Underwriters Laboratories Inc.

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Project No: 10022750
File No: MC17256
Report No: 10022750-FCC-EMC
Date: June 21, 2013
Model No: XT

Electromagnetic Compatibility Test Report

in accordance with FCC Part 15 Subpart B

For

Satellite Mobile Hand Held Terminal

Asia Pacific Satellite Communication Inc.

9FL, Lotte IT Castle 2-Dong, #550-1, Gasan-dong,
Geumcheon-gu, Seoul, 153-768, Korea

Summary of Test Results:

Requirement – Test	Reference standards	Result	Verdict
Conducted Disturbance at the mains ports	FCC Part 15 Subpart B, Class B ANCI C63.4-2009	Pass	Complied
Radiated Disturbance		Pass	Complied

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed as a witness testing and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has

☒ Met the technical requirements
☐ Not met the technical requirements

Witnessed by
Jeawoon, Choi, WiSE Operations Manager
UL Verification Services- 3014ASEO
UL Korea Ltd.
June 21, 2013

Reviewed by
Kyungyong, Kim, WiSE Korea Head
UL Verification Services- 3014ASEO
UL Korea Ltd.
June 21, 2013

Test Report Details

Test Report No:	10022750-FCC-EMC
Witnessed By:	UL Korea Ltd. 33rd FL. GFC Bldg. 737 Yeoksam-dong, Gangnam-gu, Seoul, 135-984, Korea
Test Site:	ONETECH Corp. 301-14 Daessangryeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea The test facility was deemed to have the environment and capabilities necessary to perform the tests included in the test package.
Applicant:	Asia Pacific Satellite Communication Inc. 9FL, Lotte IT Castle 2-Dong, #550-1, Gasan-dong, Geumcheon-gu, Seoul, 153-768, Korea
Manufacturer:	Asia Pacific Satellite Communication Inc. 9FL, Lotte IT Castle 2-Dong, #550-1, Gasan-dong, Geumcheon-gu, Seoul, 153-768, Korea
Applicant Contact:	Jinhyo Park
Job Title:	Manager
Phone:	+82 2 2026 7860
E-mail:	jhpark@apspace.co.kr
Product Type:	Satellite Mobile Hand Held Terminal
Model Number:	XT
FCC ID:	TZ5XT
Product standards:	FCC Part 15 Subpart B Class B
Equipment Code:	JBP
FCC Classification :	Class B Computing Device Peripheral
FCC Procedure :	Certification
Additional model number:	N/A
Trademark:	APSI
Product standards:	FCC Part 15 Subpart B Class B
Sample Serial Number:	N/A
Sample Receive Date:	May 10, 2013
Testing Start Date:	May 13, 2013
Date Testing Complete:	June 7, 2013
Overall Results:	**Pass**

UL Korea Ltd. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports.

REPORT DIRECTORY

1. General Product Description

1.1 Report Revision History

Revision Date	Description	Remarks
-	Original	-

1.2 Equipment Description

Description:
XT is the Satellite Mobile Hand Held Terminal for Thuraya satellite mobile communication service based on GMR-1 and GMPRS-1. It supports various services such as voice, circuit data, packet data and fax etc.

1.3 Details of Test Equipment (EUT)

Equipment Configuration:				
No.	Product Type	Manufacturer	Model	Comments
EUT	Satellite Mobile Hand Held Terminal	Asia Pacific Satellite Communication Inc.	XT	-
EUT	AC Adaptor	KUANTECH INCORPORATION. CO	KSAS0100500200D5	-
AE	Monitor	Daewon Computer	DWCOM17	-
AE	Key Board	SAMSUNG	SEM-DT35	-
AE	Mouse	SAMSUNG	SMOP-1310	
AE	PC	N/A	N/A	

1.4 EUT Internal operating frequency

Frequency (MHz)	Description	Frequency (MHz)	Description
12	CPU Clock	-	-
***Note:** Internal operating Frequency of EUT are below that 108MHz.			

1.5 Details information of Multi-listing model:

Model name	Description:
N/A	N/A
***Note:** The manufacturer has declared to all the multiple model names into the basic model without any further evaluation by UL.	

1.6 Technical Data:

Item	Specification	Comment
Transmitter frequency range(s)	1626.5~1660.5 MHz	-
Channel Bandwidth	31.25 kHz	-
Receiver frequency range(s)	1525~1559 MHz	-
Transmitter power	Max 2 W	Typical 1.8 W
Radiated power (EIRP)	Max 7 dBW	Min 5.0 dBW
Intermediate frequency	246 MHz	Level -20 dBm
Frequency Accuracy	Uncorrected: < ± 5ppm	Corrected: < ± 0.006ppm
Kind of Baseband signal	Voice / circuit data / packet data/ fax	-
Kind of modulation (s)	π/4-CQPSK, π/4-CBPSK, π/4-DBPSK	-
Data rate(s)	Tx: 2.4Kbps /4.8Kbps/ 9.6Kbps /14.4Kbps	Rx2.4Kbps /4.8Kbps/ 9.6Kbps /60Kbps
FEC	Convolution (1/2, 1/3, 1/4,1/5)	-
Power supply (Battery Voltage)	DC 3.7 V	-
Note: All the technical data described above were provided by the manufacturer.		

