



## TEST REPORT

### FCC PART 15 C

Applicant	Trade Name	SEBINE Technology, Inc.		
	Address	RN 202, Daedeok Radio Engineering Center, 604. Tamnip-dong, Yuseong-gu, Daejeon, Korea 305-510		
	Telephone Number	82-42-935-2085	Fax Number	82-42-935-2088
Product	Name	RF Modem		
	Model Name	M110A		
	Manufacturer	SEBINE Technology, Inc.		
Test Date		2011. 4. 25. ~ 2011. 7. 21.		
Issued Date		2011. 7. 25.		
Test Procedure		ANSI C63.4-2003		
Applicable Regulation		FCC Part 15.231		
FCC ID		Y9AM110A		
FCC Classification		DSR / Part 15 Remote Control/Security Device Transceiver		
Test Result		<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		
Test Engineer		Chief Engineer		
 Eunjung, Yang		 Kook-Sun, Shin		

## CHUNGBUK TECHNOLOGICAL UNIVERSITY

I, the undersigned, hereby declare that the equipment specified above conforms to the above FCC Rule(s) and Regulation(s) Part 15 as described in the attached test report.

This test report contains only the result of a single test of the sample supplied for the examination.

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## 1. Test Laboratory

### 1.1 General Information

Name of Laboratory	CHUNGBUK TECHNOPARK
Representative	Chang-hyun, Nam
Address	685-1 Yangcheong-ri, Ochang-eup, Cheongwon-gun, Chungcheongbuk-do, Korea
Telephone Number	+82-43-270-2000
Fax Number	+82-43-270-2099
Homepage	<a href="http://www.cbtp.or.kr">www.cbtp.or.kr</a>

### 1.2 Location of Test Laboratory

Address	685-3 Yangcheong-ri, Ochang-eup, Cheongwon-gun, Chungcheongbuk-do, Korea
Telephone Number	+82-43-270-2400
Fax Number	+82-43-270-2499

### 1.3 Registration Information

Test item(s)	Facility	Registration Number
Radiated Emission Measurement	10m semi-anechoic chamber	647924
Conducted Emission Measurement	Shielded room	

## 2. Test Rule

### 2.1 Test Rule Part(s)

Test item(s)	Test Rule Part(s)	Test Result	
1. Transmission time & silent time	15.231 (e)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2. Field strength of fundamental	15.231 (e)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3. Field strength of the spurious emissions & Radiated emissions	15.231 (e) 15.231 (b) 15.209 15.205	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4. 20 dB bandwidth	15.231 (c)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

### 2.2 Equipment Under Test(EUT) Modifications

No modifications were made to the EUT in order to achieve and maintain compliance to the standards described in this report.

### 3. Description for Equipment Under Test(EUT)

Item	Specification
Name	M110A
Dimension	88.1mm(L) × 85mm(W) × 19.6mm(H) (w/o Antenna, Connector)
Housing	Aluminum
Weight	140g (w/o Antenna)
Power Supply	+12Vdc ±10%, Reverse Power/Overvoltage/Overcurrent Protection
Current Consumption	Tx 94mA, Rx 88.5mA, WDT Reset 114mA (@12Vdc)
Operating Temperature	-10℃ ~ +60℃
RF Features	<ul style="list-style-type: none"> <li>• Frequency : 433.0625MHz ~ 434.7625MHz</li> <li>• Channel Spacing : 25KHz</li> <li>• Transmitter Power : 73dBuV/m</li> <li>• Receiver Sensitivity : -116 ~ -120dBm(-116dBm typ.)</li> <li>• Modulation : FSK</li> <li>• Bandwidth : &lt; 14KHz</li> </ul>
Performance	<ul style="list-style-type: none"> <li>• Expected Line-Of-Sight Range : Up To 1.5km with <math>\lambda/4</math> Dipole Antenna</li> <li>• RF Data Rate : 4.8K Baud, 7.2K Baud</li> </ul>
I/O Interface	<ul style="list-style-type: none"> <li>• RS232/RS485 Selectable</li> <li>• Serial Communication Basic Setting(User Selectable) : Data Bit 8bit, No Parity, 1 Stop Bit</li> <li>• User Selectable Baud Using DIP Switch: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200</li> <li>• 9Pin D-SUB Female Connector</li> </ul>
Antenna Interface	<ul style="list-style-type: none"> <li>• SMA(Female, Reverse)Connector</li> <li>• Impedance 50<math>\Omega</math></li> </ul>

## 4. TEST EQUIPMENT

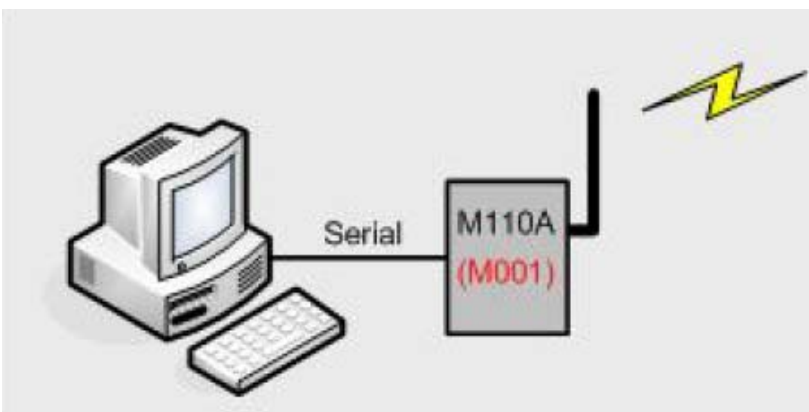
Type	Model	Manufacture	S/N	CAL. Due
10m semi-anechoic chamber	-	RIKEN	-	-
Test Receiver	ESIB26	Rohde & Schwarz	100359	2012.05.28
Horn Antenna	BBHA9120D	Schwarzbeck	9120D-540	2013.04.13
Bilog Antenna	CBL6112D	Schaffner	22022	2013.05.27

### 4.1 Operation of Equipment Under Test(EUT)

The Equipment Under Test was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner and which tends to maximize its emission level in a typical application.

