

EMC TEST REPORT

Test item : Medical Image Processing Unit
Model No. : 1012WGB
Order No. : DTNC1507-03747, DTNC1507-03750
Date of receipt : 2015-07-28
Test duration : 2015-08-12 ~ 2015-08-17
Date of Issue : 2015-09-10

Applicant : Rayence Co., Ltd.
14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, Korea

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification : CAN/CSA CISPR 22-10
ANSI C 63.4:2009
ICES-003:2012
FCC Part 15 Subpart B
Class A digital devices

Test environment : Temperature : (22 ~ 23) °C,
Humidity : (42 ~ 54) % R.H.

Test result : ☒ Comply ☐ Not Comply

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



Engineer
JunHo Park

Reviewed by:



Technical Manager
YoungKyu Shin

PRESIDENT OF DT&C Co., Ltd.

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1. General Remarks

This report contains the result of tests performed by:

DT&C Co., Ltd.

Address : 42, Yurim-ro 154beon-gil, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, Korea, 449-935

<http://www.dtnet.net>

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

DT&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Mark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
Site Filing	USA	FCC	KR0034 101842 678747, 596748, 804488, 165783	Accredited 2.948 Listed
	Canada	IC	5740A-1 5740A-2	Registered
	Japan	VCCI	C-1427 R-1364, R-3385, R-4076, R-4180, T-1442, G-338, G754, G-815	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 13 11 86721 001	ISO/IEC 17025

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".

3. General Information of EUT

Product Name	Medical Image Processing Unit
Model Name	1012WGB
Serial No	N/A
Type of Sample Tested	Pre-Production
Supplied Power for Test	120 V, 60 Hz
Rating Power	AC 100-240 V, 47~63 Hz
Clock Frequency	200 MHz
Applicant	Rayence Co., Ltd. 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, Korea
Manufacturer	Rayence Co., Ltd. 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, Korea
Factory	Rayence Co., Ltd. 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, Korea

4. Test Summary

4.1 Applied standards and test results

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4:2009 CAN/CSA CISPR 22-10	C
Radiated Disturbance	ANSI C63.4:2009 CAN/CSA CISPR 22-10	C
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		

The data in this test report are traceable to the national or international standards.

4.2 Test environment and conditions

Test Items	Test date (YYYY-MM-DD)	Temp (°C)	Humidity (% R.H.)
Conducted Disturbance	2015-08-17	23	53
Radiated Disturbance	2015-08-12	23	54
	2015-08-17	22	42

5. Test Set-up and operation mode

5.1 Principle of Configuration Selection

Emission : The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

5.2 Test Operation Mode

- EUT was scanning image periodically and sending to PC through LAN cable.

5.3 Support Equipment Used

Unit	Model No.	Serial No.	Manufacturer	CABLE			Backshell	FCC ID
				Connect type	Length (m)	shield		
PSE (EUT)	1012WGB	N/A	Rayence Co., Ltd.	-	-	-	-	-
Detector (EUT)	1012WGB	N/A	Rayence Co., Ltd.	-	-	-	-	-
Note PC	110-4103TU	5C92090V98	HP	-	-	-	-	-

NOTE

- See "APPENDIX 2 Photographs" for actual system test setup

6. Test Results : Emission

6.1 Conducted Disturbance

6.1.1 Measurement Procedure

In the range of 0.15 MHz to 30 MHz, the conducted disturbance was measured and set-up was made accordance with **ANSI C63.4 and CAN/CSA CISPR 22**.

If the EUT is table top equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 0.4 m from the conducting wall of the shielded room.

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Connect the EUT's power source lines to the appropriate power mains / peripherals through the LISN. All the other peripherals are connected to the 2nd LISN, if any.

Unused measuring port of the LISN was resistively terminated by 50 ohm terminator.

The measuring port of the LISN for EUT was connected to spectrum analyzer.

Using conducted emission test software, the emissions were scanned with peak detector mode.

After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and Average detector.

By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.

For further description of the configuration refer to the picture of the test set-up.

6.1.2 Limit for Conducted Disturbance

(1) Conducted disturbance at mains ports.

Frequency range (MHz)	Limits dB(μV)			
	Quasi-peak		Average	
	Class A	Class B	Class A	Class B
0.15 to 0.50	79	66 to 56	66	56 to 46
0.50 to 5	73	56	60	46
5 to 30		60		50
Note 1 The lower limit shall apply at the transition frequencies.				
Note 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Note) 1. Emission Level = Reading Value + Correction Factor.

