

# EMC TEST REPORT

Test item : Medical Image Processing Unit  
Model No. : 1012WCA  
Order No. : DTNC1507-03670, DTNC1507-03671  
Date of receipt : 2015-07-23  
Test duration : 2015-08-12 ~ 2015-08-17  
Date of Issue : 2015-11-02

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 : (44~ 56) % R.H.

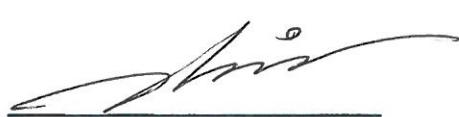
Test result :  Comply  Not Comply

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.dtnc.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	1012WCA
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	52
Radiated Disturbance	2015-08-12 2015-08-17	23 22	56 44

## 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)	1012WCA	N/A	Rayence Co., Ltd.	-	-	-	-	-
Detector (EUT)	1012WGB	EFR015300053	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 2<sup>nd</sup> 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

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**Test Result**

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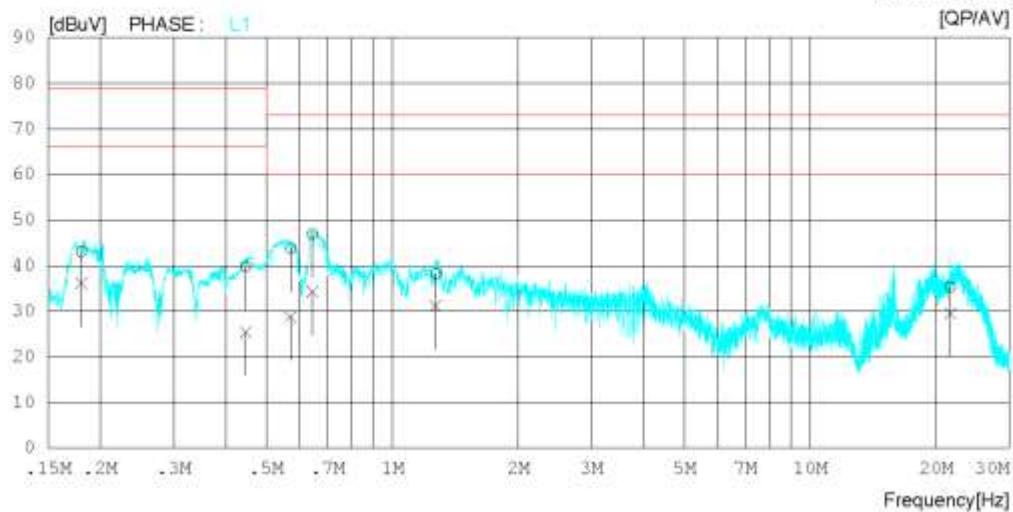
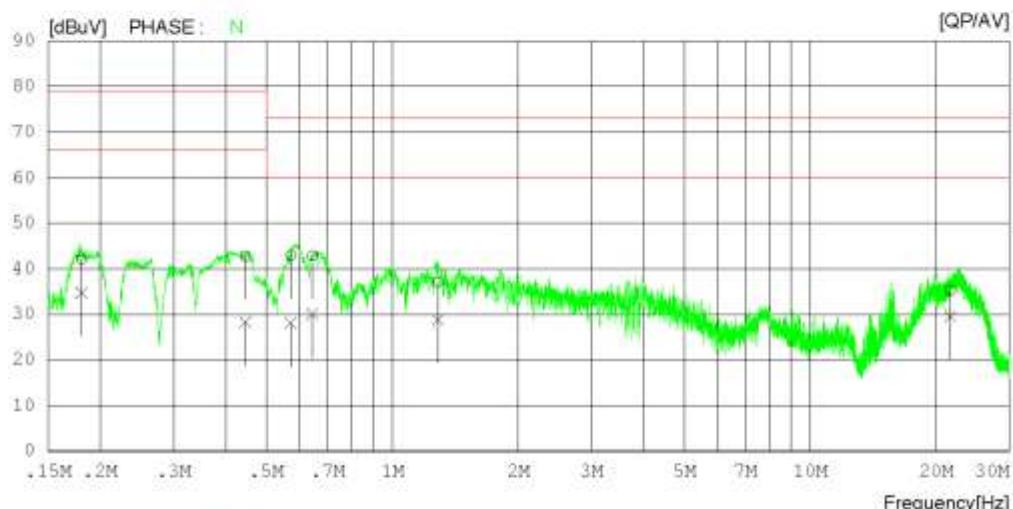
**Results of Conducted Emission**

