

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : OT-207-RWD-018

AGR No. : A207A-009

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-XIRIS

Model Name : UBio-X Iris

Multiple Model Name : N/A

Serial number : N/A

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

Date of Incoming : July 08, 2020

Date of Issuing : July 17, 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.

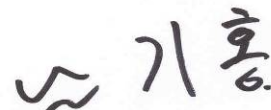
It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by:



Tae-Ho, Kim / Senior Manager
ONETECH Corp.

Approved by:



Ki-Hong, Nam / General Manager
ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-207-RWD-018	July 17, 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-XIRIS
- . MODEL NO/NAME : UBio-X Iris
- . SERIAL NUMBER : N/A
- . DATE : July 17, 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 Iris (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)	124.19 kHz, 13.558 4 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	PAIrisMA01 V11	N/A
SUB BOARD	N/A	PAIrisRFMA01 V10	N/A
FINGERPRINT BOARD(1)	N/A	PFNSFMMA01 V10	N/A
FINGERPRINT BOARD(2)	N/A	PAIrisDST01 V11	N/A
FINGERPRINT BOARD(3)	N/A	PAIrisTILT01 V10	N/A
CAMERA BOARD(1)	N/A	PAIrisFACM01 V10[SAU25]	N/A
CAMERA BOARD(2)	N/A	PAIrisIRCM01 V11	N/A
DISPLAY	N/A	CT5026N5006	N/A
SPEAKER(1)	N/A	N/A	N/A
SPEAKER(2)	N/A	N/A	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	PAIrisSC01 V10[SAU25]	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 Iris	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

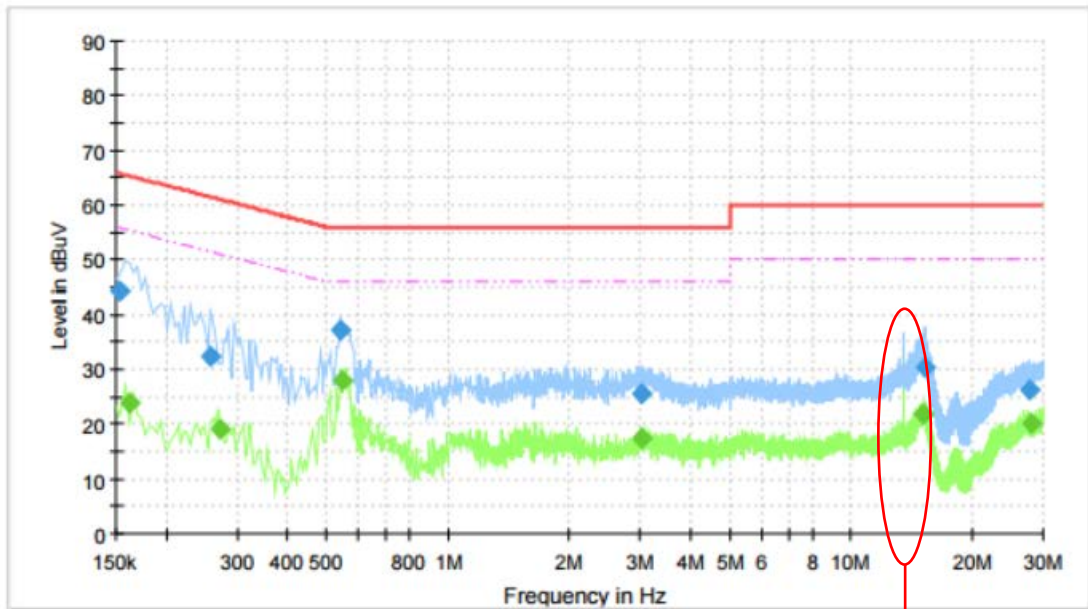
5. FINAL RESULT OF MEASUREMENT

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: July 08, 2020 ~ July 14, 2020
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
 Tested Line : HOT LINE