1.7 Technical descriptions and documents:

No.	Document Title and Description
1	User manual and Specification
***Note:** The applicant provided the following document.	

1.8 Equipment Marking Plate:

2. Test Condition

2.1 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Satellite Mobile Hand Held Terminal	Asia Pacific Satellite Communication Inc.	XT	
EUT	AC Adaptor	KUANTECH INCORPORATION. CO	KSAS0100500200D5	-
AE	Monitor	Daewon Computer	DWCOM17	-
AE	Key Board	SAMSUNG	SEM-DT35	
AE	Mouse	SAMSUNG	SMOP-1310	
AE	PC	N/A	N/A	
*** Note:** EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, SIM - Simulator (Not Subjected to Test)				

2.2 Input/Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
1	Power Input	DC	N	N	Connected to DC Power supply
2	Radio Antenna	I/O	N	Y	-
*** Note:** * AC = AC Power Port, DC = DC Power Port, N/E = Non-Electrical, I/O = Signal Input or Output Port (Not Involved in Process Control), TP = Telecommunication Ports					

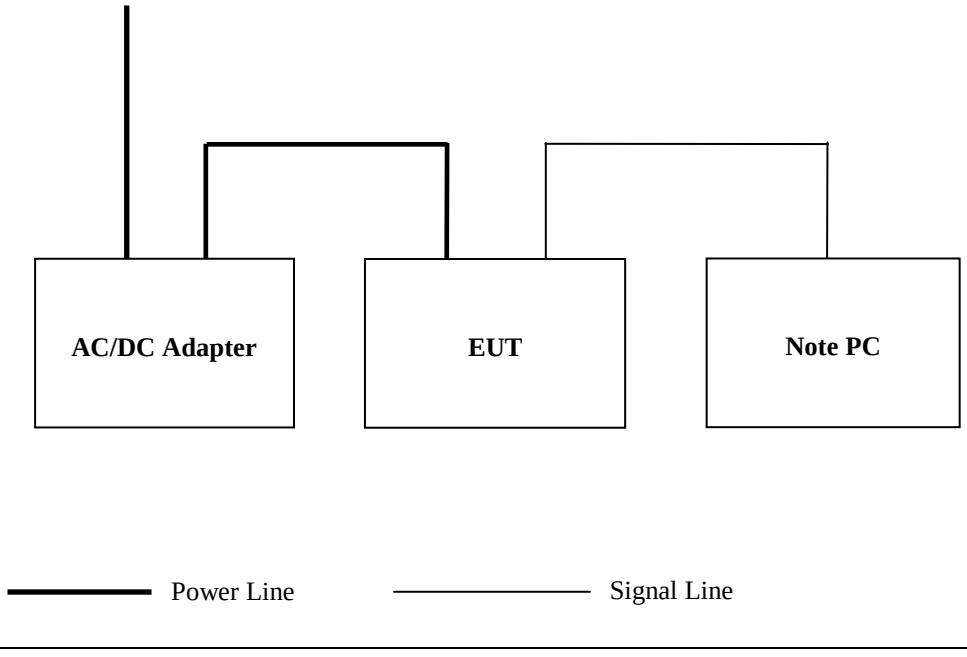
2.3 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Comments
Rated	3.7 V	-	-	DC	-
1	3.7 V	-	-	DC	-
2	3.5 V	-	-	DC	-
3	4.2 V	-	-	DC	-

2.4 EUT Operation Modes:

Mode #	Description
1	Continuous Printing mode with USB with AC Power Mode.
2	Continuous Printing mode with USB with Battery Mode.

2.5 Test Configuration:

	Description
1	

3. Test Condition and Results

3.1 Mains Terminal Disturbance Voltage Test

TEST: Limits of mains terminal disturbance voltage				
Method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.			
Basic Standard	EN55022: 2010			
Parameters recorded during the test	Laboratory Ambient Temperature	22 ℃		
	Relative Humidity	40 %		
-	Frequency range on each side of line	Measurement Point		
Fully configured sample scanned over the following frequency range	150 kHz to 30 MHz	Input A.C. Power ports of Adaptor		
Limits - Class B				
Frequency (MHz)	Limit (dBμV)			
	Quasi-Peak	Result	Average	Result
0.15 to 0.50	66 to 56	**Pass**	56 to 46	**Pass**
0.50 to 5	56	**Pass**	46	**Pass**
5 to 30	60	**Pass**	50	**Pass**
EUT Configuration Settings:				
EUT Operation Mode # (See Section 2.4)			EUT Configurations Mode # (See Section 2.5)	
1			1	

Conducted Emissions Test Equipment used:				
Description	Manufacturer	Model	Identifier	Cal. Due
Test Receiver	Rohde & Schwarz	ESHS10	834467/007	2013.06.21
AMN	Schwarzbeck	NSLK 8126	8126-404	2014.05.29
AMN	EMCO	3825/2	9109-1867	2014.05.20

Supplementary information: The test method which is not harmonized with the standard was defined by manufacturer.