Channel	Frequency(MHz)
L	433.062 5
M	433.912 5
H	434.762 5

#### ► M110A(PC MODE) Communication



※ Communication command : M00111@12345678901234567890/W002

## 5. Transmission time & Silent time

### 5.1 Limits

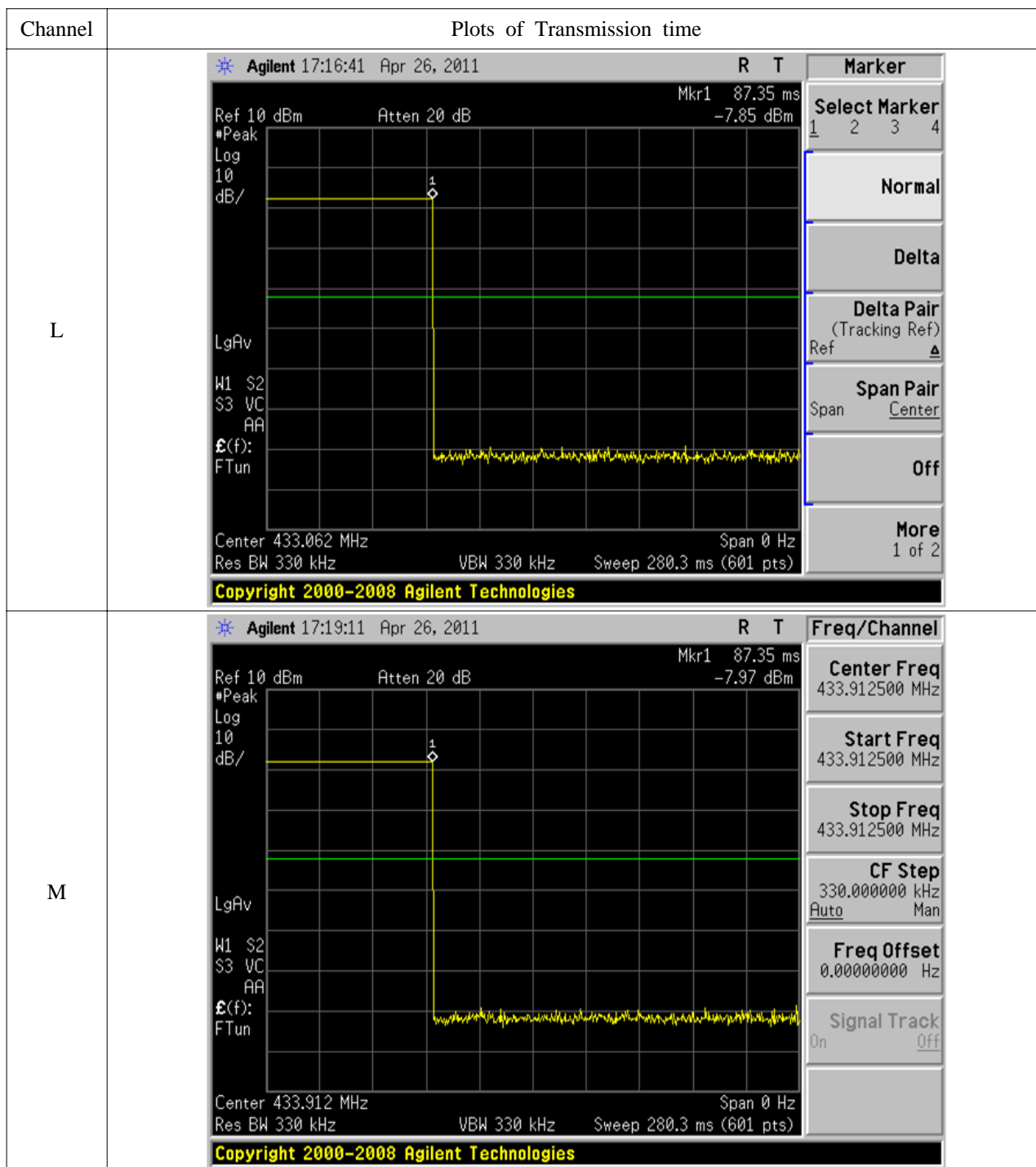
The duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### 5.2 Test Results

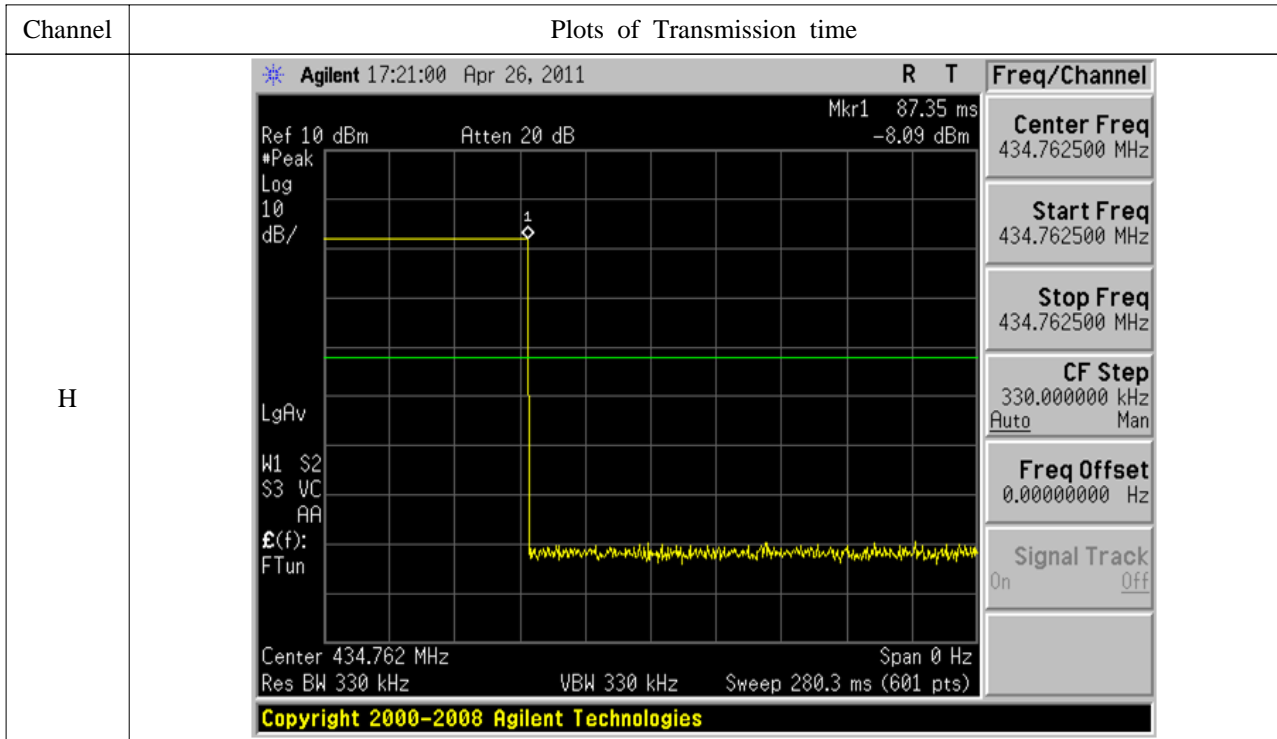
Channel	Transmission time (s)
L	0.087 35
M	0.087 35
H	0.087 35

Channel	Silent time (s)
L	10.89
M	10.89
H	10.89

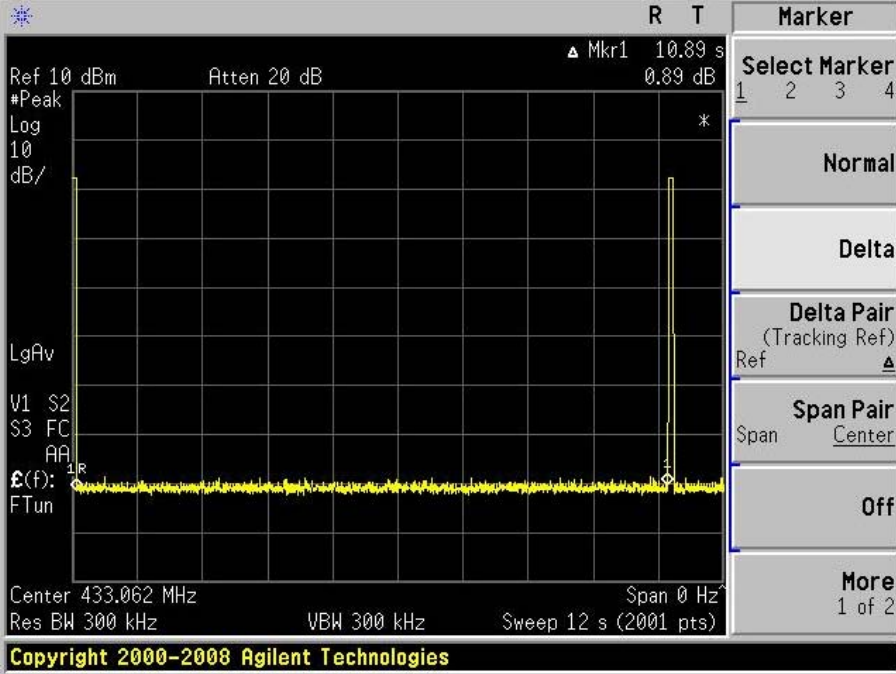
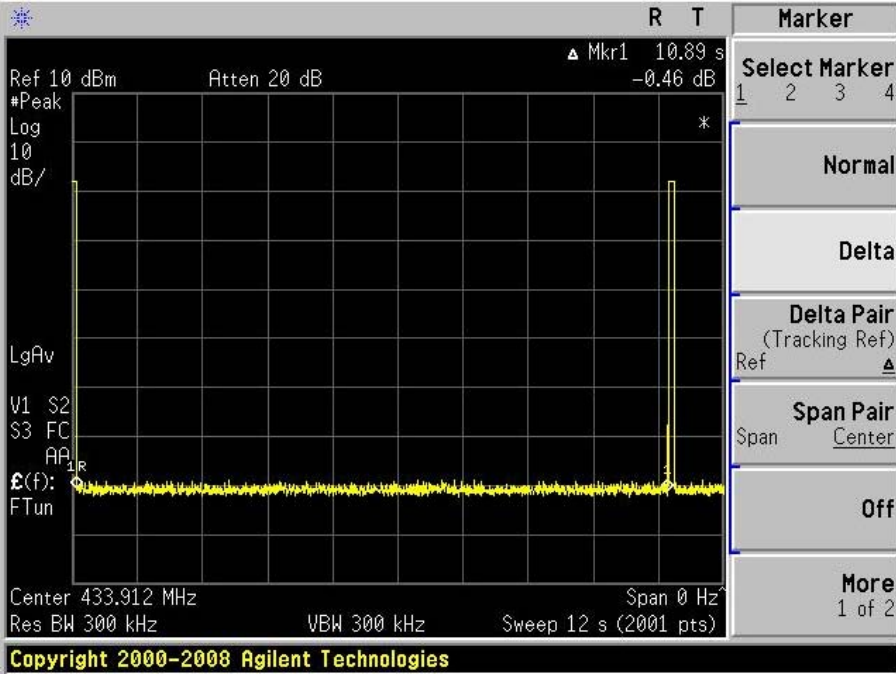
## 5.3 Plots of Transmission time

