ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No.	**: E14NR-064**
AGR No.	**: A148A-089R**
Applicant	**: UNION COMMUNITY Co., Ltd.**
Address	**: Hyundai Topics Bldg. Bangi 2-dong, Songpa-gu, Seoul, South Korea**
Manufacturer	**: UNION COMMUNITY Co., Ltd.**
Address	**: Hyundai Topics Bldg. Bangi 2-dong, Songpa-gu, Seoul, South Korea**
Type of Equipment	**: Face & Fingerprint Identification Terminal**
FCC ID	**: XX2-AC-7000**
Model Name	**: AC-7000**
Serial number	**: N/A**
Total page of Report	**: 26 pages (including this page)**
Date of Incoming	**: October 20, 2014**
Date of Issuing	**: November 12, 2014**

SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART C, SECTION 15.225 and FCC Part 15 Subpart C Section 15.209 and 15.207.**

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 / Senior Engineer, ONETECH Corp.

Approved by: Gea-Won, Lee / Managing Director, ONETECH Corp.

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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
E14NR-064	November 12, 2014	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

-. APPLICANT : UNION COMMUNITY Co., Ltd.

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

-. CONTACT PERSON : KyungWook, Han / Manager

-. TELEPHONE NO : +82-2-6488-3052

-. FCC ID : XX2-AC-7000

-. MODEL NO/NAME : AC-7000

-. SERIAL NUMBER : N/A

-. DATE : November 12, 2014

DEVICE TYPE	DXX - Low Power Communication Device Transmitter DCD – Part 15, Low Power Transmitter below 1 705 kHz
E.U.T. DESCRIPTION	Face & Fingerprint Identification Terminal
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.225, 15.209 and 15.207
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 Co., Ltd., Model AC-7000 (referred to as the EUT in this report) is an Face & Fingerprint Identification Terminal, Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Fixed Device
MODULATION	ASK
TRANSMITTING FREQUENCY	13.558 7 MHz, 124.7 kHz
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	13.56 MHz, 125 kHz
ANTENNA TYPE	PCB Antennas
USED AC/DC ADAPTER	Output: DC 12 V, 3.5 A Model No: DSA-42D-12 1 120350 Manufacturer: Dee Van Electronics(Longchuan)Co., Ltd.
NUMBER OF LAYERS	- Main Board - Tilted Dual Camera Board: 4 Layers - LCD Board: 2 Layers - RFID Module Board: 4 Layers - SD Card Board: 2 Layers - SC Ant Board: 2 Layers - IR LED Board: 2 Layers - FP Board: 4 Layers - FP Board: 2Layers
EXTERNAL CONNECTOR	DC IN , LAN Port

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 section 15.225, 15.209 and 15.207

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2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2009. 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 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842 IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. 85

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 Co., Ltd.	PAC7000MA01 V12 NSE17	N/A
FP BOARD (1)	UNION COMMUNITY Co., Ltd.	PFAS04SE01 V11NAU22	N/A
FP BOARD (2)	UNION COMMUNITY Co., Ltd.	PFAS04MA01 V13NAU22	N/A
RFID MODULE BOARD	UNION COMMUNITY Co., Ltd.	PAC7000RF01 V10 NFE14	N/A
TILTED DUAL CAMERA BOARD	UNION COMMUNITY Co., Ltd.	PAC7000CM01 V10 NAP03	N/A
SD CARD BOARD	UNION COMMUNITY Co., Ltd.	PAC7000SD01 V10 MDE23	N/A
IR LED BOARD	UNION COMMUNITY Co., Ltd.	PAC7000LD01 V12NOC02	N/A
LCD BOARD	UNION COMMUNITY Co., Ltd.	PAC7000LC01 V11NAU18	N/A
SC ANT BOARD	UNION COMMUNITY Co., Ltd.	N/A	N/A
ADAPTER	Dee Van Electronics(Longchuan)Co., Ltd.	DSA-42D-12 1 120350	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
AC-7000	UNION COMMUNITY Co., Ltd.	Face & Fingerprint Identification Terminal (EUT)	-
DSA-42D-12 1 120350	Dee Van Electronics(Longchuan) Co., Ltd.	Adapter	EUT
LGR501	LG	Notebook PC	EUT

3.3 Mode of operation during the test

The EUT was operated during the test as following operating mode.

-. The EUT has 13.558 7 MHz RF boards for reading Card and program was used for making continuous transmission mode during the test.

-. The EUT has 124.7 kHz 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: 2009 to determine the worse operating conditions.