DTNC

Date : 2015-08-17

Order No.	:	DTNC1507-03670, 03671	Reference No.	
Model No.	:		Power Supply	120 V, 60 Hz
Serial No.	:		Temp/Humi.	23 °C, 52 % R.H.
Test Condition	:		Operator	
Memo	:			

LIMIT : CISPR22\_A QP  
CISPR22\_A AV



## Results of Conducted Emission

DTNC

Date : 2015-08-17

Order No. : DTNC1507-03670, 03671 Referrence No.  
Model No. : Power Supply : 120 V, 60 Hz  
Serial No. : Temp/Humi. : 23 'C, 52 %R.H.  
Test Condition : Operator :

Memo :

LIMIT : CISPR22\_A QP  
CISPR22\_A AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN [dBuV]	PHASE [dBuV]
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]		
1	0.18043	32.1	24.7	10.0	42.1	34.7	79.0	66.0	36.9	31.3 N
2	0.44483	32.7	18.2	10.1	42.8	28.3	79.0	66.0	36.2	37.7 N
3	0.57115	32.8	17.9	10.1	42.9	28.0	73.0	60.0	30.1	32.0 N
4	0.64387	32.8	20.0	10.1	42.9	30.1	73.0	60.0	30.1	29.9 N
5	1.28720	27.0	18.7	10.1	37.1	28.8	73.0	60.0	35.9	31.2 N
6	21.66240	24.7	19.0	10.6	35.3	29.6	73.0	60.0	37.7	30.4 N
7	0.18014	33.0	26.0	10.1	43.1	36.1	79.0	66.0	35.9	29.9 L1
8	0.44535	29.8	15.5	10.0	39.8	25.5	79.0	66.0	39.2	40.5 L1
9	0.57127	33.8	18.8	10.0	43.8	28.8	73.0	60.0	29.2	31.2 L1
10	0.64323	37.0	24.3	10.0	47.0	34.3	73.0	60.0	26.0	25.7 L1
11	1.27000	28.2	21.1	10.1	38.3	31.2	73.0	60.0	34.7	28.8 L1
12	21.66160	24.4	18.7	10.9	35.3	29.6	73.0	60.0	37.7	30.4 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 <sup>th</sup> 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 (dB $\mu$ V/m)	Quasi-peak (dB $\mu$ V/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 (dB $\mu$ V/m)	Quasi-peak (dB $\mu$ V/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 (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Peak (dB $\mu$ V/m)	Average (dB $\mu$ V/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

