

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : W16OR-D014

AGR No. : A16OA-052

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 : Flush Mount Door Lock

FCC ID : XX2-FMD-10

Model Name : FMD-10

Serial number : N/A

Total page of Report : 20 pages (including this page)

Date of Incoming : October 10, 2016

Date of Issuing : October 17, 2016

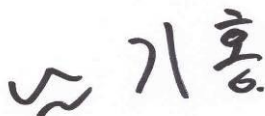
SUMMARY

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:



Ki-Hong, Nam / Asst, Chief Engineer
ONETECH Corp.

Approved by:



Sung-Ik, Han / Managing Director
ONETECH Corp.

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
W16OR-D014	October 17, 2016	Initial Release	All

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-FMD-10
- . MODEL NO/NAME : FMD-10
- . SERIAL NUMBER : N/A
- . DATE : October 17, 2016

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Flush Mount Door Lock
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 FMD-10 (referred to as the EUT in this report) is an Flush Mount Door Lock, Product specification information described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Flush Mount Door Lock
TRANSMITTING FREQUENCY	13.560 5 MHz
MODULATION	ASK
ANTENNA TYPE	PCB Antennas
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	2 480 MHz, 400 MHz, 13.56 MHz, 12 MHz, 8 MHz, 32.768 kHz

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. Radiated 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-4617/ G-10666 / T-1842

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

-. Site Accreditation:

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

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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	PFMD01MA01 V2.0	N/A
SUB BOARD	UNION COMMUNITY	PFMD10SC01 V20	N/A
FINGERPRINT RECOGNITION BOARD	UNION COMMUNITY	OPP06 Rev 1.33	N/A
ANTENNA BOARD	UNION COMMUNITY	PFMD10SA01 V11	N/A
ADAPTER	Dee Van Electronics(Longchuan)Co., Ltd.	DSA-42D-12 1 120350	N/A
Bluetooth LE Module	PROCHILD INC.	PBLN51822m	2AEEY-PBLN51822M

3.2 Peripheral equipment

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

Model	Manufacturer	Description	Connected to
FMD-10	UNION COMMUNITY	Flush Mount Door Lock (EUT)	-
N/A	N/A	Door open switch	EUT
N/A	N/A	Door Lock	EUT
DSA-42D-12 1 120350	Dee Van Electronics(Longchuan)Co., Ltd.	ADAPTER	EUT

3.3 Mode of operation during the test

-. The EUT has Bluetooth, 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 PCB pattern 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)
Tx 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)
Tx 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 : 48.2 % R.H.