Radiated Emission Test : Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2009 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 §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

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5. FINAL RESULT OF 13.56 MHz 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 : 43.3 % R.H. Temperature: 22 ℃

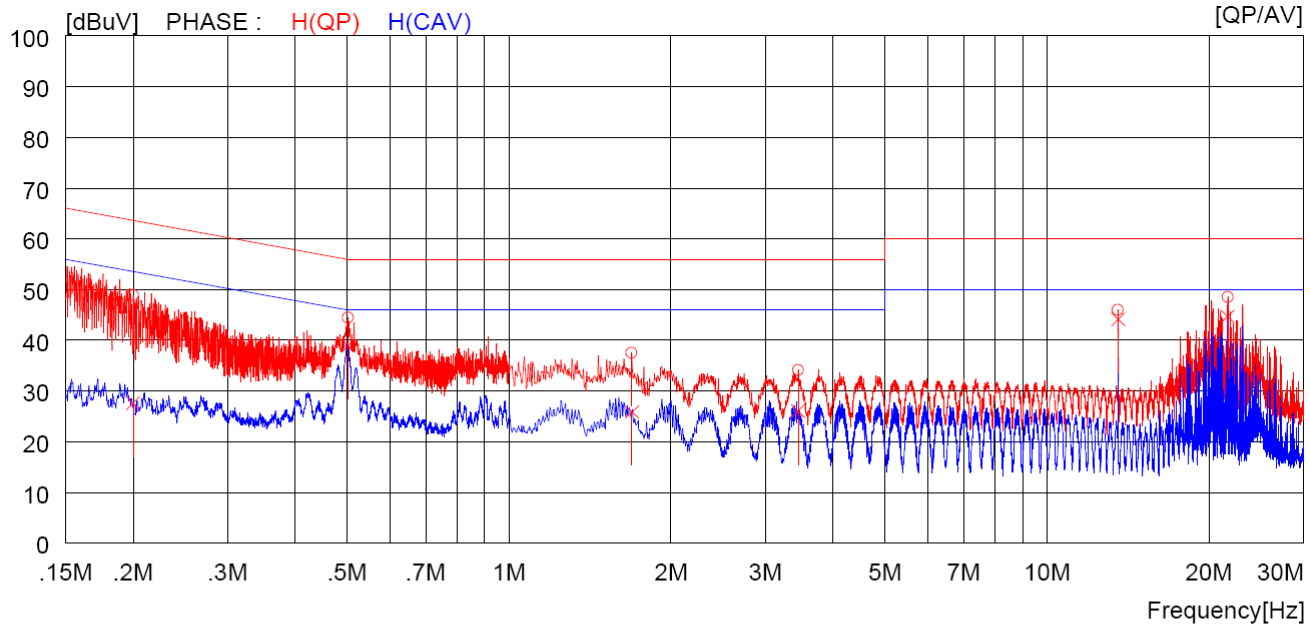
Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.207(a)

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

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

Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.20000	38.9	----	10.0	48.9	----	63.6	----	14.7	----	H(QP)
2	0.50200	34.5	----	10.0	44.5	----	56.0	----	11.5	----	H(QP)
3	1.69200	27.5	----	10.0	37.5	----	56.0	----	18.5	----	H(QP)
4	3.44400	24.1	----	10.0	34.1	----	56.0	----	21.9	----	H(QP)
5	13.56000	35.7	----	10.3	46.0	----	60.0	----	14.0	----	H(QP)
6	21.66000	37.8	----	10.7	48.5	----	60.0	----	11.5	----	H(QP)
7	0.20000	----	17.6	10.0	----	27.6	----	53.6	----	26.0	H(CAV)
8	0.50200	----	29.0	10.0	----	39.0	----	46.0	----	7.0	H(CAV)
9	1.69200	----	15.9	10.0	----	25.9	----	46.0	----	20.1	H(CAV)
10	3.44400	----	16.1	10.0	----	26.1	----	46.0	----	19.9	H(CAV)
11	13.56000	----	33.8	10.3	----	44.1	----	50.0	----	5.9	H(CAV)
12	21.66000	----	34.0	10.7	----	44.7	----	50.0	----	5.3	H(CAV)

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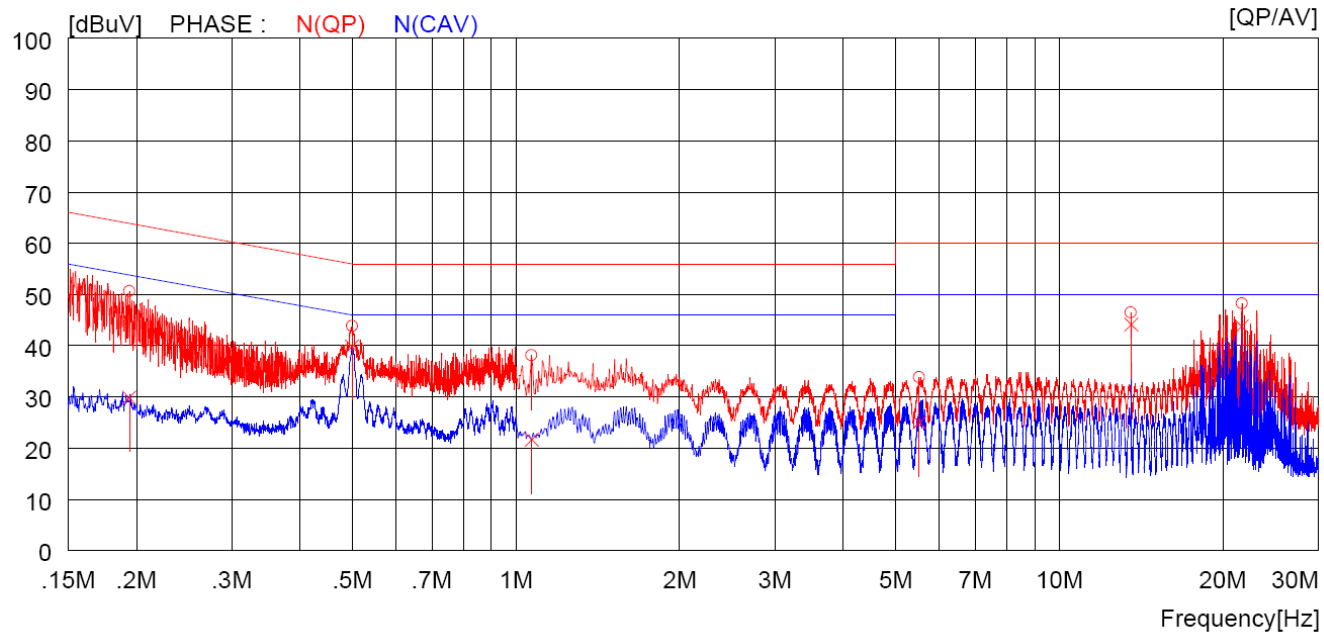
Tested Line : NEUTRAL LINE