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**Test Result**

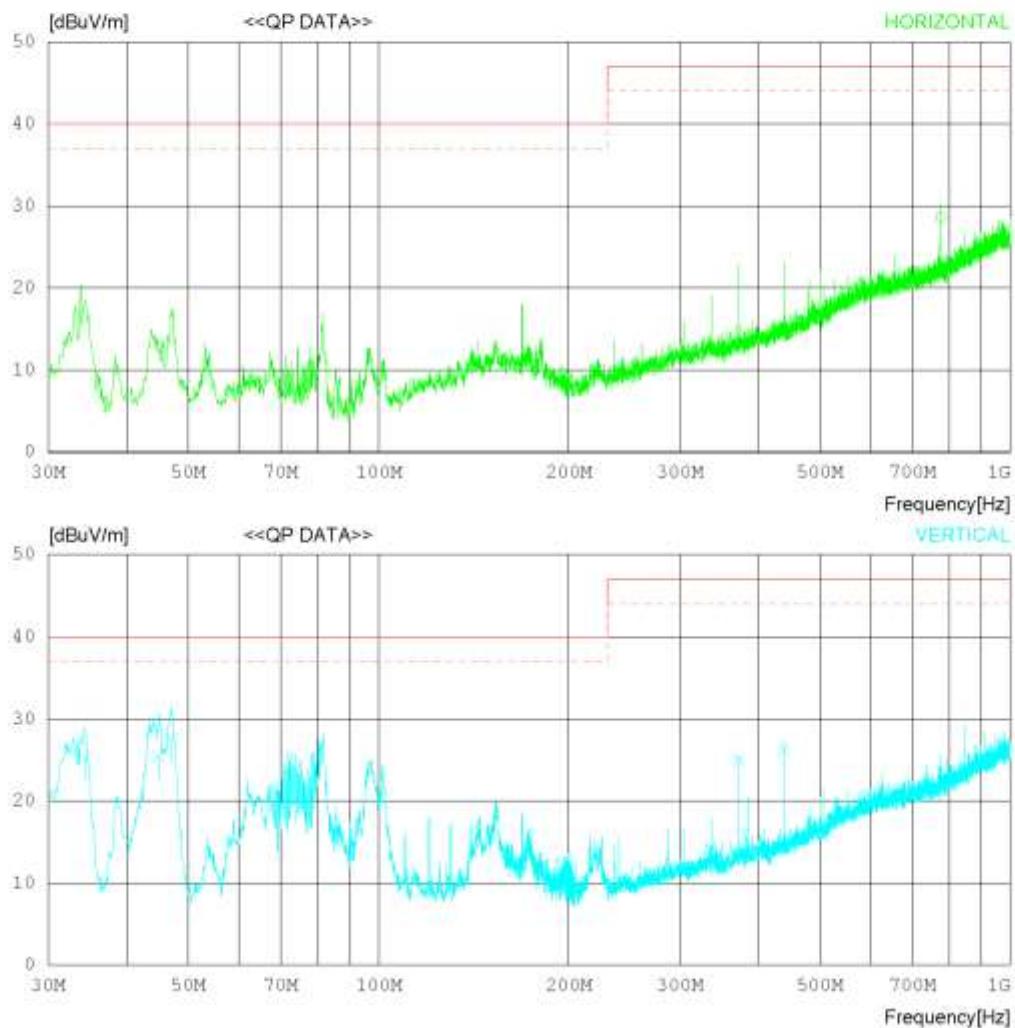
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**< 30 MHz ~ 1 GHz >****RADIATED EMISSION**

Date : 2015-08-12

Order No.	:	DTNC1507-03670, 03671	Reference No	:
Model No.	:		Power Supply	:
Serial No.	:		Temp/Humi	:
Test Condition	:		Operator	:

Memo :

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

## RADIATED EMISSION

Date : 2015-08-12

Order No. : DTNC1507-03670, 03671      Reference No.  
Model No. :      Power Supply : 120 V, 60 Hz.  
Serial No. :      Temp/Humi : 23 °C, 56 % R.H.  
Test Condition :      Operator

Memo : :

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

No.	FREQ [MHz]	READING [dBuV]	QP [dB]	ANT FACTOR	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
<hr/>											
1	776.339	30.2	22.4	6.9	30.9	28.6	47.0	18.4	100	192	
<hr/>											
2	34.286	43.0	11.6	1.4	30.7	25.3	40.0	14.7	100	146	
3	44.791	42.0	12.4	1.6	30.6	25.4	40.0	14.6	100	199	
4	47.016	44.0	12.4	1.7	30.6	27.5	40.0	12.5	100	288	
5	371.254	35.7	15.2	4.6	30.5	25.0	47.0	22.0	100	294	
6	438.752	35.0	16.7	5.0	30.5	26.2	47.0	20.8	100	100	