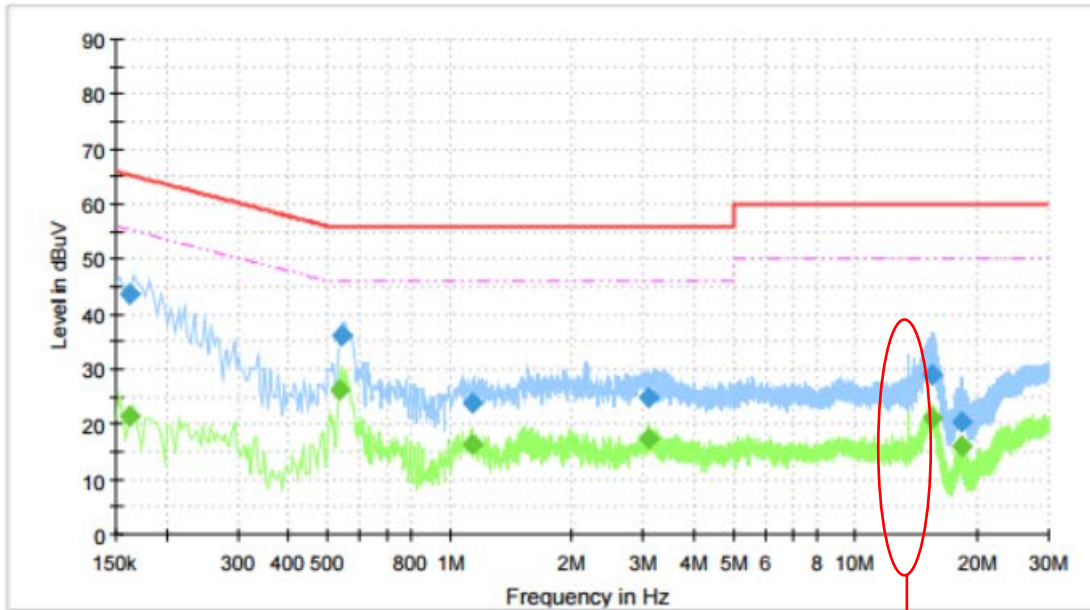


13.56 MHz Carrier Frequency

Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
3.011	25.51	---	56.00	30.49	3000.0	9.0	L1	10.04
27.711	26.39	---	60.00	33.61	3000.0	9.0	L1	10.71
15.218	30.28	---	60.00	29.72	3000.0	9.0	L1	10.47
0.258	32.51	---	61.51	29.00	3000.0	9.0	L1	9.92
0.541	37.00	---	56.00	19.00	3000.0	9.0	L1	9.93
0.154	44.38	---	65.81	21.43	3000.0	9.0	L1	9.94
27.895	---	20.19	50.00	29.81	3000.0	9.0	L1	10.71
0.274	---	18.95	51.01	32.06	3000.0	9.0	L1	9.92
3.031	---	17.37	46.00	28.63	3000.0	9.0	L1	10.04
0.547	---	27.99	46.00	18.01	3000.0	9.0	L1	9.93
0.162	---	24.03	55.39	31.36	3000.0	9.0	L1	9.93
15.142	---	21.93	50.00	28.07	3000.0	9.0	L1	10.46

Tested Line : NEUTRAL LINE



Final Result

13.56 MHz Carrier Frequency

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.161	---	21.43	55.39	33.96	3000.0	9.0	N1	9.93
0.161	43.52	---	65.39	21.86	3000.0	9.0	N1	9.93
0.533	---	26.34	46.00	19.66	3000.0	9.0	N1	9.93
0.542	36.14	---	56.00	19.86	3000.0	9.0	N1	9.93
1.136	---	16.38	46.00	29.62	3000.0	9.0	N1	9.99
1.136	23.76	---	56.00	32.24	3000.0	9.0	N1	9.99
3.083	25.02	---	56.00	30.98	3000.0	9.0	N1	10.04
3.098	---	17.23	46.00	28.77	3000.0	9.0	N1	10.04
15.385	---	21.10	50.00	28.90	3000.0	9.0	N1	10.47
15.513	28.88	---	60.00	31.12	3000.0	9.0	N1	10.48
18.207	---	15.90	50.00	34.10	3000.0	9.0	N1	10.55
18.331	20.47	---	60.00	39.53	3000.0	9.0	N1	10.56

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 : 48 % R.H. Temperature: 22 °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: July 08, 2020 ~ July 14, 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 4	36.46	H	19.3	0.3	56.06	124	67.94
13.558 4	32.07	V	19.3	0.3	51.67	124	72.33