NO	FREQ	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.19400	40.6	----	10.0	50.6	----	63.9	----	13.3	----	N(QP)
2	0.49900	33.8	----	10.0	43.8	----	56.0	----	12.2	----	N(QP)
3	1.06800	28.1	----	10.0	38.1	----	56.0	----	17.9	----	N(QP)
4	5.52500	23.8	----	10.1	33.9	----	60.0	----	26.1	----	N(QP)
5	13.56000	36.2	----	10.3	46.5	----	60.0	----	13.5	----	N(QP)
6	21.66000	37.6	----	10.7	48.3	----	60.0	----	11.7	----	N(QP)
7	0.19400	----	19.9	10.0	----	29.9	----	53.9	----	24.0	N(CAV)
8	0.49900	----	29.9	10.0	----	39.9	----	46.0	----	6.1	N(CAV)
9	1.06800	----	11.6	10.0	----	21.6	----	46.0	----	24.4	N(CAV)
10	5.52500	----	14.9	10.1	----	25.0	----	50.0	----	25.0	N(CAV)
11	13.56000	----	33.8	10.3	----	44.1	----	50.0	----	5.9	N(CAV)
12	21.66000	----	33.1	10.7	----	43.8	----	50.0	----	6.2	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: Tae-Ho, Kim / Project Engineer

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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 : 43.3 % R.H. Temperature: 22 ℃

Limits apply to : PART 15, SUBPART C, SECTION 15.225(a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

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 7	38.28	H	18.4	0.3	56.98	124	67.02
13.558 7	32.51	V	18.4	0.3	51.21	124	72.79

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

Tested by: Tae-Ho, Kim / Project Engineer

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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 : 43.3 % R.H. Temperature: 22 ℃

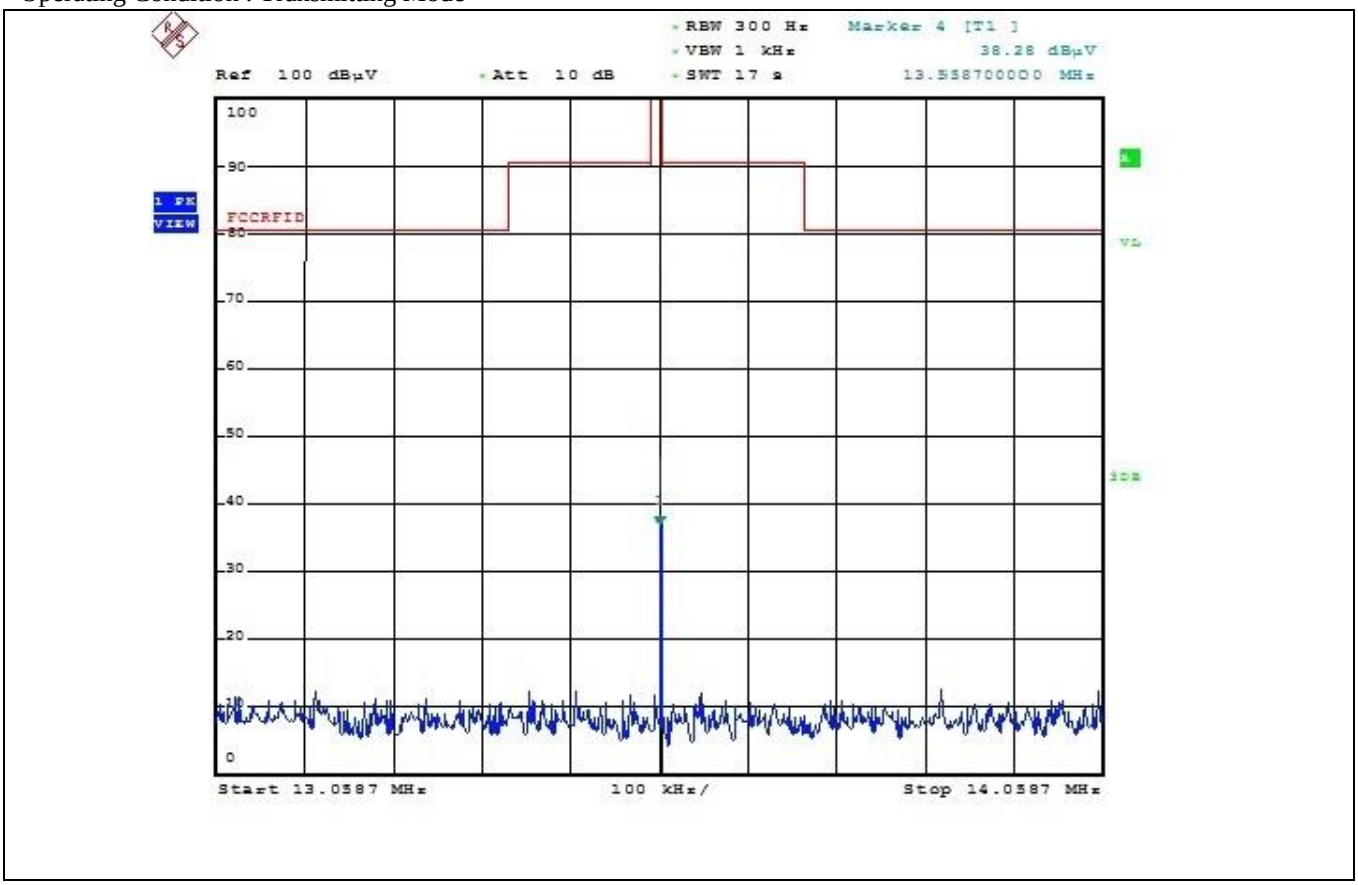
Limits apply to : PART 15, SUBPART C, SECTION 15.225(b) and (c)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.558 7 MHz is 56.98 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