Temperature: 24.8 °C

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

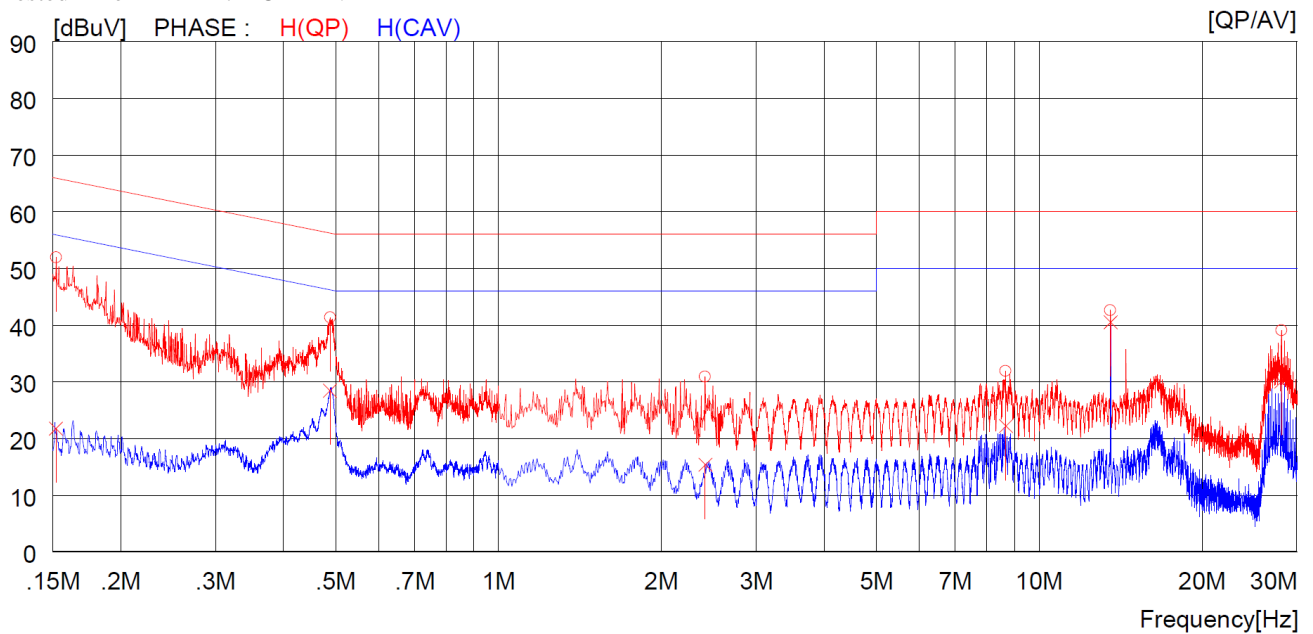
Result : PASSED

EUT : Flush Mount Door Lock

Date: October 10, 2016

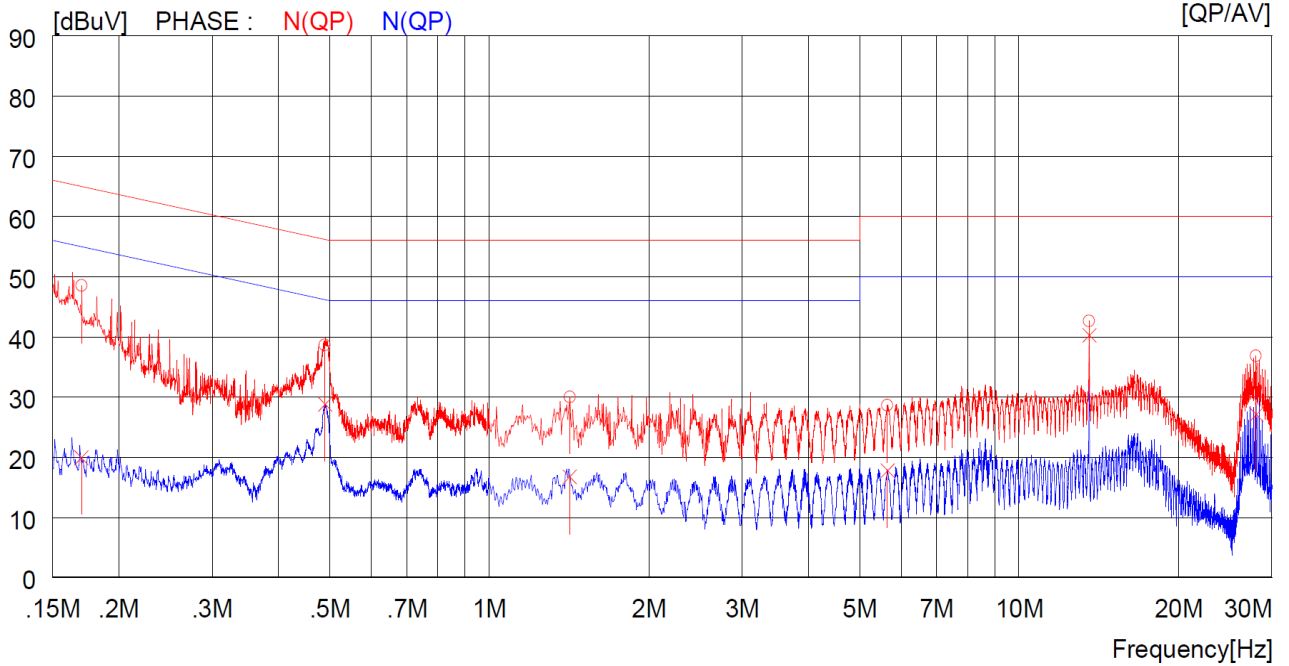
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