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



Tested by: Soon-Ki, Choi / Engineer

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

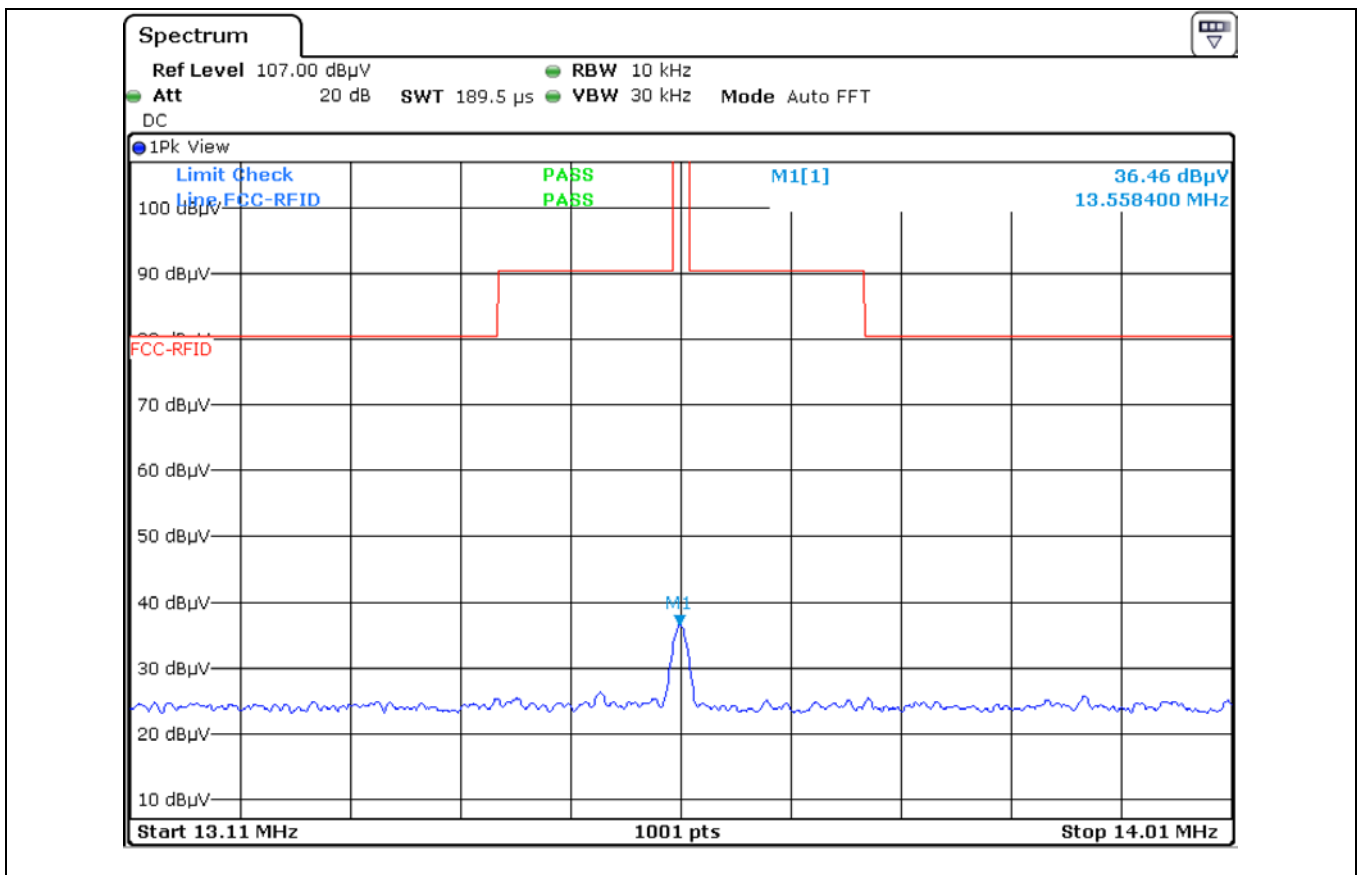
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 48 % R.H. Temperature: 22 °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: July 08, 2020 ~ July 14, 2020

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.56 MHz is 36.46 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

Signature
 Tested by: Soon-Ki, Choi / Engineer


5.3 SPURIOUS EMISSION TEST

5.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 48 % R.H. Temperature: 22 °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: July 08, 2020 ~ July 14, 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.									