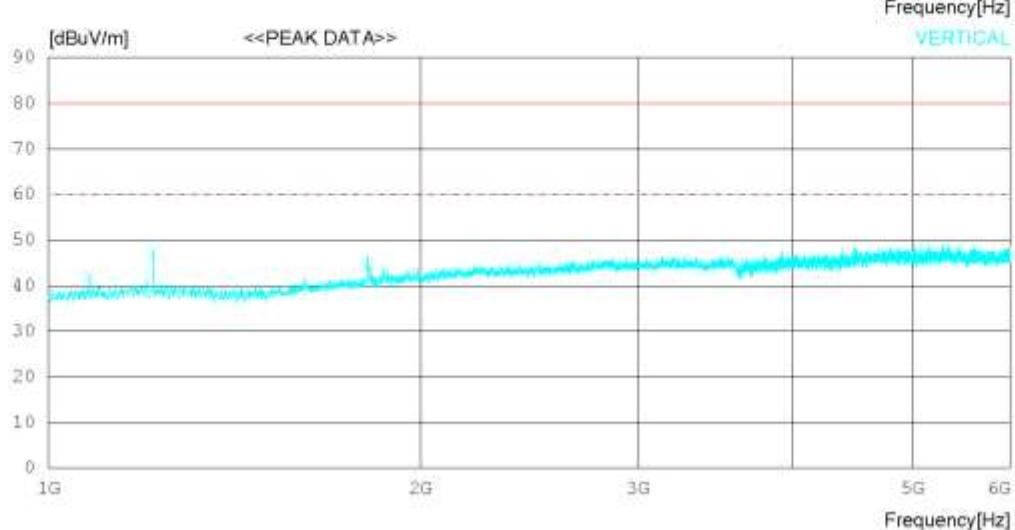
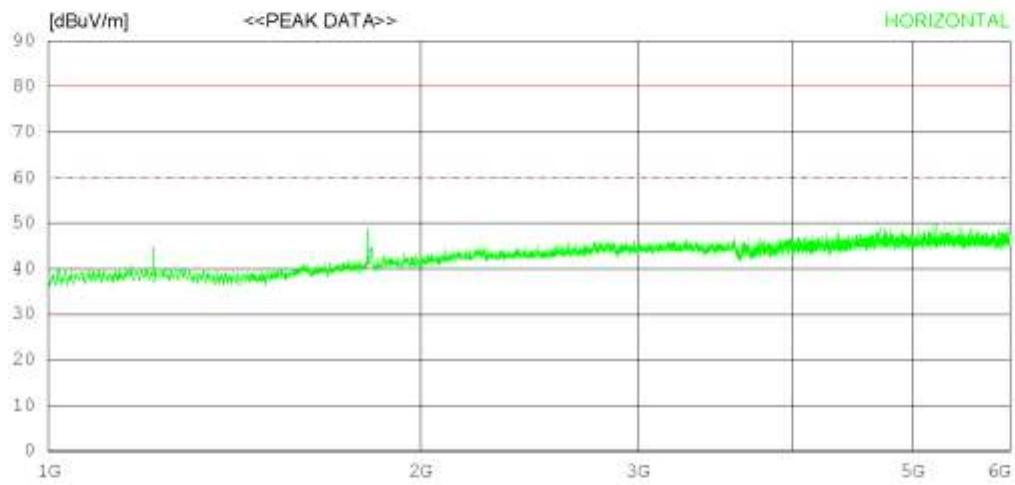
## &lt; (1 ~ 6) GHz \_ Peak &gt;

RADIATED EMISSION

Date : 2015-08-17

Order No.	:	DTNC1507-03670, 03671	Reference No.	
Model No.	:		Power Supply	120 V 60 Hz
Serial No.	:		Temp/Humi	22 °C 44 % R.H.
Test Condition	:		Operator	

Memo :

LIMIT : FCC\_CLASS A\_PK\_1-18G  
FCC\_CLASS A\_AV\_1-18G

## RADIATED EMISSION

Date : 2015-08-17

Order No. : DTNC1507-03670, 03671      Reference No.  
Model No. :      Power Supply : 120 V    60 Hz.  
Serial No. :      Temp/Humi : 22 'C    44 % R.H.  
Test Condition :      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]
----- Vertical -----										
1	1079.375	58.0	28.3	3.5	47.7	42.1	80.0	37.9	100	64
2	1215.000	62.8	28.9	3.5	47.7	47.5	80.0	32.5	100	92
3	1811.250	58.0	30.6	3.7	47.8	44.5	80.0	35.5	100	64

&lt; (1 ~ 6) GHz \_ Average &gt;