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	0.15200	51.8	----	0.1	51.9	----	65.9	----	14.0	----	H (QP)
2	0.48800	41.3	----	0.1	41.4	----	56.2	----	14.8	----	H (QP)
3	2.41200	30.7	----	0.2	30.9	----	56.0	----	25.1	----	H (QP)
4	8.67500	31.6	----	0.3	31.9	----	60.0	----	28.1	----	H (QP)
5	13.56000	42.0	----	0.6	42.6	----	60.0	----	17.4	----	H (QP)
6	28.05000	38.4	----	0.7	39.1	----	60.0	----	20.9	----	H (QP)
7	0.15200	----	21.7	0.1	----	21.8	----	55.9	----	34.1	H (CAV)
8	0.48800	----	28.4	0.1	----	28.5	----	46.2	----	17.7	H (CAV)
9	2.41200	----	15.2	0.2	----	15.4	----	46.0	----	30.6	H (CAV)
10	8.67500	----	21.9	0.3	----	22.2	----	50.0	----	27.8	H (CAV)
11	13.56000	----	39.9	0.6	----	40.5	----	50.0	----	9.5	H (CAV)
12	28.05000	----	29.3	0.7	----	30.0	----	50.0	----	20.0	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	0.17000	48.4	----	0.1	48.5	----	65.0	----	16.5	----	N (QP)
2	0.49000	38.6	----	0.1	38.7	----	56.2	----	17.5	----	N (QP)
3	1.42000	29.9	----	0.1	30.0	----	56.0	----	26.0	----	N (QP)
4	5.64500	28.4	----	0.2	28.6	----	60.0	----	31.4	----	N (QP)
5	13.56000	42.0	----	0.6	42.6	----	60.0	----	17.4	----	N (QP)
6	28.04000	36.1	----	0.7	36.8	----	60.0	----	23.2	----	N (QP)
7	0.17000	----	19.9	0.1	----	20.0	----	55.0	----	35.0	N (CAV)
8	0.49000	----	28.7	0.1	----	28.8	----	46.2	----	17.4	N (CAV)
9	1.42000	----	16.7	0.1	----	16.8	----	46.0	----	29.2	N (CAV)
10	5.64500	----	17.6	0.2	----	17.8	----	50.0	----	32.2	N (CAV)
11	13.56000	----	39.7	0.6	----	40.3	----	50.0	----	9.7	N (CAV)
12	28.04000	----	26.4	0.7	----	27.1	----	50.0	----	22.9	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: Seok-Jun, Lee / 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 : 47.5 % R.H. Temperature: 23.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(a)
 Type of Test : Low Power Transmitter below 1 705 kHz
 Result : PASSED

EUT : Flush Mount Door Lock Date: October 10, 2016

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)
13.560 5	14.91	H	19.2	0.6	34.71	124	89.29
13.560 5	12.48	V	19.2	0.6	32.28	124	91.72