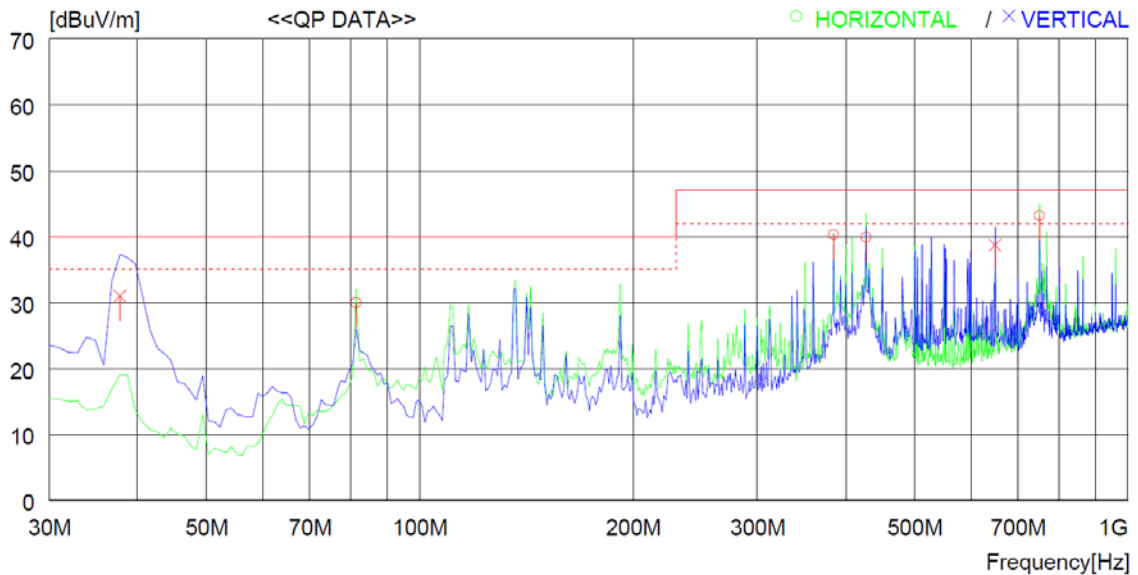
Tested by: Soon-Ki, Choi / Engineer

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 : (48 ~ 49) % 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: July 08, 2020 ~ July 14, 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	426.731	49.0	21.3	2.4	32.8	39.9	47.0	7.1	100	308
2	750.703	45.7	26.4	3.7	32.7	43.1	47.0	3.9	200	359
3	81.410	45.7	14.9	1.9	32.5	30.0	40.0	10.0	200	5
4	384.050	50.2	20.5	2.3	32.7	40.3	47.0	6.7	100	0
----- Vertical -----										
5	649.826	43.6	24.9	3.2	33.0	38.7	47.0	8.3	100	359
6	37.760	43.5	18.6	1.4	32.5	31.0	40.0	9.0	100	108

di
Tested by: Soon-Ki, Choi / Engineer

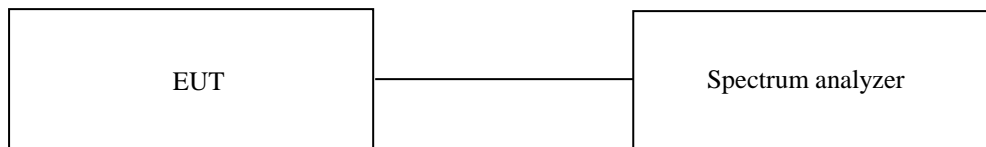
5.4 20 dB BANDWIDTH

5.4.1 Operating environment

Temperature : 22 °C
 Relative humidity : 48 % 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.