2. Correction Factor = Cable Loss + Insertion Loss of LISN

3. Margin = Limit - Emission level

Test Result

Results of Conducted Emission

DTNC

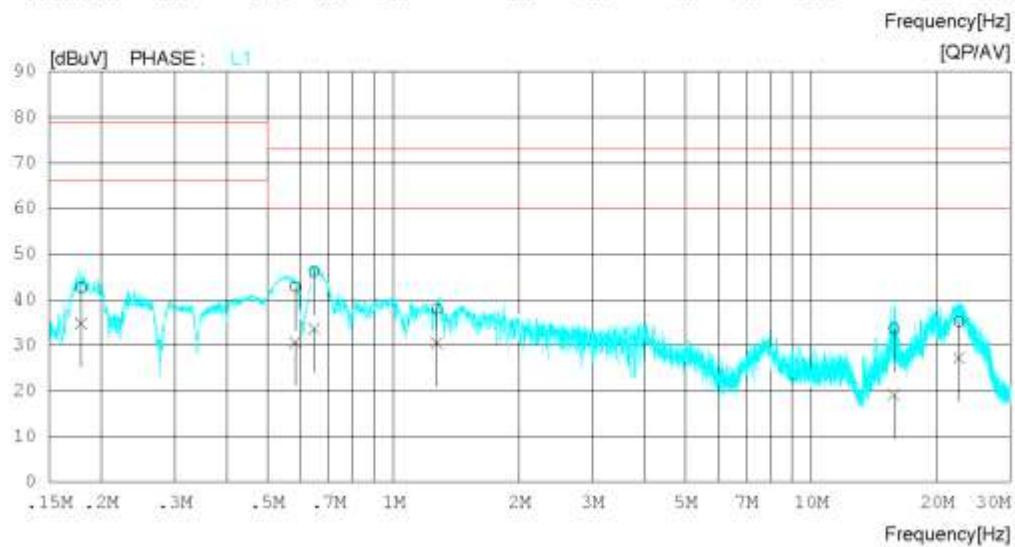
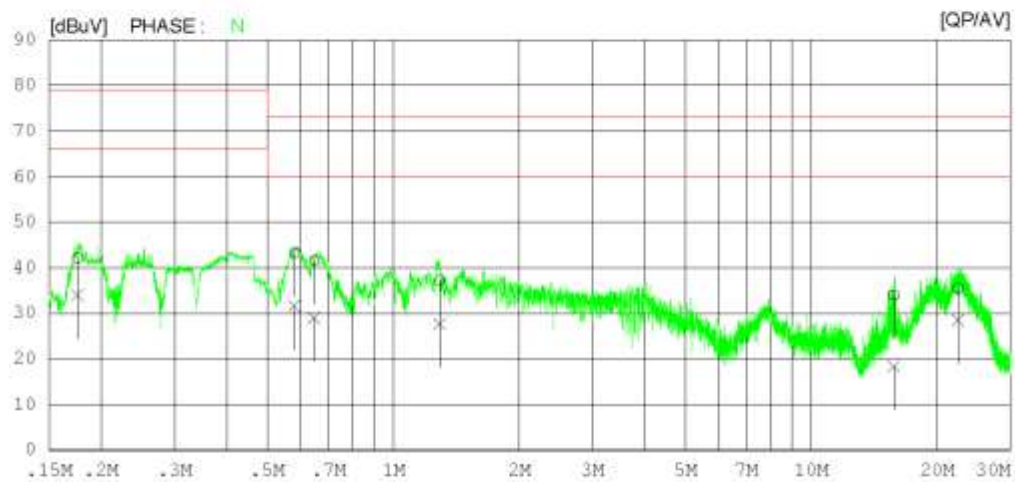
Date : 2015-08-17

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V, 60 Hz
Temp/Humi. : 23 °C, 53 %R.H.
Operator :

Memo :

LIMIT : CISPR22_A QP
CISPR22_A AV



Results of Conducted Emission

DTNC

Date : 2015-08-17

Order No.	:	DTNC1507-03747, 03750	Reference No.	:	
Model No.	:		Power Supply	:	120 V, 60 Hz
Serial No.	:		Temp/Humi.	:	23 °C, 53 %R.H.
Test Condition	:		Operator	:	

Memo :

LIMIT : CISPR22_A QP
CISPR22_A AV

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	0.17537	32.2	24.0	10.0	42.2	34.0	79.0	66.0	36.8	32.0	N
2	0.57950	33.2	21.5	10.1	43.3	31.6	73.0	60.0	29.7	28.4	N
3	0.64573	31.5	18.9	10.1	41.6	29.0	73.0	60.0	31.4	31.0	N
4	1.29080	27.1	17.5	10.1	37.2	27.6	73.0	60.0	35.8	32.4	N
5	15.79440	23.5	7.8	10.5	34.0	18.3	73.0	60.0	39.0	41.7	N
6	22.48400	24.9	17.8	10.6	35.5	28.4	73.0	60.0	37.5	31.6	N
7	0.17863	32.5	24.6	10.1	42.6	34.7	79.0	66.0	36.4	31.3	L1
8	0.58247	32.8	20.6	10.0	42.8	30.6	73.0	60.0	30.2	29.4	L1
9	0.64550	36.2	23.6	10.0	46.2	33.6	73.0	60.0	26.8	26.4	L1
10	1.27080	27.9	20.4	10.1	38.0	30.5	73.0	60.0	35.0	29.5	L1
11	15.79160	22.9	8.3	10.8	33.7	19.1	73.0	60.0	39.3	40.9	L1
12	22.61240	24.1	16.2	11.0	35.1	27.2	73.0	60.0	37.9	32.8	L1

6.2 Radiated Disturbance

6.2.1 Measurement Procedure

The radiated disturbance was measured and set-up was made accordance with **ANSI C63.4 and CAN/CSA CISPR 22**.