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



Tested by: Seok-Jun, Lee / Engineer

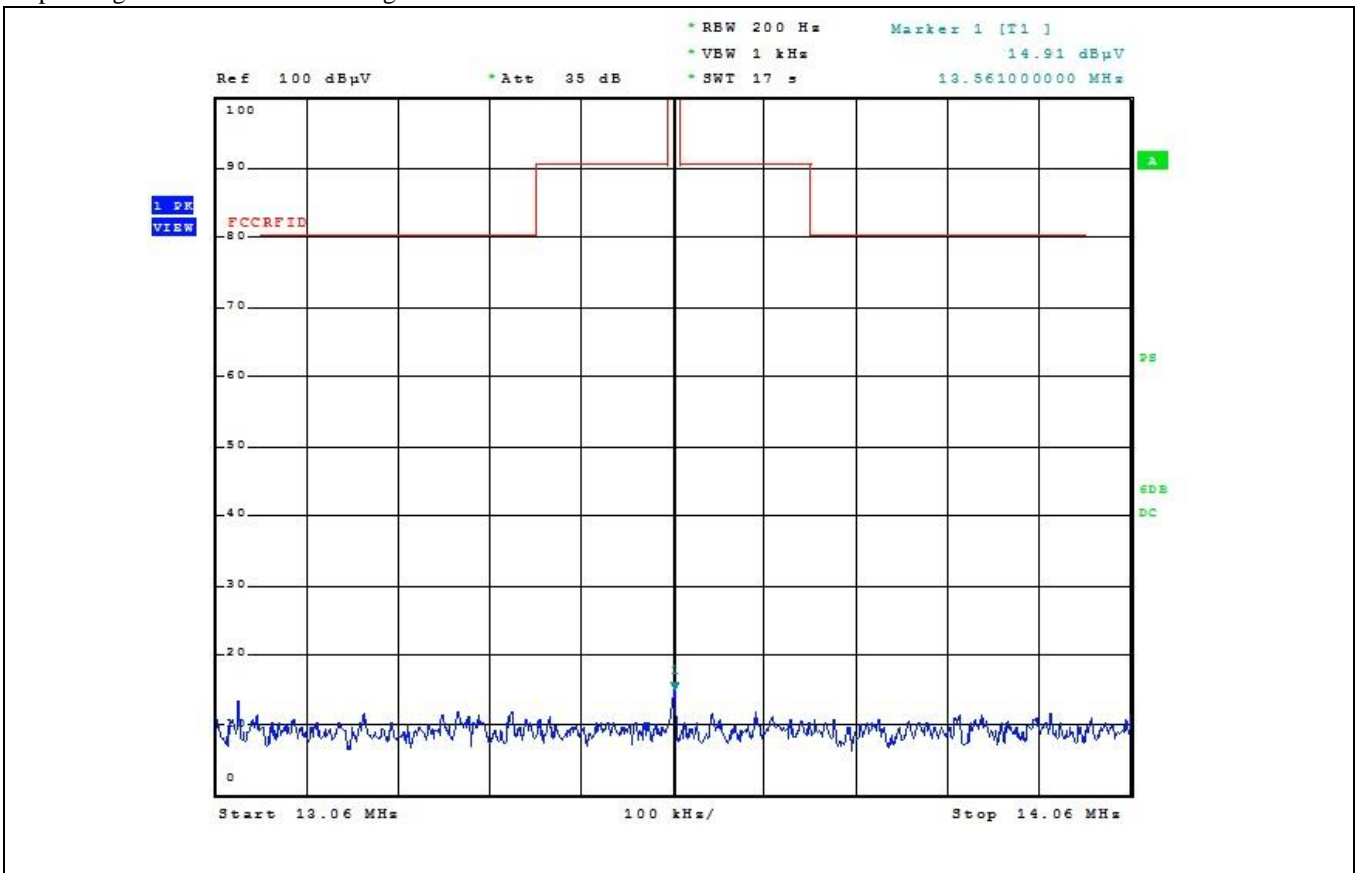
5.2.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz

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

Humidity Level : 47.5 % R.H. Temperature: 23.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(b) and (c)
 Type of Test : Low Power Transmitter below 1 705 kHz
 Result : PASSED

EUT : Flush Mount Door Lock Date: October 10, 2016

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.560 5 MHz is 14.91 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: Seok-Jun, Lee / Engineer

5.2 SPURIOUS EMISSION TEST

5.2.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 47.5 % R.H. Temperature: 23.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15. 225(d)
 Type of Test : Low Power Transmitter below 1 705 kHz
 Frequency Range : 9 kHz ~ 30 MHz
 Result : PASSED