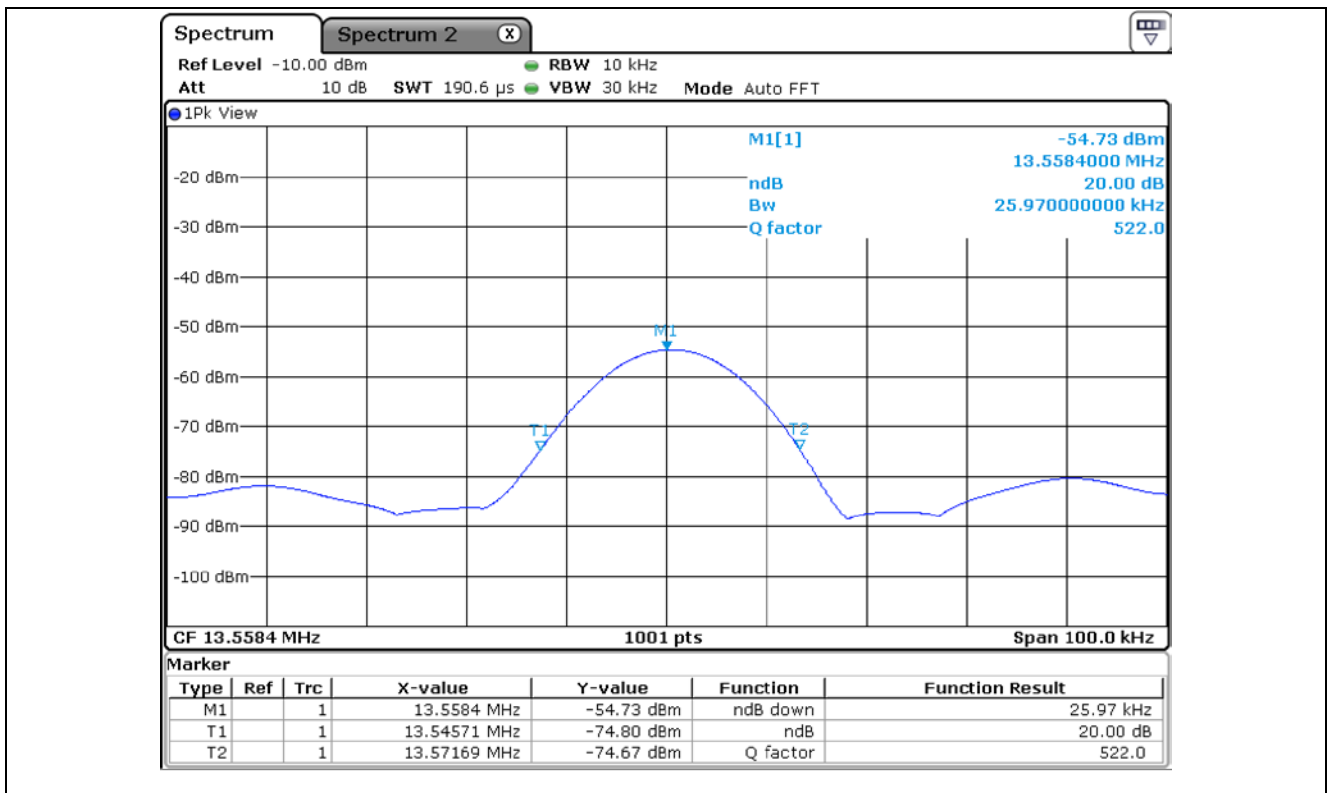
5.4.3 Test data

-. Test Date : July 08, 2020 ~ July 14, 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 4	25.97	900	PASS

Tested by: Soon-Ki, Choi / Engineer



5.5 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

5.5.1 Operating environment

Temperature : 22 °C
 Relative humidity : 48 % 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 : July 08, 2020 ~ July 14, 2020
 -. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13,558,400	13,558,856	456	± 1 355.89
-10		13,558,890	490	
0		13,558,899	499	
10		13,558,956	556	
20		13,558,918	518	
30		13,558,883	483	
40		13,558,901	501	
50		13,558,856	456	



Tested by: Soon-Ki, Choi / Engineer

5.6 FREQUENCY STABILITY WITH VOLTAGE VARIATION

5.6.1 Operating environment

Temperature : 22 °C
 Relative humidity : 48 % 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 : July 08, 2020 ~ July 14, 2020
 -. Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
17.25(115 %)	13,558,400	13,558,899	499	± 1 355.89
15.0(100 %)		13,558,889	489	
12.75(85 %)		13,559,031	631	



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 μ V)
- Amplifier Gain	(dB)
+ Cable Loss	(dB)
- Antenna Factor	(dB/m)
<hr/>	
= Corrected Result	(dB μ 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.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	Sep. 24, 2019	Two Year	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Mar. 20, 2020	Two Year	-
8.	Controller	Innco System	CO3000	CO3000/904/ 37211215/L	N/A	N/A	■
9.	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	■
10.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
11.	Antenna Master	Innco System	MA4000-EP	MA4000/332	N/A	N/A	-
12.	Antenna Master	Innco System	MA-4000XPET	MA4000/509	N/A	N/A	■
13.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-235	Mar. 24, 2020	Two Year	■
14.	Frequency Counter	HP	53152A	US39270295	Jul. 25, 2019	One Year	■
15.	Environmental Test Chamber	ESPEC	PSL-2KP	14009407	Feb. 21, 2020	One Year	■
16.	Controller	Innco System	CO3000	1026/40960617/P	N/A	N/A	■
17.	Turn Table	Innco System	DT2000-2t	N/A	N/A	N/A	■
18.	Antenna Master	Innco System	MA-4640-XPET	N/A	N/A	N/A	■
19.	Hybrid Antenna	TDK RF Solutions	HLP-2008	131316	Mar.25, 2020	One Year	■
20.	Amplifier	Sonoma Instrument	310N	392756	Oct.16, 2019	One Year	■
21.	DC Power Supply	Protek	PWS-3003D	4020409	Jul. 24, 2019	One Year	■