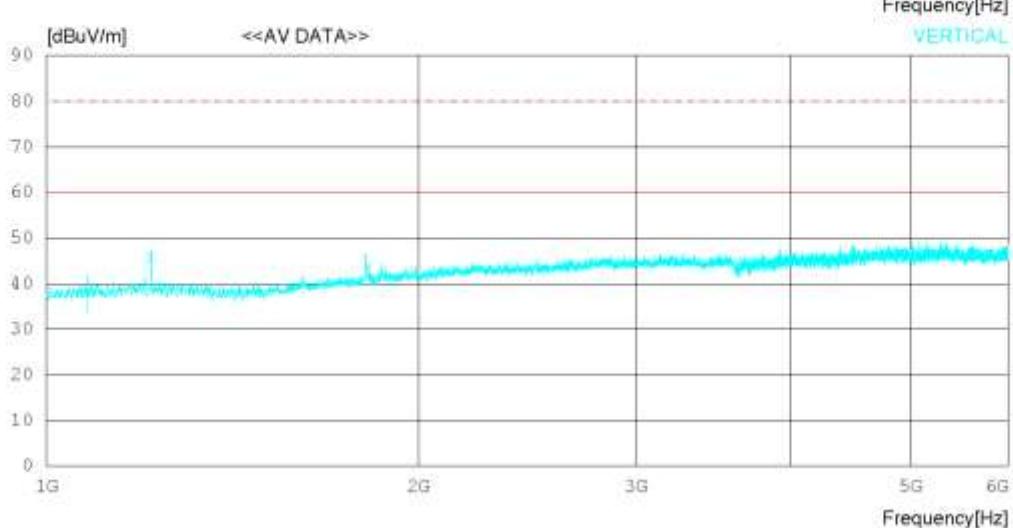
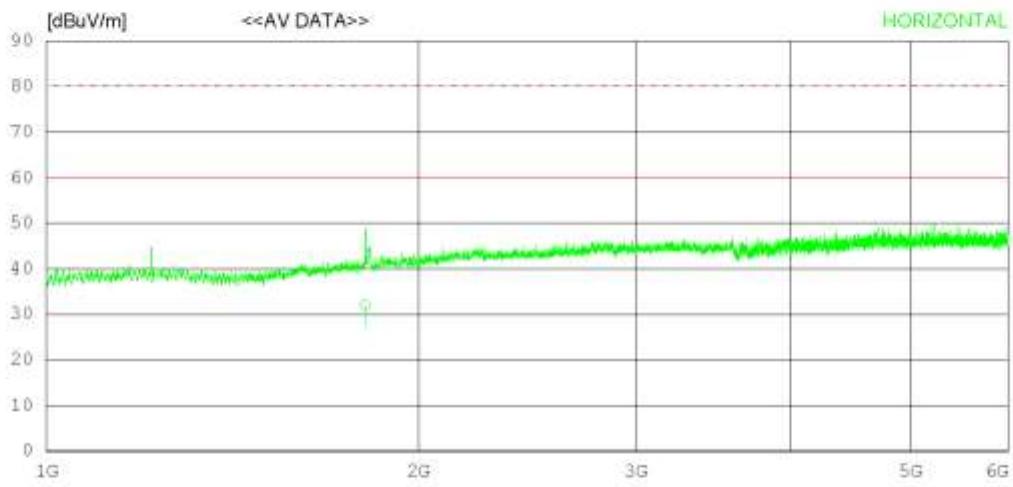
## RADIATED EMISSION

Date : 2015-08-17

Order No.	:	DTNC1507-03670, 03671	Reference No.
Model No.	:		Power Supply
Serial No.	:		Temp/Humi
Test Condition	:		Operator

120 V 60 Hz  
22 °C 44 % R.H.

Memo :

LIMIT : FCC\_CLASS A\_AV\_1-18G  
FCC\_CLASS A\_PK\_1-18G

## RADIATED EMISSION

Date : 2015-08-17

Order No. : DTNC1507-03670, 03671      Reference No.  
Model No. :      Power Supply : 120 V    60 Hz  
Serial No. :      Temp/Humi : 22 °C    44 % R.H.  
Test Condition :      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]
<hr/>										
1	1811.250	44.8	30.6	4.5	47.8	32.1	60.0	27.9	100	93
<hr/>										
2	1079.375	54.2	28.3	3.5	47.7	38.3	60.0	21.7	100	64
3	1215.000	61.0	28.9	3.7	47.8	45.8	60.0	14.2	100	92

## Appendix 1

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### 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
<input checked="" type="checkbox"/>	MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0143	TSJ	N/A	N/A	N/A
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2015.02.25	2016.02.25
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	ROHDE & SCHWARZ	828739/006	2015.09.10	2016.09.10