EUT : Flush Mount Door Lock Date: October 10, 2016

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: Seok-Jun, Lee / Engineer

5.2.2 Spurious Radiated Emission below 1 GHz

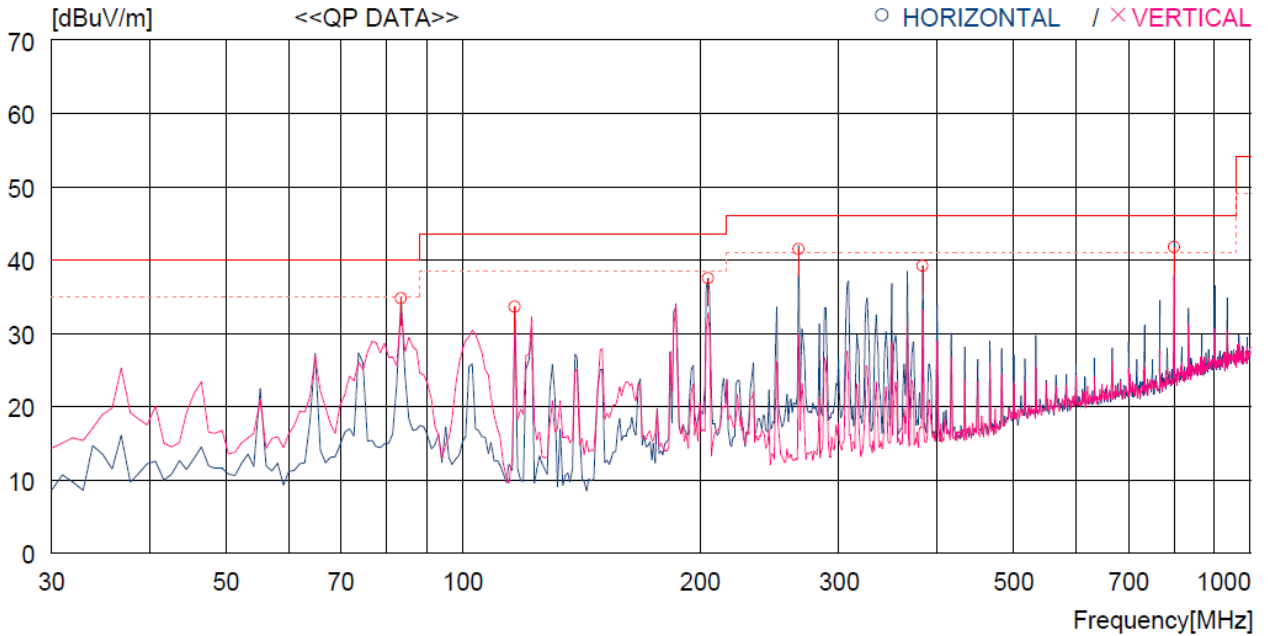
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 47.5 % R.H. Temperature: 23.4 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)
 Type of Test : Low Power Transmitter below 1 705 kHz
 Frequency range : 30 MHz ~ 1 000 MHz
 Result : PASSED

EUT : Flush Mount Door Lock Date: October 10, 2016

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	266.680	57.6	12.7	4.2	33.0	41.5	46.0	4.5	100	0
2	800.172	46.2	20.7	8.0	33.2	41.7	46.0	4.3	100	162
3	83.350	56.7	8.6	2.5	33.1	34.7	40.0	5.3	207	359
4	116.330	52.6	10.8	3.3	33.1	33.6	43.5	9.9	200	116
5	204.600	55.8	10.9	3.8	33.0	37.5	43.5	6.0	207	359
6	383.080	51.6	15.5	5.2	33.1	39.2	46.0	6.8	100	0

Seok-Jun Lee
Tested by: Seok-Jun, Lee / Engineer

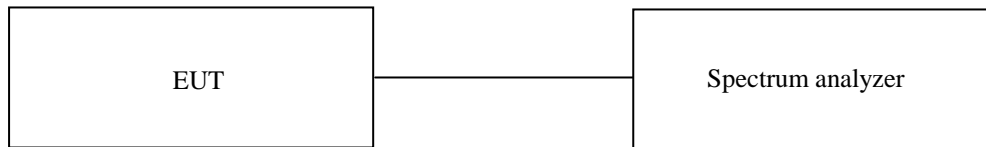
5.3 20 dB BANDWIDTH

5.3.1 Operating environment

Temperature : 25.1 °C
Relative humidity : 48.3 % R.H.