If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 3 m or 10 m away from the interference receiving antenna in the **10 m semi-anechoic chamber**.

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Rotate the EUT from (0 - 360)° and position the receiving antenna at heights from (1 - 4) m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

For below 1 GHz frequency range, Quasi-Peak detector with 120 kHz RBW was used.

Also Peak and Average detector with 1 MHz RBW were used for above 1 GHz frequency range.

For further description of the configuration refer to the picture of the test set-up.

6.2.2 Limit for Radiated Disturbance

- The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 – 500	2 000
500 – 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

(1) Limit for Radiated Emission below 1 000 MHz

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (3 m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

Note 1 The lower limit shall apply at the transition frequency.

Note 2 Additional provisions may be required for cases where interference occurs.

Note 3 According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards(CISPR), Pub. 22 shown as below.

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (10 m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 230	40	30
230 to 1 000	47	37

(2) Limits for Radiated Emission above 1 000 MHz at a measuring distance of 3 m

Frequency (GHz)	Class A Equipment		Class B Equipment	
	Peak (dBμV/m)	Average (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
1 to 40	80	60	74	54

Note) 1. Emission Level = Reading Value + Loss – Gain + Ant Factor

2. Margin = Limit - Emission level

3. Below 6 GHz : Loss = Cable Loss, Gain = Amp Gain, Ant Factor = Antenna Factor

4. (6 ~ 18) GHz : Loss = Cable Loss, Ant Factor = Antenna Factor - Amp Gain

Test Result

< 30 MHz ~ 1 GHz >

RADIATED EMISSION

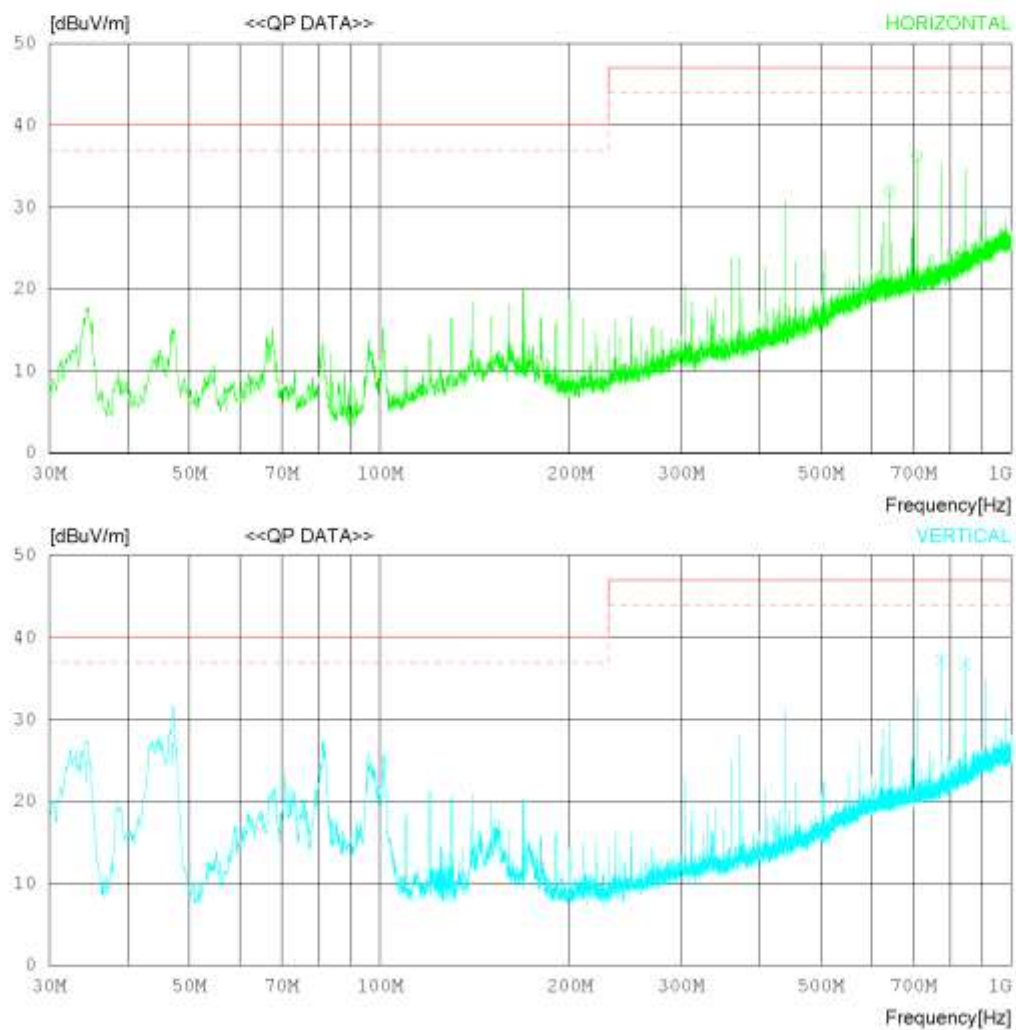
Date : 2015-08-12

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V, 60 Hz
Temp/Humi : 23 °C, 54 % R.H.
Operator :