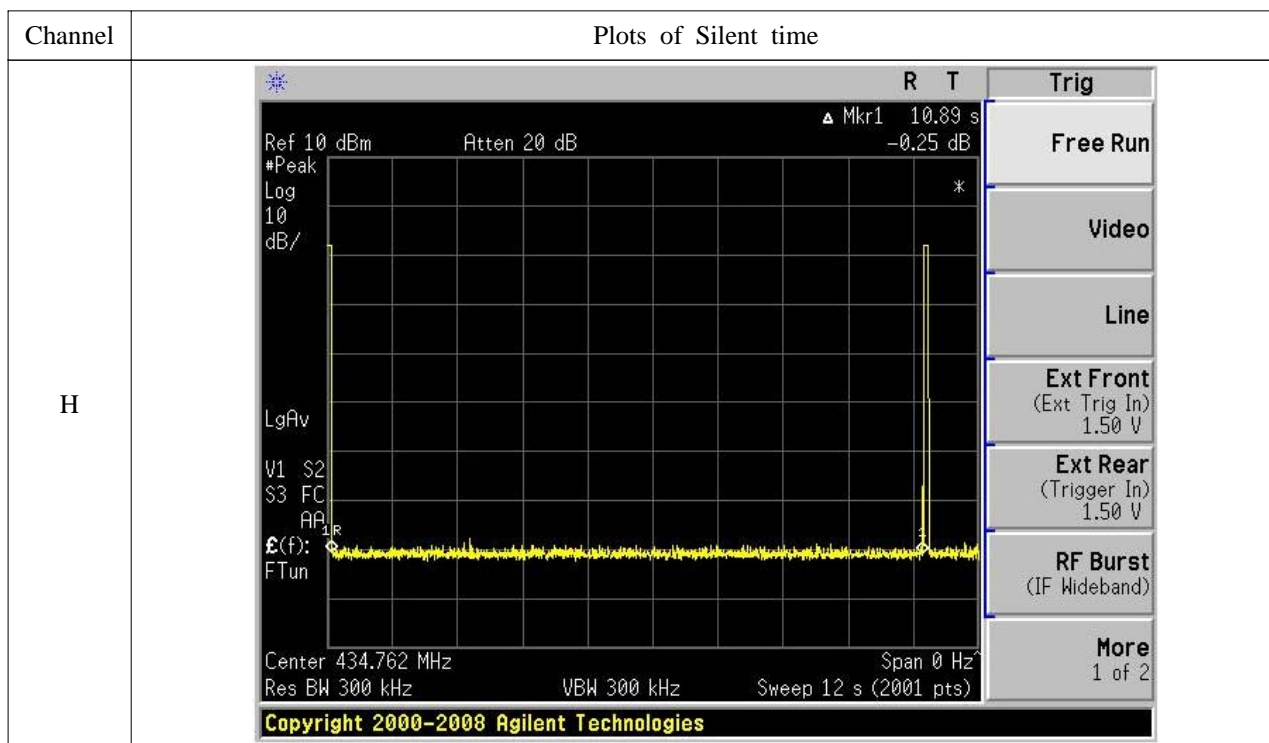






## 5.4 Plots of Silent time

Channel	Plots of Silent time
L	
M	



## 6. Field strength of fundamental

### 6.1 Limits

The field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Funda- mental fre- quency (MHz)	Field strength of fun- damental (microvolts/ meter)	Field strength of spu- rious emission (microvolts/meter)
40.66– 40.70.	1,000 .....	100
70–130 .....	500 .....	50
130–174 ....	500 to 1,500 <sup>1</sup> .....	50 to 150 <sup>1</sup>
174–260 ....	1,500 .....	150
260–470 ....	1,500 to 5,000 <sup>1</sup> .....	150 to 500 <sup>1</sup>
Above 470	5,000 .....	500

<sup>1</sup> Linear interpolations.

Channel	Frequency(MHz)	Field strength of fundamental(dBuV/m)
L	433.062 5	72.84
M	433.912 5	72.87
H	434.762 5	72.89

### 6.3 Test Results

Frequency (MHz)	Correction Factor		Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
433.06	16.29	3.51	2.00	H	92.84	69.36	89.16	3.68	H	72.84	48.53	68.33	4.52
433.92	16.30	3.60	2.50	H	92.87	68.97	88.87	4.01	H	72.87	48.08	67.98	4.89
434.76	16.30	3.60	2.00	H	92.89	68.59	88.49	4.40	H	72.89	47.73	67.63	5.26

## 7. Field strength of the spurious emissions & Radiated emissions

### 7.1 Limits

The field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Funda- mental fre- quency (MHz)	Field strength of fun- damental (microvolts/ meter)	Field strength of spu- rious emission (microvolts/meter)
40.66– 40.70.	1,000 .....	100
70–130 .....	500 .....	50
130–174 ....	500 to 1,500 <sup>1</sup> .....	50 to 150 <sup>1</sup>
174–260 ....	1,500 .....	150
260–470 ....	1,500 to 5,000 <sup>1</sup> .....	150 to 500 <sup>1</sup>
Above 470	5,000 .....	500

<sup>1</sup>Linear interpolations.

Channel	Frequency(MHz)	Field strength of spurious emissions(dBuV/m), AV	Field strength of spurious emissions(dBuV/m), PK
L	433.062 5	52.84	72.84
M	433.912 5	52.87	72.87
H	434.762 5	52.89	72.89

### 15.205

MHz	MHz	MHz	GHz
0.090–0.110 .....	16.42–16.423	399.9–410	4.5–5.15
10.495–0.505 .....	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905 .....	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128 .....	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775 .....	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775 .....	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218 .....	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825 .....	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225 .....	123–138	2200–2300	14.47–14.5
8.291–8.294 .....	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366 .....	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675 .....	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475 .....	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293 .....	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025 .....	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725 .....	322–335.4	3600–4400	( <sup>2</sup> )
13.36–13.41.			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

<sup>2</sup> Above 38.6

## 15.209

Frequency(MHz)	Field strength (uV/m)	Measurement distance(meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

## 7.2 Test Procedure

Final measurements of radiated emission were made on the 10 m semi-anechoic chamber. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the 10 m semi-anechoic chamber range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30 MHz to 10th harmonic frequency using a ESIB26 test receiver. The test receiver's 6 dB bandwidth was set to 120 kHz(30 MHz ~ 1 GHz) and 1 MHz (above 1 GHz), and the receiver was operated in the CISPR quasi-peak(30 MHz ~ 1 GHz) and peak/average(above 1 GHz) detection mode.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum emission levels. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

$$F1[\text{dBuV/m}] = F2[\text{dBuV}] + AF[\text{dB/m}] + CL[\text{dB}]$$

F1: Final Field Strength    F2:Reading    AF: Antenna Factor    CL: Cable Factor

## 7.3 Test Results

### 7.3.1 Field strength of the spurious emissions

#### 7.3.1.1 Low channel

Frequency (MHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
864.77	18.80	0.00	5.10	1.00	H	72.84	12.40	36.30	36.54	H	52.84	-2.56	21.34	31.50
1 657	25.79	24.13	6.94	2.00	V	72.84	45.70	54.30	18.54	V	52.84	25.70	34.30	18.54
1 994	26.18	24.26	7.17	1.50	V	72.84	41.30	50.40	22.44	V	52.84	28.90	38.00	14.84
3 004	28.70	24.59	8.89	1.50	V	72.84	35.50	48.50	24.34	V	52.84	20.80	33.80	19.04