### 2. Radiated Disturbance

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

## Appendix 2

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### Photographs of the Test Configurations

#### 1. Conducted Disturbance

#### 2. Radiated Disturbance

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**A2-1. Conducted Disturbance**

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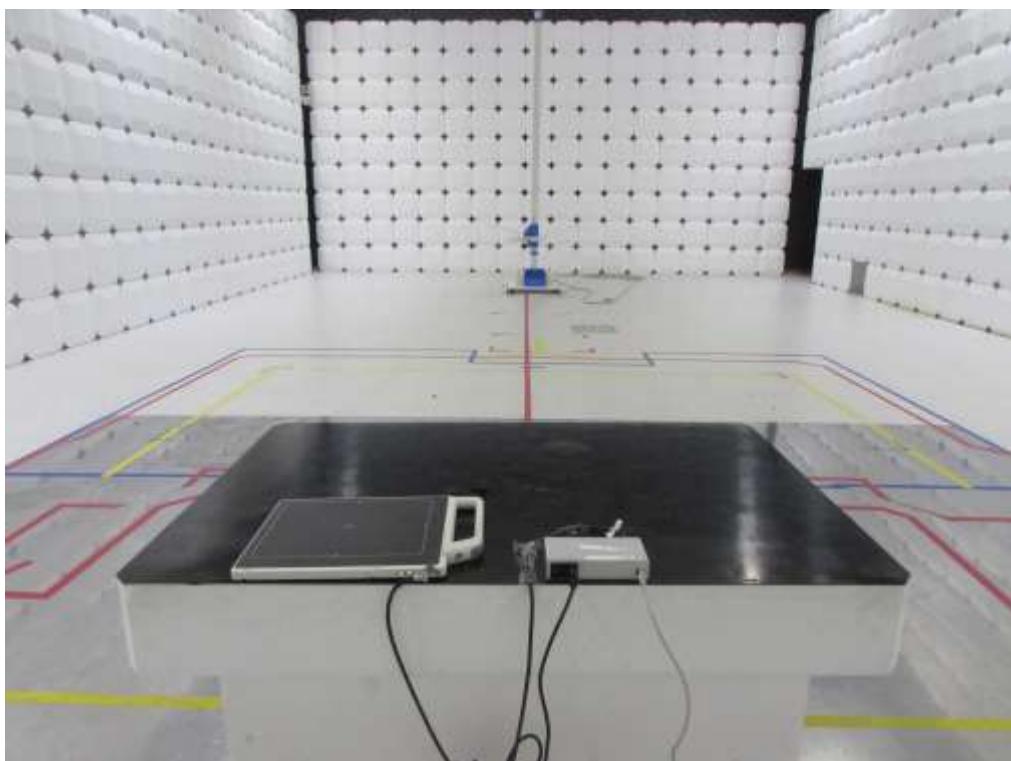
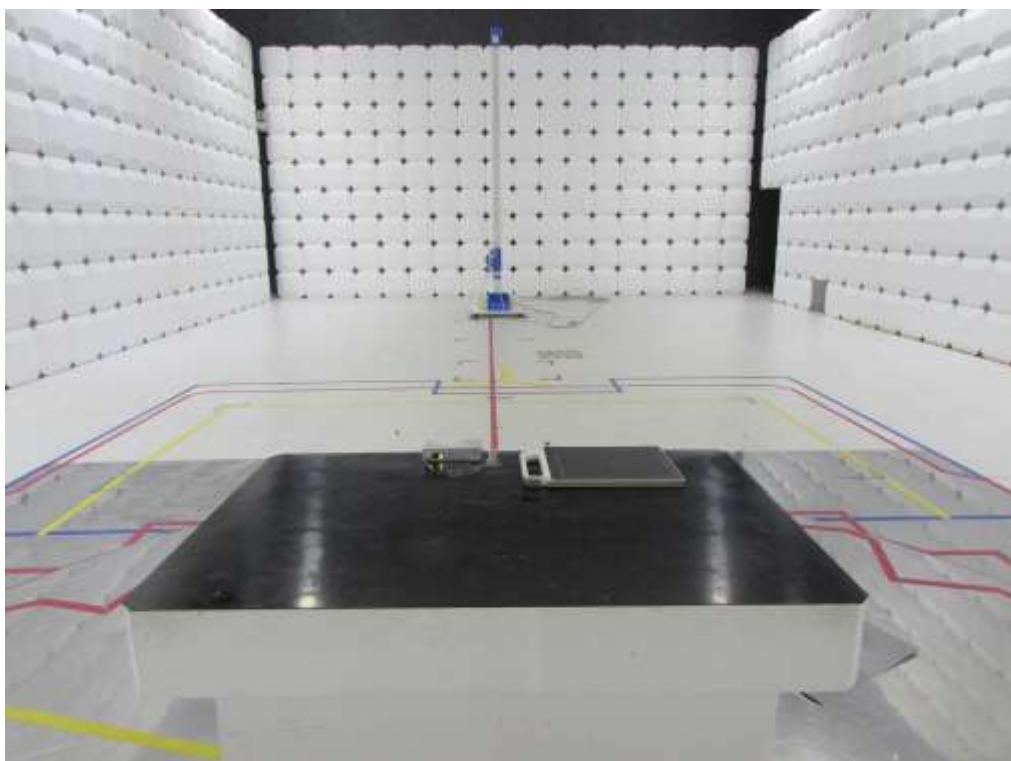