Memo :

LIMIT : CISPR Pub.22 Class A (10m)
MARGIN: 3 dB



RADIATED EMISSION

Date : 2015-08-12

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V, 60 Hz
Temp/Humi : 23 °C, 54 % R.H.
Operator :

Memo :

LIMIT : CISPR Pub 22 Class A (10m)
MARGIN: 3 dB

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	641.265	35.3	20.6	5.9	29.8	32.0	47.0	15.0	102	117
2	708.909	38.7	21.3	6.5	30.3	36.2	47.0	10.8	102	130
----- Vertical -----										
3	34.350	42.5	11.6	1.4	30.7	24.8	40.0	15.2	100	1
4	47.075	43.5	12.4	1.7	30.6	27.0	40.0	13.0	100	190
5	776.255	38.9	22.4	6.9	30.9	37.3	47.0	9.7	300	11
6	843.749	36.7	23.2	7.1	30.3	36.7	47.0	10.3	200	358

< (1 ~ 6) GHz _ Peak >

RADIATED EMISSION

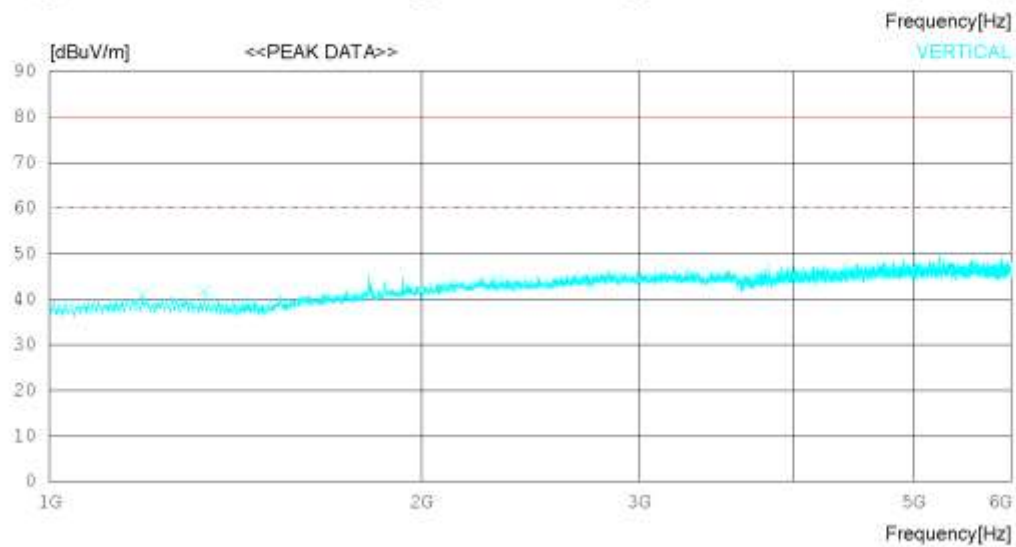
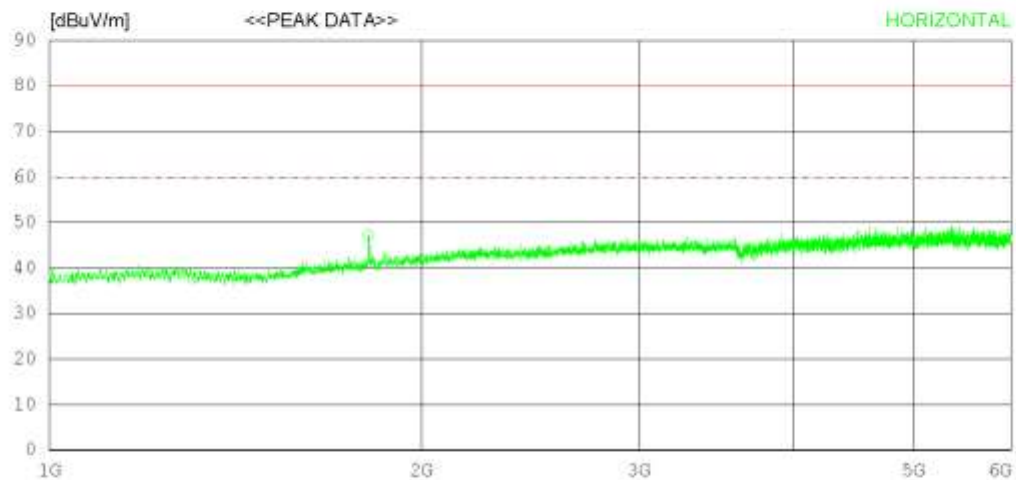
Date : 2015-08-17

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 22 °C 42 % R.H.
Operator :

Memo :

LIMIT : FCC_CLASS A_PK_1-18G
FCC_CLASS A_AV_1-18G



RADIATED EMISSION

Date : 2015-08-17

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 22 °C 42 % R.H.
Operator :

Memo :