5.3.2 Test set-up

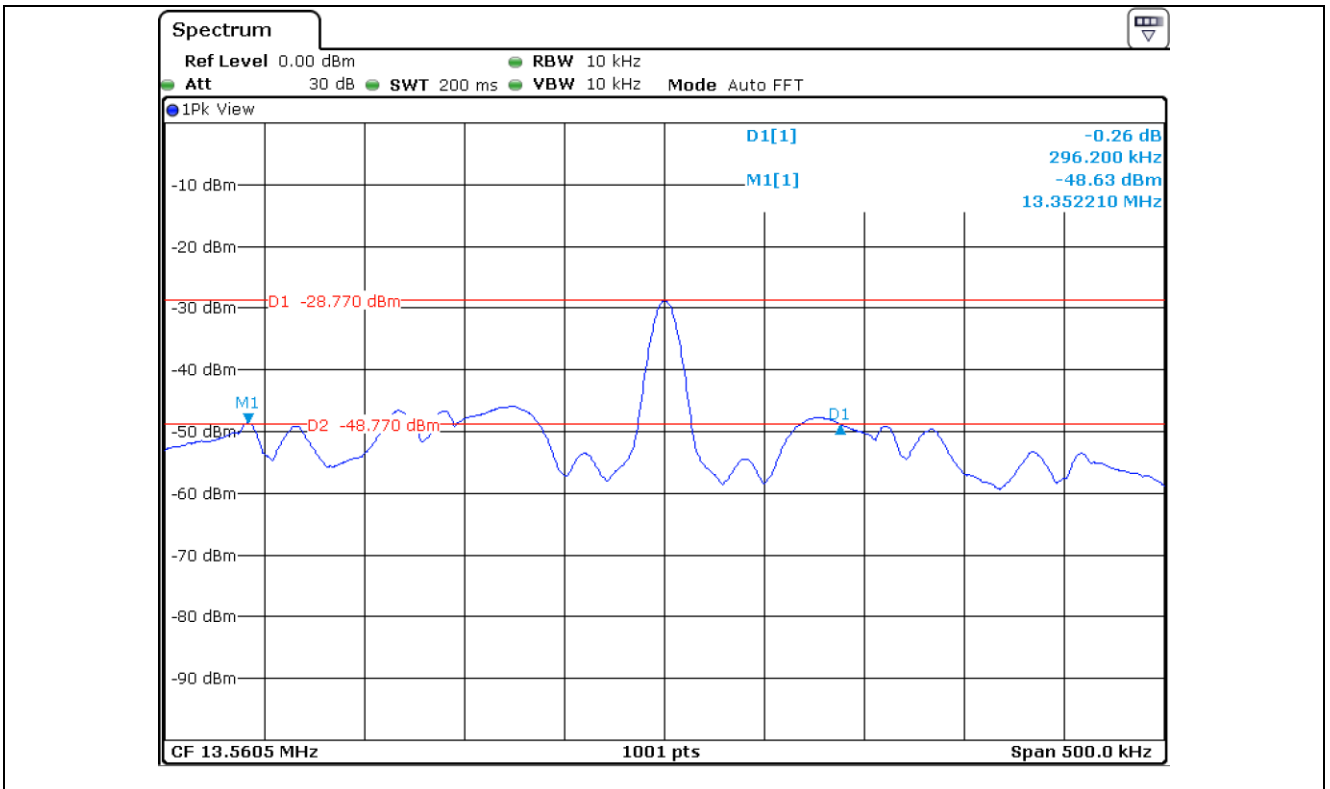
The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.