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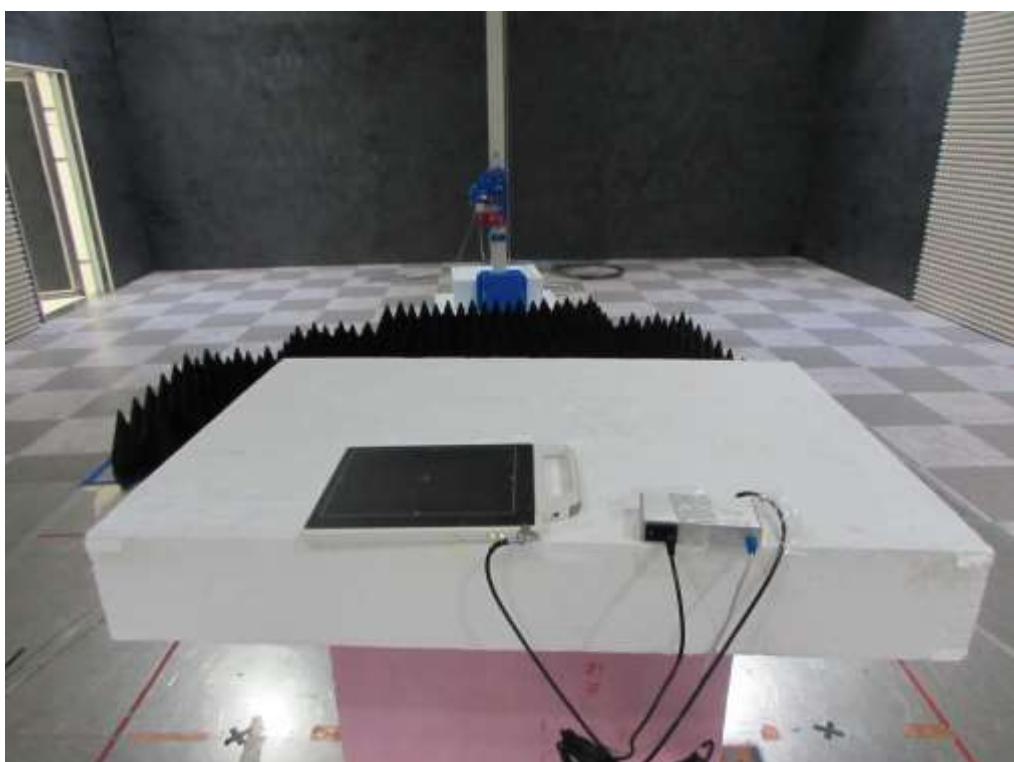
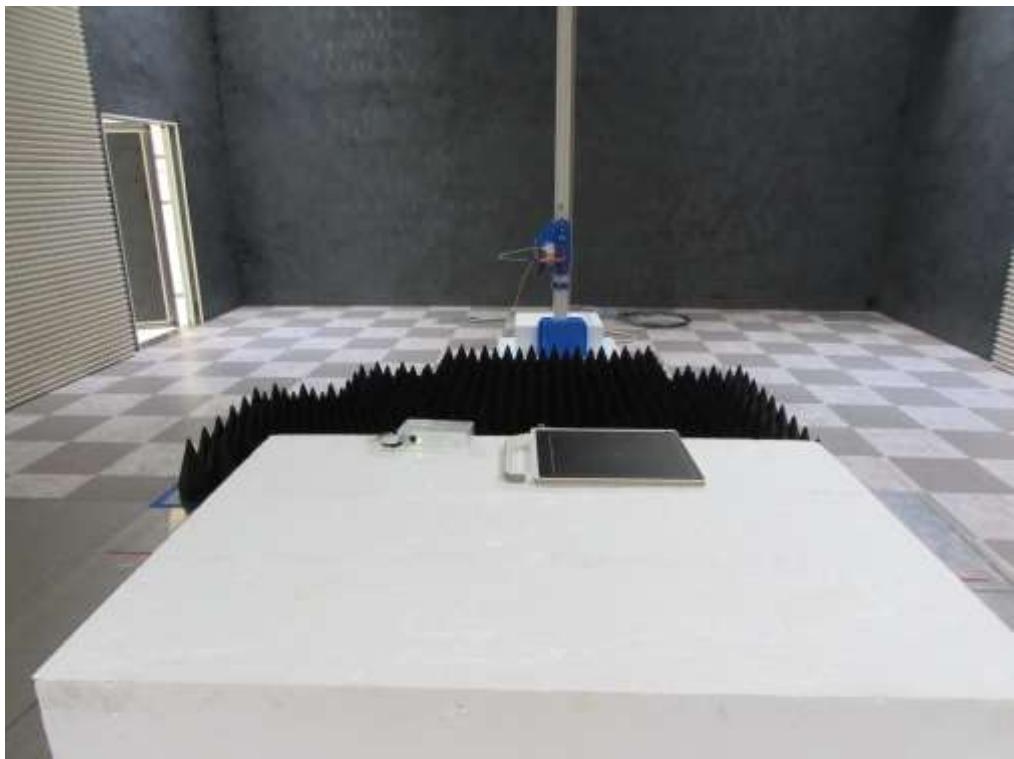
**A2-2. Radiated Disturbance**