LIMIT : FCC_CLASS A_PK_1-18G
FCC_CLASS A_AV_1-18G

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	1811.250	59.9	30.6	4.5	47.8	47.2	80.0	32.8	100	1
----- Vertical -----										
2	1188.750	56.3	28.8	3.7	47.6	41.0	80.0	39	100	358
3	1333.125	57.2	28.9	3.8	48.1	41.8	80.0	38.2	100	358

< (1 ~ 6) GHz _ Average >

RADIATED EMISSION

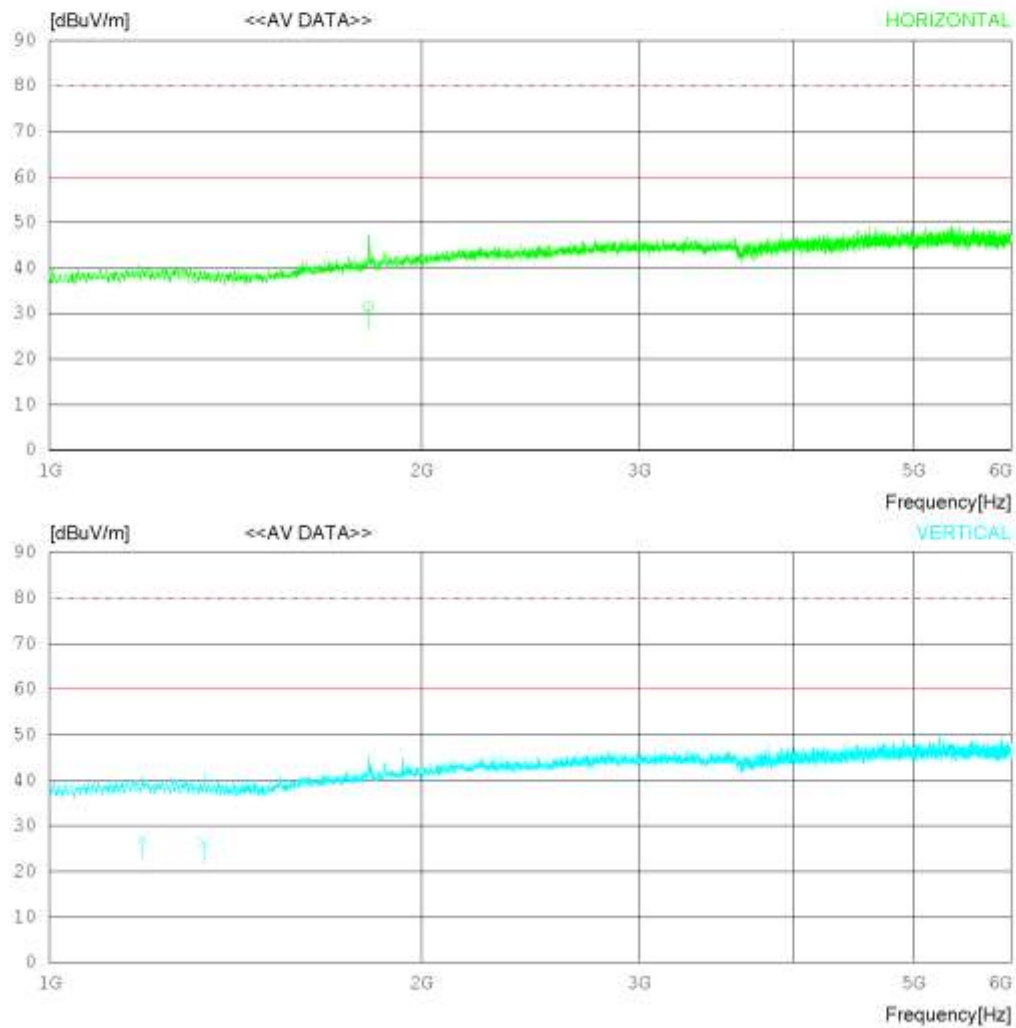
Date : 2015-08-17

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 22 °C 42 % R.H.
Operator :

Memo :

LIMIT : FCC_CLASS A_AV_1-18G
FCC_CLASS A_PK_1-18G



RADIATED EMISSION

Date : 2015-08-17

Order No. : DTNC1507-03747, 03750
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 22 °C 42 % R.H.
Operator :

Memo :

LIMIT : FCC_CLASS A_AV_1-18G
FCC_CLASS A_PK_1-18G

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	1811.250	44.2	30.6	4.5	47.8	31.5	60.0	28.5	100	1
----- Vertical -----										
2	1188.750	42.4	28.8	3.7	47.8	27.1	60.0	32.9	100	358
3	1333.125	41.8	28.9	3.8	48.1	26.4	60.0	33.6	100	358

Appendix 1

List of Test and Measurement Instruments

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment is identified by the Test Laboratory.

