Year	■
5.	Amplifier	Sonoma Instrument	310N	312544	Mar. 18, 2019	One Year	■
6.	Amplifier	Sonoma Instrument	310N	312545	Mar. 18, 2019	One Year	-
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	Jun. 05, 2018	Two Year	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Aug. 09, 2018	Two Year	-
9.	Controller	Innco System	CO3000	CO3000/904/ 37211215/L	N/A	N/A	■
10.	LISN	EMCO	3825/2	9109-1867	Mar. 27, 2019	One Year	-
				9109-1869	Mar. 19, 2019	One Year	■
		Schwarzbeck	NNLK8121	804	Oct. 22, 2018	One Year	■
		Schwarzbeck	NSLK8128	8128-216	Mar. 20, 2019	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	May 13, 2018	Two Year	■
15.	Frequency Counter	HP	53152A	US39270295	Aug. 23, 2018	One Year	■
16.	Environmental Test Chamber	ESPEC	PSL-2KP	14009407	Feb. 22, 2019	One Year	■
17.	DC Power Supply	Protek	PWS-3003D	4020409	Aug. 24, 2018	One Year	■

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