Tested by: Tae-Ho, Kim / Project Engineer

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5.3 Spurious Emission Test

5.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 43.3 % R.H. Temperature: 22 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)

Type of Test : Low Power Communication Device Transmitter

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

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: Tae-Ho, Kim / Project Engineer

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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 : 43.3 % R.H. Temperature: 22 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)

Type of Test : Low Power Communication Device Transmitter

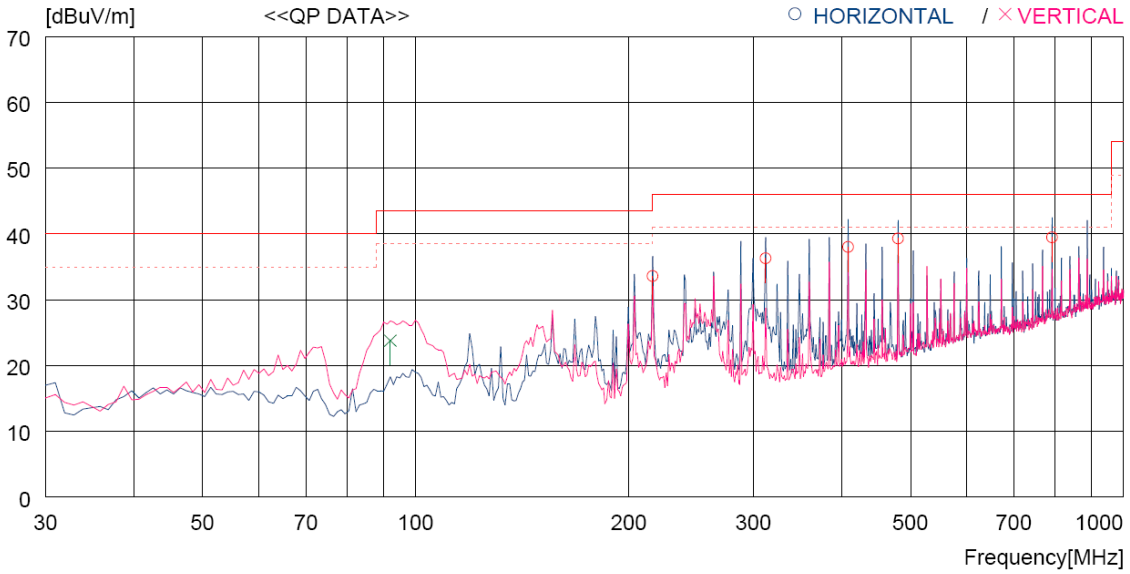
Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

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	216.240	44.9	12.7	9.0	33.0	33.6	46.0	12.4	200	222
2	312.270	44.7	15.0	9.6	33.0	36.3	46.0	9.7	100	236
3	408.300	43.9	17.0	10.1	33.0	38.0	46.0	8.0	100	264
4	480.081	43.8	18.1	10.5	33.1	39.3	46.0	6.7	200	265
5	792.412	38.5	22.1	12.0	33.1	39.5	46.0	6.5	100	359
----- Vertical ------										
6	92.080	37.3	11.8	7.8	33.1	23.8	43.5	19.7	100	137

Tested by: Tae-Ho, Kim / Project Engineer

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5.4 20 dB BANDWIDTH

5.4.1 Operating environment

Temperature : 22 ℃

Relative humidity : 43.3 % 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.