#### 7.3.1.2 Middle channel

Frequency (MHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
867.82	18.80	0.00	5.10	1.00	H	72.87	12.03	35.93	36.94	H	52.87	-1.08	22.82	30.05
1 713	25.86	24.27	6.81	1.00	V	72.87	45.20	53.60	19.27	V	52.87	24.00	32.40	20.47
1 994	26.18	24.26	7.17	1.00	V	72.87	38.70	47.80	25.07	V	52.87	26.00	35.10	17.77
3 004	28.70	24.59	8.89	1.50	V	72.87	35.80	48.80	24.07	V	52.87	20.50	33.50	19.37

#### 7.3.1.3 High channel

Frequency (MHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
869.53	18.81	0.00	5.09	1.00	H	72.89	19.43	38.24	34.65	H	52.89	-0.06	23.84	29.05
1 994	26.18	24.26	7.17	1.00	V	72.89	38.70	47.80	25.09	V	52.89	28.20	37.30	15.59
3 004	28.70	24.59	8.89	1.50	V	72.89	36.20	49.20	23.69	V	52.89	20.80	33.80	19.09

## 7.3.2 Radiated emissions

### 7.3.2.1 30 MHz ~ 1GHz

#### 7.3.2.1.1 Low channel

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (m)	Cable Loss Factor (dB)	Antenna Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
111.64	7.54	QP	V	46.00	1.50	1.79	11.31	20.64	43.52	22.88
257.43	13.52	QP	H	36.00	1.00	2.73	13.27	29.52	46.02	16.50
998.06	3.37	QP	H	246.00	1.00	5.48	20.02	28.87	53.98	25.11

#### 7.3.2.1.2 Middle channel

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (m)	Cable Loss Factor (dB)	Antenna Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
113.59	8.25	QP	V	70.00	1.00	1.79	11.41	21.45	43.52	22.07
263.27	12.97	QP	H	37.00	1.00	2.75	13.35	29.07	46.02	16.95
329.36	9.61	QP	H	290.00	1.00	3.12	14.48	27.21	46.02	18.81
409.06	5.71	QP	H	0.00	1.00	3.55	16.05	25.31	46.02	20.71
998.06	3.63	QP	V	113.00	1.00	5.48	20.02	29.13	53.98	24.85

#### 7.3.2.1.3 High channel

Test Frequency (MHz)	Meter Reading (dBuV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (m)	Cable Loss Factor (dB)	Antenna Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
113.59	11.07	QP	V	70.00	1.00	1.79	11.41	24.27	43.52	19.25
263.27	13.11	QP	H	40.00	1.00	2.75	13.35	29.21	46.02	16.81
329.36	10.01	QP	V	45.00	1.50	3.12	14.48	27.61	46.02	18.41
403.23	4.56	QP	H	111.00	2.50	3.51	15.99	24.06	46.02	21.96
995.27	3.71	QP	H	0.00	1.00	5.52	19.98	29.21	53.98	24.77



## 7.2.2.2 1 GHz ~ 10<sup>th</sup> Harmonics

### 7.2.2.2.1 Low channel

Frequency (GHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
1.144	25.20	24.10	5.61	1.00	V	73.98	50.80	57.50	16.48	V	53.98	28.70	35.40	18.58

### 7.2.2.2.2 Middle channel

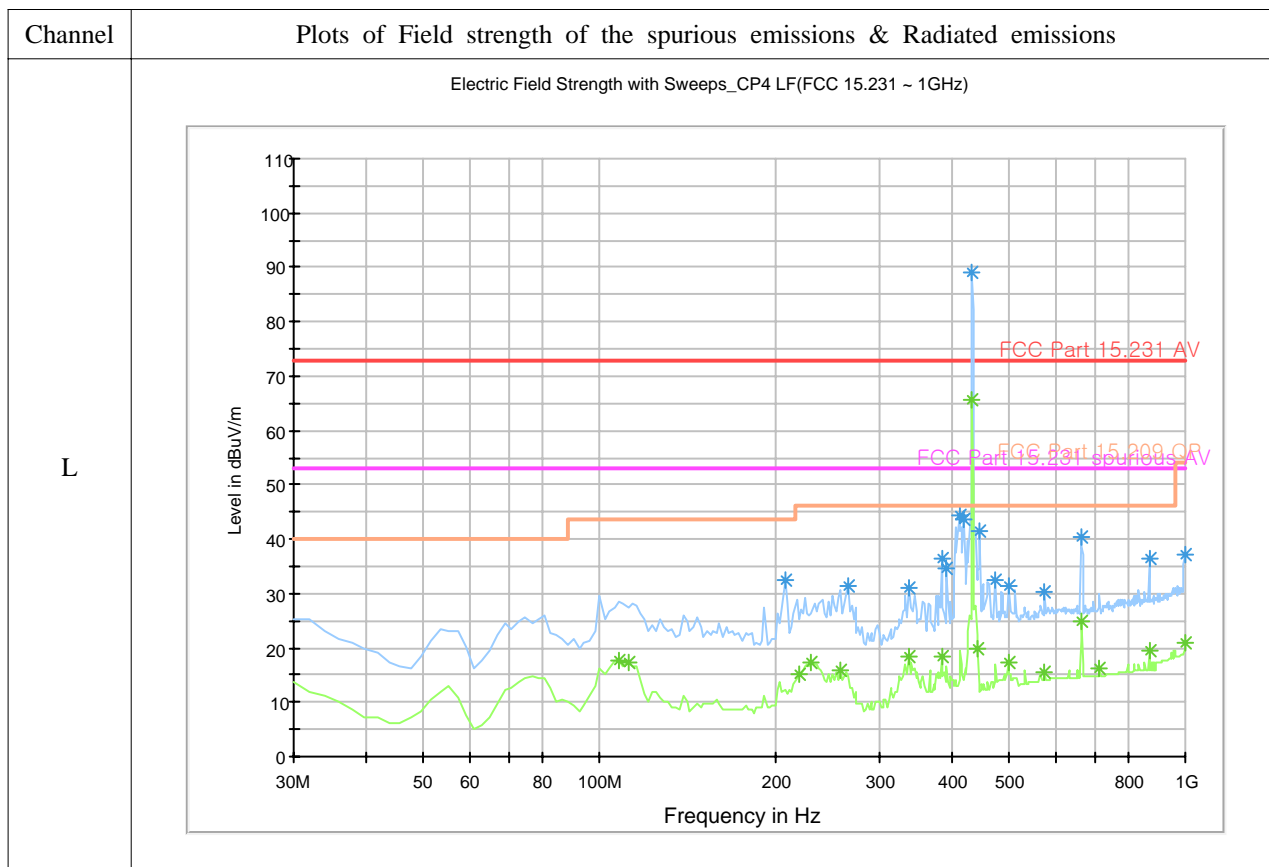
Frequency (GHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
1.176	25.23	24.25	5.81	1.00	V	73.98	45.60	52.40	21.58	V	53.98	25.00	31.80	22.18
1.329	25.41	24.00	5.99	1.50	V	73.98	43.40	50.80	23.18	V	53.98	27.60	35.00	18.98
1.665	25.80	24.05	6.75	2.00	V	73.98	47.40	55.90	18.08	V	53.98	27.70	36.20	17.78