Figure 1. Test Setup for Conducted Emissions

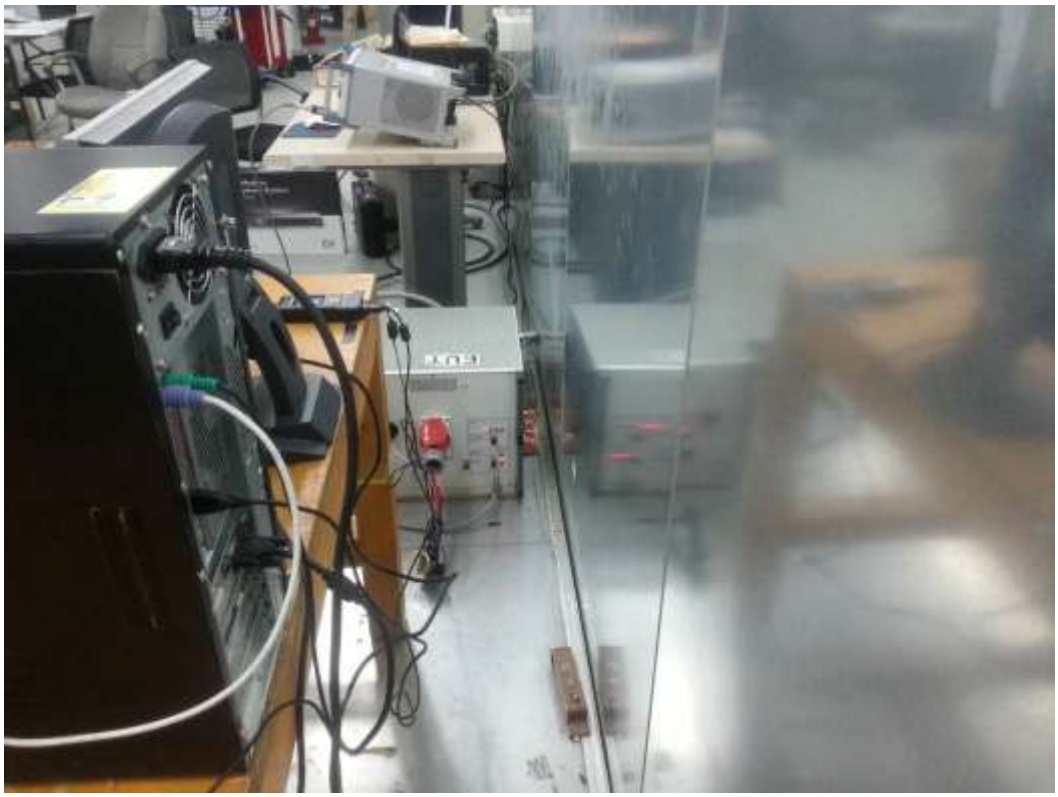
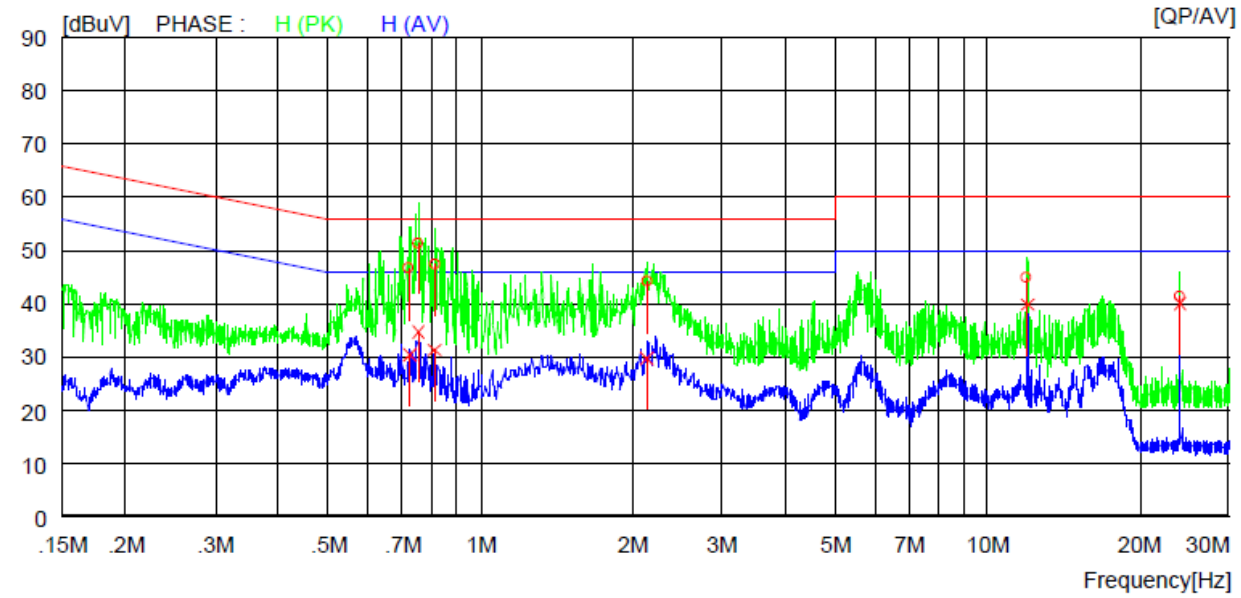