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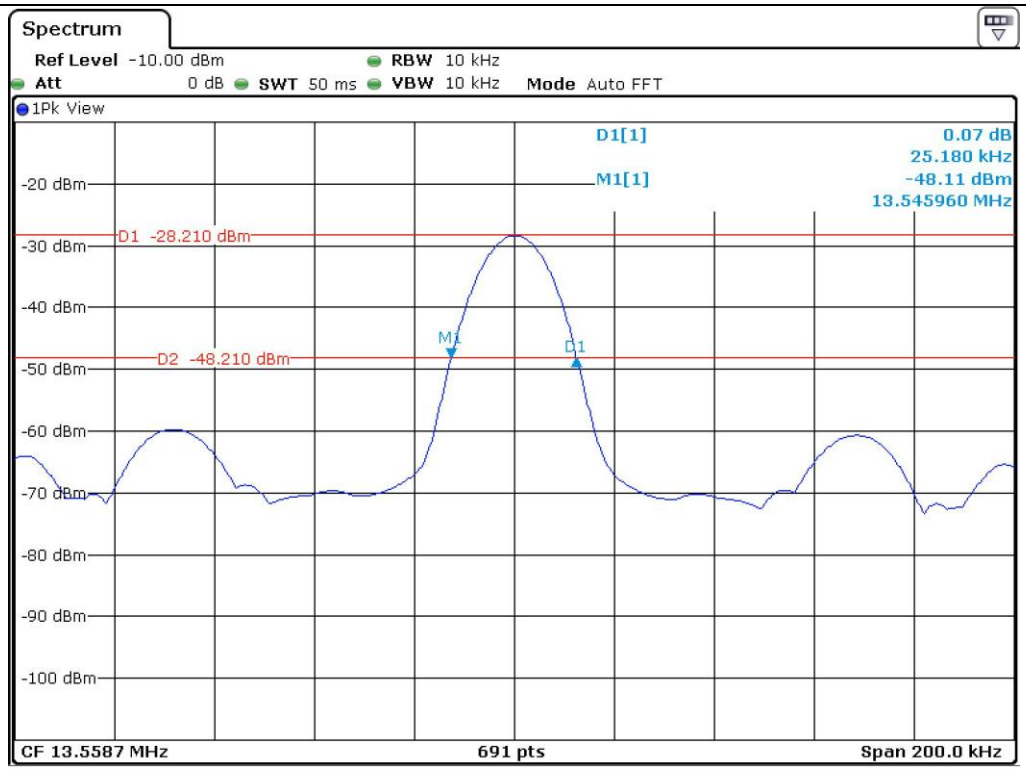
5.4.3 Test data

-. Test Date : November 06, 2014

-. 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
13.558 7	25.18	900	**PASS**



Tested by: Tae-Ho, Kim / Project Engineer

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5.5 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

5.5.1 Operating environment

Temperature : 22 ℃

Relative humidity : 43.3 % 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 : November 06, 2014

-. Result : PASSED

Temperature (˚C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 558 700	13 558 735	1320.87	± 1 355.87
-10		13 558 721	1334.87	
0		13 558 741	1314.87	
10		13 558 747	1308.87	
20		13 558 742	1313.87	
30		13 558 749	1306.87	
40		13 558 759	1296.87	
50		13 558 761	1294.87	

Tested by: Tae-Ho, Kim / Project Engineer

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5.6 FREQUENCY STABILITY WITH VOLTAGE VARIATION

5.6.1 Operating environment

Temperature : 22 ℃

Relative humidity : 43.3 % 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 : November 06, 2014

-. Result : PASSED

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5(115 %)	13 558 700	13 558 732	1323.87	± 1 355.87
110(100 %)		13 558 742	1313.87	
93.5(85 %)		13 558 738	1317.87	

Tested by: Tae-Ho, Kim / Project Engineer

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6. FINAL RESULT OF 125 kHz MEASUREMENT

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

6.1 Conducted Emission Test

Humidity Level : 43.3 % R.H. Temperature: 22 ℃

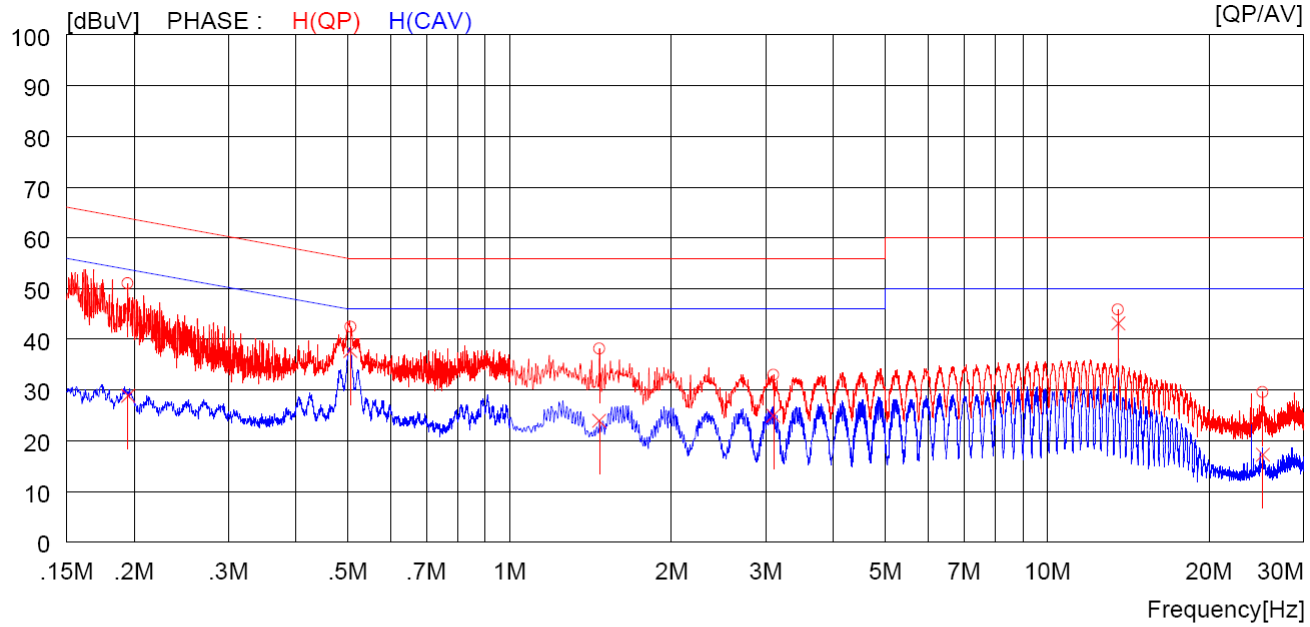
Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.207(a)