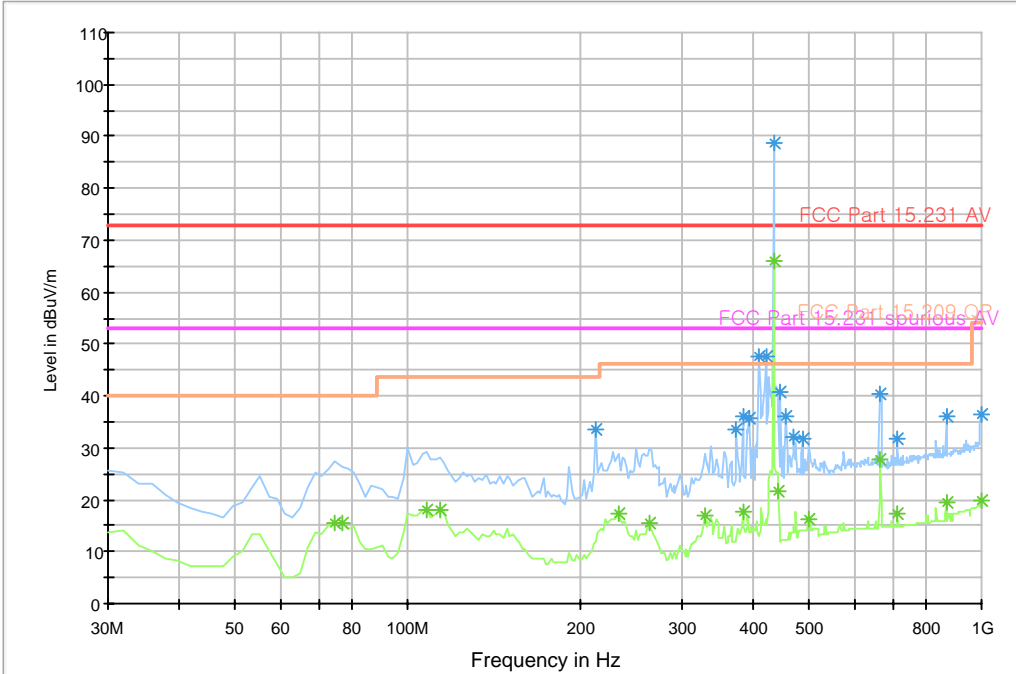
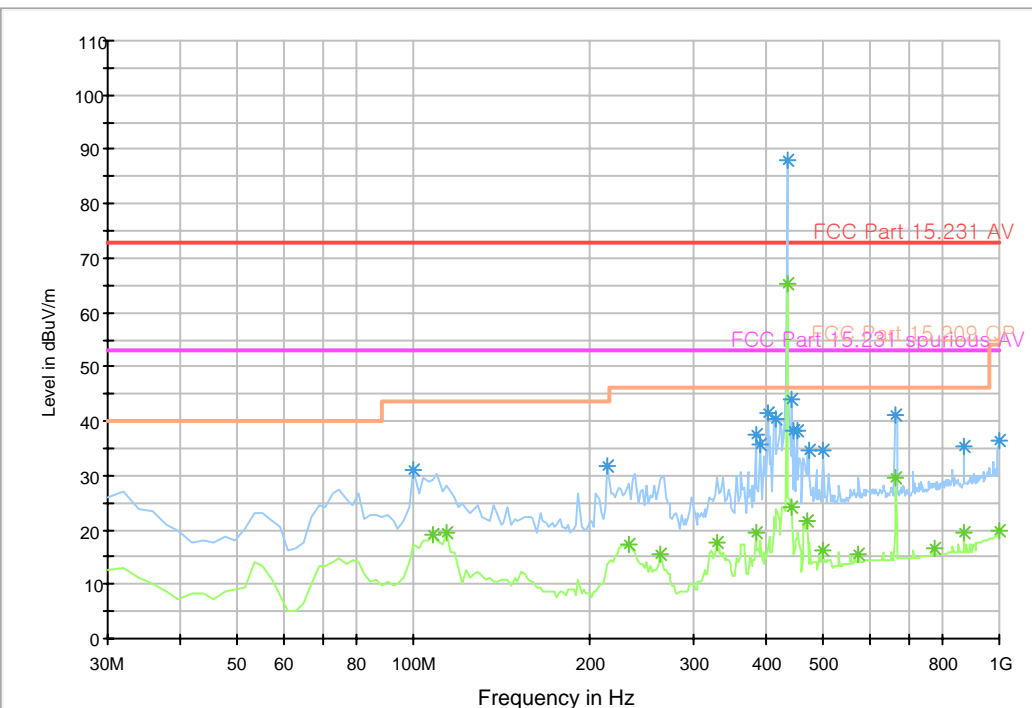
### 7.2.2.2.3 High channel

Frequency (GHz)	Correction Factor			Antenna Height (m)	Peak					Average				
	Antenna (dB/m)	Amp (dB)	Cable (dB)		Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV)	Margin (dB)	Polarity	Limit (dBuV/m)	Reading (dBuV)	Result (dBuV/m)	Margin (dB)
1.144	25.20	24.10	5.61	1.50	V	73.98	46.00	52.70	21.28	V	53.98	24.40	31.10	22.88
1.329	25.41	24.00	5.99	1.50	V	73.98	41.40	48.80	25.18	V	53.98	27.80	35.20	18.78
1.665	25.80	24.05	6.75	3.00	V	73.98	48.20	56.70	17.28	V	53.98	27.20	35.70	18.28

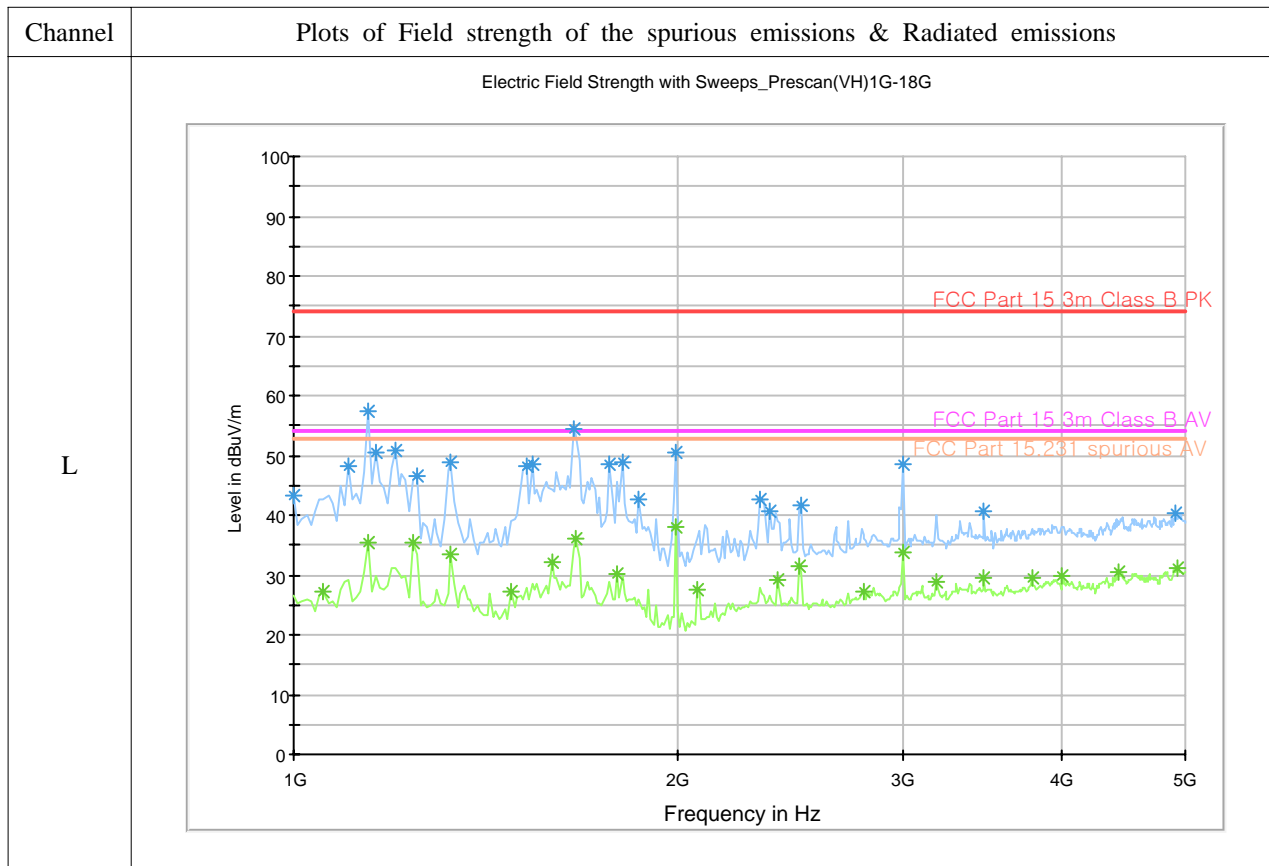
## 7.3 Plots of Field strength of the spurious emissions & Radiated emissions