Figure 2. Graphical representation of conducted emissions

Line Polarity: + / -

HOT Line



NEUTRAL Line

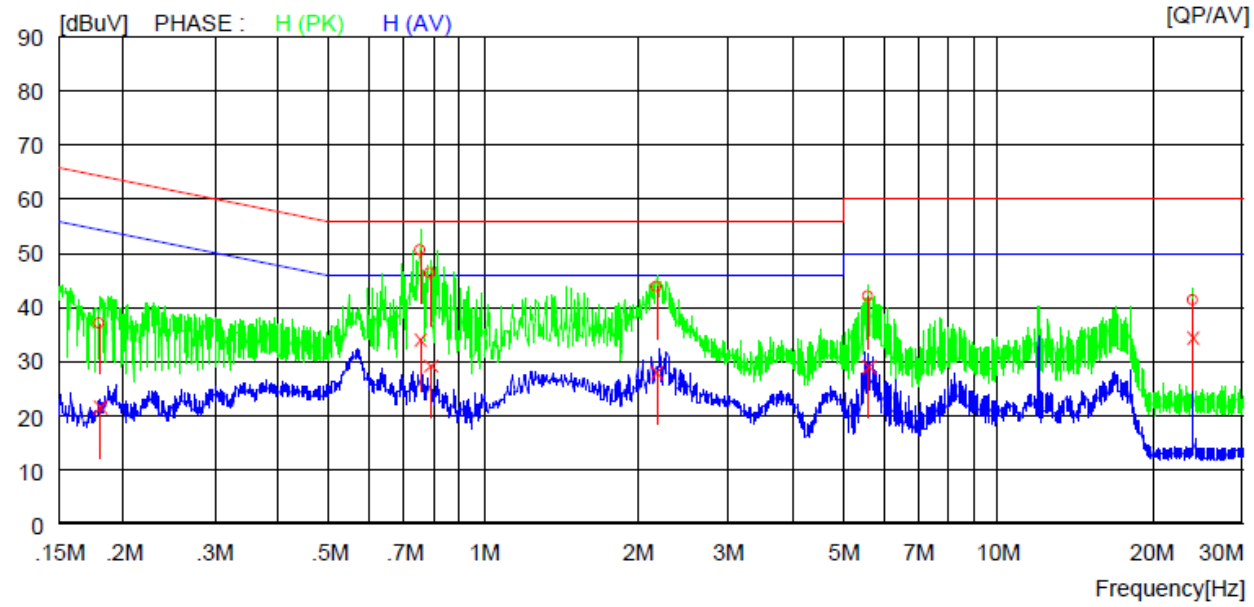


Table 1. Conducted Emissions Data Table

Line Polarity: + / -

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	0.72700	36.3	----	10.3	46.6	----	56.0	----	9.4	----	H (PK)
2	0.75300	41.1	----	10.3	51.4	----	56.0	----	4.6	----	H (PK)
3	0.81500	36.8	----	10.4	47.2	----	56.0	----	8.8	----	H (PK)
4	2.13600	33.5	----	10.6	44.1	----	56.0	----	11.9	----	H (PK)
5	12.00000	34.6	----	10.2	44.8	----	60.0	----	15.2	----	H (PK)
6	24.02000	30.9	----	10.4	41.3	----	60.0	----	18.7	----	H (PK)
7	0.72700	----	20.1	10.3	----	30.4	----	46.0	----	15.6	H (AV)
8	0.75600	----	24.5	10.3	----	34.8	----	46.0	----	11.2	H (AV)
9	0.81500	----	21.0	10.4	----	31.4	----	46.0	----	14.6	H (AV)
10	2.13600	----	19.3	10.6	----	29.9	----	46.0	----	16.1	H (AV)
11	12.00000	----	29.7	10.2	----	39.9	----	50.0	----	10.1	H (AV)
12	24.02000	----	29.8	10.4	----	40.2	----	50.0	----	9.8	H (AV)