Result : PASSED

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

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

Tested Line : HOT LINE



NO	FREQ	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.19500	41.0	----	10.0	51.0	----	63.8	----	12.8	----	H(QP)
2	0.50600	32.4	----	10.0	42.4	----	56.0	----	13.6	----	H(QP)
3	1.46800	28.1	----	10.0	38.1	----	56.0	----	17.9	----	H(QP)
4	3.09600	23.0	----	10.0	33.0	----	56.0	----	23.0	----	H(QP)
5	13.56000	35.6	----	10.3	45.9	----	60.0	----	14.1	----	H(QP)
6	25.19000	18.8	----	10.7	29.5	----	60.0	----	30.5	----	H(QP)
7	0.19500	----	18.9	10.0	----	28.9	----	53.8	----	24.9	H(CAV)
8	0.50600	----	27.7	10.0	----	37.7	----	46.0	----	8.3	H(CAV)
9	1.46800	----	13.9	10.0	----	23.9	----	46.0	----	22.1	H(CAV)
10	3.09600	----	14.9	10.0	----	24.9	----	46.0	----	21.1	H(CAV)
11	13.56000	----	32.8	10.3	----	43.1	----	50.0	----	6.9	H(CAV)
12	25.19000	----	6.5	10.7	----	17.2	----	50.0	----	32.8	H(CAV)

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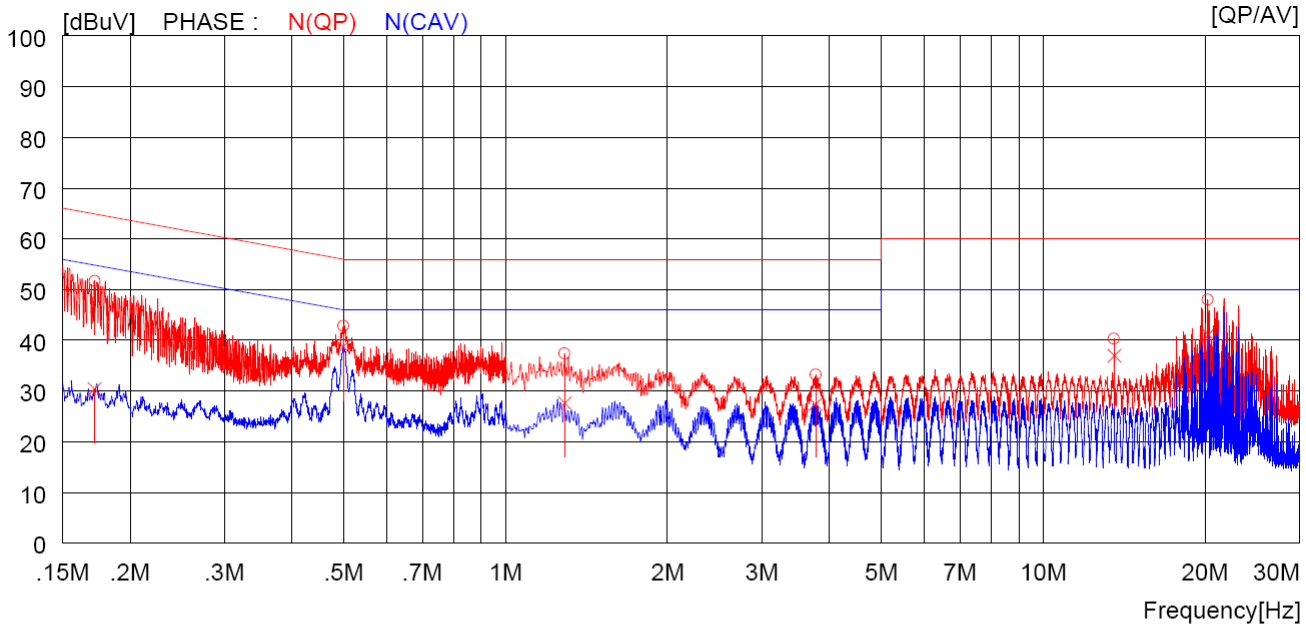
Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17200	41.7	----	10.0	51.7	----	64.9	----	13.2	----	N(QP)
2	0.49900	32.8	----	10.0	42.8	----	56.0	----	13.2	----	N(QP)
3	1.28800	27.4	----	10.0	37.4	----	56.0	----	18.6	----	N(QP)
4	3.77200	23.1	----	10.1	33.2	----	56.0	----	22.8	----	N(QP)
5	13.56000	30.0	----	10.3	40.3	----	60.0	----	19.7	----	N(QP)
6	20.26000	37.3	----	10.7	48.0	----	60.0	----	12.0	----	N(QP)
7	0.17200	----	20.4	10.0	----	30.4	----	54.9	----	24.5	N(CAV)
8	0.49900	----	28.7	10.0	----	38.7	----	46.0	----	7.3	N(CAV)
9	1.28800	----	17.6	10.0	----	27.6	----	46.0	----	18.4	N(CAV)
10	3.77200	----	17.3	10.1	----	27.4	----	46.0	----	18.6	N(CAV)
11	13.56000	----	26.6	10.3	----	36.9	----	50.0	----	13.1	N(CAV)
12	20.26000	----	30.4	10.7	----	41.1	----	50.0	----	8.9	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: Tae-Ho, Kim / Project Engineer