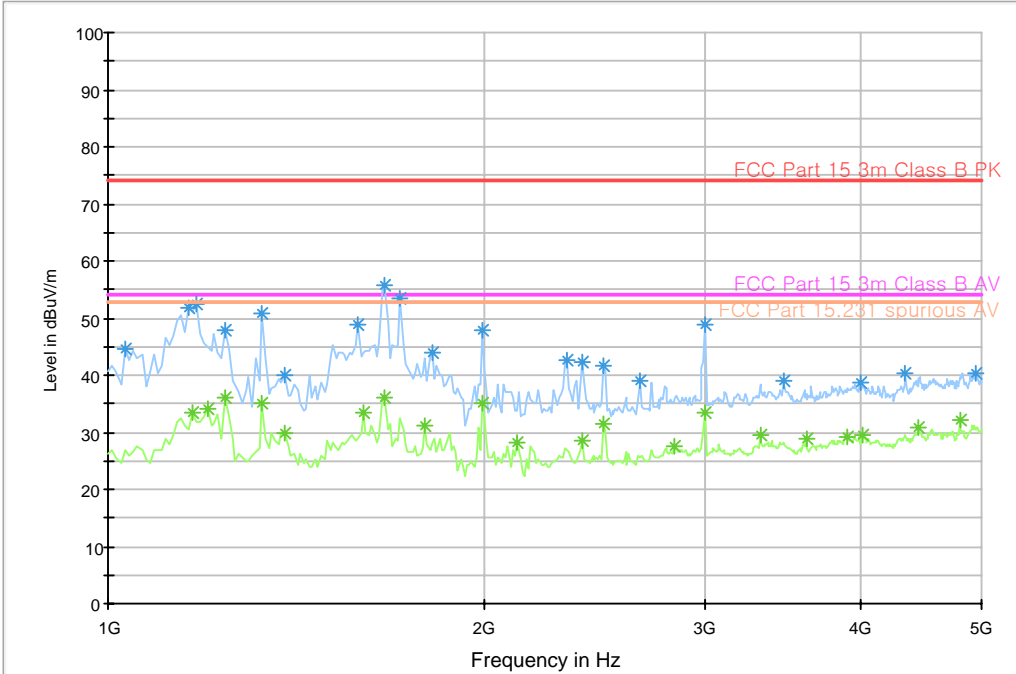
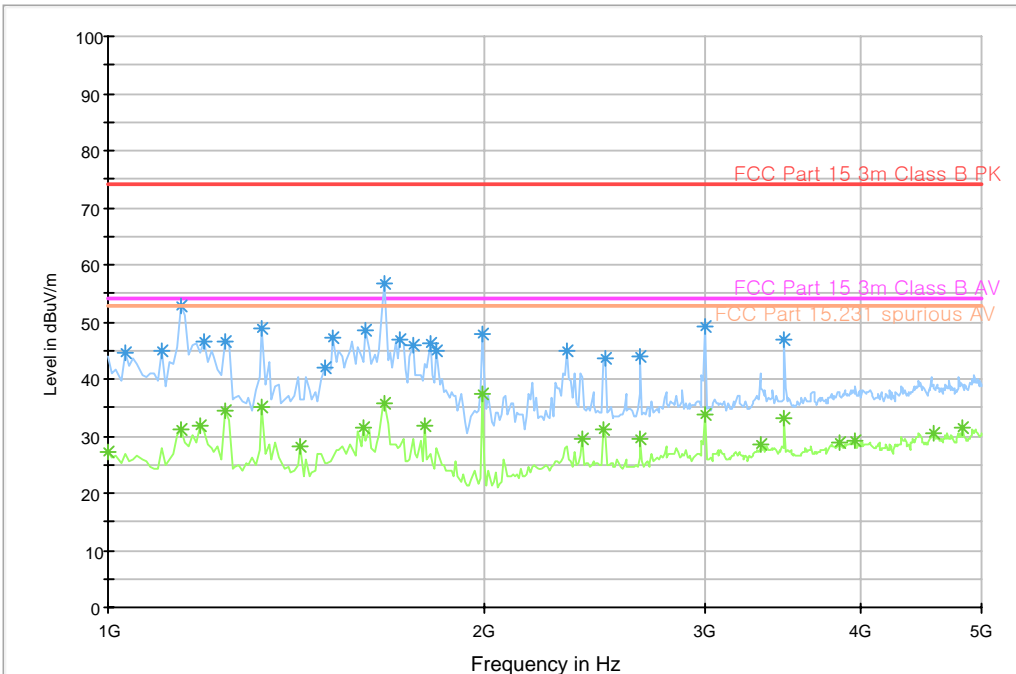
### 7.3.1 30 MHz ~ 1 GHz



Channel	Plots of Field strength of the spurious emissions & Radiated emissions
M	<p>Electric Field Strength with Sweeps_CP4 LF(FCC 15.231 ~ 1GHz)</p> 
H	<p>Electric Field Strength with Sweeps_CP4 LF(FCC 15.231 ~ 1GHz)</p> 

## 7.3.2 1 GHz ~ 10<sup>th</sup> Harmonics



Channel	Plots of Field strength of the spurious emissions & Radiated emissions
M	<p>Electric Field Strength with Sweeps_Prescan(VH)1G-18G</p> 
H	<p>Electric Field Strength with Sweeps_Prescan(VH)1G-18G</p> 

## 8. 20 dB bandwidth

### 8.1 Definition

Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 8.2 Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

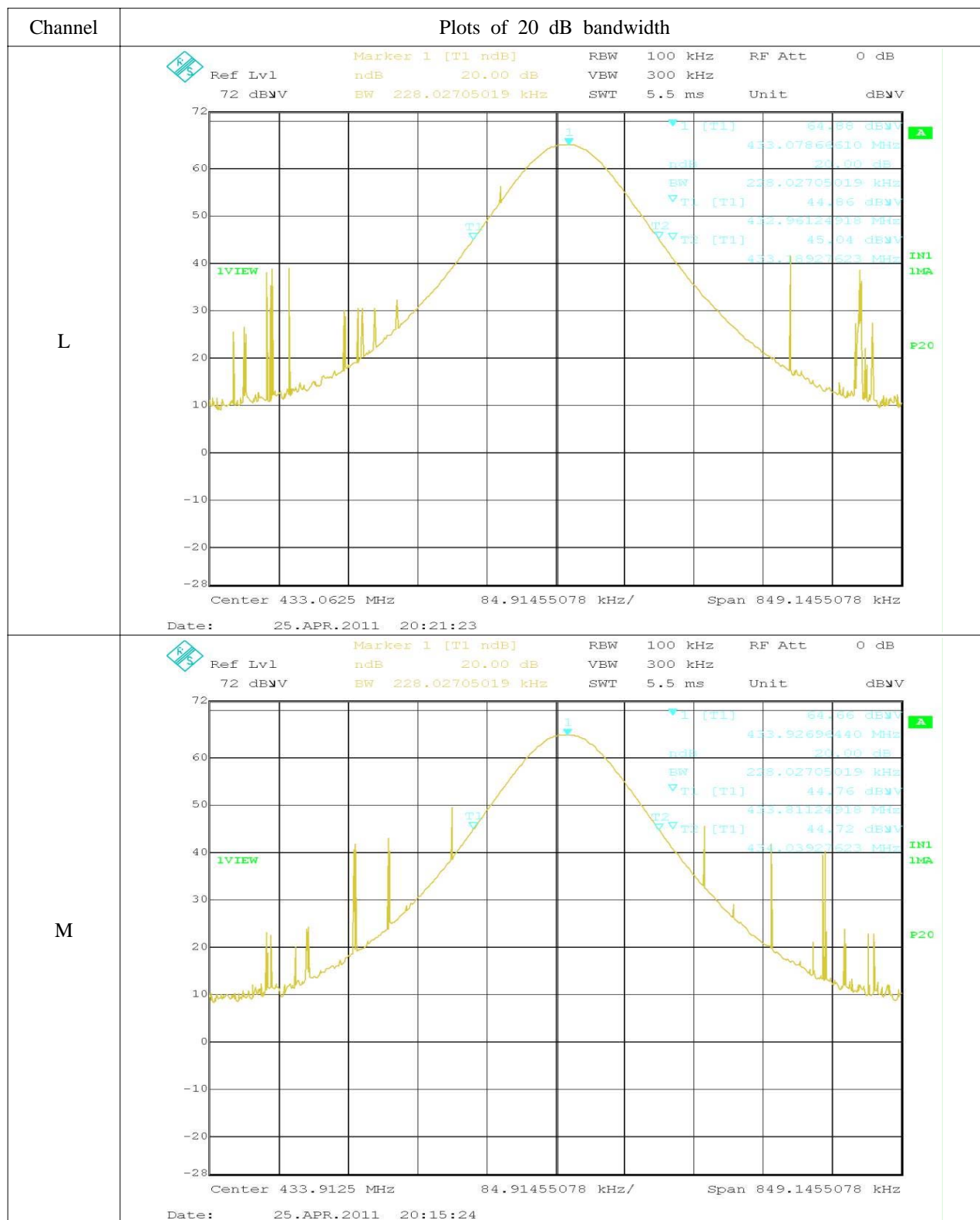
For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