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	0.18000	26.9	----	10.3	37.2	----	64.5	----	27.3	----	H (PK)
2	0.75400	40.2	----	10.3	50.5	----	56.0	----	5.5	----	H (PK)
3	0.79100	35.9	----	10.4	46.3	----	56.0	----	9.7	----	H (PK)
4	2.17600	33.1	----	10.6	43.7	----	56.0	----	12.3	----	H (PK)
5	5.62000	31.8	----	10.1	41.9	----	60.0	----	18.1	----	H (PK)
6	24.02000	30.9	----	10.4	41.3	----	60.0	----	18.7	----	H (PK)
7	0.18000	----	11.3	10.3	----	21.6	----	54.5	----	32.9	H (AV)
8	0.75500	----	23.8	10.3	----	34.1	----	46.0	----	11.9	H (AV)
9	0.79100	----	18.9	10.4	----	29.3	----	46.0	----	16.7	H (AV)
10	2.17600	----	17.5	10.6	----	28.1	----	46.0	----	17.9	H (AV)
11	5.62000	----	18.9	10.1	----	29.0	----	50.0	----	21.0	H (AV)
12	24.02000	----	24.0	10.4	----	34.4	----	50.0	----	15.6	H (AV)

Remark : “H”: Hot Line, “N”: Neutral Line.
See next page for an overview sweep performed with peak and average detector.

3.2 Radiated Disturbance

TEST: Limits for radiated disturbance					
Method	Measurements were made in a 3-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at 1, 2, 3 and 4 meter heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.				
Basic Standards	EN55022: 2010				
Parameters recorded during the test	Laboratory Ambient Temperature	20 ℃			
	Relative Humidity	38 %			
	Frequency range	Measurement Point			
Fully configured sample scanned over the following frequency range	30 MHz – 6.0 GHz	10 meter measurement distance below 1 GHz 3 meter measurement distance above 1 GHz			
Limits – Class B					
Limit (dBμV/m)					
Frequency (MHz)	Quasi-Peak	Results			
30 to 230	30	**Pass**			
230 to 1000	37	**Pass**			
Frequency (GHz)	Peak	Average	Results		
1 to 6	74	54	**Pass**		
EUT Configuration Settings:					
EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.5)				
1	1				
Radiated Emissions Test Equipment:					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	101013	2012.10.14	2013.10.14
EMI Test Receiver	Rohde & Schwarz	ESU	100261	2013.05.27	2014.05.27
Amplifier	Sonoma Instrument	310N	312544	2013.05.21	2014.05.21
Amplifier	Sonoma Instrument	310N	312545	2013.05.21	2014.05.21
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	2012.04.24	2014.04.24
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	2012.02.27	2014.02.27
Controller	Innco System	CO2000	619/27030611/L	N/A	N/A
Turn Table	Innco System	DT3000	930611	N/A	N/A
Antenna Master	Innco System	MA4000-EP	3320611	N/A	N/A
Antenna Master	Innco System	MA4000-EP	3350611	N/A	N/A