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**< 30 MHz ~ 1 GHz >**



< (1 ~ 6) GHz >



### Appendix 3

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## Photographs of EUT

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**A3. EUT**

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**1. Front View of Product****2. Rear View of Product**

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**A3. EUT**

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**3. Inside View of Product**

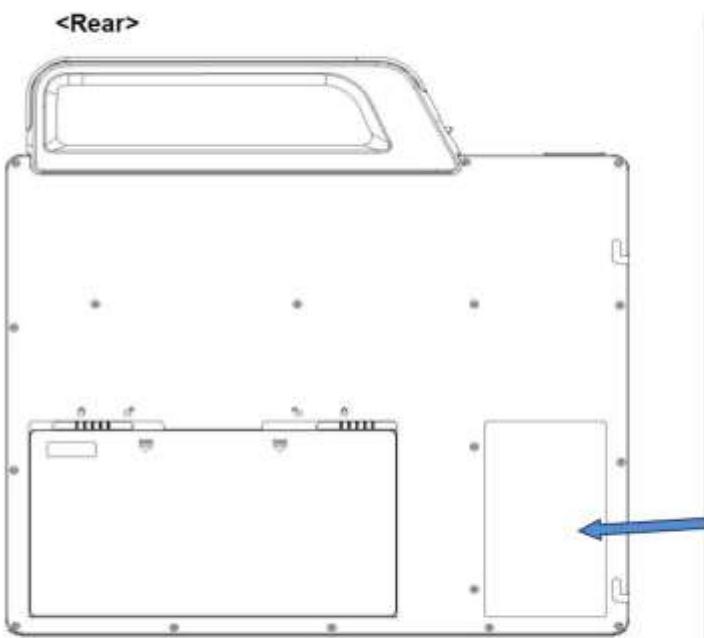
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**Appendix 4**

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**SAMPLE LABEL & LOCATION****Model Name : 1012WCA****FCC ID : QIIRY1012WA**

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.



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**Appendix 5**

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**Report Revision History**

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