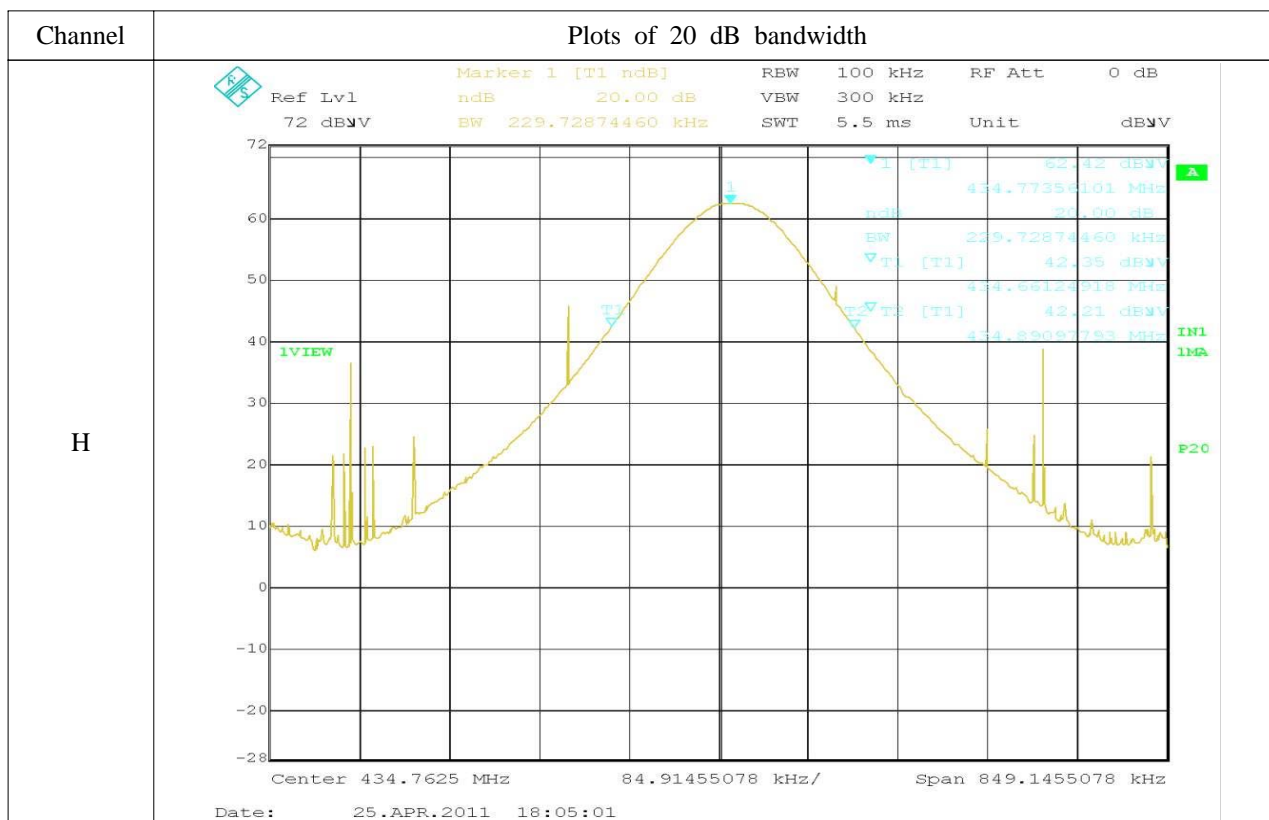
Channel	Frequency (MHz)	20 dB bandwidth (MHz)
L	433.062 5	1.082 7
M	433.912 5	1.084 8
H	434.762 5	1.086 9

### 8.3 Test Results

Channel	20 dB bandwidth (MHz)
L	0.228 027
M	0.228 027
H	0.229 729

## 8.4 Plots of 20 dB bandwidth







## 9. FCC Labelling Requirements

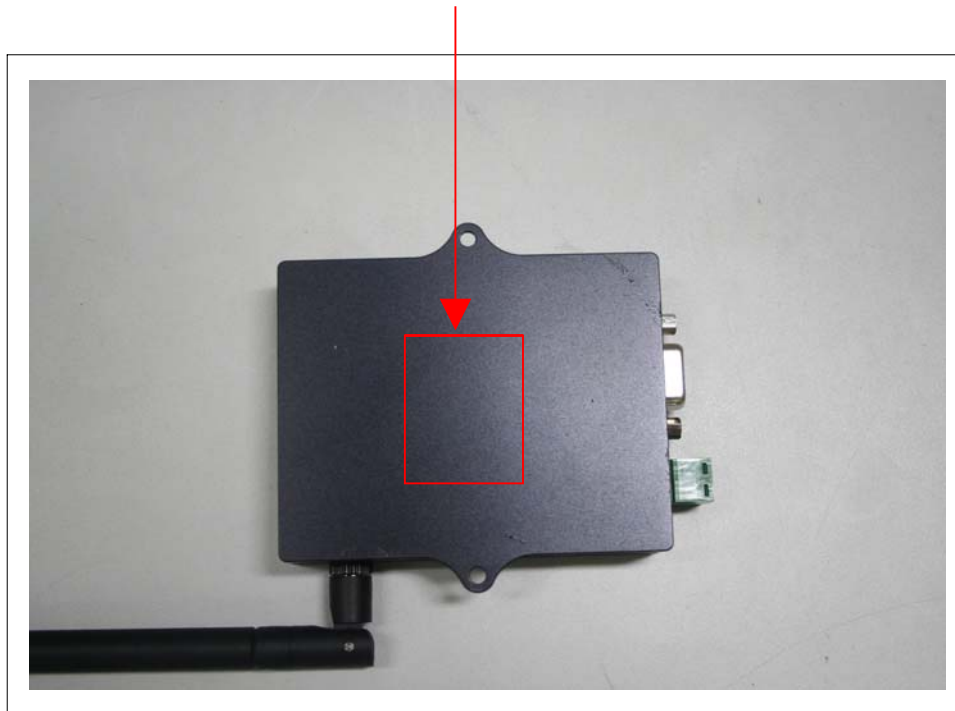
### 9.1 FCC Statement

Product shall be labelled the following statement in the manual:

**This device complies with Part 15 of the FCC Rules.  
Operation is subject to the following two conditions: (1)  
This device may not cause harmful interference, and (2)  
this device must accept any interference received,  
including interference that may cause undesired operation.**

When the device is so small or for such use that it is not practicable to place the statement on it, the information shall be placed in prominent location in the instruction manual or pamphlet supplied to the user. However, the FCC identifier or unique identifier, as appropriate, must be displayed on the device.