Figure 3. Photo of Radiated emission test setup below 1 GHz

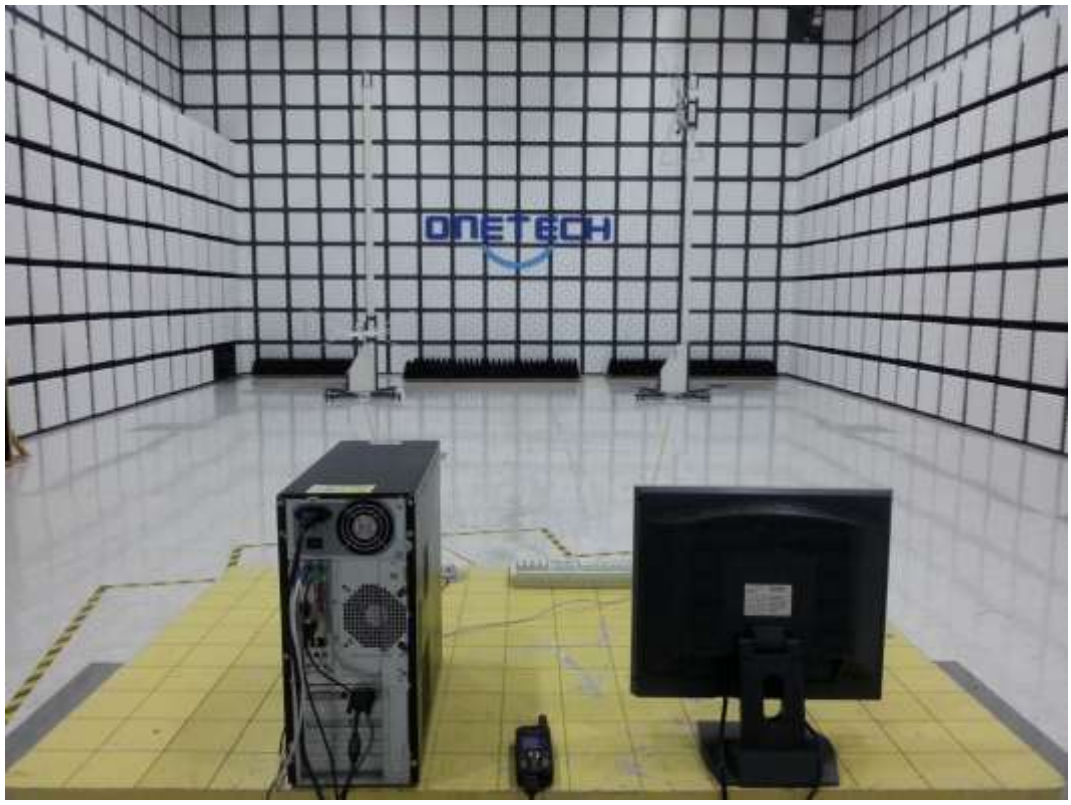
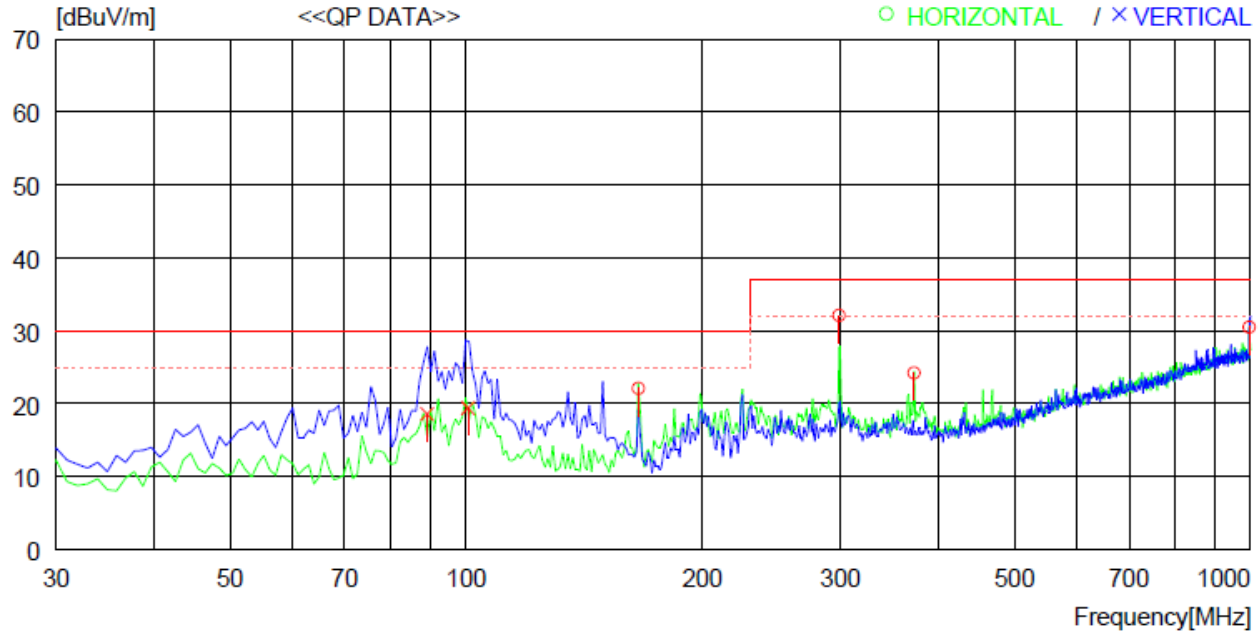


Table 2. Radiated Emissions Data Below 1 GHz



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	298.800	47.3	13.7	4.0	32.9	32.1	37.0	4.9	300	330
2	165.800	43.2	8.9	3.0	33.0	22.1	30.0	7.9	300	256
3	996.106	31.4	22.9	7.4	31.2	30.5	37.0	6.5	100	279
4	372.410	37.3	15.4	4.5	33.0	24.2	37.0	12.8	300	202
----- Vertical ------										
5	89.170	38.9	9.9	2.5	32.7	18.6	30.0	11.4	100	316
6	100.540	37.5	11.8	2.7	32.6	19.4	30.0	10.6	100	0

Note:
Radiated Disturbance were tested both of AC power mode and Battery mode, and AC power mode is recorded as the worst case.