1. Conducted Disturbance

Name of Instrument	Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☒ MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0143	TSJ	N/A	N/A	N/A
☒ EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2015.02.25	2016.02.25
☒ LISN	ESH2-Z5	ROHDE & SCHWARZ	828739/006	2014.09.11	2015.09.11

2. Radiated Disturbance

Name of Instrument	Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☒ MEASUREMENT SOFTWARE	EMI-R VER. 2.00.0121	TSJ	N/A	N/A	N/A
☒ EMI TEST RECEIVER	ESU	ROHDE & SCHWARZ	100538	2015.02.06	2016.02.06
☒ TRILOG BROAD BAND ANTENNA	VULB9160	SCHWARZBECK	9160-3339	2015.04.14	2017.04.14
☒ LOW NOISE PRE AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2015.02.25	2016.02.25
☒ HORN ANTENNA	3117	ETS-LINDGREN	00152093	2014.01.30	2016.01.30
☒ LOW NOISE PRE AMPLIFIER	MLA-100M18-B01-42	TSJ	1872271	2015.05.26	2016.05.26

Appendix 2

Photographs of the Test Configurations

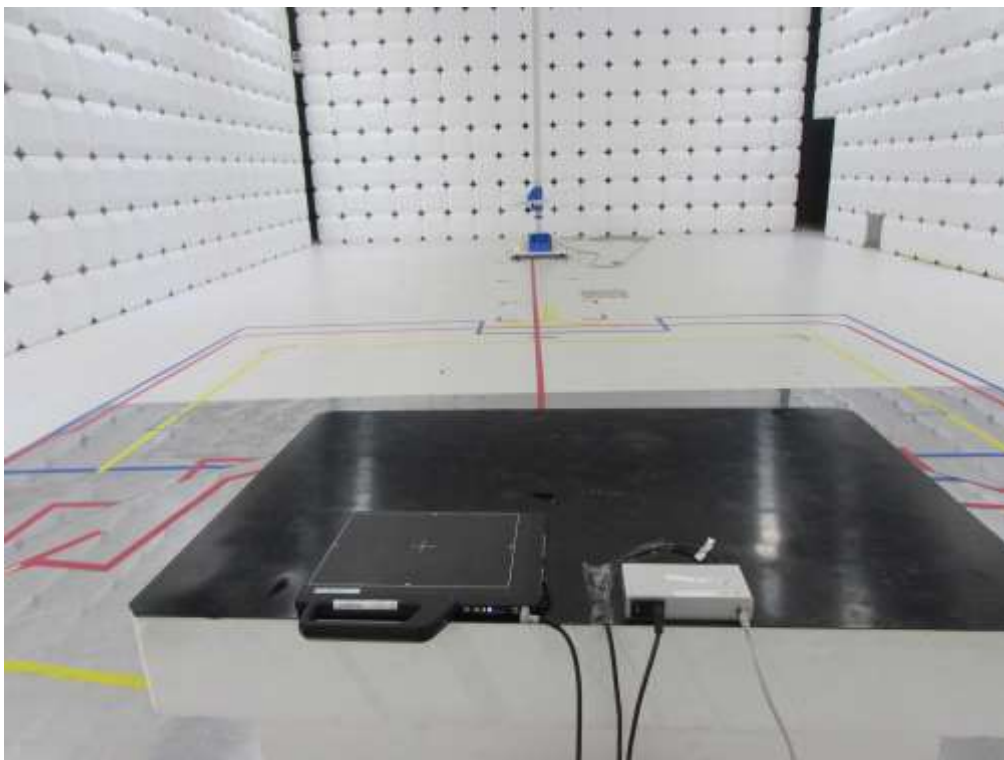
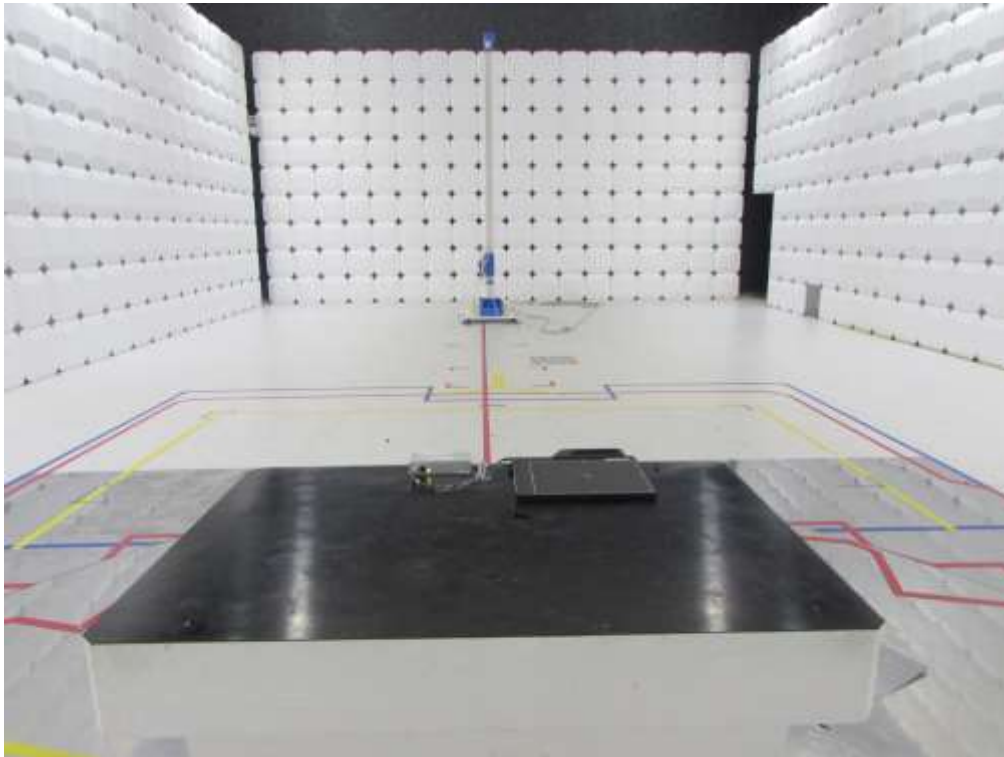
- 1. Conducted Disturbance**
- 2. Radiated Disturbance**