5.3.3 Test data

- Test Date : October 11, 2016
- Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.215(c)

Operating Freq. (MHz)	Measured Value (kHz)	Assigned Operating Frequency Band (kHz)	Result
13.560 5	296.2	900	PASS





Tested by: Seok-Jun, Lee / Engineer

5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

5.4.1 Operating environment

Temperature : 25.1 °C
 Relative humidity : 48.3 % R.H.

5.4.2 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.

5.4.3 Test data

-. Test Date : October 11, 2016
 -. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 560 500	13 560 847	1009.05	± 1 356.05
-10		13 560 864	992.05	
0		13 560 891	965.05	
10		13 560 915	941.05	
20		13 560 932	924.05	
30		13 560 946	910.05	
40		13 560 957	899.05	
50		13 560 972	884.05	



Tested by: Seok-Jun, Lee / Engineer

5.5 FREQUENCY STABILITY WITH VOLTAGE VARIATION

5.5.1 Operating environment

Temperature : 25.1 °C
 Relative humidity : 48.3 % R.H.

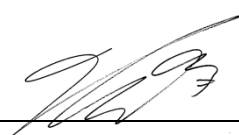
5.5.2 Test set-up

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.

5.5.3 Test data

-. Test Date : October 11, 2016
 -. Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5(115 %)	13 560 500	13 560 621	1 235.05	± 1 356.05
110(100 %)		13 560 547	1 309.05	
93.5(85 %)		13 560 489	1 367.05	



Tested by: Seok-Jun, Lee / 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	(dB μ V/m)
- Corrected Result	(dB μ V/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	Nov. 02, 2015	One Year	<input type="checkbox"/>
2.		R/S	ESU	100261	Apr. 06, 2016	One Year	<input checked="" type="checkbox"/>
3.		R/S	ESPI	101278	Nov. 02, 2015	One Year	<input type="checkbox"/>
4.	Spectrum analyzer	R/S	FSU	200319	Apr. 14, 2016	One Year	<input checked="" type="checkbox"/>
5.	Amplifier	Sonoma Instrument	310N	312544	Apr. 05, 2016	One Year	<input checked="" type="checkbox"/>
6.	Amplifier	Sonoma Instrument	310N	312545	Apr. 05, 2016	One Year	<input type="checkbox"/>
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	May 20, 2016	Two Year	<input type="checkbox"/>
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-421	Apr. 15, 2016	Two Year	<input checked="" type="checkbox"/>
9.	Controller	Innco System	CO3000	CO3000/904/ 37211215/L	N/A	N/A	<input checked="" type="checkbox"/>
10.	LISN	EMCO	3825/2	9109-1867	Apr. 06, 2016	One Year	<input checked="" type="checkbox"/>
				9109-1869	Apr. 06, 2016	One Year	<input type="checkbox"/>
		Schwarzbeck	NSLK8126	8126-404	Apr. 05, 2016	One Year	<input checked="" type="checkbox"/>
		Schwarzbeck	NSLK8128	8128-216	Apr. 06, 2016	One Year	<input type="checkbox"/>
11.	Turn Table	Innco System	DT3000	930611	N/A	N/A	<input checked="" type="checkbox"/>
12.	Antenna Master	Innco System	MA4000-EP	MA4000/332	N/A	N/A	<input type="checkbox"/>
13.	Antenna Master	Innco System	MA-4000XPET	MA4000/509	N/A	N/A	<input checked="" type="checkbox"/>
14.	Loop Antenna	R/S	HFH2-Z2	879285/26	Dec. 09, 2014	Two Year	<input checked="" type="checkbox"/>
15.	Frequency Counter	HP	53152A	US39270295	Sep. 29, 2016	One Year	<input checked="" type="checkbox"/>
16.	Chamber	Samkun Tech	SSE-43CI-A	14009407	Apr. 11, 2016	One Year	<input checked="" type="checkbox"/>
17.	DC Power Supply	Digital Electronics	DRP-305DN	4030195	Sep. 02, 2016	One Year	<input checked="" type="checkbox"/>