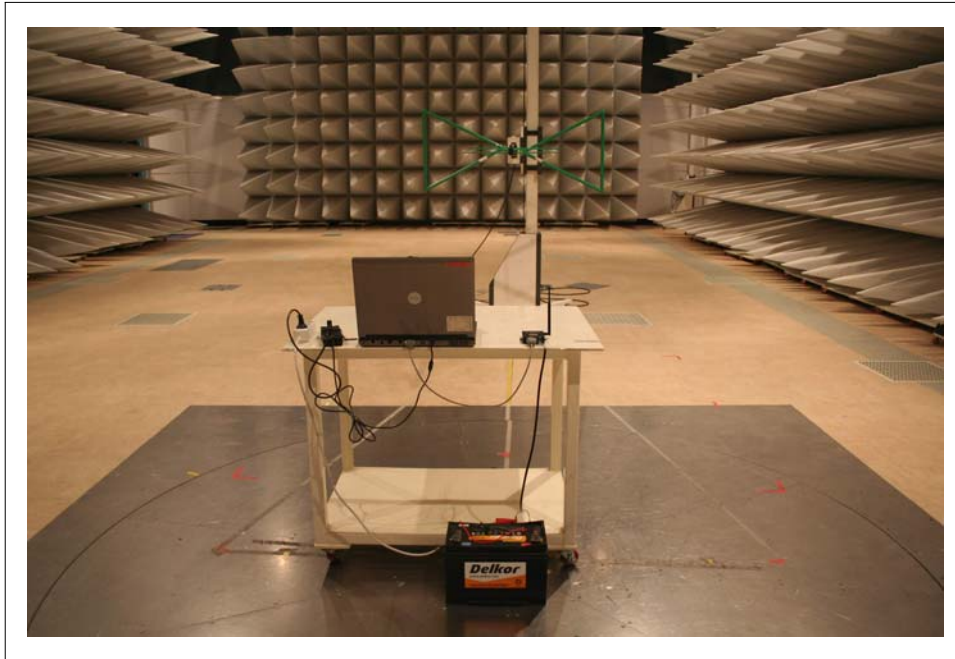
## 9.2 Label & Label Location



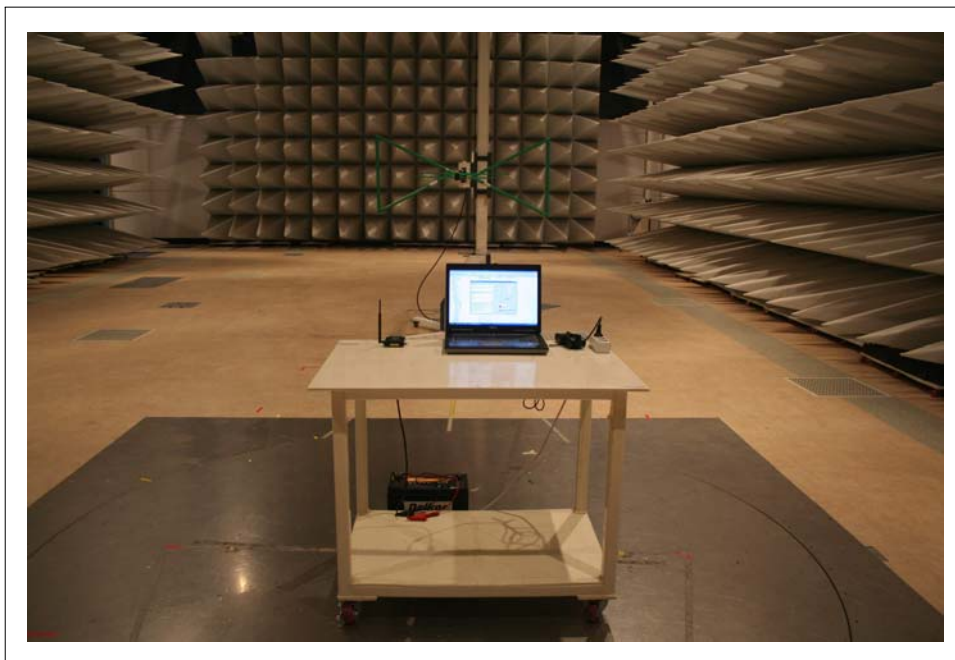
## 12. Test Setup Photographs

### 12.1 Radiated Emission Measurement, 30 MHz to 1000 MHz

[Front View]

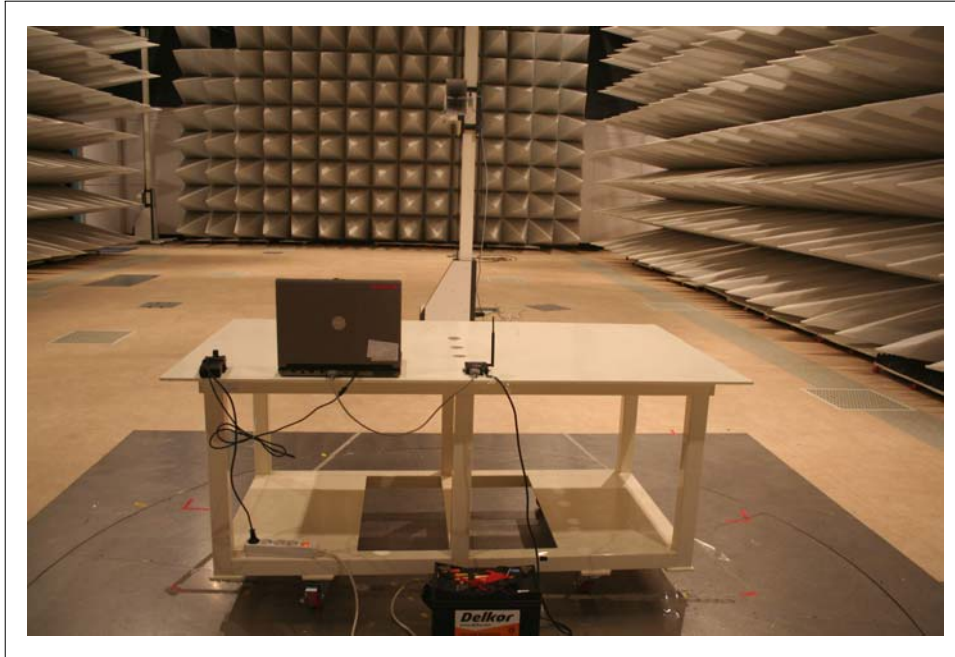


[Rear View]

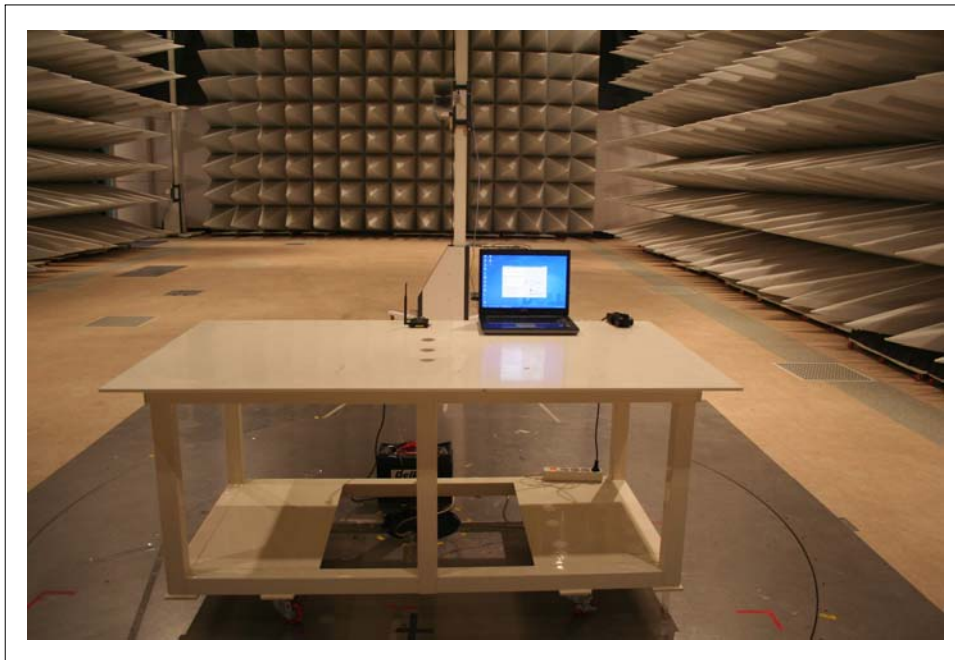


## 12.2 Radiated Emission Measurement, 1.0 GHz to 5.0 GHz

[Front View]



[Rear View]



### 13. Photographs of Equipment Under Test(EUT)

[Front View]



[Rear View]





[Internal Photograph]