A2-1. Conducted Disturbance

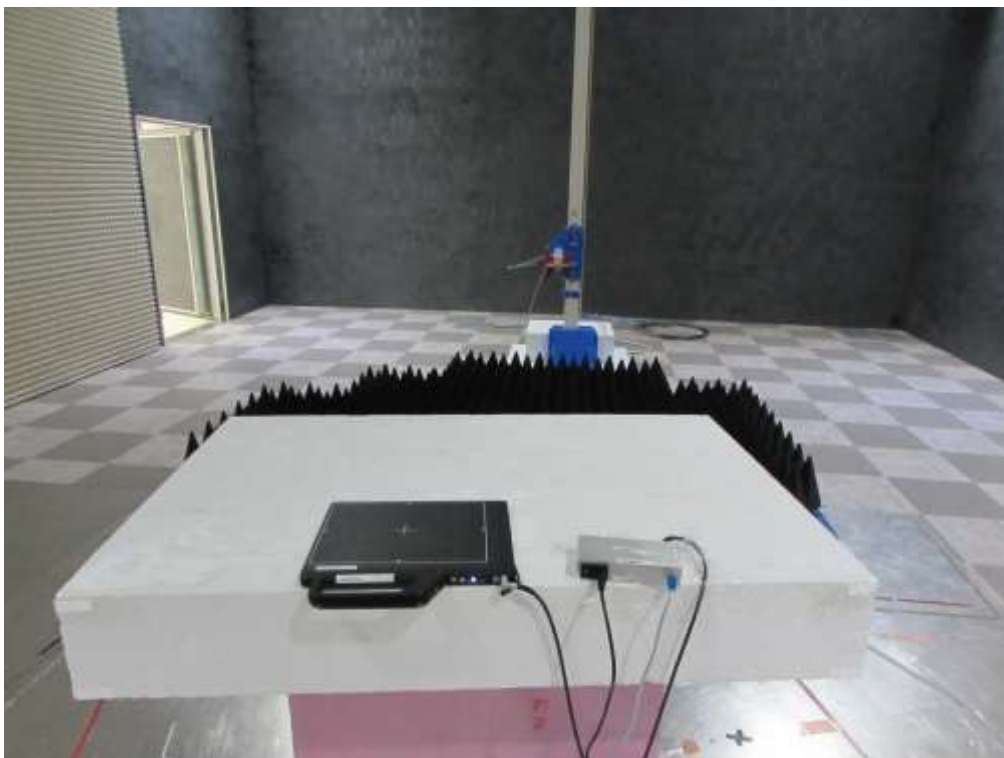
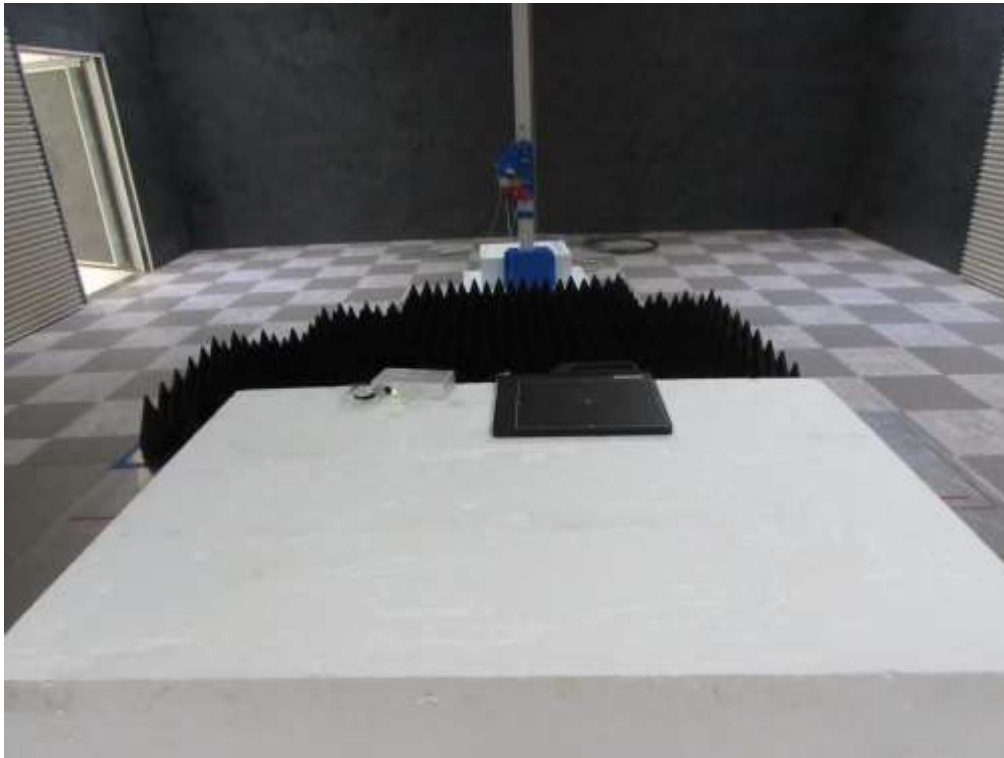