Figure 4. Photo of Radiated emission test setup 1 GHz ~ 6 GHz

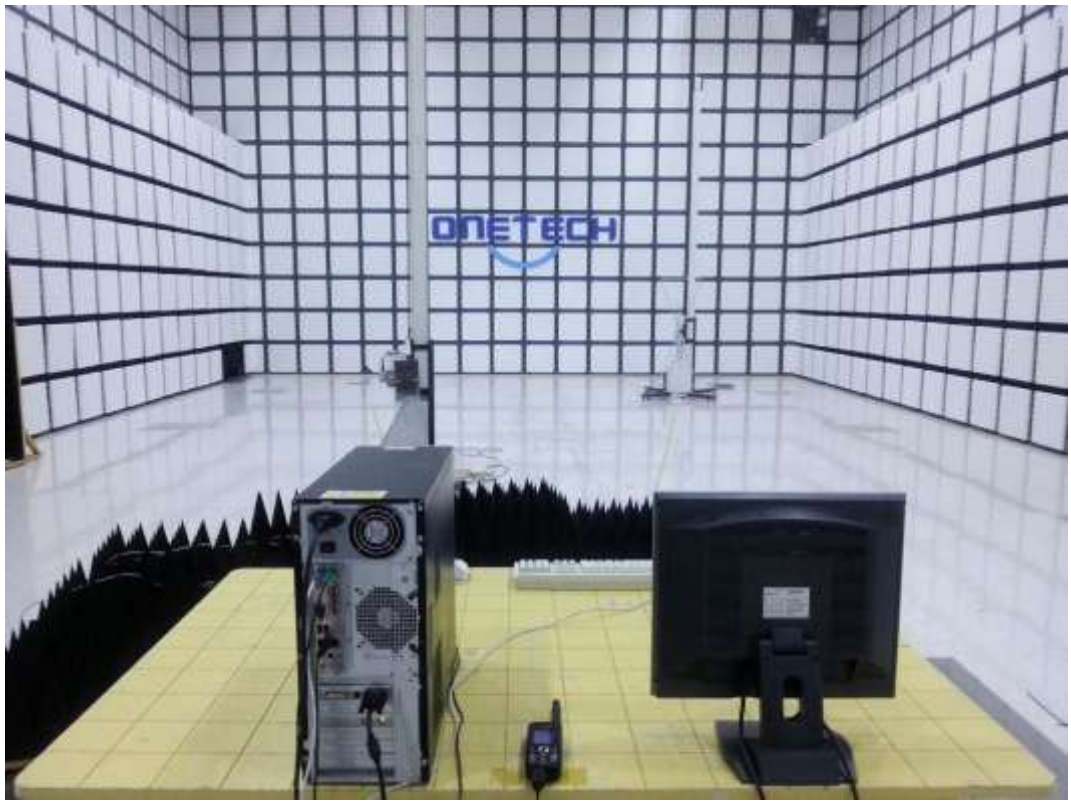
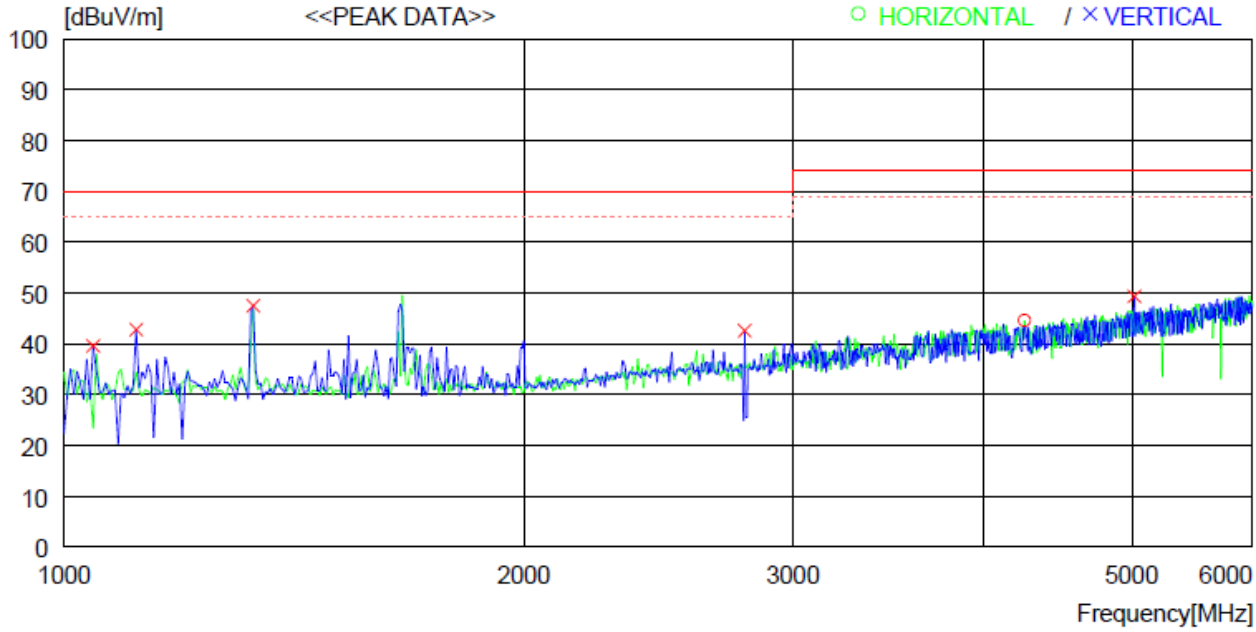
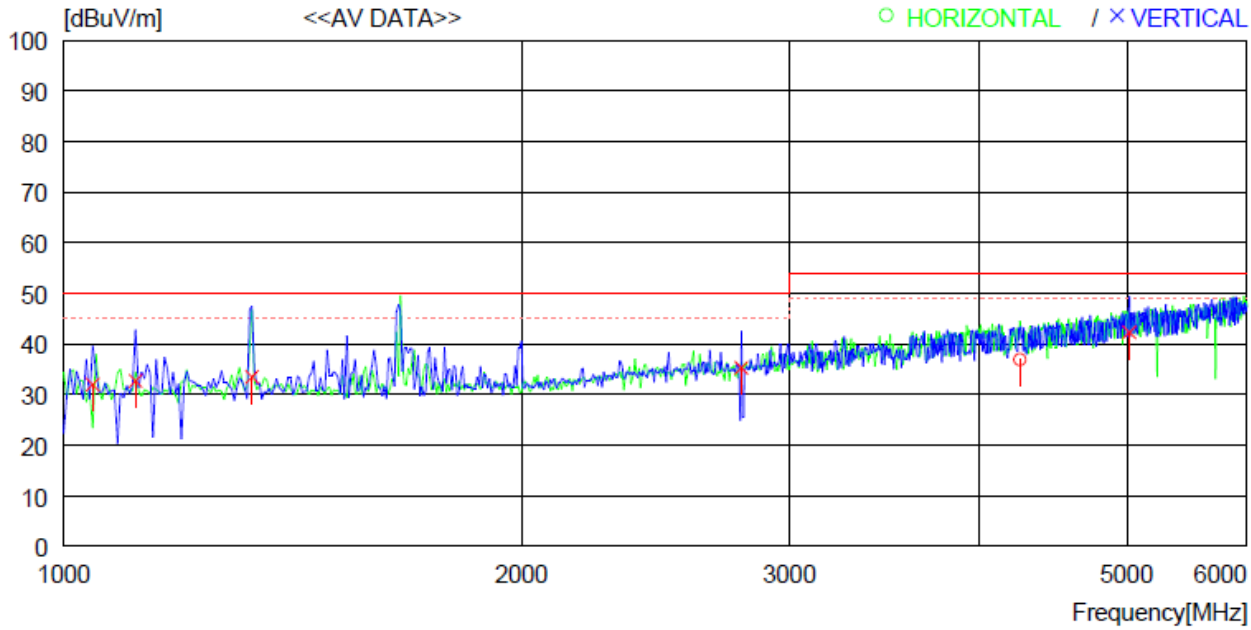