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6.2 Radiated Emission Test below 30 MHz

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

Humidity Level : 43.3 % 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 : Face & Fingerprint Identification Terminal Date: November 07, 2014

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)
0.015	31.75	H	1	180	20.22	0.12	52.09	124.10	72.01
0.025	25.15	H	1	180	19.12	0.12	44.39	119.60	75.21
0.041	23.67	H	1	180	18.39	0.14	42.2	115.30	73.10
0.125	53.43	H	1	180	18.01	0.19	71.63	105.70	34.07
0.18	25.34	H	1	360	18.04	0.21	43.59	102.50	58.91
0.382	19.24	H	1	180	17.99	0.23	37.46	96.00	58.54

Radiated Emission Tabulated Data below 30 MHz

Note: According to the distance of measurements was reduced to 3 m, the limit was extrapolated by using the square of an inverse linear distance extrapolation factor (40 dB/decade) as follows.

Limit calculation: Limit at specified distance + 40log (300/3) = Limit + 80 dB for up to 0.49 MHz

Limit at specified distance + 40log (30/3) = Limit + 40 dB for above 0.49 MHz

Tested by: Tae-Ho, Kim / Project Engineer

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6.3 Radiated Emission Test above 30 MHz

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

Humidity Level : 43.3 % R.H. Temperature: 22 ℃

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

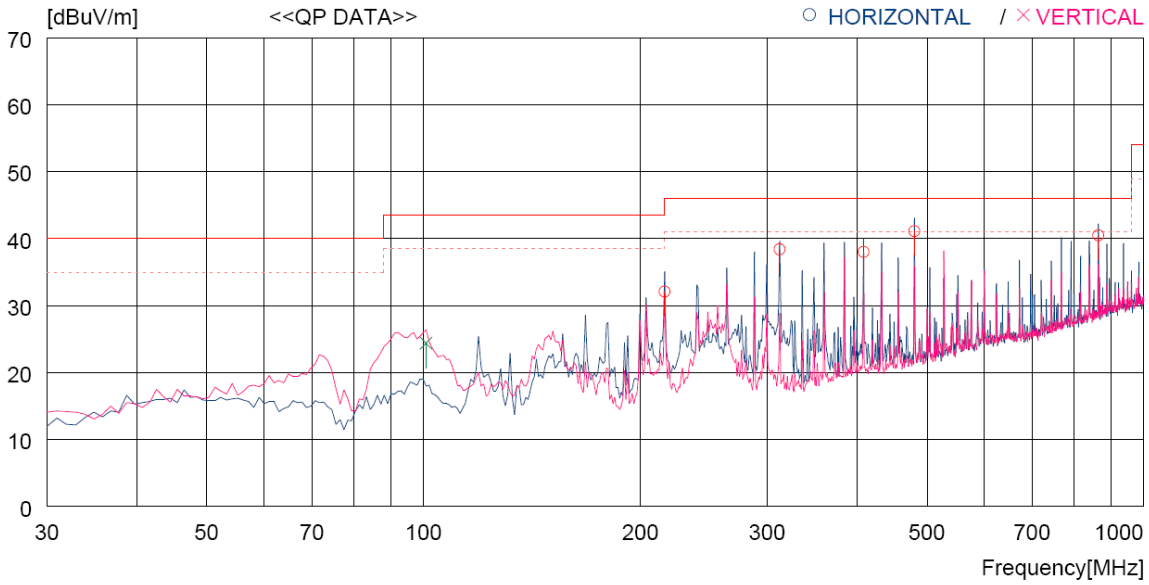
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Type of Test : Low Power Transmitter below 1 705 kHz

Result : PASSED BY 4.90 dB at 480.081 MHz

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

Distance : 3 m



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	216.240	43.4	12.7	9.0	33.0	32.1	46.0	13.9	200	0
2	312.270	46.8	15.0	9.6	33.0	38.4	46.0	7.6	100	359
3	408.300	43.9	17.0	10.1	33.0	38.0	46.0	8.0	100	258
4	480.081	45.6	18.1	10.5	33.1	41.1	46.0	4.9	100	279
5	864.190	37.9	23.0	12.3	32.7	40.5	46.0	5.5	100	359
----- Vertical ------										
6	100.810	35.9	13.6	8.0	33.1	24.4	43.5	19.1	100	0