A2-2. Radiated Disturbance

< 30 MHz ~ 1 GHz >



< (1 ~ 6) GHz >



Appendix 3

Photographs of EUT

A3. EUT

1. Front View of Product



2. Rear View of Product



A3. EUT

3. Inside View of Product

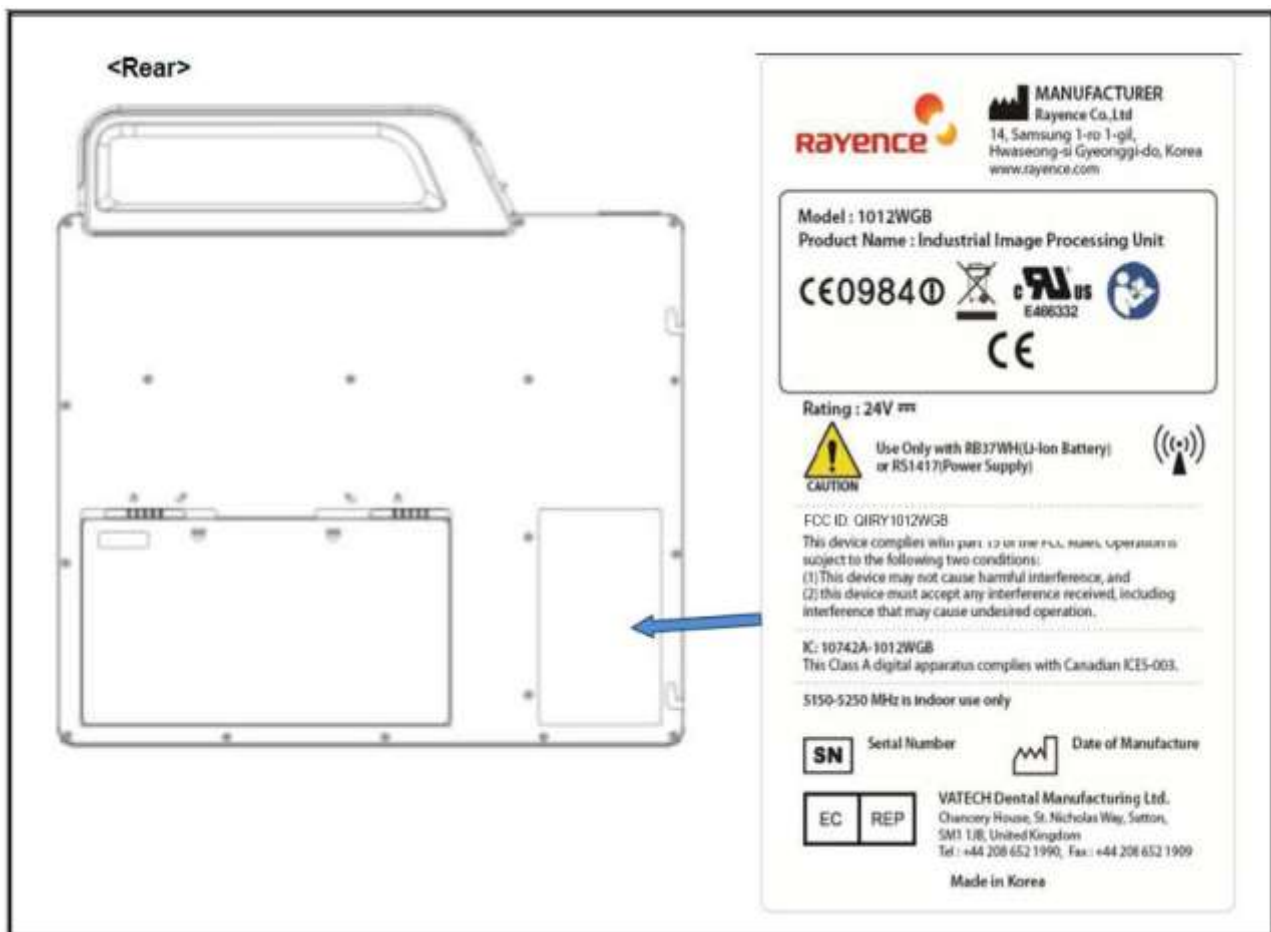


Appendix 4

SAMPLE LABEL & LOCATION

LABELLING REQUIREMENTS

The Label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase



- The FCC label shown is representative of the label that will appear on the radio when in production.
Other information may also be included on this label.

Appendix 5

Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
None	Original	N/A	N/A