Table 3. Radiated Emissions Data 1 GHz ~ 6 GHz _ Peak



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	4255.000	47.9	30.2	9.2	42.8	44.5	74.0	29.5	100	58
----- Vertical ------										
2	1045.000	51.5	25.9	4.4	42.3	39.5	70.0	30.5	100	359
3	1115.000	54.5	25.9	4.7	42.4	42.7	70.0	27.3	100	359
4	1330.000	59.0	26.0	5.0	42.6	47.4	70.0	22.6	100	350
5	2790.000	50.0	28.0	7.5	43.0	42.5	70.0	27.5	100	356
6	5020.000	50.1	31.4	10.1	42.3	49.3	74.0	24.7	100	350

Table 4. Radiated Emissions Data 1 GHz ~ 6 GHz _ Average



No.	FREQ [MHz]	READING AV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	4255.000	40.2	**30.2**	9.2	42.8	36.8	54.0	17.2	100	58
----- Vertical ------										
2	1330.000	45.0	**26.0**	5.0	42.6	33.4	50.0	16.6	100	350
3	1045.000	43.9	**25.9**	4.4	42.3	31.9	50.0	18.1	100	359
4	1115.000	44.4	**25.9**	4.7	42.4	32.6	50.0	17.4	100	359
5	2790.000	42.7	**28.0**	7.5	43.0	35.2	50.0	14.8	100	356
6	5020.000	43.0	**31.4**	10.1	42.3	42.2	54.0	11.8	100	350

Appendix A - Accreditations and Authorizations

ONETECH Corp. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Mark
Accreditation	Korea	KOLAS	No. 85	ISO/IEC 17025
Site Filing	USA	FCC	KR0013	Test Facility list & NSA Data
	Japan	VCCI	C-940 R-906 T-1842	Test Facility list & NSA Data
Certification	Korea	KC	KR0013	Test Facility list & NSA Data

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".