Tested by: Tae-Ho, Kim / Project Engineer

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6.4 Bandwidth of the operating frequency

Humidity Level : 43.3 % R.H. Temperature: 22 ℃

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

Type of Test : Low Power Transmitter below 1 705 kHz

EUT : Face & Fingerprint Identification Terminal Date: November 06, 2014

Resolution Bandwidth : 0.3 kHz

Video Bandwidth : 1.0 kHz

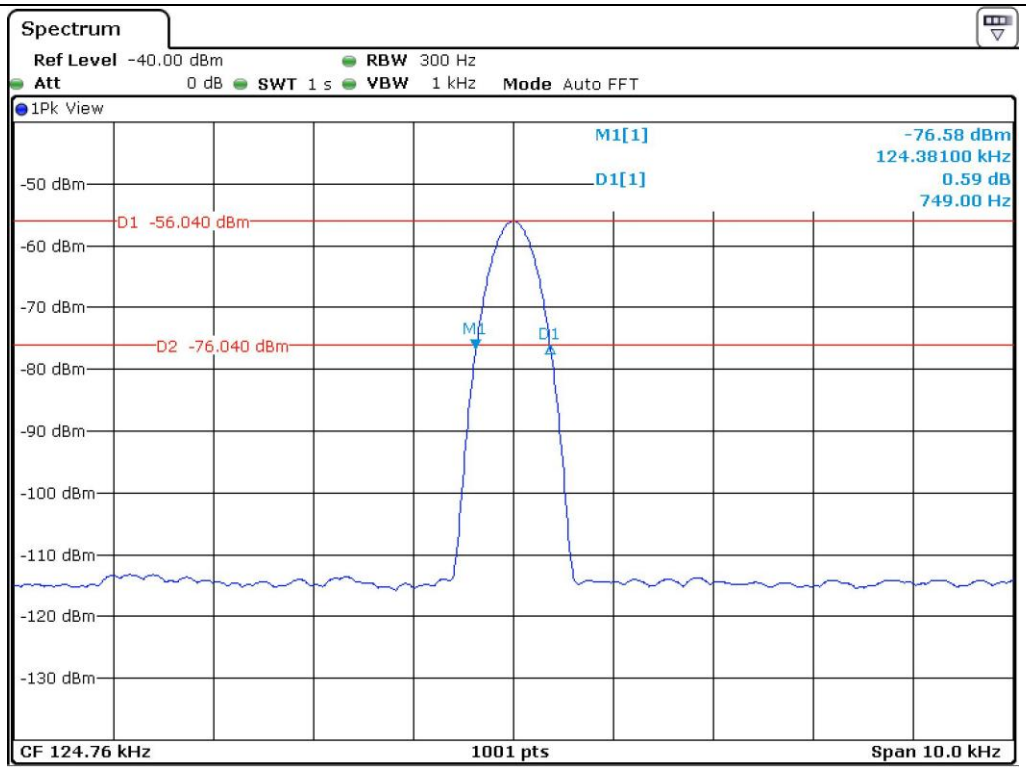
SPAN : 10.00 kHz

Carrier Freq. (kHz)	Bandwidth of the emission. (KHz)	Limit (kHz)	Remark
124.76	7.49	None	The point 20 dB down from the modulated carrier

Remark: Please refer to Photo Data for bandwidth for test data.

Tested by: Tae-Ho, Kim / Project Engineer

Photo Data for bandwidth



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7. 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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8. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESCI	101012	Nov. 03, 2014	One Year	■
2.		R/S	ESU	100261	Apr. 29, 2014	One Year	■
3.		R/S	ESPI	101278	Nov. 16, 2014	One Year	■
4.	Spectrum analyzer	R/S	FSV30	101372	April 28, 2014	One Year	■
5.	Amplifier	Sonoma Instrument	310N	312544	Apr. 28, 2014	One Year	■
6.	Amplifier	Sonoma Instrument	310N	312545	Apr. 28, 2014	One Year	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-225	Apr. 28, 2014	Two Year	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Apr. 02, 2014	Two Year	■
9.	Controller	Innco System	CO2000	619/27030611/L	N/A	N/A	■
10.	LISN	EMCO	3825/2	9109-1867	Apr. 29, 2014	One Year	■
				9109-1869	Apr. 29, 2014	One Year	-
		Schwarzbeck	NSLK8126	8126-404	Apr. 29, 2014	One Year	-
		Schwarzbeck	NSLK8128	8128-216	Apr. 11, 2014	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	MA4000-EP	MA4000/335	N/A	N/A	■
14.	Loop Antenna	R/S	HFH2-Z2	879285/26	Dec. 11, 2012	Two Year	■
15.	Frequency Counter	HP	53152A	US39270295	Oct. 08, 2014	One Year	■
16.	Chamber	Sam Kun	SSE-43CI-A	060712	May 15, 2014	One Year	■
17.	DC Power Supply	Digital Electronics	DRP-305DN	4030195	Sep. 03, 2014	One Year	■

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